The Economics of the Grameen Bank

by

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Dissertation submitted to the Faculty of the

Virginia Polytechnic Institute and State University

in partial fulfillment of the requirements for the degree of
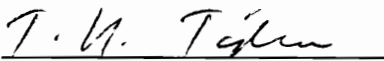
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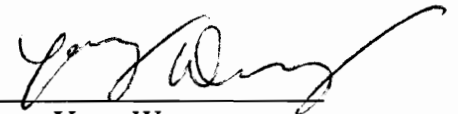
ECONOMICS

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June, 1996

Blacksburg, Virginia

Keywords: Credit, Development, Grameen Bank, Group Lending

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Economics

(ABSTRACT)

The Grameen Bank has improved the lives of several million poor people in rural Bangladesh by providing them with credit. Using an innovative group lending program, the bank has been able to recover 97% of its loans. This dissertation is an attempt to understand the intricacies of the Grameen Bank's credit program and to throw light on those features of its innovative institutional set-up that make it so successful in recovering its loans. The dissertation is divided into six chapters and organized as follows.

I first describe the institutional set-up of the Grameen Bank and its group lending program. I draw on material obtained from interviews with bank staff and borrowers during a field-trip to the Konokdia branch of the bank in Patuakhali. This is followed by an economic analysis of the bank's lending program. I analyze the multifaceted role of group lending in achieving the dramatically low default rates on loans. The emphasis is on isolating the specific ways in which the incentives created by the requirement to form groups affects group composition and the incentives for peer support, peer supervision, and loan repayment.

Using a formal model, I analyze the effect of one specific feature of the Grameen Bank -- "staggered disbursement" -- on the expected loan recovery rate. In a two borrower model I show that when loan disbursement is staggered, the probability of loan recovery is higher when borrowers are linked together in a group than when there is no such group interlinkage. I analyze the implications of loan staggering on borrower welfare.

The dissertation also includes an empirical analysis of the determinants of loan repayment in the Grameen Bank. Using panel data collected from a sample of Grameen Bank branches by the World Bank, I perform OLS, "fixed effects" and "random effects" regressions to examine the relationship between the variation in repayment rates across Grameen Bank branches and such variables as the average loan size, the proportion of loans to women and the distance of the branch from district headquarters. The results throw light on some of the theoretical issues raised in the earlier chapters. Chapter 6 concludes the dissertation.

To

Amma and Abbu

Acknowledgments

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Chapter 1

Introduction

The motivation for writing this dissertation came from learning of the existence of a very unique bank, the Grameen Bank in Bangladesh, that seemed to hold the promise of an answer to the elusive question of how to alleviate the desperate poverty facing millions in the developing world. The answer appeared to lie in the bank's use of an innovative group lending program that embodies many ideas found in the theories of games, incentives and information. The application of principles of economic theory to an urgent policy question proved irresistible as a choice for a dissertation. Thereupon I set out to understand the intricacies of the Grameen Bank's credit program and to throw light on those features of its innovative institutional set-up that make it so successful.

Today, the Grameen Bank has over two million borrowers, who are among the poorest people in Bangladesh, and 94% of whom are women. With more than a thousand branches, the bank serves borrowers in over half of Bangladesh's 68,000 villages. As a testimonial to its success, scores of banks and credit programs around the world have been patterned after the Grameen Bank's institutional set-up. These are to be found in countries at very different stages of economic development, from Tanzania to the United States.[1]

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[1] Appendix C provides a partial list of Grameen Bank replications in other countries.

From its inception as an experimental project in the late '70s, the focus of the bank has been to provide credit to the poor and landless in Bangladesh, who were not considered creditworthy by the commercial banks. According to the bank's visionary founder, Dr. Muhammad Yunus, the poor have many income-generating skills which they cannot successfully utilize for lack of employment opportunities and of seed capital for self-employment. Providing them with credit to help them start their own income-earning projects is the most promising way to enable them to emerge from the grips of poverty.[2] At the same time, he wanted to ensure that these loans did not become "grants" as had been the case with many previous subsidized credit programs.

The center-piece of the Grameen Bank's credit program is "group lending." Borrowers are required to form groups of five. Loans are given to individuals but the entire group is responsible for repayment. In the event that one member defaults the entire group is denied future loans. No physical collateral is required from the group. The entire loan delivery and recovery process appears to be geared towards maintaining the highest possible repayment rate. In fact, what has drawn the bank world-wide attention is its enviable loan recovery rate of 97%. In contrast, most other banks in Bangladesh have a dismal loan recovery rate of 50% or less. In discussing Grameen-type replications, Yunus emphasizes the central importance of a high loan repayment rate:

> In replicating Grameen Bank one must remember right from the beginning
> that if the recovery is not near 100 per cent, no matter how good it looks, it is
> not Grameen Bank. All the strength of the Grameen Bank comes from its

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[2] Dr. Yunus has even called credit a basic human right.

recovery performance. It is not merely the money which is reflected through the recovery rate, it is also the discipline which speaks loud and clear through the rate. (Excerpted from "Grameen Bank: As I see it" by Muhammad Yunus, p. 95, in *The Grameen Reader*, edited by David Gibbons, 1992.)

My focus in this dissertation is to investigate how the bank's institutional set-up fosters a high repayment rate. I analyze the incentives created by certain features of group lending to enhance loan repayment. I find that the bank relies on the group structure to screen borrowers, to elicit more effort from them, and to enforce repayment. In addition, I investigate the relation between borrowers' socio-economic characteristics and loan repayment. The dissertation is divided into six chapters and organized as follows.

Chapter 2 describes the institutional set-up of the Grameen Bank and its group lending program. This chapter is based partly on interviews with bank staff and borrowers, during a field-trip to the Konokdia branch of the bank in Patuakhali.[3] It also provides details of the bank's performance to date. In chapter 3, I analyze the multifaceted role of group lending in achieving the dramatically low default rates on loans. The emphasis is on isolating the specific ways in which the incentives created by the requirement to form groups affects group composition, and the incentives for peer assistance, peer supervision, and loan repayment. I draw on the existing literature on group lending, screening, peer monitoring, and social collateral, as well as on the experiences of the Grameen Bank and other institutions that have tried to replicate the Grameen experiment, and on interviews with borrowers and staff members of the

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[3] Appendix A provides a brief description of the field trip to Konokdia.

Grameen Bank, to throw light on the essential characteristics of group lending that have made it so successful in creating incentives on borrowers that help in keeping loan default rates low.

In chapter 4, I use a formal model to analyze the effect of using "staggered disbursement" on the expected loan recovery rate when group lending is used. It appears that the use of staggered loan disbursement may partially help to explain the high repayment rate. Using a two borrower model, I show that when loan disbursement is staggered, the probability of success is higher when borrowers are linked together in a group than when there is no such group interlinkage. This is because staggered disbursement induces "peer support" among group members. A borrower may have an incentive to invest effort in another's project in order to increase her own probability of receiving a loan. Although staggered disbursement creates a disincentive on the first borrower to invest effort in her project, this is more than compensated for by the second borrower's increased effort which results in improved loan recovery. I also analyze the implications of loan staggering on borrower welfare. I show that group interlinkage benefits the first borrower but may make the second borrower worse off. In concluding, I discuss other features that mitigate the adverse effects of staggered loan disbursement.

Chapter 5 is an empirical analysis of the determinants of loan repayment in the Grameen Bank. Using panel data collected from a sample of Grameen Bank branches by the World Bank, I perform OLS, "fixed effects" and "random effects" regressions to examine the relationship between the variation in repayment rates across Grameen Bank

branches and several variables that represent the opportunity cost of time of the borrowers, and the incentives facing the borrowers. The results throw light on some of the theoretical issues raised in the earlier chapters. The opportunity cost of time of borrowers appears to play a statistically significant role in repayment. The regressions do not reject the hypothesis that repayment rates decline as opportunity costs increase. Interestingly enough, men appear to be affected to a greater extent by changes in opportunity cost than women. This result seems to support the observation that women in rural Bangladesh are more constrained in terms of their mobility and their access to economic opportunities. The presence of alternative opportunities thus affects their performance on Grameen Bank projects to a lesser extent. Variations in the average loan size and number of rounds of loans received do not appear to have a statistically significant impact on repayment. Surprisingly, variations in the number of bank employees per borrower does not have a statistically significant effect on repayment. This suggests that either the employee-borrower ratio does not represent the monitoring effort of bank staff or that peer monitoring is more important than monitoring by the bank staff in its effect on repayment. A greater proportion of loans to women appears to have a statistically significant positive effect on repayment rates, while the age of a branch appears to have a negative effect. I conclude the chapter with a discussion of the limitations of the data and suggestions for future research. Chapter 6 concludes the dissertation.

Chapter 2

Grameen Bank: The Institutional set-up

2.1 Introduction

This chapter gives a brief overview of the performance and organization of the Grameen Bank and the institutional features of its group lending program.[1] The Grameen Bank in Bangladesh was started as an experimental project in 1976 by Dr. Muhammad Yunus, a former economics professor, and now the managing director of the bank. The project was an attempt by him to find ways of providing credit for income generating purposes to people at extreme levels of poverty (the target group), who were without means to provide physical collateral for loans, and unable to profitably borrow at the high interest rates prevalent in informal credit markets. The emphasis, right from the beginning, was to prevent the credit program from becoming a "hand-out" program. The highest priority was placed on recovery of loans within a fixed period of time, usually a year. The success of the Grameen Bank has been defined by its ability to improve the lives of the poorest in Bangladesh, while achieving an enviably high loan recovery rate. In

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[1] This section is based on information acquired from staff members and borrowers during a stay at the Konokdia branch of the Grameen Bank in 1990, as well as on interviews at the head office in Dhaka. I also draw on the excellent overview by Hossain (1988) and Grameen Dialogue newsletters published by the Grameen Trust. Please note that due to continuous adaptation of the Grameen Bank's operations to changing circumstances, some of the specifics of the group lending program may have changed.

contrast, most other banks in Bangladesh lend to a clientele with considerably more assets and experience much higher default rates.

This chapter is divided into three sections. Section 2.1 serves as the introduction. Section 2.2 provides details about the size of the Grameen Bank's credit program and the extent of its reach among its target group. This section also describes the administrative organization of the bank. In particular, the hierarchy of operations of the different levels of the bank's administration is explained. The next section, 2.3, explains the institutional features of the bank's group lending program at the branch level. This section describes how branches are set up, how potential borrowers are attracted, how the borrower groups are organized, and how loans are disbursed and recovered. Section 2.4 concludes with a discussion of Grameen Bank's diversification into some newer activities, in recent years, in addition to its credit program. (Appendix A describes the field trip taken by the author to the Konokdia branch of the Grameen Bank, which is the basis for much of the information presented here.)

2.2 The Grameen Bank's Organization and Performance

Since the early 1980s, the Grameen Bank has been operating as a full-fledged bank. As of January 1996, the bank had 1,055 branches with 2,063,640[2] borrowers.

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[2] The bank allows only one borrower per nuclear family. Assuming an average family size of five members, the bank thus helps more than 10 million people. This is over 8% of Bangladesh's population of 120 million people. It is estimated that about 50% of Bangladesh's fall into the category of the

Women comprised 94% of the borrowers. The cumulative amount of loans disbursed as of January 1996 was US $1,662.70 million. The bank had operations in 35,569 of Bangladesh's 68,000 villages, employing 10,861 persons. The bulk of these employees worked in regional branches and only 4% were employed in the bank's head office in Dhaka.

The Grameen Bank is an independent bank with 75% of its shares held by borrowers and the remaining 25% held by the government. More than 97% of all loans made by the bank are repaid on time. In contrast, the government agricultural bank in Bangladesh recovers only 50% of its loans. The bank obtains most of its funds at concessionary rates from the Bangladesh Bank (the central bank of Bangladesh) and several donor agencies including the International Fund for Agricultural Development (IFAD), the international development agencies of Norway, Netherlands and Sweden, as well as the Ford Foundation. One of the bank's long-term goals is financial self-sufficiency. To this end, it has mobilized borrower deposits in savings accounts. As of January 1996, the cumulative amount of savings was over US $128 million. The Grameen Bank's loans to borrowers are currently made at a nominal interest rate of 20%.[3] (Prevailing interest rates for agricultural loans from commercial banks are below 20%. The inflation rate in Bangladesh is currently less than 5%.)

Grameen Bank's target group of landless poor. This means that the bank has reached over 17% of its target group in Bangladesh.

[3] Initially, loans were made at a nominal interest rate of 16%, the then prevailing interest rate for loans by commercial banks to the agricultural sector. The rate has been increased to 20% in 1991. The interest rate for house-building loans were increased from 5% to 8%. House-building loans are made only to borrowers that belong to groups which have successfully used and repaid several rounds of general loans.

The bank is organized into units at several tiers, with each tier enjoying some autonomy. The four administrative units are the Branch, the Area office, the Zonal office, and the Head office. The Branch is the smallest "field-level" unit and lends to borrowers from several adjoining villages. A Branch may have up to 2,000 borrowers. It thus services borrowers that live in villages within walking distance. Every Branch is independently responsible for its own profit or loss. Several Branches fall under the jurisdiction of an Area office, which is usually located in a small town close to the villages covered by the branches under its jurisdiction. Each Area office supervises the work of about 15 branches. Area managers have the authority to approve all branch-level loans. Several Areas together form a Zone. Zonal offices are located in the headquarters of the district where the branches are located. Each Zone has considerable autonomy. Zonal managers work closely with the Area mangers under their supervision. The Head Office coordinates the workings of the different Zones, receives feedback from the "field" and passes it on back down to the Zonal, Area, and Branch offices.

The Head Office also recruits new employees, sets policies and reviews employee and branch performances regularly. The Head Office has an independent Evaluation and Monitoring Unit. Bank workers from the branch offices can communicate directly with this department without going through the administrative hierarchy of the bank. The unit constantly receives information and data which it analyzes, compiles and updates continuously, and disseminates it back to the employees. Because of the possibility of

employees communicating directly with the unit, problems in remote branches can be brought to attention and thereby remedied relatively swiftly.

Every Branch has a manager, a sub-manager, eight to 10 bank assistants (field workers), and a guard cum office help. Recruitment is done through the head office. All employees spend six months of their training period in the field. Only about two weeks of the training period is spent in the head office. The attrition rate is high during the training period, when many prospective employees become aware of the rigor involved in the intensive field work in rural areas. The pay scale is the same as that for employees in government-owned banks, but the work load is usually more demanding. The Branch manager monitors the work of the bank assistants by actually visiting every center supervised by a bank assistant, once every four to six weeks, and by visiting individual borrowers. Area managers, Zonal managers, and even the Managing Director make frequent, random trips to the "field." Employees of a branch are usually selected from areas other than where the branch is located, so that they have little or no prior contact with the inhabitants of that area, thereby reducing the risk of favoritism or patronage. Employees are often transferred from branch to branch, seldom being retained in a particular area for more than two or three years.

2.3 The Institutional Features of Grameen Bank's "Group Lending"

Before starting a new branch, Grameen Bank officials survey the villages in the area of proposed operation, to study the socio-economic condition of the area and to find out the proportion of landless people in the area. The Grameen Bank defines landless people in Bangladesh as members of households owning up to 0.5 acres of land or assets not exceeding the value of 1.0 acre of medium-quality land. (By this definition about half the population of Bangladesh is landless. With a total population of 120 million and family sizes of five or six members, there are 10 to 12 million potential borrowers in Bangladesh, assuming one borrower per family.) Having surveyed the area, bank officials hold a well-publicized public meeting where the work of the bank is explained. The eligibility criterion for being a borrower is also stressed. Interested persons are asked to approach the bank in groups of five of their own choosing, to request loans. Relatives cannot belong to the same group. Only one member of a family can be a borrower. Men and women form separate groups.

The group has to undergo a week-long program of training, where the rules of the bank and the duties of the borrowers are explained and repeatedly emphasized. The group is then asked to elect a chairperson. Borrowers discuss amongst themselves and with a bank assistant (the field-level bank employee) the projects they plan to undertake with their first loan. Loans are made individually, and each individual chooses his or her own project. Any income generating activity which the group believes is viable can be undertaken. Loan applications are very simple and do not require many details about the

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project to be undertaken. Loans are disbursed within a week or two of application. Loans are to be repaid in 50 weekly installments starting a week after loan disbursement. All interest is to be repaid in the last two weeks of the year.

Two members of a group are the first to receive loans. If they repay their first two or three installments on time, then the next two members receive loans. The chairperson is the last to receive a loan. The entire group is responsible for every installment of every borrower. If any one member cannot pay an installment, the group must find a way to pay it. Any default on the loans of one or more members results in the entire group being denied repeat loans. Loans are given for one year. Repeat loans of a higher amount are normally guaranteed to groups that repay loans on time.

Six groups together form a center. The center is responsible for the groups in the same manner as the group is responsible for its members. Groups receive their loans in a staggered fashion just as the members within a group receive their loans in phases. In other words, some groups have to wait for several months while the repayment performance of other groups in their center is observed. The chairperson of one of the groups is elected to be the center chief. Center meetings are held weekly where members discuss issues pertinent to them. These include their loan-financed projects as well as issues such as building a shed for the center, employing a teacher for the children of the members of a center, etc.

A bank assistant attends center meetings once a week to collect installments due, to collect the (forced) savings (to be described below), and to discuss loan proposals and

any other issues that may arise. They also give "motivational" talks if morale or performance in the center is flagging. They talk about other social issues such as family planning, children's education, and the undesirability of accepting dowries in marriage.[4] The bank also encourages members to plant their own vegetable gardens in order to improve their nutrition. Towards this end, the bank supplies seeds at cost.

First time borrowers (in 1990) received loans of about Taka (Tk.) 2,000 to 2,500 (US $55 to $70, approximately; Bangladesh's per capita GNP was about US $230 in 1993). The amount of a loan is increased each year by Tk. 500 to 1,000. The maximum amount of a loan in 1990 was Tk. 7,000. The average loan amounts have been increasing gradually over time. The bulk of the loans, called general loans, are used for activities such as processing grain, raising milch cows, making earthenware pots, trading, etc. General loans cannot be used for agricultural purposes. Sometimes a group or a whole center will take a large loan for a joint project such as leasing land for farming. These loans are called collective loans. Members in good standing for several years are eligible for housing loans to get started on building a house. The house-building loans are used primarily to build a basic structure of four pillars and a roof. Borrowers then gradually complete the house over the next few months and years. Members who acquire enough assets or wealth to exceed the criteria for being considered landless are supposed to be gradually phased out of the lending program. In practice, however, this has rarely happened. This is partly due to the fact that over the years, the Grameen Bank has come

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[4] See appendix B for a list of the bank's "Sixteen Decisions" social program, which include among other things, issues related to dowry, family planning, and sanitation.

up with new loan programs for these "graduated" borrowers. These include the house-building loans and the more recent technology loans. Technology loans provide borrowers or groups of borrowers with larger loans for more technologically intensive projects, such as the installation of lift-pumps for irrigation purposes.[5]

At the time a loan is issued, 5% of it is deducted and deposited into a group fund, which is used to purchase shares of the Grameen Bank for each member (each share is worth Tk. 100) and for other group activities. Every week each member must save Tk. 1 as personal savings, Tk. 1 in a children's welfare fund, and Tk. 2 in an emergency fund. Members earn an interest rate of 8% on these savings. Members can borrow from the group fund in times of difficulty or social ceremony (such as a family wedding). As of January 1996, the cumulative amount of savings in the group fund was US $115.52 million). An amount equal to 25% of the interest is also collected as part of an insurance program whereby members' families receive compensation in case of death or disaster. Each week a borrower repays 2% of the principal amount of the loan. The interest and the insurance amount is due in the final two weeks of the year.

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[5] In 1995, Dr. Yunus, the managing director of the Grameen Bank, has talked about loans to enable borrowers to operate a cellular phone network. As envisaged, borrowers would use loans to purchase cellular phone service. They would then provide door-to-door phone service, in the villages. Currently, few people in villages have private phone lines. Most need to travel to the nearest post office in order to make phone calls. Presumably, villagers would be willing to pay somewhat the higher rates of the cellular phone service if this could save them a considerable amount of time. The bank has apparently had some successful talks with cellular phone companies that are enthusiastic about the idea.

2.4 The Grameen Bank Today: New Activities

Over time, the Grameen Bank has branched out into newer activities. When the bank first started, it concentrated on disbursing general loans to individual borrowers. It then started giving collective loans to groups of borrowers, sometimes to a whole center jointly. These loans were usually given to groups that had demonstrated good loan utilization and repayment performance. The repayment performance on collective loans have not been as high as those on general loans, and over time, the bank has reduced the percentage of loans made collectively. Less than 1% of loans are currently given as collective loans. In contrast, general loans constitute about 85% of the total loan disbursement.

House-building loans were introduced in 1984. These loans are given only to borrowers who have demonstrated good repayment performance. Loans are much larger than general loans (about Tk. 15,000). They are repayable over 10 years and carry an interest rate of 8%, in contrast to the 20% rate on other loans. The borrower is required to hold title to the land on which the house is built. Borrowers with house-building loans usually also have a general loan. They are thus able to use part of the proceeds from the use of the general loans to help repay their housing loans. About 10% of the total loan disbursement currently goes toward housing loans.

More recently, the Grameen Bank has started offering "technology" loans. These loans are often used collectively for larger and more technology-intensive, and therefore

more expensive, projects. These loans constitute a little more than 3% of the total amount of loans disbursed.

In addition to its loan programs, the Grameen Bank has several independent affiliated organizations. These include the Grameen Trust and the Grameen Uddog. The Grameen Trust is a non-profit organization that has several programs aimed at disseminating information about the Grameen Bank's operations in order to help replication efforts of Grameen-type credit programs around the world. The Grameen Trust publishes a newsletter, the *Grameen Dialogue*, which publicizes the efforts of individuals and organizations around the world involved in setting up or running credit programs similar to that of the Grameen Bank. The Grameen Trust, in conjunction with the Grameen Bank, organizes and conducts the annual Grameen International Dialogue Programmes. These programs are a series of seminars and workshops held in Dhaka, to provide an "opportunity for participants to gain first hand exposure to the philosophy and operational procedures of Grameen Bank."[6] The trust also has a research program called the Programme for Research on Poverty Alleviation. This programs sponsors, publicizes, and partially funds local costs of research related to poverty alleviation.

The Grameen Uddog helps thousands of poor handloom weavers spread throughout Bangladesh. Many of these weavers had handloom machines and the skills to make a very inexpensive cotton fabric. Yet, many of these looms remained unutilized because most of the weavers had little seed money or access to loans to enable them to

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[6] Excerpt from *Grameen Dialogue*, no. 25, January 1996.

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buy the thread and other materials required to make the fabrics. They also lacked the resources necessary to market the product. The Grameen Uddog has made it possible for these weavers to make and market their product. The organization secures orders for the weavers, helps them purchase the raw materials to make the fabric, and then helps to market and promote the fabric. This cotton fabric usually has simple check patterns and is used to make shirts and other garments. This operation has become so successful that the fabric is now called "Grameen Check." The Grameen Uddog has embarked on an aggressive marketing campaign in an effort to compete with and displace imports of similar fabrics from India and Pakistan, and even to export the fabric.

The Grameen Bank has also expanded in other sectors with the aim of increasing commercial agricultural production and income, while enhancing soil capacity and other social goals. These enterprises include the Grameen Krishi (agricultural) Foundation and the Grameen Fisheries Foundation. The bank is also increasingly involved in replication efforts throughout the world. As testimony to the success of its efforts, there are now scores of successful Grameen-type credit programs throughout the world. A list of some of these programs is provided in appendix C.

Chapter 3

Economics and the Grameen Bank

3.1 Introduction

The Grameen Bank is arguably the most successful of the "development" banks.[1] The bank's excellent loan recovery rate and its ability to improve the living standards of its "target" group, the landless, has brought it the attention of development practitioners, economists, sociologists, governments, and non-governmental organizations interested in understanding its group lending program and assessing its replicability in other countries.[2]

The purpose of this chapter is to throw light on the precise economic intricacies that make the innovative group lending features used by the Grameen Bank in Bangladesh so much more successful than other financial institutions, in extending loans to some of the poorest people in the world, and in recovering these loans with a dramatically low default rate.

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[1] That is, banks concerned with economic development of their clientele as opposed to commercial banks.

[2] Hossain (1988) writes: "The Grameen Bank ...... has been visited by high-level government officials from Nepal, Malaysia, the Philippines, Indonesia, and the Solomon Islands, and by nongovernmental organizations and interested individuals from Kenya, Tanzania, and Rwanda. The Economic and Social Commission for Asia and the Pacific (ESCAP) organized a "Study Tour of Grameen Bank" for government representatives, bankers, and female program leaders of the region. IFAD is trying to launch a Grameen Bank-type credit program in Malawi. Malaysia has already formulated a project to experiment with such credit for the poor in Selangor State. Thus there is widespread interest in trying the Grameen Bank approach to credit in other countries. But will it work? (p. 80-81)"

A lot has been written and said about the Grameen Bank, much of it complimentary. Strangely, some have hailed the success of the Grameen Bank as evidence of the irrelevance of contemporary economic theory and analysis. This is rather unfortunate. A close scrutiny of the analytical literature on group lending, screening, incentives, peer monitoring, social collateral, and so on shows a wealth of insights that can inform policy decisions on improvement and replication of such group lending programs.[3] Indeed, some of the analytical literature has developed precisely due to a desire to understand the incentive structures in such existing programs. This interplay of mutual feedback between existing institutions and economic theory could potentially be useful in avoiding costly policy mistakes as well as in channeling the energy of economic analysts into areas that could help in understanding the conditions under which group lending programs can be successful, thereby helping to improve the institutional structures of these credit programs.

Today, there exist numerous group lending schemes around the world, many inspired by the Grameen Bank and, indeed, some even its direct replication.[4] Many have made mistakes in the initial stages that could perhaps have been avoided by a closer analysis of the mistakes of the Grameen Bank and by a closer look at the analytical

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[3] See, for example, Stiglitz (1990), Varian (1990), Bernasek (1991), Besley and Coate (1992), Armendariz de Aghion (1994).

[4] Some of the prominent replication experiments include the "Projek IKHTIAR" in Malaysia (now Amanah IKHTIAR Malaysia), the Project Dungganon in Philippines and the Good Faith Fund in Arkansas, USA. For a periodic update of continuing experiments around the world, see the *Grameen Dialogue* newsletter. See appendix C for a list of Grameen-type replications around the world.

literature on the economics of information and incentives as well as the literature in applied game theory.[5] Indeed, Hossain (1988) who was among the first to do a detailed study of the Grameen Bank, warns against a blind replication of the Grameen Bank system, without taking into account an analysis of the specifics of local conditions and environment:

> The Grameen Bank concept of generating self-employment for the poor through credit without collateral should work in other countries with widespread poverty and underemployment. Some elements of the Grameen Bank approach to delivery of credit, such as formation of small homogeneous groups for group guarantee of loans and supervision of loan utilization, recovery of loans in small regular installments, and development of institutions of collective savings for mutual benefit of members, may also work in other environments. But elements like taking the bank to the people and intensive interaction of bank staff with borrowers may be inappropriate and highly expensive for sparsely settled areas with underdeveloped transport systems. For such environments, an appropriate delivery mechanism has to be worked out. Indeed, one of the lessons of Grameen Bank is that an appropriate institution can be developed only after considerable experimentation, through a thorough understanding of the physical and socioeconomic environments (Hossain 1988, p. 11).

Gibbons and Kasim (1990), in their account of the problems and mistakes encountered by the organizers of "Projek IKHTIAR" in Malaysia, speak of the implications of their lack of a full understanding of the Grameen Bank approach:

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[5] I draw attention to some of these mistakes in a later section. For a more detailed study of such mistakes in the case of one such bank, the Projek IKHTIAR in Malaysia, see Gibbons and Kasim (1990).

Although we tried to implement the Grameen Bank Approach faithfully, we encountered serious problems and made major mistakes, because we did not understand it fully (Gibbons and Kasim 1990, p. 19).

The success of the Grameen Bank has brought encouragement at two levels. First, in the knowledge that a well organized credit program may indeed help to substantially reduce poverty and improve living standards for the masses of poor people in developing countries. And second, that this can be achieved with a program that does not rely on grants, but rather on a scheme that imposes very strict accountability on the beneficiaries themselves.[6] When an experiment such as this seems to be working, it is imperative that we closely scrutinize its organization and operation in order to draw all the lessons we can about the reasons for its successful functioning, its mistakes, as well as the possibilities for improvement and replication of such a scheme in other places with different environments.

The economic literature on the Grameen Bank and group lending has evolved in several directions. There is a body of work that has expanded on the themes introduced by Hossain's (1988) detailed study of the institutional set-up, operations, economic effects, and costs of operation of the Grameen Bank. These have included several studies evaluating the effectiveness of the Grameen Bank credit scheme in reducing the poverty level and improving the living standards of the borrowers.[7] Another strand of literature

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[6] It is true that the loanable funds of the Grameen Bank are obtained at concessionary interest rates. There is some controversy as to the extent of the subsidy involved. When I say that these loans are not grants I mean that as far as the borrowers are concerned, they are expected to return the money loaned to them, and that the price of the loans, to them, are at least as much as the interest rates charged by commercial banks for loans to the agricultural sector.

evaluates the long-run sustainability and replicability of the bank on a self-financing basis, and examines the extent of subsidy involved in the bank's operations.[8]

There is now also a growing body of literature that analytically examines the incentive structures and functions of the various institutional features of the bank.[9] They include overviews of the role of groups and cooperatives in rural lending (Huppi and Feder 1990) as well as overviews of the effects of imperfect information in rural credit markets (Hoff and Stiglitz 1990).

My focus in this chapter is to examine the different facets of group formation, group interaction, and group guarantee of loans as specifically used by the Grameen Bank, with a view to a better understanding of the functions of these different aspects of group based lending. For example, it is widely believed that group "solidarity" plays a big role in preventing defaults. But, does the group structure itself really have much to do with preventing default or is the role of the group more important in borrower selection while the repeat nature of loans induces repayment?[10] Are groups in fact homogeneous as is

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[7] See, for example, Rahman (1986), Khandker (1993), Khandker, Khalily, and Khan (1995). Also see earlier work by Hossain (1986).

[8] For issues of implicit subsidy and financial and economic viability, see Khandker, Khalily and Khan (1993, 1994, 1995); Yaron (1992).

[9] This includes among others, Stiglitz (1990); Varian (1990); Bernasek (1991); Besley and Coate (1992).

[10] It is known for example that the Badan Kredit Kecamatan (BKK) in Indonesia makes loans to poor women without any requirement of material collateral or of group formation, but with repeat lending. The repayment rate of BKK borrowers is substantially higher than that of most other rural credit programs (over 80%). See World Bank (1989). Chapter 5 is an empirical analysis of factors that determine the loan repayment rate.

widely believed or are there differences among members in ability and experience?[11] Does staggered disbursement of loans have any appreciable effect on loan repayment? What determines the optimal size of a group?

The analytical papers on the various facets of group lending, while rich with insight, are often only partial analyses of one or two aspects of these group lending schemes.[12] I attempt to integrate the insights both from the analytical and the institutional literature in order to gain a fuller understanding of the conditions under which this institution is successful in using a group lending program.

This chapter is organized as follows. In section 3.2, I discuss the main problems that any loan contract must overcome. This serves as a background to evaluate the use of different features of the group lending scheme. Section 3.3 briefly discusses the differences between formal, informal and semi-formal credit markets in order to highlight the particular niche the Grameen Bank occupies in fulfilling the credit needs of a specific group of clientele from among the rural population. Section 3.4 is a detailed discussion of the different features of the group lending scheme of the Grameen Bank, in light of their functions as they relate to overcoming the problems mentioned in section 3.2. I conclude

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[11] Bernasek (1991), for example, shows that it may be beneficial for the bank to induce borrowers of unequal ability to form groups together so as to enable information transfer from the more-skilled to the less-skilled.

[12] The more general expositions are Huppi and Feder (1990), which is an overview of group lending programs and cooperatives; and Hoff and Stiglitz (1990), which explores in general the implications of imperfect information in rural credit markets.

in section 3.5 by summarizing the analysis, raising some questions, and suggesting some possible paths for fruitful exploration of the issues discussed in section 3.4.

3.2 Loan Contracts: Problems to Overcome

Every loan contract involves the giving up of a sum of money by a lender in one period in exchange for a promise by the borrower to repay the money plus an interest amount (the price of the loan) in a future period. Because the exchange takes place over time, the lender must decide whether to make a loan to a certain borrower and then, if the loan is made, he must find ways to ensure that the borrower in fact repays the money. While the lender may not be able to make sure with certainty that the money is repaid, he can take certain actions to increase the likelihood of repayment. For example, the lender can try to sort out the "good" borrowers (those who are more likely to repay) from the "bad" (those less likely to repay), by investigating the creditworthiness of potential borrowers. The lender may also try to design the loan contract with features that would induce borrowers to take the kind of action that would enhance the probability of success of the loan-financed project. The lenders may themselves supervise and monitor the borrowers or may employ others to do so. Thus, while making a loan may be profitable to a lender, there are costs involved to ensure that the transaction is successful from the lender's point of view. This uncertainty about repayment, arising from the inter-temporal

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nature of the loan transaction, exists in every credit market, be it urban or rural, formal or informal.

The creditworthiness of a borrower is the probability that he or she will repay a loan. Uncertainty about repayment can arise from uncertainty about the ability and the willingness of the borrower to repay. I look at each of these sources of uncertainty in turn.

Ability to Repay

The ability of a borrower to repay a loan can be affected by the following factors:

1. The skill, training, and experience of the borrower in utilizing the loan effectively in an income generating project. (In other words, the productivity or "type"of the borrower.)

2. The effort invested in the loan-financed project, by the borrower and others.

3. The existence of other assets or wealth owned by the borrower or by others, which can be used to enable repayment in case of failure of a loan-financed project.

4. Random events that can affect the riskiness of a project. (For example, changes in the amount of rainfall has a greater effect on income from rice production than that from basket weaving.)

Willingness to Repay

If a borrower has the money to repay a loan, then the question of willingness arises. A borrower, even if able, may decide not to repay a loan. The reason for this is

that the present value of gains from not repaying, net of any penalties, may be greater than the present value of gains from repaying. The penalties from not repaying may be pecuniary, or otherwise (such as social sanctions).

3.3 Formal, Informal, and Semi-Formal Credit Markets

A variety of types of financial institutions exist in developing countries. Their distinguishing characteristics are in the institutional features of their loan delivery and recovery mechanisms, the clientele they serve, and the ways in which they try to overcome the problems inherent in a loan contract.

Formal credit markets are characterized by financial institutions that belong to the traditional commercial banking system where loans are largely made against some kind of physical security, usually property, as collateral. The financial institutions themselves may be owned privately or by the government. They may have branches both in urban and rural areas.[13]

Informal credit markets include the lending operations of moneylenders, traders, landlords, shopkeepers, friends, relatives, etc. Loans are made largely on the basis of personal knowledge of borrowers, arising out of kinship, proximity or other interactions

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[13] Depending on the country rural branches may or may not be easily accessible to the population it is meant to serve. Typically, due to the higher density of population in urban areas, urban branches are more accessible.

(for example, a landlord making loans to his share tenant), etc. Physical collateral may be used as security. Often, the threat of personal or social sanctions rather than physical collateral may be used to prevent default.[14] Presumably, due to geographical proximity and other personal and professional interactions, the lenders are also in a good position to judge the repayment ability of the borrowers (Basu 1983).

Semi-formal financial institutions are the increasing number of financial institutions found in developing countries that may have their own peculiar mechanism for loan dispensation and recovery and savings mobilization. They may also be serving a well specified target group of clients. The loans from these institutions may be used for certain specified types of activities. They include group lending programs like that of the Grameen Bank, cooperatives (that may serve not just credit, but also the technology and marketing needs of its clients), rotating savings and credit associations (ROSCAS) (Besley and Coate 1993; Edwards 1989) that use the pooled contributions of the borrowers themselves to finance purchases, etc. Semi-formal financial institutions may be owned and run by the borrowers themselves, by the government, by a private agency, or by some combination of some or all of the above.

How have formal and informal credit markets in developing countries coped with the problems that are inherent in a loan contract? By and large, it appears that formal credit markets have not been very successful with respect to recovery of loans, in most of the developing world (Von Pischke, Adams and Donald 1983). For example, in

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[14] See Sarap (1991) for a discussion of collateral and other forms of guarantee in rural credit markets.

Bangladesh, commercial banks have traditionally recovered less than 50% of all outstanding loans. A large part of the reason may be the lack of adequate legal mechanisms to enforce repayment. Many of these loans are made against physical collateral, but political patronage rather than the creditworthiness of borrowers may have determined the composition of the clients. Non enforcement of laws ensures that borrowers consider much of the credit as grants even though physical collateral has been pledged.[15] There has also been an attempt by formal government financial institutions in many developing countries to provide subsidized credit, purportedly to low-income borrowers who cannot afford to borrow at commercial interest rates. Again, for political and other reasons, these subsidized loans have invariably gone to wealthier borrowers.[16]

Informal credit markets seem to serve a very specific clientele, personally or professionally known to the lender. They are able to overcome many of the problems of formal credit markets related to borrower selection, because lenders often have information about borrowers that the formal markets may not have. This is due to the geographical proximity, and personal, professional, and social ties between borrower and lender. These markets are often characterized by high interest rates.[17] Some have tried to explain the high interest rates as being the result of the monopoly power of local landlords

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[15] In the Indian sub-continent, for example, it has not been uncommon for polticians running for office to promise to write off previous loans if elected. Also, even when laws are enforced, the time and procedures involved in actually collecting collateral such as land, in case of default, may make it very costly to do so.

[16] See Braverman and Guasch (1989) and Adams, Graham and Von Pischke (1984).

[17] For a good exposition of informal credit in a particular region in India see Bouman (1989).

and moneylenders (Bhaduri 1977). Others explain the high rates as a result of the high incidence of default on agricultural loans, due to the high correlation in failures of farming projects (due to lack of rainfall, for example) (Basu 1984). Whatever the reasons, there appears to be a fragmentation in credit markets, with interest rates being much higher in informal credit markets,[18] and both formal and informal sectors coexisting.[19]

Semi-formal credit institutions may have a variety of interest rates, and may finance many different types of operations. Typically, they serve a specific type of clientele. The Grameen Bank, for example, serves landless or near-landless borrowers. ROSCAS are often formed among people wishing to finance the purchase of a durable good. Cooperatives may serve farmers' credit, technology, and marketing needs.

I limit my discussion in the next section to the group lending program of the Grameen Bank, in order to explore the ways in which its features may have been instrumental in overcoming many of the problems inherent in a loan contract.

3.4 The Grameen Bank and Economics

The Grameen Bank was created to serve a particular clientele, or target group. They were the landless or near-landless in the rural areas of Bangladesh. They were

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[18] Interest rates in informal credit markets are known to be sometimes as high as 200 % (see Basu 1984, p. 136).

[19] See Hoff and Stiglitz (1990).

among the poorest people in Bangladesh with little income earning resources other than their labor. The founder of the Grameen Bank (Dr. Muhammad Yunus) believed that access to credit was instrumental in enabling this group to acquire productive resources which they could use to set up income generating projects of their own. This particular target group did not have access to the formal credit markets, because of their lack of land or other material assets that could be used as collateral. On the other hand, informal credit markets, which did serve this clientele, charged interest rates that were too high for them to be able to profitably use loans for income generating projects. The informal credit markets were used largely for unforeseen contingencies, social ceremonies such as weddings, and so on.

The Grameen Bank, therefore, had to design a credit delivery and recovery scheme for this particular group of potential borrowers who were effectively shut out of the formal credit market, and could not profitably use the high interest loans in the informal credit market. What they needed was access to loans at the rates charged by the commercial banks but without having to put up material collateral. The Grameen Bank's innovative institutional features were designed to specifically address the requirements of this group of borrowers.

The bank had to ensure that only borrowers who fit the target group characteristics would get loans, and that others would be screened out. And that once they received the loans, they would take those actions that would increase the probability of success of their projects, and finally that they would be compelled to repay their loans.

In other words, the institutional features of the bank had to overcome possible problems with borrower selection, borrower's ability and willingness to repay (that is, problems of screening, incentives, and enforcement). As Hoff and Stiglitz (1990) note:

> The new views of rural credit markets are based on the following three observations:
>
> 1. Borrowers differ in the likelihood that they will default, and it is costly to determine the extent of that risk for each borrower. This is conventionally known as the *screening* problem.
>
> 2. It is costly to ensure that borrowers take those actions which make repayment most likely. This is the *incentives* problem.
>
> 3. It is difficult to compel repayment. This is the *enforcement* problem.
>
> The new view holds that it is the markets' responses to these three problems, singly or in combination, that explain many of the observed features of rural credit markets, and that they must therefore inform the policy perspective for designing specific interventions (Hoff and Stiglitz, 1990, p. 237-238).

In the case of the Grameen Bank, screening implied, first of all, the exclusion of all potential borrowers who were not in the target group (that is, those who had more than 0.5 acres of land or assets exceeding the value of 1.0 acre of medium-quality land).[20] Second, it implied that "bad" borrowers (those that had no intention of repaying loans) had to be screened out. The Grameen Bank did not want to exclude well-intentioned borrowers with little experience ("low productivity" types), since the belief was that with adequate preparation, guidance and support, borrowers could increase their productivity.

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[20] Hossain (1988) found that only 4.2 % of the borrowers belong to households that are not in the target group.

The bank was able to do this to some extent through the use of its specific brand of group lending.

The Grameen Bank has a myriad of institutional features that are geared towards creating incentives for borrowers to take actions that enhance the ability to repay loans. This ranges from incentives to undertake less risky projects, to ensuring that borrowers monitor and supervise each other, and perhaps even invest effort in each others' projects.[21] The incentives created were particularly important because the bank had ruled out one of the factors that enhance the ability to repay: that is, assets and wealth to be used as collateral, in case of failure of a project.

Finally, in the absence of effective legal sanctions or securable physical collateral, the Grameen Bank has ingenuously devised a number of features to enforce repayment of loans. These include the small sizes of individual loans,[22] the guarantee of future loans, and the use of "social collateral" and group lending.

A close look at the bank's group lending program reveals that every facet of the institution is geared towards eliminating some part of the problems mentioned above. I analyze the Grameen Bank's institutional set-up, by dividing it into four sub-sections: the first three -- 3.4.1 (group formation), 3.4.2 (mutual insurance), and 3.4.3 (peer monitoring) -- deal with features designed to enhance the ability to repay. The last sub-section (3.4.4), on enforcement, deals with the willingness of borrowers to repay.

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[21] See chapter 4 for an analysis of the incentives to invest effort in another borrower's project.
[22] See chapter 5 for an empirical investigation of the effect of loan size and repeat loans on the loan repayment rate.

3.4.1 Group Formation

The group formation process is perhaps one of the most important stages in Grameen Bank's lending program. It is during this stage that much of the screening out of undesirable borrowers[23] is done. It is also during this stage that the composition of the group in terms of borrower productivity and other characteristics, is determined. Grameen Bank officials arriving in a new village publicly announce the requirements for receiving loans: that borrowers must have no more than 0.5 acres of land (or assets worth 1.0 acre of medium-quality land); that they must form groups of five people of their own choosing; that loans will be made to individuals but the entire group will be responsible for repayment; that they must be willing to abide by all the rules and attend all the weekly meetings of the bank in addition to two weeks of initial training and other meetings set up as needed; and that they must follow all the social rules of the bank.[24]

Clearly, the Grameen Bank relies on the informational efficiency of groups, compared to individual lending. With individual lending, a bank has to incur a cost in trying to obtain information about the creditworthiness and other characteristics of borrowers. The information obtained is likely to be imperfect. Presumably, group members already have substantial information about each other's characteristics and

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[23] By undesirable, I mean borrowers who are too wealthy or those who have a reputation for unreliability, or those known (to other villagers but not to the bank) to have premeditated plans to default.

[24] The social rules are contained in the bank's "Sixteen Decisions" program. See appendix B for the list.

creditworthiness. By requiring borrowers to form their own groups, the Grameen Bank induces potential group members to use their private information to screen out undesirable borrowers, at a much lower cost. (The cost of acquiring the information is lower for the borrowers because it is a by-product of geographical proximity and social and professional interaction.)

Screening

It would seem that at least one of the reasons for the initial intensive training and other regular commitments of time for group activities is to decrease the worth of joining groups for borrowers who are wealthier than the target group. Given the fact that it would be very hard for Grameen Bank officials to verify the actual land-holding status (or wealth) of potential borrowers, the extensive commitment of time required on the borrowers' part screens out those who may have a higher opportunity cost of time -- the wealthier villagers.[25] This is reinforced by making loan sizes small so that only small-scale projects can be undertaken with the loans, making the loan less attractive to those interested in large-scale projects.[26]

This function of the group formation process is especially important because the fact that group members have personal information about each other is not adequate to

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[25] The link between opportunity cost and repayment rate is evaluated empirically in chapter 5. Also see Tideman, Nichols and Smolensky (1971) for a discussion of discrimination by waiting time in merit goods.

[26] Currently, first-time borrowers are limited to loans of about $70. Maximum loan amounts for borrowers who have gone through three or four cycles of borrowing rarely exceed $250.

prevent wealthier members from joining the group, since they could always offer side payments to poorer borrowers in return for a place in their group.[27] The small size of loans and extensive time commitment reduce the possibility of such an outcome. In addition, certain activities that were initially introduced, such as saluting (now abandoned) and group physical exercises, are activities which many wealthier borrowers may not have been willing to undertake.[28] As such, these activities may have served an important screening function, aside from the much-heralded "solidarity"-building.

The group formation process does, however, use the private information that borrowers have about each other to weed out other undesirable borrowers, those that may be predisposed to defaulting. Since potential borrowers know that their stream of loans depends on the ability and willingness of their group members to repay, they have an incentive to associate with those they have a personal knowledge of, and whose ability and willingness they can rely on. Thus, "good" (more creditworthy) borrowers will have an incentive to associate with other "good" borrowers. "Bad" (less creditworthy) borrowers have an incentive, of course, also to associate with "good" borrowers. If potential group members have reliable information about each other's creditworthiness, then "good" borrowers should be willing to accept "bad" borrowers only if they are offered adequate side payments (Varian 1990). However, this outcome may be less likely due to certain

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[27] See Varian (1990) for a treatment of group formation with the possibility of side payments.

[28] This is because, in rural Bangladesh, such joint public activities would be deemed by the wealthy to be not in keeping with their social status.

other features of the group lending scheme. Staggered disbursement of loans implies that a borrower takes the risk of being in line to receive a loan after a "bad" borrower, reducing his/her own chance of getting a loan. It is also not likely that the side payments made by the "bad" borrowers can be very large due to the already small size of loans. These two features together make it less likely that "good" borrowers will accept "bad" ones in their group.

It is, of course, possible that groups are formed among "bad" borrowers, all of whom are predisposed to defaulting. However, this cannot last for more than one cycle of loans, since repeat loans are contingent on repaying in the first cycle. In addition, since loan disbursement is staggered and later borrowers' loans depend on initial borrowers' repayment of installments, such groups of "bad" borrowers may not be attractive to all five persons concerned. Since no one has an incentive to be among the later borrowers, such groups may not be formed to begin with or may break down as soon as the order of loan recipients is determined.

The importance of self-selection in group formation is borne out by the initial experience of the organizers of "Projek IKHTIAR" in Malaysia. According to two of the organizers, Gibbons and Kasim [(1990) p. 20]:

> We were impatient and decided that we should assist by suggesting names
> and convening meetings......in the few cases in which the potential borrowers
> accepted our suggestions, the groups that were formed were of little value.
> Subsequently most of these 'assisted groups' broke up at the first repayment
> crisis. The individual felt no sense of collective responsibility. We had made
> a bad mistake in prematurely deciding that in Malaysia poor villagers would

require assistance to form groups; we should have been more patient and waited for them to form the groups themselves, as we do now.

Group formation is the cornerstone of the Grameen Bank Approach. If it is not done properly, i.e., by the qualified potential members themselves from among people similar to themselves whom they know and trust, then the whole structure of Groups and Centers will be in danger of collapse at the first repayment crisis. We had to learn this the hard way; 'hard' both for us and our first borrowers. And, it is one of those important lessons that periodically needs to be relearned. Fieldworkers, keen or under pressure to reach quotas, will be tempted to 'help' in group formation, despite the shortsighted nature of such 'help'.

Are Groups Homogeneous?

Almost every reference made to the Grameen Bank's group lending scheme states that the groups are homogeneous. By requirement, all members of a group belong to the pool of landless or near landless rural population. By self-selection, they invariably tend to be from the same social class and perhaps neighborhood. However, within these boundaries, there are people with varying skills and experience. In this sense, the group may not be homogeneous. In fact, the bank tries to ensure that there is some heterogeneity in skills and experience among the members. For example, every group is required to elect a chairperson, who is responsible for group discipline, meetings, interactions with bank officials, etc. Invariably, the chairperson is someone with greater past experience in business interactions than others, and sometimes with greater formal education than others.[29] According to Bernasek [(1991) p. 7]:

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[29] In chapter 5 I evaluate the emprical relationship between the density of schools and loan repayment rates.

> ... The next level of sorting involves looking for people who could carry out the role of group chairperson. In this case they look for people who are intelligent, confident, dependable, experienced, people who can be trusted and who are respected and who are willing to accept responsibility. Each five member group seeks to have at least one member who possesses these characteristics.

These differences in work experience, education, etc., are differences in human capital that lead to differences in productivity between members, which in turn affect the probability of success of loan financed projects. Is it in the bank's interest that a person of higher productivity bear the risk of associating with someone of lower productivity? It may very well be so if there are a large number of borrowers with lower productivity and if the lower productivity borrowers can gain information and skills from those with higher productivity. Bernasek (1991) shows that if the bank's objective is to maximize the number of loans made rather than to maximize profit,[30] then it is in the bank's interest to offer contracts that induce heterogeneous group formation so as to facilitate the transfer of information between agents. The bank is able to do this by offering a lower interest rate on loans than it would normally charge the "experienced" borrower individually, in order to compensate the "experienced" for the risk of associating with the "inexperienced" borrowers. Since the Grameen Bank's objective was to serve precisely those potential

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[30] One of Grameen Bank's stated objectives is to try to expand and reach as many households in the target group as possible. While the Grameen Bank does not want to be making a loss in the long run, it certainly is not a profit-maximizing institution like other commercial banks. In this sense, Bernasek's objective function for the bank may apply in the case of the Grameen Bank in Bangladesh.

borrowers (inexperienced or low productivity borrowers) that a profit-maximizing bank might want to screen out, it had to find a way of increasing the productivity of these borrowers to reduce the risk of default. It would seem that the encouragement of heterogeneous group formation serves this purpose.

It is not at all clear, however, in the case of the Grameen Bank, why the "experienced" should be induced to form groups with "inexperienced" borrowers. The bank does not deny loans to groups whose members fall into the target group, have otherwise "good" reputations, and have potentially feasible project ideas. There seems to be no reason why "experienced" borrowers with these characteristics should want to form groups with "inexperienced" ones. Rather, they would want to form groups with other "experienced" borrowers in order to lower the probability of default and to increase the probability of repeat loans. There is of course the possibility that the experienced would be willing to form groups with the inexperienced if they received adequate side-payments from them, to compensate for the higher probability of future default. (For a treatment of group formation with side-payments, see Varian 1990).

There does not seem to be any evidence to suggest that the Grameen Bank in any way tries to force the "experienced" to form groups with "inexperienced" people. Yet, the facts suggest that group chairpersons invariably tend to be more "experienced" than others. The exact dynamic leading to this outcome needs to be understood.

3.4.2 Mutual Insurance

One function of the requirement of group formation is its risk-pooling advantage. Borrowers can mutually insure each other. Mutual insurance is forced on the borrowers by the requirement that the whole group is responsible for the repayment of loan installments of all members. If any member defaults, whether due to project failure or due to an unwillingness to repay, loans are denied to all members waiting for their loans. The only way for others to receive loans is to pay the arrears of the defaulting member. In a sense, although the borrowers are not held legally accountable for the loans of group members, they are in fact "jointly and severally liable" because they incur the penalty of being cut off from future loans if another borrower defaults.

This requirement would seem to impose a heavy burden on group members since they are penalized for others' actions or for random events. The Grameen Bank itself tries to mitigate the burden of this risk by disallowing loans for farming,[31] where the risk of failure may be highly correlated (due to lack of rainfall, for example). With few exceptions, only off-farm projects are allowed with general loans, and usually borrowers in a group are encouraged to diversify their projects.[32] Diversification of risk of failure of projects is especially important since most Grameen Bank members have very thin asset

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[31] Collective loans used to be granted in special cases to groups and sometimes whole centers, for farming purposes. Borrowers would jointly lease in agricultural land and produce for sale. These loans had the worst repayment rate. The reasons for failure of these projects were many, including management problems. The share of collective loans has been reduced to less than 1% of total loan disbursement.

[32] A particular group may have one person making earthen pots, another engaged in trading, another buying cows to sell milk, and yet another selling grain-processing services, and so on.

bases. Due to the very limited amount of assets, it is important that the borrowers are able to obtain some kind of insurance. Mutual insurance among group members, thus, serves a useful purpose.

Although the bank may be in a better position than the borrowers to bear the risk of default, the requirement of mutual insurance may actually improve borrower welfare and enhance the repayment ability of the borrowers, thereby reducing default rates on loans. In the next section on peer monitoring (3.4.3), I discuss the possible welfare-enhancing effect of this mutual insurance, as explored by Stiglitz (1990).

Group Fund/ Consumption Loans

The Grameen bank does not make loans exclusively for consumption purposes. It, however, forces borrowers to save a proportion (5%) of their loans in a *group fund*. While the funds are to be used to enhance group activities and welfare, it is also an emergency source of funds that borrowers can resort to. Having this potential source of funds, borrowers do not have to use their meager assets or take loans from informal lenders at high interest rates in times of difficulty. They may use this fund to obtain loans for any reason, including consumption and expenditure on social ceremonies. Although planners and bankers in developing countries have traditionally discouraged consumption loans on the grounds that they take funds away from investment, the Grameen Bank sees these loans as a way of allowing borrowers to tide over unforeseen adverse circumstances (or even foreseen circumstances such as a family wedding), thereby maintaining their

productivity. Indeed, Eswaran and Kotwal (1989) show that consumption loans, by decreasing the need for hoarding as insurance, can encourage investment.

Thus, the institution of a mandatory contribution to a group fund helps pool borrower resources as insurance against unforeseen contingencies. Presumably, this helps to reduce the default rate by ensuring repayment in some states of nature when individuals without this group insurance would have defaulted.

3.4.3 Peer Monitoring

It is by now common to refer to the repayment-enhancing interactions between borrowers in Grameen Bank groups as peer monitoring. With a few exceptions, what is not always made explicit is the precise form that peer monitoring takes. There are at least two aspects to peer monitoring -- the supervision aspect and the mutual assistance aspect. According to Yunus (1984), groups have the capacity to exert "... the right kind of peer pressure at times when a member tries willfully to violate Grameen Bank rules, and peer support at times when a member falls into any difficulty."

Peer Pressure: Incentive to Supervise

How does the group achieve mutual supervision? Before the loan of an individual borrower is approved by the bank, the potential project has to be approved by the other members of the group. Members even take an active part in deciding on a feasible project

for another group member. Since all members are negatively affected by another member's default, it is in their interest to ensure that borrowers undertake relatively safer projects (that is, projects with surer returns, even if the return itself is smaller).

Stiglitz (1990) models this aspect of peer monitoring. In his model, borrowers have a choice of two projects, a safe and a risky project. The risky project yields a higher return with a lower probability, and the safe project yields a lower return with a higher probability. The safe project always yields a higher expected return. An individual using his own funds would always choose the safe project. Using borrowed funds, an individual can declare bankruptcy if the project fails, and so may decide to undertake the risky project. The bank is always worse off if the borrower chooses the risky project, because of its lower probability of success. Peer monitoring is introduced in the following way. Two-person groups are formed. The lender requires borrowers to cosign each others' loans (and to report on those who undertake the risky project), agreeing to pay a proportion of the cosigned loan (possibly the full amount of the loan) in the event of default. It is assumed that the borrowers cooperate and jointly decide whether to undertake the safe or the risky project (and not report each other). Given that banks must break even, it is shown that with the cosigning the zero-profit condition is reached at a lower interest rate, and, at a low enough cosigning proportion, the decrease in the interest rate exactly compensates the borrower for the additional risk burden. At low enough cosigning proportions, borrower loan sizes can be increased by increasing the cosigning proportion, still ensuring that the safe project is undertaken. It turns out that the increased

risk transferred on to the borrower is more than compensated for by the increased loan size and the lower interest rate, and thus the imposition is welfare-enhancing for the borrowers.

In Stiglitz's model, cosigning has a function other than the usual one of increasing the effective collateral behind a loan. It gives an incentive to one member of a group to monitor the actions of the other. Although this increases the risk burden of the cosignee, forcing borrowers to monitor each other can actually increase their welfare, even while it enhances the loan repayment rate for the bank.

Peer Support: Staggered Disbursement - Incentive to Increase Effort Levels in Projects

In addition to the supervision aspect of peer monitoring, the staggered disbursement of loans to members of a group creates an incentive for members to ensure that borrowers are working hard enough on their projects and perhaps even to help out in their projects.[33] This is due to the fact that some members in the group will receive loans only after others have repaid several installments and that all members have to wait until everyone has repaid before getting another loan. Thus, members stand to gain by increasing the probability of success of the projects of their group members since that enhances their own probability of receiving loans.

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[33] This is quite apart from the transfer of information generated by inducing the formation of heterogeneous groups.

In chapter 4, I analyze the effects of a scheme where borrowers' loans are interlinked in such a fashion. The probability of success of a project depends on the total level of effort invested in it. Staggered disbursement ensures that borrowers will invest some effort in the projects of those who precede them, thus raising the total effort levels in all projects but that of the last borrower (when there is only one round of loans). Interestingly enough, this is in spite of the fact that borrowers being helped by other group members have an incentive to reduce their level of effort. The additional effort by the other group members more than compensates for this reduction. As long as the cycle of loans is repeated, there is an incentive to invest effort in the last member's project as well. This increases the probability of success of all projects, thus increasing the repayment rate.

3.4.4 Enforcement

The group formation process, the mutual insurance, and peer monitoring are all institutional features that enhance the ability of borrowers to repay their loans. There remains the problem of borrowers who are able but unwilling to repay their loans. Some of the features of the Grameen Bank's group lending program address this problem. An attempt has been made to "sweeten" the gains from repaying and increase the penalties from defaulting, as compared to individual lending. I discuss here some of these features in light of their effect on the willingness to repay.

Small Size of Loans / Guarantee of Future Loans

The fact that borrowers have very small asset bases make it almost impossible for them to obtain loans from commercial banks. They are thus limited to borrowing from informal lenders (moneylenders) who may charge high interest rates, or to borrowing from institutions such as Grameen Bank that do not require physical collateral but impose other stipulations. If large loans and/or one-time loans without repetition were advanced without collateral requirements, then borrowers might have the incentive to take the money and willfully default. The Grameen Bank, however, makes loans of a relatively small size (average starting loan size of about US $70). This, coupled with the fact that a repeat loan of a slightly larger amount is guaranteed when all borrowers repay their first loans, provides an incentive for borrowers not to willfully default (especially since they have limited alternative sources for obtaining credit).

The gain from using the small loans is small compared to the present value of gains from the future stream of loans. If the loan sizes were sufficiently large and borrowers discounted heavily the future stream of loans, then the incentive to default would be greater. In addition to the small gain from willfully defaulting, the penalties are large (as discussed in the next section). A problem still remains. What happens as a borrower approaches the end of his several cycles of borrowing? Borrowers are eventually phased out as they acquire asset levels above that of the target group. Evidence suggests that the repayment rate of borrowers in a later (fourth or fifth) cycle of loans (as they approach

phasing out) is lower than the rates in their initial cycles (Hossain 1988). This suggests that the repayment rate is helped by the repetition of the lending cycles.[34]

Social Penalties as Social Collateral

The Grameen Bank has not tried to institute legal penalties to deal with defaulters. Indeed, the slow and inadequate legal process, combined with political interference in the legal process, precludes the possibility of using the law to penalize defaulters. Additionally, as already mentioned, the thin asset bases of borrowers reduces the ability of the bank to recover loans that are in default. Therefore, in addition to offering future guaranteed loans to repayers, the bank has tried to harness the power of possible social penalties that group members may be able to impose on others.

The precise nature of these penalties themselves are a rich area of study for economists and sociologists. It is widely known that reputation plays a large part in many personal and professional interactions in rural areas of developing countries, and that a loss of reputation can mean a loss of the benefits from other personal and professional dealings. The Grameen Bank relies on this "social collateral" to reduce willful default by borrowers who are able to repay. Borrowers who become known to be "dishonest" may not only be dropped from the group, but also may find themselves cut off from other profitable personal and professional dealings, due to the freer flow of information among

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[34] See chapter 5 for an empirical evaluation of the relationship between the loan repayment rate and other variables such as the average loan size, and the number of rounds of loans borrowers have received.

residents of rural communities living in close proximity to each other.[35] Since the bank itself has no other prior dealings with the borrowers, it does not have the capability to impose these kinds of social penalties. However, fellow villagers have the capacity to impose penalties on each other. The Grameen Bank has ingenuously harnessed this capacity by requiring group formation. The group lending scheme effectively harnesses this potential capacity for social penalties into a different kind of security for the bank -- that is, "social collateral" rather than the more usual material collateral.

Besley and Coate (1992) model a "repayment game" which emphasizes the importance of social collateral. In their model, a group of two borrowers receive loans from a bank. They invest in projects whose returns are independent. There is a distribution of possible returns on the project. Once the returns are realized, the group repays both loans or nothing at all, since the group is considered to be in default even if one loan is not repaid. The bank can impose certain penalties if the group defaults. This includes a monetary penalty and a non-pecuniary "hassling" by the bank.

Their model considers explicitly the possibility of strategic default. Thus, for example, a borrower may decide to repay both loans if he believes that the other borrower will not repay. But, if the other borrower believes this to be the case, he has no incentive to pay his share. In comparison to individual lending, they find two countervailing incentives when borrowers are linked in a group. There is a positive effect in that a

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[35] This is quite apart from the threat of "having a leg broken" in case of "cheating" by a group member. Presumably, the bank is less willing and able to resort to such illegal penalties than a private individual.

successful borrower may repay the loan of a group member who earns a low return on his project. But there is also a negative effect. That is, the entire group may default, when at least one of the group members may have repaid if he did not have to repay both loans. Besley and Coate find the ranges of returns on projects for which the loan may be repaid, and the ranges when the group will default.

They then introduce social penalties, the harnessing of "social collateral" in group lending. A social penalty function is postulated. This could arise from two particular forms of social penalties:

> First, the contributing member may admonish his partner for causing him or her discomfort and material loss. He might also report this behavior to others in the village, thus augmenting the admonishment felt. ... A second penalty mechanism, which seems reasonable for the context of group lending, is that a contributing member reduces cooperation with his borrowing partner in future. This is particularly pertinent if there is some form of exchange between them which occurs outside of the lending group. ..... The social penalties in this case would be consistent with the approach to reputation taken in the theory of repeated games [Besley and Coate (1992), p. 11].

It is then shown that social penalties can mitigate the negative effects of group lending. That is, groups will repay loans for a larger range of returns than they would without the social penalties. In fact, they establish that if the social penalties are severe enough, then group lending will necessarily yield higher repayment rates than individual lending.

3.5 Conclusion: Questions and Puzzles

In the preceding sections, I have tried to highlight the ways in which the Grameen Bank overcomes the problems of a borrower's inability or unwillingness to repay a loan. By the use of its innovative institutional features, the bank has managed to recover more than 97% of the money it has lent out, to some of the poorest people in the world, who are effectively shut out of formal credit markets. Unable to rely on physical collateral from these people with extremely thin asset bases, and unwilling to charge the high interest rates existing in the informal credit markets, the Grameen Bank has ingenuously devised a group lending scheme to enhance its loan recovery rate. Yunus (1984) points out the importance of the design of appropriate institutional features:[36]

> Most often structural resistance to PFPs (poverty-focused programmes) are over-played by the planners, programme designers, and programme executives to hide their own incompetence. Weaknesses in design and implementation are phenomenal. Most of these programmes can be improved substantially in terms of effectiveness if some analytical house-cleaning supported by appropriate changes at the implementation level is introduced ... institutional preparation is extremely important for credit to become useful. Conventional methods of credit dispensation have proven themselves to be inefficient and inadequate to reach the poor.

I have illustrated the ways in which the bank uses a self-selecting group formation process, mutual insurance, and peer monitoring among group members to increase the

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[36] See also Yunus (1986, 1987).

repayment ability of borrowers, while screening out wealthier borrowers and other undesirable borrowers (such as those with premeditated intentions of defaulting). I have also highlighted the bank's use of small loan sizes and repeat loans to increase the willingness of borrowers to repay their loans as well as the use of social penalties to enforce repayment.

Many questions about the Grameen Bank's group lending program remain unanswered yet. I discuss some of them below.

What is an Optimal Size for a Borrowing Group?

One of the most widely replicated features of the Grameen Bank is its group size of five borrowers. Many group lending programs around the world have faithfully replicated this group size. The Grameen Bank itself arrived at this group size through a trial and error process after trying groups of varying sizes. According to Hossain [(1988), p. 25]:

> The bank has settled on a group of five through trial and error. Initially, loans were given to individuals, but that quickly proved to be uncontrollable for the staff. Then groups of 10 or more were organized and the idea of mutual responsibility was introduced, but that size turned out to be too large to have the informal relationship among members that is necessary for mutual responsibility to be effective. In the end, five members proved to be the most practical size.

Clearly, from the bank's point of view, group formation reduces some of the transaction costs of lending, compared to individual loans. On the other hand, group size

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can have two countervailing effects on borrowers. If group sizes are "too small," the burden of supervision, monitoring, and repayment (in case of default by a group member) on each individual member can be rather large. On the other hand, if group size is "too large," individuals have an incentive to free ride and leave the tasks of supervision and monitoring to others.

In addition, assuming that people in villages do not have the same amount of information about everybody, the larger the group size the less informed members are about others, and, therefore, the greater the probability of admitting "bad" types into a group and the lesser the possibility of enforcing social penalties.[37]

There is still no clear understanding of how exactly the "optimal" group size is determined by these different considerations. It is plausible that the optimal size of a group is different for different countries depending on the particular characteristics of the borrowers and the social environment. This makes it important that we understand the determinants of the optimal group size so that group lending programs in other countries can be made more effective.

Is Staggered Disbursement of Loans Really Important?

Earlier, I have emphasized the role of staggered disbursement in creating the right kind of incentives for peer support among group members. But, the relative importance of

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[37] The reasoning here is that the extent of social penalties that one person can impose on another is, to some extent, related to their prior dealings. If people have less information about each other, it is at least partly a result of limited interactions.

this role of staggered disbursement is not clear. The Grameen Bank itself, for example, has over time reduced the time period between loan disbursements to different members of a group. In the 1980s, loans were staggered so that the first two borrowers had to repay weekly installments for about two months before the next two borrowers received their loans. And then the final borrower had to wait for another two months. Today, the waiting time between loan disbursements is often only two or three weeks.

This raises the question of the precise role of staggered disbursement. Clearly, repayment of a few weeks' installments only imperfectly conveys information about a borrower's intention of repaying, and may not induce the next borrower to invest much effort in the previous borrower's project.

The experience of the Projek IKHTIAR in Malaysia seems to have been quite the opposite. According to two of the program's organizers, Gibbons and Kasim [(1990), p. 22-23]:

> Initially, we shortened Grameen's staggered disbursement practice to two instead of three stages, because we could not see the need for three. Also we allowed larger first loans for Group members who had to wait their turn. We reasoned falsely that after the first two loan recipients had repaid regularly for 6 weeks, we could have more confidence in the creditworthiness of the whole Group. Hence there was no need to require, as Grameen does, the Group Chairman to wait until the second two loanees had established good repayment records; and we could safely loan larger amounts in the second round for each Group.
>
> We were unwittingly violating the principles of 1) adequate evidence of creditworthiness and 2) small and manageable first loans. Some

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unscrupulous members were happy to wait for the second round of loans in their Group because they could borrow twice as much and then abscond. Others experienced difficulty in repaying weekly the larger loans and went into default. On the advice of the Senior Officers from Grameen Bank we instituted their three stage staggered disbursement, with the Group Chairman being the last to receive a loan, and imposed the same maximum on all first loans.

The issues raised by Gibbons and Kasim about "small and manageable first loans" and the incentive to default as loan size increases with repeat loans, is addressed empirically in chapter 5. Another point emphasized by them is the importance of the waiting time between loans -- that is, the feature that no one receives a repeat loan until all borrowers in the group have repaid the previous round of loans, and that for the same round of loans, all borrowers do not receive their loans at the same time, but in a staggered fashion. In chapter 4, I suggest that part of the reason for the staggering and the waiting time is to induce borrowers to invest effort in their group members' projects, in an attempt to increase the probability of success of the project, thereby increasing their own chances of receiving a loan. This of course works in the bank's favor by enhancing the repayment rate on loans made by the bank.

Staggered disbursement of loans is thus another institutional feature whose role and importance, in the group lending program, remains to be fully understood.

Why do Women's Groups have Better Repayment Rates?

One of the much heralded facts about the Grameen Bank's experience is that women's groups have better repayment rates on loans than men's groups. This has been true also of other programs, such as Projek IKHTIAR in Malaysia.

What is not clear is the reason for lower default on loans by women. Many, including some bank staff who were interviewed, have attributed the difference to the better organizational skills and discipline of women, better group interaction and solidarity among women, and so on. If this is indeed the case, then the source of these differences between men and women borrowers needs to be understood.

It is plausible, though, that at least part of the reason for the difference in repayment rates may be related to the alternative opportunities available to men and women in rural Bangladesh and Malaysia. For men, the opportunity cost of the time spent in Grameen Bank (or Projek IKHTIAR in Malaysia) activities may have been higher due to the other opportunities for employment available to them but not to women. This may have resulted in a lower level of effort and time spent on Grameen Bank financed projects by men compared to women. Indeed, according to Gibbons and Kasim [(1990), p. 27]:

> Given their responsibility and the need to look outside of the village for work on a daily basis, male members found it difficult to regularly attend weekly center meetings. Over time their attendance tended to drop off and, eventually so did repayment. Female members, on the other hand, found attendance relatively easy because the meetings were held in the village. In fact, Center meetings became a social event for many women. Female attendance remained good and so did their repayment. Once this difference

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became clear to us, and in light of the worsening repayment rate among the male members, we took the decision to give priority to potential female members in any future expansion.

In chapter 5, I test the hypotheses that the opportunity cost of time of the borrowers, and their gender, affect the repayment rate, and evaluate these hypotheses in an empirical analysis. It must be noted that in rural Bangladesh, like in rural Malaysia, the opportunity costs of time of borrowers may very well be linked to their gender. Because of socio-economic constraints, women may face a lower opportunity cost of time, on average, in both countries. Whatever the merits of the different views on the reasons for the higher repayment rates of women, this is an issue that deserves serious investigation.

Another factor that may be important with respect to women's repayment rates is fertility. Child bearing certainly must have some effect on the ability of women to undertake loan-financed projects. Empirical investigation can be useful in determining the links between the number and age of children, and borrowers' attendance and participation in group activities and performance in loan repayment. The findings may help to shed further light on the relationship between borrower characteristics and loan repayment.

Group Characteristics: Homogeneous or Heterogeneous?

A question of substantial interest remains, with respect to the composition of borrowing groups. Are the self-formed borrower groups homogeneous or heterogeneous? The answer to this question may help us throw light on the precise conditions under which

group lending works well as a loan delivery mechanism. As alluded to in the preceding section, Grameen Bank's group formation process performs important screening functions and determines the composition of the group in terms of borrower characteristics.

Empirical investigation into borrower characteristics, especially into the similarities and differences between chairpersons and other group members, can be very fruitful. A knowledge of these similarities and differences may hold the key to a better understanding of the dynamics of group formation and interaction, and the role of group lending in enhancing repayment rates.

What is the Importance of Weekly Repayment?

One of the Grameen Bank rules that is strictly enforced is that repayment of loans must be made in small weekly installments rather than in larger amounts repaid over longer intervals. Some have contended that people have a higher propensity to consume at low incomes and this rule helps to forcibly divert money away from consumption, thereby avoiding repayment difficulties later.

Others have emphasized the "discipline" aspect of this rule, that this rule forces borrowers to learn economic discipline and realize that "the bank is not a charity institution."

The substantial transactions costs of recovering weekly installments on loans has not caused the bank to modify this requirement (to monthly installments, for example). This procedure of small weekly repayments may be more crucial than has been recognized,

both in borrower selection as well as in loan recovery, and is a feature to be analyzed more thoroughly.

These puzzles, and others, are fertile grounds for research, both empirical and theoretical, in our effort to better understand group lending, which holds important lessons for poverty-alleviating credit programs around the world.

In exploring the various facets of group lending as used by the Grameen Bank, I have also tried to show that there is much in the analytical literature in economics that can inform our understanding of this institution, just as the institutional literature has directed researchers to the puzzles to be analyzed, and the questions to be answered.

Chapter 4

Group Lending: The Role of Staggered Disbursement and "Peer Support" in Enhancing Loan Recovery

4.1 Introduction

The Grameen Bank in Bangladesh has achieved a remarkable loan recovery rate (97%)[1] while lending to some of the poorest landless people, who are not able to offer physical assets as collateral. While formal credit markets have considered this segment of the rural population uncreditworthy, the Grameen Bank has ingenuously devised innovative features in their loan delivery and recovery mechanism to increase borrowers' ability and willingness to repay their loans. The bank's lending program is centered around the use of self-formed borrowers' groups in the lending process.[2]

An important feature of the bank's group lending program is the use of staggered disbursement of loans to the borrowers in a group. The Grameen Bank requires borrowers to form groups of five members. Two members receive a loan at first. The

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[1] Interestingly, women borrowers have a higher repayment rate than men. Although at the start of the Grameen Bank project there were roughly equal number of men and women borrowers, over 94% of the borrowers are currently women.

[2] For a description of the Grameen Bank's group lending program, see chapter 2. For a thorough exposition of the bank's group lending as well as other aspects of its organization and operation, see Hossain (1988). See also Huppi and Feder (1990) for a general overview of group lending, and Hoff and Stiglitz (1990) for a discussion of the problems peculiar to rural credit markets.

next two members receive their loans only after the first two repay several weekly installments on their loan. Finally, after all four complete further repayments of several weekly installments, the final member (the chairperson of the group) receives her loan. Loans are to be repaid in full in fifty two weekly installments.[3] All members are guaranteed repeat loans if all group members repay their loans. If an individual member is in default at any point of time, repeat or first-time loans to all remaining borrowers in the group are suspended, until the defaulting member's loan arrears are settled. In this sense, although there is no legal penalty involved, borrowers in the group are "severally and jointly liable" for loans to every member of the group.[4]

In this chapter, I investigate the effect of interlinking of borrowers, on loan repayment rates, when loans are disbursed in a staggered fashion. I find that the probability of repayment is higher when borrowers are interlinked in a group. I consider a model with two identical borrowers, where the probability of success of a loan-financed project depends on the total amount of effort invested in the project. The bank advances a unit of loan to one borrower. If the loan is repaid, the money is then lent out to the second borrower. I show that it is advantageous for the bank to have groups of borrowers known to each other. This is because borrowers who are known to each other have an incentive to invest effort in a previous borrower's project (in order to increase their own

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[3] The interest rate on the loans is currently 20%. The principal amount is to be repaid in fifty weeks and the interest in the final two weeks. (The inflation rate in Bangladesh is currently below 5%).

[4] Staggered disbursement of loans is also used by other banks that have adopted the so-called "Grameen Bank Approach" to lending to poor people. One such example is the Amanah IKHTIAR Malaysia. See Gibbons and Kasim (1990) and Grameen Dialogue (newsletter) for details.

probability of receiving a loan), thereby increasing the probability of success of the project. This also results in an increase in the expected return and the loan recovery rate.

A higher probability of success of at least the first project is achieved, despite the fact that the first borrower actually reduces the amount of effort invested in her own project when group lending is used. The second borrower more than compensates for the reduction in the effort level by the first borrower, in order to increase her own probability of receiving a loan. Since the second borrower does not completely "crowd out" effort invested by the first borrower, the total effort level in at least the first project is higher in the interlinked case. Additionally, it is shown that the first borrower is made better off by using the group lending scheme, whereas the second borrower may be made better or worse off.

This chapter looks explicitly at one aspect of the borrowers' *ability to repay* their respective loans: that is, the role of 'peer support' or mutual assistance. (See section 3.4.3 in chapter 3 for a discussion of two different aspects of peer monitoring -- "peer support" and "peer pressure".) It does not consider the problems associated with a borrower's *willingness to repay* (that is, willful default even when able to repay). In a different framework, Besley and Coate (1992) analyze the possibility of strategic default by borrowers even when they are able to repay, and show that default can be reduced by the use of "social collateral" that is harnessed when group lending is used.

This paper should be contrasted with Stiglitz's (1990) analysis of "peer monitoring". Stiglitz also analyzes the use of group lending to increase borrowers' ability

to repay loans. His model, however, addresses the *peer pressure* or *mutual supervision* aspect of monitoring. In his framework, borrowers' ability to repay loans is enhanced due to the fact that borrowers are made liable for each others' loans (when group lending is used) and they therefore monitor each other to ensure that a less risky project is undertaken, than would be the case if individual lending was used. This paper, on the other hand, addresses the *peer support* or *mutual assistance* aspect of monitoring. In this paper, borrowers' ability to repay loans are enhanced due to the fact that borrowers have an incentive to help out (invest effort) in another group member's project.

A contrast should also be made with Bernasek's (1991) model of endogenous group formation where "inexperienced" borrowers' ability to repay loans is enhanced due to interaction with "experienced" borrowers. Her model focuses on the transfer of information within groups from "experienced" to "inexperienced" borrowers. Experienced borrowers are offered a lower interest rate (than they would be offered under individual lending) in order to compensate them for the risk of forming groups with inexperienced borrowers. The transfer of information is costless. As such, the model does not look at the incentives to assist in each other's projects.

Finally, Varian's (1990) paper, while motivated by the questions raised by the Grameen Bank example, analyzes the "sequential incentive problems" raised by staggered disbursement, in a very general contracting framework not directly related to group lending.

This chapter is organized as follows. Section 4.2 analyzes models of staggered disbursement with and without group interlinkage, and presents the results. In section 4.3, I conclude with a discussion of some of the other features of Grameen Bank's group lending scheme that mitigate the adverse effects of staggered disbursement. Section 4.4 is an appendix.

4.2 A Model of Staggered Loan Disbursement

In order to focus in on the incentives created by group interlinkage when staggered disbursement is used, I shall abstract somewhat from the Grameen Bank set up to consider the simplest of models of lending.

Staggered Disbursement means that loans are disbursed in a sequential fashion. A loan is advanced to one borrower. If she repays, then a loan is advanced to the next borrower, and so on. In this paper I show that combining staggered disbursement with group interlinkage can enhance the group's ability to repay loans, by creating the incentive for borrowers to invest effort in their group members' projects.

Unlike the Grameen Bank set-up, in this model, borrowers in a group are not "jointly liable" for loans. Yet they may have an incentive to assist their group members in order to increase their own chances of receiving a loan.

This model does not specifically postulate an objective function for the lender. Rather, it asks the question: if a lender (bank) is to advance a loan of a certain size

sequentially to a number of borrowers, is it better off interlinking the borrowers in a group or not? Thus, the focus is on determining whether group interlinkage increases the repayment ability of borrowers and therefore the expected loan recovery rate of the lender.[5] The model tries to understand the role of group interlinkage in the link between Grameen Bank's use of staggered disbursement and its dramatically high loan recovery rate. It also attempts to evaluate the welfare effect of this higher repayment rate on the borrowers.

The rest of this section is organized as follows. Sub-section 4.2.1 presents the basic features of the model. Sub-section 4.2.2 analyzes staggered loan disbursement when there is no group interlinkage (the unrestricted case). Staggered disbursement with group interlinkage is analyzed in sub-section 4.2.3. Borrower incentives are discussed in sub-section 4.2.4. Sub-section 4.2.5 evaluates the welfare implications of using the group lending scheme.

4.2.1 The Features of the Model

In this model, there are two identical borrowers.[6] Borrower i's expected utility, EU_i, depends on the expected return from her project and the effort invested in her own

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[5] Implicit in this model is the assumption that if a borrower's project is successful, the bank is able to recover its money. But even if borrowers are *able* to repay they may not be *willing* to do so. I am aware that this is not entirely satisfactory. However, if other features of the Grameen Bank, such as repeat loans, intensive monitoring by bank staff, reputation and social penalties, etc. are used in group lending, then the incentive or "willingness" to repay, increases.

and others' projects. The borrowers' expected utility is considered to be separable in expected returns and the effort level, as follows:

$$EU = P(e)R - V(e),$$

where P is the probability of success of a project and e is the effort level.

The bank (the lender) advances one unit of loan that borrowers invest in a project that will earn a net return of R with probability P. The probability of success, P, of the project depends on the total effort invested into the project (by the borrower and others). More specifically, P is a function of effort, e, where e is the sum of the effort levels put into a project by different individuals. $P(e)$ is a differentiable function where $0 \le P \le 1$. Additionally, $P(0) = 0$, $P'(e) > 0$, and $P''(e) < 0$. And $P(e_j) = P\left(\sum_{i=1}^{n} e_{ij}\right)$ where e_{ij} is the effort level invested by the ith borrower in the jth borrower's project. The disutility of effort, $V(e)$, is a differentiable function with the following properties: $V(0) = 0$, $V'(0) = 0$, $V'(e) > 0$, and $V''(e) > 0$.

Since I am interested in evaluating the effect of group lending on the probability of success of the borrowers' projects, rather than on the bank's profitability, I simplify the analysis by assuming a zero interest rate on loans.[7] I also assume that borrowers have a zero discount rate on future returns.

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[6] There is a high degree of homogeneity among group members in the Grameen Bank, insofar as most of them are essentially landless, rural inhabitants. Most of them are from the same socio-economic class with low levels of income and often only seasonally employed. There is some evidence that at least the chairperson of the group may be somewhat more productive due to greater experience. Bernasek (1990) models the implications of the possibility of the inexperienced learning from the experienced.

Consider the following options for a bank in lening one unit of money in two periods. It can lend it unrestricted in each period or interlink it between two borrowers. In both cases, I assume that the order of the loan recipients is arbitrarily decided.[8]

In the *unrestricted* case, the first borrower is advanced a loan of one unit which she invests in her project. The probability of success of the project depends solely on the effort invested by her in the project. The borrower then chooses the level of effort that she will invest in the project. If the project is successful and the loan is repaid, the second borrower gets the loan. The second borrower in turn invests her optimum level of effort in her project, which determines the probability of repayment of the second loan. Together, they determine the probability of recovery of the one unit of money by the bank in two periods.

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[7] While the Grameen Bank does impose a positive real interest rate, though below the opportunity cost of its funds (Hossain, 1988; Khandker Khalily and Khan, 1993), at least one other similar experiment, the Projek IKHTIAR in Malaysia, initially charged only a nominal administrative fee of 5% of the loan amount (Gibbons and Kasim, 1990, p. 3). In any case, with concessionary funds available to these development banks from governments and international organizations, the focus has been on the economic "discipline" of repayment, and on expanding clientele among the target group of landless.

[8] Removing this assumption would not change the outcome in terms of the probability of success of projects and that of loan recovery, as long as borrowers are homogeneous. However, in the case of interlinked loans, once the ordering of the borrowers is decided, the second borrower may have an incentive to discontinue with the loan program. This is because there may be some adverse welfare effects on the second borrower (section 4.2.5). This would happen only if the borrower has the option of getting a loan from another source, which is unlikely to be the case with Grameen Bank borrowers (section 4.2.4). The ordering of the loans may have greater importance when borrowers are not homogeneous. In this case, the ordering of loan recipients may affect both the probability of success of projects as well as the incentives faced by different borrowers. Further empirical investigation is required to understand the process of ordering of loan recipients by Grameen Bank groups, which appear to be fairly homogeneous.

In the *interlinked* case, the two borrowers are grouped together. They are informed that the bank will make individual loans to the two borrowers, but in a staggered fashion, and that the second borrower will get her loan only if the first repays. The sequence of the loans is then arbitrarily decided. The first borrower will invest the optimum level of effort in her project. But now the second borrower has some incentive to invest effort in the first borrower's project, in order to increase her own chances of receiving a loan.[9] The first borrower knows this and will thus take it into account when deciding on her own effort level. If the loan is repaid, the second borrower goes on to receive her loan. Because there is only one cycle in this model, the first borrower has no incentive to help the second, and so the second borrower decides on her own optimum effort level in her project.[10] Again, the probability of success of the two projects together determines the bank's probability of recovering the one unit of money.

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[9] Typically, Grameen Bank borrowers help each other out in project selection, in setting up of the projects and also assist each other when problems arise. Of course, group members also have an incentive to take some effort in making sure that the loan recipient himself is putting in enough effort in his project. As noted in chapter 3, according to Yunus (1982), groups have the capacity to exert ..."... the right kind of *peer pressure* at times when a member tries wilfully to violate Grameen Bank rules, and *peer support* at times when a member falls into any difficulty." (Italics mine). In this model, the effort invested by the second borrower into the first borrower's project can be thought of as a component of *peer support*.

[10] If there is more than one cycle of loans to the borrowers in a group, then of course, the first borrower has an incentive to invest some effort in the second borrower's project. The results in this chapter regarding the probability of recovering loans are only strengthened if repeated loans are introduced in the model.

4.2.2 Unrestricted (Individual) Lending

In the unrestricted case, the two borrowers are not known to each other. The bank arbitrarily decides on the sequence in which the loans will be advanced to the two borrowers. The second borrower knows that her probability of receiving a loan depends on the first borrower repaying her loan, but has no knowledge of who the first borrower is and therefore cannot in any way influence the probability of success of the first project. The unit of loan is advanced to borrower 1. If she repays, then the unit of loan is advanced to borrower 2. The expected utilities of the two borrowers are, therefore, as follows:

$$EU_1 = P(e_{11})R - V(e_{11})$$

$$EU_2 = P(e_{11})[P(e_{22})R - V(e_{22})]$$

Maximizing expected utilities of the two borrowers with respect to their effort levels yields the following two first order conditions:

$$\frac{\partial P}{\partial e_{11}}(e_{11})R = \frac{\partial V}{\partial e_{11}}(e_{11}) \qquad \text{...... (1)}$$

$$\frac{\partial P}{\partial e_{22}}(e_{22})R = \frac{\partial V}{\partial e_{22}}(e_{22}) \qquad \text{...... (2)}$$

While borrowers experience increasing disutility by increasing the effort level, there is also an increase in expected gain due to the higher probability of success of the loan financed projects. Each borrower puts effort into her own project up to the point where the marginal gain in expected return equals the marginal disutility of effort. The assumptions ensure that optimal U_1 and U_2 are positive. Equations (1) and (2) thus yield the unique effort levels $\tilde{e}_{11}$ and $\tilde{e}_{22}$. Since the two borrowers are identical it follows that $\tilde{e}_{11} = \tilde{e}_{22}$.

The first borrower's project is successful with probability $P(\tilde{e}_{11})$. Since the optimal effort level is the same for both borrowers, it follows that the probability of the second borrower's project being successful is $P(\tilde{e}_{22}) = P(\tilde{e}_{11})$. The bank's probability of recovering the one unit of loan, is therefore, $\tilde{\rho} = P(\tilde{e}_{22}) \cdot P(\tilde{e}_{11})$.

4.2.3 Interlinked (Group) Lending

In the interlinked case, the two borrowers are grouped together and the bank lends to the second borrower only if the first repays. Again, the sequence of loans is decided arbitrarily. Each borrower's optimization problem is, then, to find the optimal effort levels to be invested in one's own and the other person's project, given the other person's optimizing behavior. (Essentially, this means that we must find the Nash equilibrium in effort levels for the two person group).

Given the sequence of loans, an individual has an incentive to put some effort into the project that precedes hers if that increases the probability of success of that project, which in turn increases her own probability of receiving a loan. On the other hand, if there is no provision for a repeated sequence of loans, there is no incentive for an individual to invest effort in a project that follows her's.

The expected utilities of the two borrowers are as follows:[11]

$$EU_1 = P(e_{11} + e_{21})R - V(e_{11})$$

$$EU_2 = P(e_{11} + e_{21})\left[P(e_{22})R - V(e_{22})\right] - V(e_{21})$$

Maximizing U_1 with respect to e_{11} yields the following first order condition:

$$\frac{\partial P}{\partial e_{11}}(e_{11} + e_{21})R = \frac{\partial V}{\partial e_{11}}(e_{11}) \quad , \qquad \text{..... (3)}$$

which yields e_{11} as a function of e_{21}.

Maximizing U_2 with respect to e_{21} and e_{22} yields the following first order conditions:

$$\frac{\partial P}{\partial e_{21}}(e_{11}+e_{21})\left[P(e_{22})R-V(e_{22})\right]=\frac{\partial V}{\partial e_{21}}(e_{21}) \qquad \text{..... (4)}$$

$$\frac{\partial P}{\partial e_{22}}(e_{22})R=\frac{\partial V}{\partial e_{22}}(e_{22}) \qquad\qquad\qquad \text{..... (5)}$$

Equation (4) implies that e_{21} is a function of e_{11} and $\hat{e}_{22}$. Equation (5) yields $\hat{e}_{22}$

The assumptions ensure that optimal U_1 and U_2 are positive. Equation (3) says that the first borrower will put effort in the first project up to the point where the marginal gain in expected return (evaluated at joint efforts of 1 and 2) is equal to the marginal disutility of her effort. Equation (4) is the condition that, given 2's optimal effort in her own project in the second period, 2 will invest effort in 1's project up to the point where marginal gain in expected return due to the increased probability of getting a loan is equal to the marginal disutility of effort. Equation (5) gives us 2's optimal effort in her own project and that is determined independent of the effort that 2 puts into 1's project, because her project is undertaken only if 1's project is successful. Equations (3), (4) and (5) together yield the Nash equilibrium in effort levels: $\hat{e}_{11}$, $\hat{e}_{21}$ and $\hat{e}_{22}$. (See A.1 in the appendix (section 4.4), for a proof of the uniqueness of the Nash equilibrium). The assumptions ensure positive values for the optimal effort levels.

The first borrower's project is successful with probability $P(\hat{e}_{11}+\hat{e}_{21})$. The probability of success of the second borrower's project is $P(\hat{e}_{22})$. The bank's probability

of recovering the one unit of loan, in the interlinked case, is therefore,

$$\hat{\rho} = P(\hat{e}_{11} + \hat{e}_{21}) \cdot P(\hat{e}_{22}).$$

The question of interest is: Do we achieve a higher input of total effort for each project by interlinking the borrowers or by unrestricted lending? I show below that group interlinkage yields a higher level of total effort in the first project while the total effort in the second project is the same under both types of lending. This then results in a higher probability of loan recovery with group interlinkage. This is in spite of the fact that the first borrower invests a lower amount of effort in her own project, since the second borrower more than makes up for the decline in effort by the first borrower. This suggests that the second borrower may now be worse off, even as the first borrower's welfare increases. I discuss the welfare implications of interlinking in section 4.2.5 below.

PROPOSITION 1: The probability of recovery of the one unit of loan is higher with group interlinking. $\hat{\rho} \equiv P(\hat{e}_{11} + \hat{e}_{21}) \cdot P(\hat{e}_{22}) > P(\tilde{e}_{11}) \cdot P(\tilde{e}_{22}) \equiv \tilde{\rho}$.

Proof: First, note that $P(\hat{e}_{22}) = P(\tilde{e}_{22})$. With group interlinking, borrower 2's optimization in her own project is independent of her effort in 1's project. Therefore, equations (2) and (5) yield identical optimal effort levels. That is, $\hat{e}_{22} = \tilde{e}_{22}$, which implies that $P(\hat{e}_{22}) = P(\tilde{e}_{22})$.

Next I show that $P(\hat{e}_{11} + \hat{e}_{21}) > P(\tilde{e}_{11})$.

Assume the contrary: $\hat{e}_{11} + \hat{e}_{21} \leq \tilde{e}_{11}$.

This implies that $\dfrac{\partial P}{\partial e_{11}}(\hat{e}_{11} + \hat{e}_{21})R \geq \dfrac{\partial P}{\partial e_{11}}(\tilde{e}_{11})R$. (This follows from the assumptions on the

probability of success function).

It follows then, that $\dfrac{\partial V}{\partial e_{11}}(\hat{e}_{11}) \geq \dfrac{\partial V}{\partial e_{11}}(\tilde{e}_{11})$ (due to the assumptions on the disutility of effort

function), which implies that $\hat{e}_{11} \geq \tilde{e}_{11}$, (from equations 3 and 5).

Since $\hat{e}_{21} > 0$, this implies that $\hat{e}_{11} + \hat{e}_{21} > \tilde{e}_{11}$, which is a contradiction. Q.E.D.

Thus, by using group lending, the bank can enhance its probability of recovering a loan, when loan disbursement is staggered. This is achieved due to the incentive created on the second borrower to make an effort to increase the probability of success of the first project, even though she does not directly benefit from the returns of that project. Her benefit comes from the increased probability of receiving a loan. Staggered disbursement, thus, harnesses the effort of the group and improves the repayment ability of the group.

However, in the absence of repeated loans, the interlinking creates an adverse incentive on the first borrower, who decreases the amount of effort invested in her own project, due to the 'peer support' from her group member.

PROPOSITION 2: $\hat{e}_{11} < \tilde{e}_{11}$. In the interlinked case, borrower 1 invests less effort in her own project than she does in the unrestricted case.

Proof: Assume the contrary: $\hat{e}_{11} \geq \tilde{e}_{11}$.

Since $\hat{e}_{21} > 0$, this implies that $\dfrac{\partial P}{\partial e_{11}}(\hat{e}_{11} + \hat{e}_{21})R < \dfrac{\partial P}{\partial e_{11}}(\tilde{e}_{11})R$.

It follows then, that $\dfrac{\partial V}{\partial e_{11}}(\hat{e}_{11}) < \dfrac{\partial V}{\partial e_{11}}(\tilde{e}_{11})$.

This, in turn, implies that $\hat{e}_{11} < \tilde{e}_{11}$, which is a contradiction. Q.E.D.

The expected loan recovery rate improves with the use of group lending, due to the higher total level of effort invested in the first project. However, the first borrower actually invests less effort in her own project than she would have done under individual lending. This is because borrower 1 is aware that 2 has an incentive to help out in her

project and therefore she herself can cut back on her effort level, while still achieving a higher expected return compared to the unrestricted case. Staggered disbursement, when used in a group lending scheme, can thus create adverse incentives on some of the borrowers, causing them to work "less hard" than they would have under unrestricted lending.

PROPOSITION 3: $\hat{e}_{21} + \hat{e}_{22} > \hat{e}_{11}$. The total effort invested by borrower 2 (in project 1 and 2 together) is more than the total effort that borrower1 invests, in the interlinked case. Borrower 2 thus ends up investing more effort when loans are interlinked. That is, $\hat{e}_{21} + \hat{e}_{22} > \tilde{e}_{22}$

Proof: From proposition 1, we know that $\hat{e}_{22} = \tilde{e}_{22}$.

From sub-section 2.2, we know that $\tilde{e}_{11} = \tilde{e}_{22}$, which implies that $\hat{e}_{22} = \tilde{e}_{11}$.

We know from proposition 2 that $\hat{e}_{11} < \tilde{e}_{11}$.

It follows then that $\hat{e}_{21} + \hat{e}_{22} > \hat{e}_{11}$.

Since $\hat{e}_{21} > 0$, it also follows that $\hat{e}_{21} + \hat{e}_{22} > \tilde{e}_{22}$. Q.E.D.

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Borrower 2 ends up investing a greater amount of effort than borrower 1 does in the interlinked scheme. 2's expected return from the loan is, however, less than 1's. Staggered disbursement, though enhancing loan recovery, creates incentives among the group that may adversely affect some members of the group.

In the next sub-section, I explore the incentives a potential borrower may have to accept loans that are interlinked to others' in a group. The following section discusses the implications of staggered loan disbursement with group interlinkage on borrowers' welfare. In the concluding section, I discuss how some of the other features of Grameen Bank's group lending scheme help mitigate the adverse effect of staggered disbursement.

4.2.4 Borrower Incentives

Thus far I have addressed the question of the bank's preference over the two types of lending. But what of the incentives of the borrowers? Any analysis of interlinked loans must ask the question - what incentive would a borrower have to join a group and accept the risks involved in interlinked loans? There are at least two reasons why a borrower might want to accept such a lending scheme.

First, interlinked loans may be attractive when compared to normal unrestricted lending, if interest rates are lower and/or if it increases expected return enough to compensate for the additional burden of investing effort in another's project and for the

uncertainty of a loan if one is not the first among the group of borrowers. Evidence suggests that this is not the reason for the borrowers' willingness to accept interlinked loans. Interest rates for Grameen Bank loans are not lower than loans from the commercial banking sector. Expected returns of Grameen Bank financed projects are not very high.

Second, the biggest incentive for Grameen Bank borrowers to participate in interlinked loan programs is the fact that they have little prospect of other loans. Having almost no assets that can be used as collateral, most of the borrowers are effectively shut out from loans from the commercial banking sector. Their main alternative to the Grameen Bank is informal rural moneylenders. The effective interest rates charged in the informal credit sector in rural areas of Bangladesh tend to be considerably higher than those on Grameen Bank loans. Perhaps just as importantly, with informal moneylenders, the borrowers run the risk of losing whatever property or belongings they may own. While the formal credit sector may not accept household items and small pieces of land as collateral, informal moneylenders do (Basu, 1984). Borrowers from the Grameen Bank do not risk losing their belongings in the case of default. Thus, the lower interest rates and "limited liability" may offset the burden of investing effort in another's project and the uncertainty of receiving a loan due to staggered disbursement.

In Bangladesh (as in many developing countries) such a situation exists in rural credit markets. I have thus assumed in the model that borrowers do in fact have the incentive to accept loans with group interlinkage.

4.2.5 Welfare Implications

In this section I evaluate the welfare effects on the two borrowers when interlinked (group) lending is used, as compared to the unrestricted (individual) lending. In both cases, borrower 1 has a higher expected utility level than borrower 2 (see A.2 in the appendix (section 4.4) for a proof). This is, of course, due to the fact that while borrower 1 is certain of receiving a loan, the second borrower is less than certain of receiving one. Additionally, borrower 2 expends greater effort than borrower 1.

It is also found that borrower 1 is actually made better off by the use of interlinked lending while borrower 2 may be made worse off. Although borrower 2 may be made worse off, this is in relation to unrestricted (individual) loans. As discussed in section 4.2.4, most Grameen Bank borrowers do not have access to the commercial banking sector that makes unrestricted loans against physical collateral. Thus, while being second in the order of loans may be welfare decreasing, it may be better than the alternative of high-interest loans from the informal rural credit-markets. The incentive to join an interlinked lending program, is therefore not removed by being the second borrower.

PROPOSITION 4: The first borrower is better off in the interlinked case. That is, the expected utility of borrower 1 is higher with interlinked loans. $(\hat{U}_1 > \tilde{U}_1)$.

This obviously follows from propositions 1 and 2.

Borrower 2, on the other hand, may be made better or worse off (see A.3 in the appendix (section 4.4)). Thus, interlinked group lending may impose an inequitable burden on one of the borrowers, arising purely out of the arbitrariness of the sequencing decision. Repeated sequences of loans, practiced by the Grameen Bank, may help to reduce the negative effects of interlinking on the second borrower.

4.3 Conclusion

In this chapter, I have analyzed the effect of group lending on loan recovery rates when loan disbursement is staggered. In a two borrower model, I have shown that when borrowers are advanced loans in a sequence (that is, a borrower receives a loan only when another repays hers) a bank can enhance its probability of recovering its money if it uses group interlinkage when making loans. This is because borrowers in a group have an incentive to invest effort in a previous borrower's project in order to increase their own probability of receiving a loan.

It is found that in the two borrower group, the total effort (by borrower 1 and 2 together) invested in the project of the first borrower is greater than the optimal effort that borrower 1 would invest in her own project in the unrestricted case. This is in spite of the fact that borrower 1 reduces the amount of effort that she invests in the group lending scheme. Borrower 2, however, more than compensates for the reduction in effort by

borrower 1. This increases the probability of success of the first project. Even though the effort invested in the second project is the same as it would be under unrestricted (individual) lending, the bank's expected loan recovery rate is higher under the interlinked (group) lending.

This interlinking of borrowers is, however, found to have some adverse effects on the borrowers in the group. Due to the interlinking of the loans, the first borrower, knowing that the second borrower has an incentive to help her out, actually reduces her effort level in her own project, compared to the unrestricted (individual) scheme. Thus, while being the first borrower is better in both schemes, due to the certainty of receiving a loan, the first borrower is better off in the interlinked (group) scheme. This is because her expected return increases with interlinked (group) lending. Even as she reduces the amount of effort she invests in her project, the second borrrower more than compensates for the lost effort.

The second borrower on the other hand, may be made better or worse off. In this model, it was assumed that the order of loans is arbitrarily decided. The order of the loans, however, has important implications for the welfare of the borrowers in a group.

In the Grameen Bank, there are certain features that mitigate the adverse effect of staggered loan disbursement on the borrowers. In general, as long as groups repay their loans, repeat loans are guaranteed (as long as their accumulated assets are less than the bank's cut-off point for borrower eligibility).[12] This creates an incentive for even the first

borrower to invest effort in the second borrower's project (in order to get another loan), thereby increasing the probability of success of both projects, presumably until the last round of repeat loans. In chapter 5, I evaluate empirically the link between loan repayment and the number of rounds of loans that borrowers have received. The results are not conclusive. I find that the loan repayment rate is higher for branches with a greater proportion of first-time borrowers. With a panel data set of Grameen Bank branches, I find that the result is statistically significant when all observations are pooled together. However, a fixed effects estimate of the same data set, is not statistically significant.

The guarantee of repeat loans (at least for several cycles), along with the fact that loan sizes are small, may lower the probability of willful default, when borrowers are indeed able to repay. This is because the present value of gains from repaying increases with repeat loans. This, along with a high degree of supervision by bank staff[13] and "social penalties" (Besley and Coate, 1992) in the case of willful default, reduces borrowers' willingness to default when they are able to repay.

The model assumes that effort levels of different borrowers have the same effect on the probability of success of a project (additive effort in the probability of success function). While it is true that most borrowers have the same kind of expertise and

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[12] The Grameen Bank makes loans only to the "landless". It considers as landless all rural inhabitants with less than 0.5 acres of land, or with assets worth less than the value of 1.0 acre of medium-quality land. By this criteria, about half of Bangladesh's population of about 120 million people are potential borrowers. Loans are made, though, to only one member of each household.

[13] Chapter 5 contains an empirical investigation of the relationship between supervision of borrowers by the bank staff, and loan repayment rates.

background with respect to the projects undertaken, this assumption may be restrictive. It can be argued that the effort that a group member exerts in helping or monitoring the project owner is not necessarily the same type of effort that the project owner herself invests in her project. Therefore, its effect on the probability of success may not be the same.

A more complete analysis requires explicit modeling of the bank's objective function. While the Grameen Bank has striven to achieve a high loan recovery rate, it is implausible that this alone can be the bank's objective. At any rate, the high loan recovery has been attained at considerable cost to the bank in terms of monitoring effort by bank staff and interest rates below opportunity cost of funds (Hossain, 1988 ; Khandker, Khalily and Khan, 1993). Additionally, it is not clear if there is also a cost in terms of a reduction in borrowers' welfare.

The main result would be weakened if several of the assumptions made here are removed. Borrower involvement in activities other than the loan-financed projects, may cause them to invest less effort in these projects. Also, if borrowers discount future returns, this would affect their effort in the current period.

Finally, if borrowers are not identical, then the outcome on loan recovery rates need to be analyzed. Additionally, this has an implication on the sequencing decision for the bank. An arbitrary sequencing decision for the order of loans to borrowers may no longer be optimal for the bank.

4.4　Appendix

A.1 <u>Claim</u>:　The Nash equilibrium of the interlinked lending game is unique in effort levels.

<u>Proof</u>:　The assumptions ensure that $\hat{e}_{22}$ is unique.　It remains to be shown that $\hat{e}_{11} + \hat{e}_{21}$ is also unique.

Without loss of generality, assume that there exists another equilibrium $\widehat{e}_{11} + \widehat{e}_{21}$ such that $\widehat{e}_{11} + \widehat{e}_{21} > \hat{e}_{11} + \hat{e}_{21}$.

Equations (3) and (4) imply that $\widehat{e}_{11} < \hat{e}_{11}$ and $\widehat{e}_{21} < \hat{e}_{21}$.

It follows then that $\widehat{e}_{11} + \widehat{e}_{21} < \hat{e}_{11} + \hat{e}_{21}$, a contradiction.

The first order conditions ensure that $\hat{e}_{11}$ and $\hat{e}_{21}$ are unique. Q.E.D.

A.2 <u>Claim</u>: Borrower 1 is at least as well off as borrower 2 in the unrestricted case, and strictly better off in the interlinked case. That is, $\tilde{U}_1 \geq \tilde{U}_2$ and $\hat{U}_1 > \hat{U}_2$.

<u>Proof</u>: I evaluate each case in turn.

The unrestricted case

The expected utilities of the two borrowers are as follows:

$$\tilde{U}_1 = P(\tilde{e}_{11})R - V(\tilde{e}_{11}).$$

$$\tilde{U}_2 = P(\tilde{e}_{11})\left[P(\tilde{e}_{22})R - V(\tilde{e}_{22})\right].$$

Since $\tilde{e}_{11} = \tilde{e}_{22}$, it follows that $\tilde{U}_2 = P(\tilde{e}_{11})\cdot\tilde{U}_1$.

Since $P(\tilde{e}_{11}) \le 1$, it follows that $\tilde{U}_2 \le \tilde{U}_1$.

The interlinked case

The expected utilities of the two borrowers in this case, are as follows:

$$\hat{U}_1 = P(\hat{e}_{11} + \hat{e}_{21})R - V(\hat{e}_{11}).$$

$$\hat{U}_2 = P(\hat{e}_{11} + \hat{e}_{21})\left[P(\hat{e}_{22})R - V(\hat{e}_{22})\right] - V(\hat{e}_{21}).$$

From proposition 1, we have $\hat{e}_{11} + \hat{e}_{21} > \tilde{e}_{11}$.

Since $\hat{e}_{22} = \tilde{e}_{22} = \tilde{e}_{11}$, it follows that $P(\hat{e}_{11} + \hat{e}_{21})R > P(\hat{e}_{22})R$.

Since $\hat{e}_{11} < \tilde{e}_{11}$ (from proposition 2) and $\hat{e}_{22} = \tilde{e}_{11}$, it follows that $V(\hat{e}_{11}) < V(\hat{e}_{22})$.

This implies that $\hat{U}_1 > \left[P(\hat{e}_{22})R - V(\hat{e}_{22})\right] \ge 0$.

Since $P(\hat{e}_{11} + \hat{e}_{21}) \le 1$ and $V(\hat{e}_{21}) > 0$, it follows that $\hat{U}_2 < \hat{U}_1$.   Q.E.D.

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A.3 <u>Claim</u>: Borrower 2 may be made better or worse off in the interlinked case, compared to the unrestricted case.

<u>Borrower 2</u>

The expected utility of borrower 2 in the unrestricted case is $\tilde{U}_2$ where

$$\tilde{U}_2 = P(\tilde{e}_{11})\left[P(\tilde{e}_{22})R - V(\tilde{e}_{22})\right].$$

The expected utility of borrower 2 in the interlinked case is $\hat{U}_2$ where

$$\hat{U}_2 = P(\hat{e}_{11} + \hat{e}_{21})\left[P(\hat{e}_{22})R - V(\hat{e}_{22})\right] - V(\hat{e}_{21}).$$

Since $\tilde{e}_{22} = \hat{e}_{22}$, it follows that $P(\tilde{e}_{22})R - V(\tilde{e}_{22}) = P(\hat{e}_{22})R - V(\hat{e}_{22})$.

From proposition 1, we know that $P(\hat{e}_{11} + \hat{e}_{21}) > P(\tilde{e}_{11})$.

Since $V(\hat{e}_{21}) > 0$, it follows that $\hat{U}_2$ may be greater than, less than or equal to $\tilde{U}_2$.

Consider the two following examples:[14]

1. Let $P(e) = \dfrac{e}{1+e}$ and $V(e) = \dfrac{16}{27}e^3$

    Using these specific functional forms of $P(e)$ and $V(e)$, the optimal effort levels in the unrestricted and interlinked cases yields $\hat{U}_2 < \tilde{U}_2$.

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[14] Thanks to Dr. Hans Haller for providing these examples.

2.   Now consider the following example. For this example, let x represent effort and

e the Euler number.

Let $P(x)=1-e^{(-x)}$ and $V(x) = \dfrac{1}{2e}x^2$

Using these specific functional forms of $P(x)$ and $V(x)$, the optimal effort levels in

the unrestricted and interlinked cases yields $\hat{U}_2 > \tilde{U}_2$.

Thus borrower 2 may be made better or worse off by using group interlinkage.

Chapter 5

The Determinants of Loan Repayment in the Grameen Bank:

An Empirical Analysis

5.1 Introduction

It is by now widely accepted that the phenomenal success of the Grameen Bank's credit program can be explained by the very innovative institutional set-up used by the bank. What has not been clearly determined is the relative importance of the various facets of the bank's institutional set-up in its success. Explanations about the bank's success range from rigorous economic analysis of incentive structures in group lending to anecdotal explanations suggesting that "group solidarity" plays a major role in its success.

Although the hypotheses and conjectures abound, there have been few attempts to empirically test the various hypotheses. Most of the empirical studies of the Grameen Bank have analyzed the effectiveness of the bank's credit program in reducing the poverty level and improving living standards of its borrowers (Hossain, 1986, 1988; Khandker, 1993; Rahman, 1986). There have been some examinations of the extent of implicit subsidies involved in operating the bank, with a view to evaluating its financial and economic viability for sustained development in future and replicability in other countries (Khandker, Khalily and Khan, 1993, 1994, 1995; Yaron, 1992). But there have been no

empirical investigations of the various theoretical models of the incentive structure created by the bank -- that is, the use of self-selected groups, group lending, staggered loan disbursement, repeat loans, etc. -- to enhance loan recovery. There have also not been any systematic attempts to isolate the relative importance of group lending in achieving high repayment rates, compared to the importance of other socio-economic factors and factors relating to borrower characteristics and gender.[1]

In this chapter, I use data collected at the branch level of the Grameen Bank to determine if the variation in repayment rates across branches can be explained by the theoretical propositions discussed in the previous chapters. In particular, I wish to evaluate the relative importance of several socio-economic factors and certain incentive structures in their impact on the repayment rate. This is especially important in the light of evidence form certain other credit programs (notably the Badan Kredit Kecamatan[2] in Indonesia) that have managed to attain high repayment rates without using group lending, but by targeting borrowers similar to the Grameen Bank clientele (mostly poor, landless women).

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[1] On average, repayment rates are higher for loans to women, compared to those made to men. See table 5.1 for repayment rates as the proportion of loans to women varies.

[2] The Badan Kredit Kecamatan (BKK) in Indonesia makes loans mostly to women in rural areas. It does not require any kind of group involvement. The activities financed are small-scale off-farm activities. The BKK's loan repayment rate is about 80% (Yaron, 1992). While this rate is considerably lower than that of the Grameen Bank, it must be noted that the BKK uses a different definition of overdue loans than does the Grameen Bank. For the BKK, a loan is considered to be overdue if the last installment due has not been paid on time. For the Grameen Bank, however, overdue loans are those that have not been repaid one year after the original due date. Thus, by the Grameen Bank's calculation, the BKK would have a considerably higher repayment rate.

The empirical model used in this chapter specifically examines the following questions: Is there a link between gender and loan utilization and repayment? Women borrowers are characterized as more creditworthy by the bank and the Grameen Bank's new clients are almost exclusively women. I use the branch level data to examine whether the higher loan repayment rates of women borrowers is significant enough to be attributed to gender differences.

Can the high repayment rate be explained by the incentive structure created by the bank? In particular, the incentive for willful default may be lower for new borrowers compared to those who have already received several rounds of loans.[3] I examine whether repayment rates are significantly higher for branches with a greater proportion of new (first-time) borrowers. Another aspect of the incentive structure is the relatively small size of most general loans advanced to individual borrowers. (Collective and technology loans, given to groups as a whole or to entire centers tend to be large. House-building loans are also relatively large. General loans constitute the bulk of the loans advanced. The other types of loans are only given to long-time borrowers belonging to groups that have demonstrated good performance.) The incentive to willfully default may be high if individual loans are large. With the current small loans, borrowers may not find it worthwhile to default and forego the future stream of loans. Additionally, larger loans may involve projects that require a higher level of group monitoring than the group can

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[3] See chapter 3 for a discussion of incentives to default, in light of other literature.

provide. I test the data to examine whether the repayment rate declines significantly as average loan size increases.

A trip to any branch of the Grameen Bank immediately makes apparent to the visitor the high level of effort and energy expended by each member of the bank staff in monitoring the borrowers. The analytic literature in economics on the Grameen Bank's group lending has drawn little attention to this aspect of monitoring of borrowers. The focus of most analysis has been on peer monitoring by members of the borrowing group. In contrast to this, the institutional literature has drawn considerable attention to the role of the branch-level employees in the bank's success (see Fuglesang and Chandler, 1988; and Holcombe, 1995). I use the branch-level data to examine whether a greater number of bank employees per borrower, has a significant positive effect on the repayment rate.

The Grameen Bank has a plethora of rules and regulations that borrowers must abide by. These include training sessions prior to becoming a borrower, weekly meetings, and special "motivational" meetings, in addition to other requirements. I test the hypothesis that one aim of such time-consuming activities is to screen out borrowers with a high opportunity cost of time.[4] Since the bank is unable to perfectly screen out wealthier borrowers, they use these time-consuming activities so that the incentive for them to participate in Grameen Bank's loan program diminishes. By retaining borrowers who have a low opportunity cost of time (who are also the borrowers with fewer alternative opportunities), the bank is able to elicit a higher effort level in the loan-financed projects

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[4] See chapter 3 for a discussion of the link between borrowers' opportunity costs and group formation.

than would be the case with borrowers who have higher opportunity costs. Higher effort levels lead to higher probabilities of success of projects, leading to higher repayment rates. Of course, because of the possibly high positive correlation between ability and opportunity cost, the pool of borrowers selected are probably of lower ability. Other features such as staggered disbursement and repeat loans help to increase total effort invested in projects, mitigating some of the negative effects of choosing low opportunity cost borrowers. Using several variables from the data set as proxies for opportunity cost, I examine the data to see if the opportunity cost of borrowers has a significant impact on loan repayment.

This chapter is divided into 6 sections. In the next section, I discuss the various hypotheses to be tested. Section 5.3 is a brief description of the Grameen Bank branch-level data and the different variables available for use in the data set. Section 5.4 presents the empirical model to be tested and explains the methodology used. Some descriptive statistics are also presented in this section. The results of the regressions are presented in section 5.5. I conclude in section 5.6 with a discussion of the implications of the results and the limitations of this analysis. I also suggest a program of future empirical research aimed at understanding the importance and role of the borrowing groups in achieving the high repayment rates enjoyed by the Grameen Bank.

5.2 The Hypotheses to be Evaluated

The Grameen Bank's worldwide fame rests squarely on one fact, that it has consistently maintained a repayment rate of 97%, while lending to some of the poorest people in the world who have no physical collateral to offer against their loans. Remarkably, against all predicted odds, the repayment rate has stayed at this level even with continuous expansion of membership and coverage.[5]

Many have tried to explain the success of the bank as an exceptional case, dependent largely on the managerial abilities and charisma of its founder and managing director, Dr. Muhammad Yunus. It is difficult, however, to ignore the fact that other credit programs replicated along the same lines as the Grameen Bank, in different parts of the world, have met with similar success, maintaining exceptionally low default rates[6]. Common to all these different credit programs is the Grameen Bank's highly structured loan delivery and recovery mechanism. This includes very stringent screening to exclude all but the most needy landless villagers (mostly women) from its clientele.

The rules governing loan delivery and recovery, which have evolved over time, are strictly enforced by the bank staff. Exceptions are rarely made. This suggests that enforcing the myriad of rules and procedures may have played a role in achieving the high

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[5] As of January 1996, the Grameen Bank served 2,063,640 borrowers in 35,569 villages of Bangladesh. Thus, the bank's 1055 branches now have operations in over half of Bangladesh's 68,000 villages.

[6] Some of the other replications, (with repayment rates in parantheses), are Amanah Ikhtiar Malaysia (99.91%), Project Dungganon in Philippines (94.21%), Presidential Trust Fund in Tanzania (95%), Foundacion Contigo in Chile (98.8%), Microenterprise Loan Program in North Carolina, USA (86%), Community Credit Service in Sri Lanka (95%). The source for this information is Khandker, Khalily and Khan (1995). See appendix C for a list of some of the Grameen Bank replications in other countries.

repayment rates. These include initial training sessions, self-selected group formations, staggered loan disbursement, weekly meetings, weekly repayments, repeat loans, forced savings, insurance contributions, and educational, hygienic, environmental and social obligations.[7] Indeed, in offering advice for replication of the Grameen Bank, Yunus points out the importance of the rules in enforcing loan repayment and the central importance of the repayment rate in the Grameen Bank's operations:[8]

> The branch manager should not change any rules of procedure without clear permission from the person responsible to do so. This is necessary because it is always found that the branch managers and bank workers try to solve their problems by bending rules and procedures. Unless somebody tough oversees their activities, soon all the rules and procedures will be replaced by temporary rules and procedures.
>
> In replicating Grameen Bank one must remember right from the beginning that if the recovery is not near 100 per cent, no matter how good it looks, it is not Grameen Bank. All the strength of the Grameen Bank comes from its recovery performance. It is not merely the money which is reflected through the recovery rate , it is also the discipline which speaks loud and clear through the rate.

Some of the rules govern borrower behavior while others concern the size and type of loans that are given. Borrower behavior is regulated even before potential applicants become borrowers. In order to be eligible to be a borrower, a potential member

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[7] All borrowers of the Grameen Bank have to pledge to abide by the so called "Sixteen Decisions" manifesto. See appendix B for a list of the decisions.

[8] Excerpted from "Grameen Bank: As I see it" by Muhammad Yunus, p. 95, in "The Grameen Reader", edited by David Gibbons, 1992.

has to undergo observation and training, including seven days of continuous instruction to become conversant with the bank's rules and regulations. A potential borrower must participate in all training programs prior to being given a loan. Furthermore, borrowers must attend weekly meetings held in the presence of bank staff, even if they are not currently a loan recipient. In other words, borrowers must attend 52 weekly meetings a year. It is not enough that a borrower repays her loan. She must be physically present at the meetings to repay her own installments. In addition to these meetings, special meetings may be called in order to discuss various group matters. Occasional "motivational" meetings are also arranged by the bank staff when members of groups face difficulties in making their loan payments.

There are also strict rules governing the size and type of loans and repayment procedure. Each borrower is given a loan amount which is within a narrowly prescribed range. This range varies depending on the number of years a group has been in existence. Exceptions are not made to accommodate borrowers with abilities to absorb loans of different sizes. Collective, technology or house-building loans are never given to first time borrowers and are usually advanced only after a group has been in existence for several years, with all members performing satisfactorily in terms of their loan utilization and repayment. Borrowers are not allowed to repay loans early in order to get the next loan[9]. Loans are disbursed in a staggered fashion, so that everyone in a group does not receive a

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[9] Gibbons and Kasim (1990), note the difficulties faced by the Amanah Ikhtiar Malaysia, (a replication of the Grameen Bank), in the early stages of their credit program, when exceptions were made to these seemingly unnecessarily stringent rules (see chapter 2).

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loan at the same time. Repeat loans are not advanced to any member of a group until all borrowers have repaid their previous loans. (In chapter 4, I analyze the effect of staggered disbursement of loans on effort invested in projects. The chapter addresses the 'peer support' aspect of monitoring.)

Why are these group meetings, long training sessions, rules concerning type, size and timing of loans, so important to the Grameen Bank? I hypothesize that these institutional features, requirements and rules, play important roles in enhancing the bank's loan repayment rate, by helping to screen potential borrowers, by monitoring their behavior and by providing the "right" incentives for repayment. I investigate the significance of some of these institutional features in their effect on the repayment rate by evaluating data from a sample of Grameen Bank branches. Before moving onto an evaluation of the data, a discussion of these hypotheses is appropriate. They are discussed below.

Gender and Loan Repayment

The Grameen Bank has steadily increased its lending to women. In 1985, 65% of Grameen Bank borrowers were women. By January 1996, this number had increased to 94%. Three main reasons are put forward for the increase in lending to women. First, women are the poorest of the poor, and since the bank's objective is the socio-economic emancipation of the poorest, it follows that the bulk of the bank's clientele should be

women. Second, the Grameen Bank has reportedly found that the welfare of the borrower's family, and especially that of the children, is enhanced to a greater extent if the income from loan-financed projects is controlled by women rather than by their husbands. Finally, there is evidence that women's groups have higher repayment rates than men's groups[10]. A look at the repayment performance of men and women in all existing Grameen Bank branches in 1990 and 1991 show higher loan repayment rates for women. In 1990 with 781 branches in existence, the repayment rate for loans to women was 97% while the rate for men was 83%. The repayment rates for 1991, when the number of branches had increased to 915, was 95% for women and 77% for men. These differences in repayment justifies increased lending to women not just on social grounds but on economic grounds as well (that is, women have proved to be more creditworthy).

I use the data collected from the sample of Grameen Bank branches to test whether repayment rates are significantly higher for loans made to women, compared to those made to men. There is the possibility that the higher repayment rate for women can be explained by other factors correlated with gender. If there is indeed a significant difference in loan repayment rates between men and women, this would call for a rigorous analysis of the causes for this difference.

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[10] Almost all Grameen Bank staff interviewed by the author at the Konokdia branch in Patuakhali maintained that women managed the loans better, that they were better better organizers, and that they worked much better in groups, than their male counterparts.

Borrower Incentives and Loan Repayment

How do the incentives created by the institutional features of the Grameen Bank affect the repayment rate on loans? I explore the relationship between loan repayment and borrower incentives with respect to two particular features, the number of loans a borrower has received and the average size of a loan.

First-Time Borrowers

The Grameen Bank has been continually expanding its operations and attracting new borrowers. At the same time, older borrowers who have maintained proper repayment records have been advanced repeat loans of increasing size. Many borrowers over the years have successfully used loans to improve their standard of living and generate better business opportunities for themselves. As borrowers "mature", their dependence on Grameen Bank loans decrease in importance. Is there not, then, an increasing incentive for borrowers to default on their loans as the number of rounds they have participated in, increases?

One of Grameen Bank's stipulations (which appears not to be strictly enforced) is that borrowers who are able to increase their wealth and assets to a level above the maximum cut-off point to be considered "functionally landless"[11], must be phased out of the program. Presumably, this rule would create adverse incentives (for repayment) for a

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[11] The Grameen bank defines a landless person as one who owns no more than 0.5 acres of land or assets worth 1.0 acre of medium quality cultivable land.

borrower as he approaches the end of his borrowing cycles. In the last round of loans, a borrower would have no economic incentive to repay his loan.

There is some evidence (Hossain, 1988) to suggest that in fact repayment rates tend to drop off for older groups, which are also the groups with decreasing proportions of first-time borrowers. The introduction of new types of loans such as house-building and technology loans in the last few years, to long time borrowers, may help explain why repayment rates have not fallen off further over time. The new loans for longer term projects, and with presumably higher returns, may have decreased the incentive for borrowers to default even after several rounds of loans[12].

A look at Grameen Bank's "program-level" (that is, aggregates of all existing branches) data between 1985 and 1991 shows that branches with more than 30% first-time borrowers had an average repayment rate of 96%, while branches with less than 25% first-time borrowers had an average repayment rate of 93%. I use the available branch-level data to evaluate whether the proportion of new (first-time) borrowers has a significant impact on loan repayment rates.

Average Loan Size

It is widely believed that one of the main reasons that the Grameen Bank's credit program is able to achieve a high repayment rate is that its borrowers receive loans that

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[12] See chapter 2 for a description of the different kinds of loans and chapter 3 for a discussion of the incentives for borrowers to not default willfully.

are very small. Given the inability of assetless borrowers to secure loans from commercial banks, the borrowers have few alternatives in obtaining credit - moneylenders in the village and credit programs like those of the Grameen Bank. Since the interest rates on Grameen Bank loans are significantly lower than the rates charged by moneylenders, and since the bank guarantees repeat loans on repayment of a previous loan, there is little incentive to default. This is because the value of the small current loan is outweighed by the present value of returns from the expected future stream of loans. This line of reasoning, in keeping with game theoretic analysis, would suggest that the incentive to willfully default can be reduced by keeping the loan size small.

Larger loan sizes may also decrease the ability to repay loans. As Armendariz de Aghion (1994) argues, bigger loans may involve proportionately higher monitoring effort by group members, which may not be feasible. Thus, by keeping loan sizes small, the Grameen Bank not only reduces the incentive to willfully default but may also be enabling successful utilization of loans by keeping monitoring requirements by the borrowing group at a level that is feasible for the group.

The "program-level" data for all branches between 1985 and 1991 shows an average repayment rate of 95% for branches with average loan sizes of less than Taka 7,500 and a rate of 93% for branches with average loans of more than Taka 11,000. In this chapter, I use the branch-level Grameen Bank data to test whether loan repayment rates decline significantly as average loan sizes increase.

Monitoring and Loan Repayment

It is widely known that in addition to any peer monitoring that might exist among members of a Grameen Bank borrowers' group, bank staff spend considerable time and effort in supervising and monitoring borrowers. Bank workers are required to conduct weekly center meetings. They also take an active part in borrowers' project selection and regularly check-up on the progress of their projects. They are partially responsible for helping borrowers who have difficulties in making repayments[13].

The economic literature (as opposed to the institutional and sociological literature) on the Grameen Bank has thus far placed little emphasis on the importance of the bank staff's supervisory role in achieving high repayment rates. It has been widely assumed that the high repayment rates can be explained largely by peer monitoring. In a recent study, Jain (n.d.) suggests that:

> ...the credit policies of the bank do not constitute a sufficient explanation for the bank's success, and that its acclaimed policy of replacing individual collateral with group guarantee is in fact not practiced. The paper presents an alternate explanation for the success of the Grameen Bank .... it explains how Grameen Bank has been able to overcome typical problems of implementing development programs, *by sustaining good performance from its large work-force*. (Italics mine.) (p. 2.)

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[13] During my visit to the Konokdia branch in Patuakhali, I found that several bank staff used part of their weekends to "catch-up" on visits to struggling borrowers. The visit was considered important to "motivate" the borrowers. Motivation included components of both support and pressure. The bank staff themselves seemed under pressure to perform this task.

Anecdotal evidence collected by the author from a field trip to the Konokdia branch of the Grameen Bank, as well as interviews conducted with bank staff at both that branch and the head office, seem to suggest that the bank staff may indeed be instrumental in inducing the high repayment rates. How the bank is able to elicit this high level of effort from the staff is in itself a subject of study.

The "program-level" data shows that between 1985 and 1991, branches with less than 4 borrowers' centers per employee had an average repayment rate of 96%, while those with more than 4 centers per employee had a rate of 93%. I use the data from the Grameen Bank branches to test whether there is any significant difference in repayment rates between branches, arising from the difference in the number of borrowers that each employee must supervise. The assumption here is that bank employees are able to devote more time and effort to monitoring each borrower if they have a smaller "case load". Therefore, branches where employees have higher "case loads" would experience lower repayment rates.

Opportunity Cost of Time, Ability, and Loan Repayment

The next four variables are used to test the significance of the general conjecture that the Grameen Bank's loan repayment rate is strongly linked to the opportunity cost of time of the borrowers. I test the hypothesis that the loan repayment rate decreases as the opportunity cost of time (of the borrowers) increases.

The Grameen Bank's objective is to provide credit to the poorest of the poor in Bangladesh, especially to women. Unlike many other credit programs, including many government organized and subsidized credit programs, the Grameen Bank has scrupulously maintained its insistence on borrowers going through time consuming training, weekly meetings and other group activities. This has been the case regardless of the need for training (in bank affairs) and weekly attendance at meetings in order to repay loan installments. Attendance is required at every meeting by every borrower of a group, even if she is not currently a loan recipient. It is said that these activities promote group discipline and solidarity. It may well be the case, though, that these activities also play a role in weeding out those potential borrowers who are better off and have a high opportunity cost of time. The high cost of borrowing (in terms of time spent in required group and other activities), combined with the generally small loans and low-income activities for which the loans are given, may ensure that only the poorest have the incentive to join the borrowing groups.[14]

By screening out those with the higher opportunity costs and attracting those with only the lowest opportunity costs of time, the Grameen bank may also be ensuring a high repayment rate on its loans. This is because the borrowers with the lowest opportunity cost of time have the incentive to undertake the most effort in ensuring the success of their

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[14] Hossain (1988) found that fewer than 5% of borrowers have assets of value greater than the amount defined as the maximum amount to be considered functionally landless/assetless by the Grameen Bank. There is some anecdotal evidence that in recent years the proportion of non-target group borrowers has become higher, due to the inability to perfectly screen out those borrowers.

projects, since they have few other alternatives. By repaying their loans fully on time, they are ensured further new loans. Although a borrower's "ability" is likely to be positively correlated with opportunity cost, other features such as staggered disbursement and repeat loans may help to mitigate the adverse effects of selecting low opportunity cost borrowers. This is because staggering loan disbursement and giving repeated loans induces a higher level of effort, perhaps offsetting the effect of lower "ability".

In addition to the survey of Grameen Bank branches, the data set contains socio-economic, geographic and infrastructure-related information about the regions where these branches are located. Several of the variables in this data set also have a bearing on the opportunity cost of time of people in the area. They are indicators of economic development which are assumed to be positively correlated with opportunity cost. These variables then serve as a proxy for the opportunity cost of time of borrowers in each branch. I use the variables to determine the significance of the opportunity cost of time in its impact on loan repayment.

Distance to Greater District Headquarters

In general, in Bangladesh, distance from the headquarters of a district also have implications for commerce, employment opportunities, etc. As one moves farther away from district headquarters, there is a general falling off in the quality of services such as roads, postal service, health and schooling facilities, and for opportunities for banking, marketing, and commerce. Although distances may not be very great in absolute terms,

the absence of paved roads and the preponderance of rivers make travel and transaction costs high.[15] Thus, in many ways, as one gets farther away from district headquarters, one is less able to avail oneself of income earning opportunities. This includes employment opportunities as well as potential trading opportunities in bigger markets.

Therefore, as one gets farther away from district headquarters, the opportunity cost of time of potential Grameen Bank members decreases. This can be expected to make these borrowers better credit risks, since they have an incentive to devote more time and effort to projects financed by the Grameen Bank, given their lack of alternative opportunities. I test the hypothesis that branches located at greater distances from their respective district headquarters have significantly higher repayment rates.

Density of Electrification

The density of villages electrified raises the opportunity cost of time of potential borrowers. The presence of electricity greatly increases the employment opportunities for those in a village. This is because electricity makes possible the operation of many small-scale, rural, off-farm 'industrial' enterprises. This includes activities such as mechanized paddy husking, use of power looms, etc. Thus, the presence of electricity in a village can create employment for the landless who work part time as farm hands on others' land. The increased employment opportunity thus increases their opportunity cost of time.

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[15] For example, there are places as close as five miles from Dhaka, the capital, that are accessible only by boat and foot, and that may take up to an hour and a half to travel.

Because potential borrowers in villages that have been electrified may have incentives to devote less time and effort on their Grameen Bank projects, (due to the availability of alternative employment opportunities), I test the hypothesis that increasing electrification of villages significantly lowers repayment rates.

Density of Krishi Banks (government agriculture banks)

The government's network of Krishi[16] banks is used to channel credit to the agricultural sector in Bangladesh. While the Krishi banks do target small and large farmers, most potential Grameen Bank borrowers do not qualify for loans from the Krishi bank since they are for the most part landless, and Krishi banks require land or other assets as collateral. However, increased lending by the Krishi bank to farmers in a region leads to increased investment in farming and other agricultural activities and therefore an increase in the demand for farm labor. Many potential Grameen Bank members work part time as farm laborers.

Presumably, then, an increase in the financing of agricultural activities by the Krishi banks would increase the employment opportunities of potential Grameen Bank borrowers, thus increasing their opportunity cost of time. Since most Krishi bank loans go to men, the effect may not be very great on the opportunity cost of time of women. In keeping with my conjecture, I therefore test the hypothesis that the repayment rate on Grameen Bank loans decreases as the density of Krishi banks in the region increases.

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[16] The word 'krishi', in Bengali, means agricultural or related to agriculture and farming.

School Density and Loan Repayment

Access to schooling can increase a potential borrower's ability as well as her opportunity cost of time. Thus, there are two countervailing effects. While education increases a borrower's alternatives to the Grameen Bank, it can also make her more successful in utilizing Grameen Bank loans. Using the density of primary and secondary schools as a proxy for ability and experience, I test the data to determine the effect of changes in the density of primary and secondary schools in a region on loan repayment rates for Grameen Bank branches.

5.3 The Data

The data set used for this chapter was collected in a series of surveys of a sample of Grameen Bank branches by the World Bank and the Bangladesh Institute of Development Studies. A Grameen Bank branch is the smallest administrative unit of the bank and typically lends to borrowers in several neighboring villages. The data collected are year-end aggregates of each variable for each branch.

This panel data set spans the period 1985-1991 and consists of information on 140 branches. All of the branches were surveyed more than once, each branch being surveyed every year following the year when it was first surveyed. Because new branches were

added by the Grameen Bank over the years, the number of branches surveyed increases each year.

The data set includes information on loans disbursed, recovered, outstanding and overdue. This information is broken down by type of loans (i.e. type of activity for which the loan was disbursed)[17]. The data set also contains information on the number of borrowers, groups and centers as well as the gender of the borrowers, the borrowing round of the borrowers (i.e. whether first, second or third time borrower and so on), etc. Information is also available on the number of borrowers who have left their groups in a given year.

The Grameen Bank requires borrowers to save in a number of different accounts, including individual savings accounts, group funds, emergency funds, child welfare funds and other special funds. Branch-level information on these funds is available in the data set. The data also contain information on the number of employees in a branch as well as balance sheet items pertaining to a branch's expenditure, income, assets and liabilities. In

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[17] The most common type of loan is the 'general' loan. These are the individual loans given to members of a group to be used for any of a wide range of non-farm rural activities. 'Collective' loans are given to a group or a centre (which is a group of about five or six groups) jointly for some large scale activity such as a collective farming project where the entire centre (about 30 people) might lease in a plot of land for farming. 'Technology' loans are relatively new and are also given jointly for projects such as the installation of a lift pump or the purchase or hire of machinery for processing grain, etc. 'House-building' loans are given to enable borrowers to set up the basic foundations of a house (wooden pillars and a roof). These loans are to be repaid over a period of seven years. Collective, technology and house-building loans are usually given to borrowers and groups that have demonstrated the ability to use and repay 'general' loans for several rounds.

addition, there is information on the branch's location (identified by thana[18] and district), year of establishment, etc.

In addition to the branch-level Grameen Bank data, certain regional thana-level socio-economic, geographic, and infrastructure-related data were collected during the survey, from various secondary sources. This data set contains thana-level information for the areas where the branches are located. 225 thanas are covered in the data set. The geographic information includes the extent of rainfall and the distance of a certain thana from its district headquarters. There is infrastructural information on the density of roads and the density of villages electrified in the area. The socio-economic data includes the density of primary and secondary schools, and the density of Krishi and other banks in the area.

After the process of merging the two data sets (the Grameen Bank branch data and the socio-economic data), observations from 122 branches were retained. The sample includes 23 branches in 1985, 27 in 1986, 44 in 1987, 73 in 1988, 94 in 1989, 120 in 1990 and 122 in 1991. This includes 10% of the existing branches in 1985 and 1986, over 11% in 1987, over 14% of the branches in 1988 and 1989, over 15% in 1990, and 13% of the branches in 1991.[19]

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[18] A 'thana' is a governmental administrative unit comprising of several villages in a region. Literally, in Bengali, a thana is a police station. Usually, each thana has a police station, a post office, a civil service office, etc.

[19] The Grameen Bank had 226 branches in 1985, 295 in 1986, 396 in 1987, 501 in 1988, 641 in 1989, 781 in 1990, and 915 in 1991.

5.4 The Empirical Model

The following empirical model is used:

$$RR_{it} = \alpha_i + \beta_1 FLOANPRO_{it} + \beta_2 BORPRO1_{it} + \beta_3 EMPBOR_{it} + \beta_4 AVGL_{it} +$$

$$\beta_5 DISTDHQ_{it} + \beta_6 ELECDEN_{it} + \beta_7 KRBNKDEN_{it} + \beta_8 SCHDEN_{it} +$$

$$\beta_9 LOGAGE + \varepsilon_{it}$$

where,

RR	=	Repayment rate on loans in a given year.
FLOANPRO	=	Proportion of loans disbursed to female borrowers in the previous year.
BORPRO1	=	First-time borrowers as a proportion of the total number of borrowers in the branch, in the previous year.
EMPBOR	=	Number of bank employees per borrower, in the previous year.
AVGL	=	Average loan size in the previous year.
DISTDHQ	=	Distance to greater district headquarters.
ELECDEN	=	Villages electrified per square kilometer in the previous year.
KRBNKDEN	=	Density of Krishi banks in the previous year.
SCHDEN	=	Primary and Secondary schools per square kilometer in the previous year.
LOGAGE	=	Log of the age of the branch.
i	=	The i th Grameen Bank branch (i = 1, ..., 122).
t	=	The t th year (t = 1985, ..., 1991).

The reason for taking lagged values of all the explanatory variables, (except for distance to district headquarters which is time invariant, and the age of the branch), is the following. The Grameen Bank considers loans to be overdue only if they are overdue for more than one year. It is not possible from the data set to determine exactly when the overdue loans were disbursed. Some of them may have been disbursed 14 months earlier and some 20 months. As an approximation, I use the lagged values (from the previous year) of the explanatory variables since they are likely to be highly correlated with the actual values of the variables when the overdue loans were disbursed.

Using the model described above, I also test for differences in the impact of the explanatory variables on the repayment rates of men and women (RRF and RRM). To do this, I separate the repayment rates and other variables for men and women by branch and year, and then stack them together. Creating a dummy variable for gender, I am then able to create a nested equation with separate coefficients of each variable for men and women. This allows me to test whether the male and female estimated coefficients are significantly different from each other.

The branch level data set does not contain information on individual borrowers. All variables are aggregates for each branch surveyed. However, since the number of borrowers per branch is known, the data set yields information on averages per borrower for the branch. This information is available for male and female borrowers separately since the figures for borrowers, groups and centers are broken down by gender. Since the

amount of loans are broken down by borrower gender we can separate information on the loan repayment performance of male and female borrowers.

A Description of the Variables used and some Descriptive Statistics

The repayment rate, RR, is calculated by taking the amount of loans overdue as a proportion of outstanding loans for a given year. This gives the default rate. Subtracting the default rate from one gives the repayment rate. The female and male repayment rates (RRF and RRM, respectively) are determined by using the same variables, overdue and outstanding loans, for each gender.

FLOANPRO is the proportion of total loans disbursed by a branch that went to female borrowers, in the preceding year. Table 5.1 divides the observations of Grameen Bank branches into four categories depending on the proportion of total loans that went to women borrowers of a branch, in a given year. Using data from 1990 and 1991, the two years with the largest number of branches observed, I look at the relationship between the proportion of loans to women and the repayment rate. The average loan repayment rate is generally higher for branches that have a higher percentage of loans to women. As the table shows, branches with more than 90% of loans to women had a near perfect loan repayment rate.

Table 5.1

Repayment rates with varying proportions of loans to female borrowers

Proportion of Loans to Female Borrowers	Average Repayment Rate 1990	(No. of Branches) 1991
0% - 70%	87% (4)	91% (11)
70% - 80%	99% (4)	92% (4)
80% - 90%	91% (9)	88% (9)
90% - 100%	99% (103)	99% (98)

The BORPRO1 variable is the number of first-time borrowers in a given branch expressed as a proportion of the total number of borrowers in that branch, in the preceding year. Table 5.2 shows that branches (in 1990 and 1991) with a greater proportion of first-time borrowers also had higher repayment rates, on average. However, one should use caution when interpreting this information since branches that have a greater proportion of first-time borrowers are also relatively newer branches. Newer branches may have other reasons for better loan repayment performance, such as more extensive supervision and monitoring by bank staff, in the early stages of the establishment of a branch.

Table 5.2

Repayment rates with varying proportions of first-time borrowers

Proportion of First-time Borrowers	Average Repayment Rate 1990	(No. of Branches) 1991
0% - 25%	93% (28)	91% (4)
25% - 50%	98% (18)	99% (26)
50% - 75%	99.9% (20)	99.9% (19)
75% - 100%	99.9% (54)	99.9% (35)

The average loan size, AVGL, is determined by dividing the total amount of loans disbursed in the preceding year, by the number of borrowers. The corresponding variables for female and male borrowers are AVGLF and AVGLM, respectively. Table 5.3 shows the average loan repayment rates as average loan size varies. On average, repayment rates appear to be higher with smaller loans, although the rates are high for some of the larger loan ranges. Also, female repayment rates appear to be higher than male rates for a given loan size.

Table 5.3

Repayment rates with varying average loan sizes

Average Loan Size	FEMALE Average Repayment Rate		MALE Average Repayment Rate	
	1990	**1991**	**1990**	**1991**
Taka[20] 0 - 4000	99.8% (55)	99.6% (55)	98.4% (10)	98.8% (12)
Taka 4000 - 8000	94.3% (14)	99.3% (26)	80% (9)	92% (10)
Taka 8000 - 12000	92% (15)	91% (20)	92% (7)	76% (4)
Taka 12000 - 16000	100% (3)	89% (6)	98.8% (2)	64% (1)
Taka 16000 & above	99.6% (33)	94% (15)	99% (20)	89.5% (23)

Note: The figures in parentheses are the number of branches in each case.

The decline in average repayment rates with larger loans may be linked to difficulties in managing loans of large sizes (Armendariz de Aghion, 1994), or to a greater incentive to default as future loans from Grameen Bank become less attractive, compared to alternative opportunities generated by the borrowers' enhanced income and business capabilities (see chapter 3).

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[20] Taka is the currency used in Bangladesh. The exchange rate currently (in 1996) is approximately Taka 40 = U.S. $ 1.

Table 5.4

Repayment rates with varying no. of Branch Level Employees per Borrower

Number of Branch Level Employees per Borrower	Average Repayment Rate 1990	(No. of Branches) 1991
Less than 0.01	96.6% (64)	96% (89)
0.01 - 0.015	99.9% (14)	99% (19)
0.015 - 0.02	100% (8)	100% (4)
0.02 - 0.025	100% (2)	----
More than 0.025	99.9% (32)	99.9% (10)

EMPBOR is the number of bank employees per borrower of a branch, in the preceding year. Each bank assistant (branch-level field staff) is responsible for the supervision of several centers. A center is composed of five or six groups (or an average of about 25 to 30 borrowers). It is assumed that as a staff member's load of borrowers increases, he is less able to properly monitor and supervise each borrower. Thus, the EMPBOR variable is used as a proxy to capture the intensity with which a bank employee can monitor borrowers under his supervision. Table 5.4 shows the repayment rates for

several categories of branches. The categorization of branches is by the number of branch level employees per borrower. Repayment rates appear to increase with greater number of employees per borrower, although the rates are high for all the categories.

Several geographic, socio-economic and infrastructure-related variables are used in the empirical model. DISTDHQ is the distance from the thana where a Grameen Bank branch is located to the greater district headquarters. The number of electrified villages per square kilometer of the thana in the preceding year is the variable ELECDEN. KRBNKDEN measures the preceding year's density of Krishi banks in the region where a Grameen Bank branch is located. Krishi (which literally means agricultural in Bengali) banks are government owned banks which channel loans specifically for rural agricultural projects. SCHDEN is the preceding year's density of primary and secondary schools per square kilometer in the region.

Table 5.5 lists the average repayment rate for branches located at varying distances from their respective greater district headquarters (DISTDHQ). The repayment rate, on average, is higher for more remote branches. Branches located at a distance of more than 100 kilometers from their district headquarters have an almost perfect repayment rate.

Table 5.5

Repayment rates for varying distance from district headquarters

Distance of Branch from District Headquarters	Average Repayment Rate 1990	(No. of Branches) 1991
50 km or less	96% (50)	94% (59)
50 - 100 km	99% (27)	99% (31)
100 - 150 km	100% (8)	99.7% (16)
More than 150 km	99.9% (35)	99.9% (16)

Table 5.6

Repayment Rates for varying densities of village electrification

Villages Electrified per square kilometer	Average Repayment Rate 1990	(No. of Observations) 1991
less than 0.2	97% (74)	96% (81)
0.2 - 0.4	99% (8)	97% (18)
0.4 - 0.6	100% (4)	99% (9)
0.6 - 0.8	100% (5)	96.5% (6)
more than 0.8	99.9% (29)	99.9% (8)

Table 5.6 lists the repayment rates for branches located in regions with different densities of electrification of villages (ELECDEN) in the preceding year. A majority of branches were located in regions with less than 0.2 villages electrified per square kilometer. The variation in repayment rates for the different categories is not very great.

Table 5.7

Repayment rates for varying densities of Krishi banks in the region

Krishi Bank Density	Average Repayment Rate	(No. of Branches)
	1990	1991
less than 0.008	97.9% (45)	96.6% (61)
0.008 - 0.016	97% (32)	96.4% (36)
0.016 - 0.024	97.3% (13)	97.5% (15)
greater than 0.024	99.9% (30)	99.9% (10)

Table 5.7 shows the repayment rates for branches located in regions with varying densities of Krishi banks (KRBNKDEN). There appears to be little variation in repayment rates as the density of Krishi banks vary, although the rate comes closer to 100%, as the density increases.

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Table 5.8 below shows the repayment rates for branches located in regions with varying densities of primary and secondary schools per square kilometer (SCHDEN). Repayment rates appear to increase as school densities increase, and come closer to 100% as the density approaches one school per square kilometer. The bulk of the branches are located in regions which have 0.3 to 0.9 schools per square kilometer.

Table 5.8

Repayment rates for varying densities of primary and secondary schools

Primary and Secondary Schools per square km	Average Repayment Rate 1990	(No. of Branches) 1991
less than 0.3	95% (15)	90% (15)
0.3 - 0.6	97.4% (56)	97.3% (73)
0.6 - 0.9	99.8% (22)	98.8% (27)
greater than 0.9	99.9% (27)	99.9% (7)

Finally, table 5.9 shows the average repayment rates for branches of different ages in 1990 and 1991. The repayment rate appears to decline markedly for older branches in 1991. Branches that are more than six years old have repayment rates under 90%.

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Table 5.9

Repayment Rates for Branches of different Ages

Age of the Branch	Average Repayment Rate 1990	(No. of Branches) 1991
less than 2 years	99.9% (24)	99.2% (1)
2 to 4 years	99.9% (49)	99.9% (50)
4 to 6 years	99.2% (16)	99.9% (36)
6 to 8 years	92.8% (28)	89.8% (24)
more than 8 years	97.5% (3)	88% (11)

Given the nature of the panel data, I perform several different regressions to examine the relationship between the variation in repayment rates across Grameen Bank branches and the aforementioned variables. I begin with *OLS* regressions on cross-sections for 1990 and 1991 (the two years for which a large number of observations are available). I then pool together observations from 1985 through 1991 and run an OLS regression. In order to control for branch-specific heterogeneity, I also perform and compare *fixed effects* and *random effects* regressions. Finally, I perform regressions on the repayment rates of men and women. The two are nested in the same regression to allow for comparisons of possible differences in the effect of the explanatory variables on repayment rates for men and women.

5.5 Regression Results

Table 5.10 below provides the summary statistics for all the independent and dependent variables used in the regressions. Table 5.11 gives the coefficients for the correlation between the variables.

Table 5.10
Summary Statistics

Variable	N	Mean	Std. Dev.	Minimum	Maximum
RR	503	0.98	0.066	0.51	1.00
RRF	503	0.98	0.070	0.31	1.00
RRM	196	0.94	0.148	0.12	1.00
FLOANPRO	371	0.93	0.144	0.04	1.00
BORPRO1	371	0.53	0.363	0.00	1.00
AVGL	371	5.418	5.26	0.259	40.014
AVGLF	371	5.834	8.25	0.247	79.381
AVGLM	135	10.634	14.62	0.370	91.824
EMPBOR	371	0.0116	0.012	0.0033	0.086
DISTDHQ	370	57.08	44.89	0.00	193.00
ELECDEN	370	0.126	0.195	0	0.946
KRBKDEN	368	0.008	0.006	0	0.026
SCHDEN	370	0.472	0.180	0.077	0.95
AGE	503	3.37	2.036	1.00	12.00

Note: RR, RRF, RRM, FLOANPRO and BORPRO1 are expressed as proportions.
AVGL, AVGLF and AVGLM are in thousands of Takas. DISTDHQ is in km.
ELECDEN, KRBKDEN and SCHDEN are densities expressed per square km.

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Table 5.11
Correlation Coefficients

Varia-bles	RR	FLOA NPRO	BOR PRO1	AVGL	EMP BOR	DIST DHQ	ELEC DEN	KRBN KDEN	SCH DEN
RR	____	0.20	0.24	-0.13	0.11	0.15	-.002	-0.11	0.18
FLOA NPRO	0.20	____	0.30	-0.23	0.13	0.26	-0.09	0.25	-0.15
BORP RO1	0.24	0.30	____	-0.49	0.27	0.35	0.20	0.17	-0.19
AVGL	-0.13	-0.23	-0.49	____	-0.12	-0.30	-0.13	-0.33	0.22
EMP BOR	0.11	0.13	0.27	-0.12	____	0.05	0.20	0.05	-0.09
DISTD HQ	0.15	0.26	0.35	-0.30	0.05	____	0.02	0.36	-0.47
ELEC DEN	-0.002	-0.09	0.20	-0.13	0.20	0.02	____	0.02	0.29
KRBN KDEN	-0.11	0.25	0.17	-0.33	0.05	0.37	0.02	____	-0.27
SCH DEN	0.18	-0.15	-0.19	0.22	-0.09	-0.47	0.29	-0.27	____
AGE	-0.35	-0.32	-0.64	0.56	-0.06	-0.24	-0.16	-0.27	0.04

The summary statistics in table 5.10 show that the average repayment rate for women is slightly higher (98%, compared to 94% for men). On average, women received

about 93% of all loans. More than half the total number of borrowers were first-time borrowers. Interestingly, the average size of loans to men was significantly higher than for loans to women (taka 5,834 for women and taka 10,634 for men). The average number of years that a branch had been in existence was 3.37 years.

Table 5.12 presents the results for the regressions on the overall repayment rates. I first look at the cross-sectional *OLS* regressions. Increase in the proportion of loans to women appears to have a positive effect on repayment rates in both years (significant at 5.5% and 6.5% for 1990 and 1991 respectively). For both years, the proportion of first-time borrowers and the average loan size do not appear to have statistically significant effects on the repayment rate. The employee-borrower ratio also does not appear to significantly affect repayment rates, although the effect is negative for 1991, counter to our intuition. Distance from district headquarters has the expected positive effect for both years but is significant only for 1991. The density of electrification does not appear to have a statistically significant effect in either year. Increased density of Krishi banks appears to have a significant negative effect on repayment rates in 1990 and 1991 (at 9%). School density has a positive effect in both years, although for 1990 the significance level is 8%. Age of the branch appears to have a statistically significant negative effect for 1991. For 1990, the effect is negative but not statistically significant. The cross-sectional data appears to support the hypotheses about the effect of opportunity cost and ability in explaining the variation in repayment rates. Except for the density of electrification, the

Table 5.12
Regression Results
Dependent Variable: Loan Repayment Rate (RR)

Variable	OLS (1990)	OLS (1991)	OLS (Pooled)	Fixed Effects	Random Effects
Proportion of Loans to Women	0.13 (1.95)	0.12 (1.86)	0.12 (3.95)	0.09 (1.37)	0.12 (3.95)
Proportion of First-time Borrowers	0.01 (0.29)	0.028 (0.71)	-0.0002 (-0.016)	-0.004 (-0.22)	-0.0002 (-0.016)
Average Loan Size	0.0014 (0.672)	-0.0003 (-0.147)	-0.0003 (-0.37)	-0.0005 (-0.36)	-0.0003 (-0.37)
No. of Bank Employees per Borrower	0.047 (0.06)	-2.05 (-1.527)	-0.59 (-1.86)	-0.956 (-2.39)	-0.59 (-1.86)
Distance from District Headquarters	0.0002 (1.31)	0.0003 (2.003)	0.0002 (2.44)	dropped	0.0002 (2.44)
Density of Villages Electrified	0.0005 (0.012)	-0.009 (-0.22)	-0.03 (-1.47)	-0.014 (-0.12)	-0.03 (-1.47)
Density of Krishi Banks	-2.615 (-2.062)	-2.38 (-1.71)	-1.85 (-3.04)	3.54 (1.17)	-1.85 (-3.04)
Density of Primary and Secondary Schools	0.09 (1.77)	0.14 (2.62)	0.09 (3.90)	-1.13 (-1.73)	0.09 (3.9)
Log of Age of Branch	-0.47 (-1.32)	-0.06 (-2.07)	-0.06 (-3.6)	-0.063 (-2.19)	-0.55 (-3.6)
Constant	0.86 (8.54)	0.88 (9.52)	0.90 (20.76)	-------	------
F Value	2.84	5.02	12.38	2.10	111.38 (chi-sq)
R sq.	0.24	0.30	0.24	0.53	0.24
Adjusted R sq.	0.15	0.24	0.22	0.28	--
No. of Observations	92	115	368	368	368

Note: The numbers in parentheses are *t*-statistics except for the random effects model, for which they are asymptotic z-statistics.

other variables used to represent opportunity cost - distance from district headquarters, the density of Krishi banks - show the expected impact. The density of schooling has a significant positive effect supporting our conjecture that the increased ability resulting from increased access to schools may outweigh the negative effect arising from increased opportunity cost as a result of more schools. The results also suggest that the average loan size and number of loans received may not play a significant role in explaining variations in the repayment rate.

The *OLS* regression on the pooled data (covering branches surveyed from 1985 to 1991) also show a statistically significant positive relationship between the proportion of loans to women and the repayment rate on loans. Increase in the bank employee-borrower ratio appears to have a negative effect (significant at 7%) on the repayment rate. This is counter to the expected positive effect. As expected, distance from district headquarters has a statistically significant positive effect. Increased presence of Krishi banks and the density of schools have statistically significant effects. The effect is in the predicted direction for Krishi banks. For school density, it appears that the positive effect of increased ability outweighs the negative effect of increased opportunity cost, as in the two cross-sectional regressions. The age of a branch appears to have a statistically significant negative effect. The incentive variables, proportion of first-time borrowers and average loan size do not appear to have significant effects on the repayment rate. The density of electrification also does not appear to have a statistically significant effect.

The pooled regression thus appears to reinforce the results from the cross-sectional ones. Branches with a greater proportion of loans to women have higher repayment rates. Branches located further from the district headquarters have higher repayment rates, suggesting that a low opportunity cost of time may explain the better repayment performance. Branches situated in thanas with a greater density of Krishi banks have lower repayment rates, reinforcing the hypothesis that increased opportunity costs lead to lower repayment rates. The positive effect of schooling continues to suggest that any possible negative effect of increased opportunity cost is outweighed by the positive effect of increased ability. The negative effect of the age of a branch may have several interpretations. One possible explanation is that newer branches that are under pressure to prove themselves perform more intensive monitoring in the early stages and are therefore able to achieve a better repayment performance. (Although it would be tempting to assume that the lower number of borrowers in newer branches allow for more intensive monitoring, the results thus far point to an insignificant or negative affect of higher employee-borrower ratios, on repayment.) It is also possible that branches recruit the "best" borrowers first and as they get older they move from good to more marginal borrowers.

There is yet the possibility that these results are affected by unobserved branch-specific variables. If these unobserved variables are correlated with any of the explanatory variables, then the above results may be misleading. For example, it is likely that the influence of management and organization at the branch-level on the repayment

performance of borrowers, varies across branches. In order to control for this possibility of heterogeneity arising from unobserved variables, I perform *fixed effect* (FE) and *random effect* (RE) regressions and compare the results with those above. Table 5.12 contains the results.

Both the FE and RE regressions continue to show a positive relationship between the proportion of loans to women and the repayment rate. However, in the FE regression this is not significant. The "incentive" variables (proportion of first-time borrowers and average loan size) continue to appear statistically insignificant in both the regressions. As in the pooled *OLS* regression the proportion of bank employees to borrowers appears to have a statistically significant but (unexpectedly) negative effect in both FE and RE regressions. Distance from headquarters is dropped from the FE regression because it is time invariant. In the RE regression however, it continues to have a statistically significant positive effect on repayment, as expected. The density of electrification continues to be statistically insignificant, although it is significant at the 14% level in the RE regression. The effect of the density of Krishi banks in the region appears to have a statistically significant negative effect, as expected, only in the RE regression. The density of schools appears to have a significant positive effect in the RE regression. In the FE regression however, the effect is negative, although not significant at 5%. The age of the branch continues to have a significant negative effect in both the FE and RE models.

The FE and RE regression results on the whole appear to support the previous results of the OLS regressions. The "opportunity cost" variables, distance from district

headquarters and density of Krishi banks, appear significant in their effect on repayment rates while the "incentive" variables (proportion of first-time borrowers, average loan size) have statistically insignificant effects in all the regressions. For several variables, the RE regression yields statistically significant results where the FE model does not. In order to check the validity of using a random effects model, I perform a Breusch and Pagan Lagrange multiplier test (Breusch and Pagan 1980; Baltagi and Li 1990) for random effects. The result supports the contention that these unobserved effects are present. The Hausman specification test (Hausman 1978), however, finds that the difference between the FE and RE estimates may be systematic. This suggests that the random effects may be correlated with the other regressors. The FE model may therefore provide more reliable results.

Comparison of Male and Female Borrowers

In order to compare the possibly different impacts that the explanatory variables may have on men and women, I run regressions on male and female repayment rates. The two, however, are nested together in one model and I use a gender dummy variable to estimate coefficients for men and women separately. I then test to see if the coefficients for each variable are significantly different for men and women. The results are presented in table 5.13.

Table 5.13
Regression Results (continued on next page)
Dependent Variable: Female and Male Loan Repayment Rates (RRF and RRM)

Variable	OLS (1990)	OLS (1991)	OLS (Pooled)	Fixed Effects	Random Effects
Gender Dummy (1=women) (0=men)	-0.26 (-0.8)	-0.16 (-0.74)	0.0028 (0.024)	-0.0128 (-0.107)	0.0028 (0.024)
Proportion of Loans to Women (Female coefficient)	0.137 (1.31)	0.104 (1.40)	0.108 (2.53)	0.04 (0.54)	0.109 (2.53)
(Male coefficient)	0.014 (0.11)	0.09 (0.76)	0.116 (2.06)	0.06 (0.70)	0.116 (2.056)
Proportion of First-time Borrowers (Female coefficient)	0.012 (0.23)	0.028 (0.59)	-0.06 (-0.25)	-0.013 (-0.48) **	-0.0057 (-0.249)
(Male coefficient)	0.009 (0.05)	0.164 (1.93)	0.06 (1.17)	0.08 (1.55)	0.056 (1.167)
Average Loan Size (Female coefficient)	0.00006 (0.046)	-0.0018 (-1.33)	-0.0005 (-0.70)	-0.0009 (-1.026)	-0.0005 (-0.70)
(Male coefficient)	0.0018 (1.065)	0.0002 (0.22)	0.0006 (0.89)	-0.0003 (-0.486)	0.0005 (0.887)
No. of Bank Employees per Borrower (Female coefficient) *	0.124 (0.104)	-1.87 (-1.14)	-0.634 (-1.40)	-0.98 (-1.82)	-0.634 (-1.40)
(Male coefficient)	19.73 (2.78)	-4.40 (-0.53)	3.83 (1.03)	-3.08 (-0.74)	3.826 (1.032)
Distance from District Headquarters (Female coefficient)	0.0002 (0.86)	0.0003 (1.445) **	0.0002 (1.736) **	dropped	0.0002 (1.736) **
(Male coefficient)	0.0009 (1.684)	0.0011 (2.82)	0.0006 (2.85)		0.0006 (2.85)

Note: The numbers in parentheses are *t*-statistics except for the random effects model, for which they are asymptotic z-statistics. * Male and Female coefficients are statistically significantly different at 5%. ** Male and Female coefficients are statistically significantly different at 10%.

Table 5.13 (continued)
Regression Results
Dependent Variable: Female and Male Loan Repayment Rates (RRF and RRM)

Variable	OLS (1990)	OLS (1991)	OLS (Pooled)	Fixed Effects	Random Effects
Density of Villages Electrified (Female coefficient)	-0.004 (-0.065)	-0.214 (-0.45)	-0.025 (-0.85) *	0.06 (0.40)	-0.024 (-0.85) *
(Male coefficient)	0.205 (0.98)	-0.76 (-0.91)	-0.15 (-2.85)	-0.001 (-0.008)	-0.15 (-2.85)
Density of Krishi Banks (Female coefficient)	-2.54 (-1.32) *	-2.49 (-1.49) *	-1.96 (-2.26) *	5.65 (1.38) **	-1.96 (-2.26) *
(Male coefficient)	-29.75 (-5.91)	-14.62 (-3.89)	-8.58 (-4.57)	1.70 (0.37)	-8.58 (-4.57)
Density of Primary & Secondary Schools (Female coefficient)	0.099 (1.304)	0.144 (2.32) *	0.093 (2.74) **	-0.455 (-0.638)	0.09 (2.74) **
(Male coefficient)	0.039 (0.32)	0.383 (4.00)	0.209 (4.04)	-0.40 (-0.56)	0.21 (4.04)
Log of Age of Branch (Female coefficient)	-0.328 (-0.69)	-0.048 (-1.32) *	-0.06 (-2.86)	-0.09 (-2.66)	-0.06 (-2.86)
(Male coefficient)	-0.14 (-1.30)	-0.21 (-3.40)	-0.12 (-3.41)	-0.125 (-2.64)	-0.12 (-3.41)
Constant	1.10 (3.95)	1.05 (5.46)	0.926 (9.52)	--------	--------
F Value	4.10	5.33	8.42	2.60	160.05 (chi-sq)
R sq.	0.43	0.42	0.25	0.50	0.25
Adjusted R sq.	0.32	0.36	0.22	0.30	--
No. of Observations	125	157	504	504	504

Note: The numbers in parentheses are *t*-statistics except for the random effects model, for which they are asymptotic z-statistics. * Male and Female coefficients are statistically significantly different at 5%. ** Male and Female coefficients are statistically significantly different at 10%.

Comparing the cross-sectional regressions for 1990 and 1991, we find the following. The effect of the proportion of loans to women appear to not be significant for the repayment rate of either men or women. In 1991, the proportion of first-time borrowers appear to have a statistically significant positive effect on men but not on women. This result is interesting. The previous regressions did not separate the impacts of the variables on the repayment rates of men and women. By separating the two, I find that the number of rounds of loans may have an impact on male repayment rates. This would be in keeping with the discussion in chapter 3 on borrower incentives. Men receive larger loans on average, and also have more alternative opportunities if they default and therefore may also have more incentive to default once they have received several rounds of loans. In 1990, the proportion of employees to borrowers appears to have a significant positive effect on men. The distance from the district headquarters has a statistically significant positive effect for men in both 1990 (at 10%) and 1991. The presence of Krishi banks has a statistically significant negative effect for men in both years. The density of schools appears to have a statistically significant positive effect for both men and women in 1991, but not in 1990. The age of the branch continues to have a negative effect, although it is significant only for males in 1991. The effect of the other variables do not appear to affect repayment in a statistically significant way. Tests to evaluate whether the male and female coefficients are statistically significantly equal provide the following results. The coefficients for the Krishi bank appear to be significantly different for men and women in both years. The coefficients for distance from district headquarters are

different for men and women in 1991, and the coefficients for employee-borrower proportion are significantly different in 1990. These tests combined with the results seem to reinforce the hypothesis that repayment rates may be affected by the opportunity cost of time of the borrowers (note that the statistically significant results are for the opportunity cost variables, distance from district headquarters, density of Krishi banks). More interesting are the results that the distance from headquarters and the density of Krishi banks have a more significant impact in the case of men. As discussed earlier in chapter 3, women are more constrained in their mobility for social and economic reasons. Men are the primary recipients of Krishi bank loans. It thus follows that both distance from district headquarters and the density of Krishi banks have a greater impact on the opportunity cost of time for men rather than for women.

The OLS regression on the pooled (1985-1991) data provides the following results. The proportion of loans to women appear to have a statistically significant positive effect on the repayment rate for both men and women. The distance from district headquarters continues to show a statistically significant positive effect for men and significance at 9% for women. The density of electrification has a statistically significant negative effect for men. The density of Krishi banks continue to have a significant negative effect for both men and women, the density of schools a positive effect, and the age of the branch a negative effect. Again, joint tests on the coefficients show that the opportunity cost variables have a significantly different effect on men and women. The coefficients on the density of electrification, schools (at 6%) and Krishi banks appear to be

statistically significantly different for men and women. The coefficient for the distance from the district headquarters is also statistically different at the 10% level. The pooled data suggests that in addition to the variables that appeared to be significant in the cross-sectional analysis, the density of electrification raises the opportunity cost of men (again consistent with observed differences in mobility and employment opportunities for men and women). It also suggests that both men and women are positively affected by increase in the density of schools. This is consistent with the conjecture discussed earlier in section 5.2 and supported by the regression results on the overall repayment rate, that the positive effect of increased ability due to increased availability of schools more than compensates for the negative effect of increased opportunity cost.

I also run FE and RE regressions on the nested model for men and women. Two of the FE results deserve mention. The age of the branch appears to negatively affect repayment in a statistically significant way for both men and women. And the proportion of first-time borrowers has a positive effect on male repayment rates (at the 12% level). This result again reinforces the "incentive" argument for males discussed above in the context of the OLS regression for 1991. The RE model supports several of the earlier results. The proportion of loans to female borrowers appears to have a statistically significant, positive effect on repayment for both men and women. Distance from district headquarters has a positive effect for both men and women (at 9% for women). The density of electrification has a negative impact for men, the density of Krishi banks a significant negative impact for both men and women, the density of schools a positive

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significant negative impact for both men and women, the density of schools a positive impact for both men and women. The age of the branch again appears to impact the repayment rate negatively for both men and women. Joint tests on the coefficients again show statistically significant differences in the coefficients for men and women for the distance from headquarters (at 10%), the density of electrification, Krishi banks and schools. The RE regression thus seems to support the implications of the cross-sectional and pooled regressions -- that opportunity cost and ability have significant impacts on repayment rates, and that men and women are affected differently by a change in their opportunity cost. The differences, I suggest, arise from the greater constraints on women in terms of their mobility and employment opportunities. These social and economic constraints prevent women from taking advantage of the presence of potential alternatives to the Grameen Bank. The effect of the increase in electrification and Krishi banks, and increased proximity to district headquarters is thus less detrimental to their repayment rate compared to the effect on men's.

The Breusch and Pagan Lagrange multiplier test does not reject the possible existence of branch-specific random effects. However, the Hausman specification test suggests that the FE and RE models have systematically different coefficients. Thus, the results of the RE model should be interpreted with caution.

5.6 Conclusion: Implications, Limitations and Future Research

I have performed OLS, *fixed effects* and *random effects* regressions to examine the relationship between the variation in repayment rates across Grameen Bank branches and several variables. The results throw light on some of the theoretical issues raised in the earlier chapters and pose some new questions.

The estimates from the regressions suggest that the opportunity cost of time of the borrowers may be significant in explaining the variation in repayment rates. The results do not reject the hypothesis that increases in the opportunity cost of borrowers' time has a negative effect on repayment. This would suggest that the Grameen Bank's success may come partly from the fact that their clientele have few alternative economic opportunities. Limited alternatives ensure that they invest the appropriate amount of effort and care in their Grameen Bank projects. The regression results are particularly significant because they suggest that opportunity costs have different impacts on men and women. It is clear that women and men find themselves in very different situations in rural Bangladesh. Women face greater constraints in the labor market, being effectively excluded from many kinds of employment opportunities that are open to men. In addition, their average wage is typically lower than men's wages. Women also face the more universal female constraints related to child-bearing. In rural Bangladesh, women also appear to have much more limited mobility than men, for social and economic reasons. It follows that women are therefore less able to gain from increased opportunities engendered by

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economic and infrastructure development. Thus their repayment performance suffers less from the availability of alternatives.

The regression results suggest that average loan size and the proportion of first-time borrowers do not have a significant effect on repayment. This would imply that the hypotheses about borrower incentives are misplaced. However, economic theory makes a strong case for the incentive argument. It is likely that the variables available in this data set are not adequate to evaluate the effects of incentives on repayment. A more appropriate survey needs to be designed to evaluate the incentives created by group lending.

I tested the conjecture that loan repayment rates increase as the intensity of supervision by the branch-level staff of the bank increases. The intensity of supervision was assumed to be directly related to the number of employees per borrower (EMPBOR). The regressions, with the exception of the nested model, do not provide statistically significant estimates for the EMPBOR variable. The sign on most of the estimates is negative, contrary to expectation. This result is puzzling. One explanation for the possible negative link implied by the estimates might be related to the fact that the branches where EMPBOR is large are also the branches that have been in existence for a shorter period of time. The management of newer branches may not have the benefit of information that can be acquired only with time.[21] It is possible that the increase in the

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[21] In order to prevent favoritism or patronage of any kind, bank staff are not recruited from the region where the branch is located. This implies that bank staff have little prior local information. Exception is made for women bank assistants because their mobility is constrained due to social reasons. Bank assistants live in dormitories at the branch. This would be socially difficult for women to do in rural

intensity of supervision due to the smaller "case-loads" is more than outweighed by the lack of enough information about the borrowers and the villages. However, this explanation is contradicted by the results that consistently show a negative relationship between the age of a branch and its repayment performance. Unfortunately, the data set provided no direct way of measuring the intensity of supervision by the bank employees. The number of employees per borrower seemed to be the best proxy variable, on the assumption that the intensity must decline if employees have to oversee more borrowers (that is, if EMPBOR is smaller). Monitoring intensity, however, may well be endogeneously determined and not directly related to the number of borrowers that each employee must supervise.

This study has certain inherent weaknesses. Due to the nature of the data available -- aggregate branch-wise information for Grameen Bank loans and borrowers, and thana-level aggregates for socio-economic factors -- we are unable to evaluate the performance of individual borrowers. All conclusions are drawn from data that are averages and not borrower-specific. A more reliable evaluation of the impact of different factors on loan repayment rates would require information about each individual borrower's loan utilization and repayment performance, as well as each borrower's personal characteristics and attributes. We would then have information on each borrower's individual opportunity cost, schooling information, employment status, etc. This study has relied on several proxy variables. The rather low measures of fit (R square and adjusted R square)

Bangladesh. Hence, women personnel are selected locally in most cases. In any case, the percentage of branch-level women employees is typically not very high.

of the regressions may be indicative of problems in the selection of proxy variables. Individual borrower information would provide a more reliable basis to draw inferences about the determinants of loan repayment.

The Role of Gender

Does gender have a role to play in the repayment performance, and if so, do the differences in outcomes between male and female borrowers arise out of socio-economic differences related to gender? This was one of the questions I wanted to address in this study. The data suggests a statistically significant positive relationship between the proportion of loans to women and the loan repayment rate. The regressions do not reject the hypothesis that the better repayment performance of women is linked to the differences in the opportunity cost of time of males and females. My future research agenda includes an evaluation of the very different economic and social constraints faced by men and women in rural Bangladesh, and the effect of these differences on repayment rates and group behavior. Such an evaluation may illuminate not only the factors affecting repayment rates but also other institutional aspects of organizing group-based credit programs.

Age of the Branch

The data suggests that the age of a branch has a statistically significant effect on repayment rates. The available data did not allow for an evaluation of the causes for this.

Declining repayment rates as branches age may arise from the fact that long-established branches move from lending to good borrowers to those who are more marginal. Other factors related to management and organization of the branches may also have an impact as branches age. This study points to the need for a thorough analysis of the link between the age of a branch and repayment performance. The results of such an analysis may have important policy implications for branch management and organization.

Other Significant Factors

It was not possible in this study to include several factors that might have significant impacts on the repayment rate for loans. A change in the interest rate on loans, presumably would have an impact on repayment rates. It was not possible to evaluate the effect of a varying interest rate, since the rates were fixed on different types of loans by the Grameen Bank (16% for general, collective and technology loans and 5% for housing loans). The rates were increased in 1991 (to 20% and 8% respectively). However, the effect of this increase would not be seen until 1992. Since no data was available for 1992, the effect of the change could not be evaluated.

It is widely believed that peer monitoring is largely responsible for the success of the Grameen Bank and in particular for the high repayment rates. Any definitive evaluation of the determinants of the repayment rate on Grameen Bank loans would thus have to include information about borrowers within a group. The data set used in this study provides no such information about group membership. To the extent that group

members have a significant effect on each other's repayment rates, this study falls short. For a thorough study we need not only individual borrower information, but also group-level information about the borrowers.

Chapter 6

Conclusion

Millions of poor people in the developing world suffer from extreme levels of poverty. Decades of poverty-reduction efforts by governments have been only marginally successful. In the midst of this sobering picture, the success of the Grameen Bank in improving the lives of several million of the poorest in Bangladesh stands out as a bright ray of hope. Recognizing credit as the key ingredient in development, the bank has devised an ingenuous loan program for the landless in rural Bangladesh who are severely constrained in their access to credit. Using its innovative group lending scheme, the Grameen Bank has not only provided credit but has achieved an enviable loan recovery performance. Encouraged by its success, scores of Grameen Bank replications have sprung up around the world, from Africa to Arkansas.

Although replication efforts continue, we still do not understand which, if any, of the bank's institutional features are critical to its success. For successful implementation of similar programs in other countries and environments, it is imperative that we understand the role of each of the bank's institutional features. This dissertation has been an attempt to throw light on the reasons behind the bank's excellent loan recovery performance.

Drawing on the analytical literature in economics, I have tried to illustrate the ways in which the different features of the bank's group lending program help to enhance loan

repayment. The group formation process performs important screening functions. Group liability helps to provide mutual insurance as well as incentives for peer supervision. Staggered disbursement of loans enhances peer support, and therefore, loan repayment. Repeat loans and the harnessing of social collateral prevent willful default. Using a formal model I have analyzed the effect of using "staggered disbursement" on the expected loan recovery rate. In a two borrower model, I have shown that when loan disbursement is staggered, the probability of loan recovery is higher when borrowers are linked together in a group than when there is no such group interlinkage. This is because staggered disbursement induces "peer support" among group members. Although staggered disbursement creates a disincentive on the first borrower to invest effort in her project, this is more than compensated for by the second borrower's increased effort which results in improved loan recovery. I have also analyzed the implications of loan staggering on borrower welfare. I show that group interlinkage benefits the first borrower but may make the second borrower worse off. In concluding, I have discussed other features that mitigate the adverse effects of staggered loan disbursement.

In the empirical section of the dissertation I analyze the determinants of Grameen Bank's loan repayment rate. Using panel data collected by the World Bank from a sample of Grameen Bank branches, I examine the relationship between the variation in repayment rates across branches and several variables that represent the opportunity cost of time of borrowers, and the incentives facing the borrowers. The results of the analysis are mixed. They suggest that opportunity cost of time may play a key role in determining repayment

rates. Branches with borrowers facing a lower opportunity cost of time appear to have better loan repayment rates. Women's loan repayment performance appears to be affected less by several economic indicators representing opportunity cost. This may reflect the fact that women are more constrained in their mobility as well as access to alternative opportunities. The data also suggests that the proportion of loans to women has a statistically significant positive impact on the repayment rate of a branch. Newer branches appear to do significantly better in repayment performance. Surprisingly, increase in the number of bank employees per borrower does not appear to have a significant effect on repayment, suggesting perhaps that bank supervision is less important than peer supervision. Loan size and the number of rounds of loans received by the borrowers do not appear to have a statistically significant impact on repayment rates, suggesting that the role of incentives discussed in earlier chapters may not be as strong as expected. Unfortunately, the limitations of the data used -- branch-level aggregate data -- make it difficult to draw any firm conclusions about the role of incentives. Questions regarding individual or group incentives cannot adequately be addressed without individual and group-level data.

While this study has not been conclusive, it has raised a few important issues to be addressed. Hitherto it has been assumed that group lending is crucial to the success of the Grameen Bank. I have suggested in this dissertation that the opportunity cost of time of borrowers may also play a key role in the repayment performance. In particular, the bank's fine screening to ensure that their clients are limited to only the poorest, may be

crucial to such a good loan recovery performance. Another issue that has not been adequately addressed is the reason for the better repayment performance by women. I have suggested here that this may be linked to the differing socio-economic constraints faced by men and women in rural Bangladesh. Much more remains to be understood about the dynamics of group formation and peer monitoring. This dissertation has been my first step in understanding this fascinating institution.

Appendix A

A Field Trip to the Konokdia Branch of the Grameen Bank

In the summer of 1990, at the suggestion of Dr. Muhammad Yunus, I made a trip to the Konokdia branch of the Grameen Bank in Patuakhali, Bangladesh. I spent a week at the branch with the staff members of the bank. Many of my insights about the working of the bank came from the knowledge gained by the interaction I had with the bank staff and the borrowers. I greatly appreciated their willingness to discuss their work and life, and their generous hospitality.

The Location

Konokdia is a village situated in Patuakhali district in southern Bangladesh. It falls under the jurisdiction of the Bauphal Area office of the Grameen Bank, which in turn is directed by the Patuakhali Zonal office. An overnight journey, by river, from Dhaka took me to Bauphal. The Area manager in Bauphal, Mr. Halim Khan, later took me to Konokdia, a few miles away. We made that journey by auto-riksha and foot.

The Organization of the Branch

The Konokdia branch was managed by Mr. Mohammed Mizanur Rahman Patwari. There were about 12 staff members at the branch, including a peon-cum-guard. The branch building included living quarters on the second floor. All male members stayed at

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the branch. The manager had his own room. The bank assistants had dormitory-style accomodation. I stayed with them. The three female staff members lived in private accomodations in the village.

The Konokdia branch had 59 borrower centers at that time. A center was made up of six groups. Only two of the centers had male borrowers. All the others were female centers. Each of the bank assistants were responsible for nine to 12 centers, i.e. for about 300 borrowers. The branch claimed a 100% loan recovery rate.

The Bank Staff

In the time I spent at Konokdia I found that all the staff members worked extremely hard. A typical day for them started early in the morning. By seven they would all be out on their field work. The work involved holding meetings with borrower centers to collect loan payments, to motivate them, and to help resolve problems. Typically, the staff would return around two in the afternoon. After lunch they would spend the afternoon at the office completing all their paper-work. Many worked overtime to finish all their work as they were expected not to carry paper-work from the day's transactions to the next day. In the evening and even on the weekend, some of the bank staff would go out to meet with borrowers who were having trouble with their projects, or difficulties in repaying. They called this "motivational" work. I had the opportunity to witness a motivational meeting addressed by Mr. Halim Khan, the area manager. He addressed a group of center chiefs, all women. The motivational meeting appeared to be part "pep

talk" and part disciplinary lecture. He later summed up for me the Grameen Bank's mode of operation as involving three components -- "motivation," "organization," and "supervision." The manager of the branch appeared to be filled with a sense of dedication and fervour about his work.

The Borrowers

I had the opportunity to meet with several borrowers from the Konokdia branch. Zakia was one of the earliest borrowers in the area. She had been involved in different loan-financed activities. When I visited, she was involved in grain-processing as her main project. She had a tin-roofed house, financed by a Grameen Bank housing loan. I also visited two other women who used their loans to buy milch cows. The proceeds from the sale of milk were enough to pay their monthly installments on the loan.

Anjali Rani used her loan to make clay pots and other earthenware. She gladly demonstrated her production process. The products were sold to wholesale traders from other areas. In the non-monsoon months she claimed to be making a profit of as much as 50%. She was also building a new house with the help of a housing loan from the bank. Kamala Begum had apparently been extremely poor at one time. When I visited Konokdia she had a house, built with a loan from the Grameen Bank, and two or three milch cows to generate income. Both women seemed to have acquired some measure of independence. Both were enthusiastic in talking about their work.

I visited several center meetings where the branch manager gave "motivational" lectures. I also visited a male center that had a collective project. The borrowers had jointly leased some land for farming. It appeared that the project was going well.

My week spent in Konokdia was very fruitful in that it gave me first-hand knowledge, albeit limited, about the bank's work at the branch-level. The preceding chapters reflect this.

Appendix B

The Grameen Bank's "Sixteen Decisions"[1]

1. The four principles of Grameen Bank - discipline, unity, courage, and hard work - we shall follow and advance in all walks of our lives.

2. We shall bring prosperity to our families.

3. We shall not live in dilapidated houses. We shall repair our houses and work towards constructing new houses as soon as possible.

4. We shall grow vegetables all the year round. We shall eat plenty of them and sell the surplus.

5. During the planting seasons, we shall plant as many seedlings as possible.

6. We shall plan to keep our families small. We shall minimize our expenditures. We shall look after our health.

7. We shall educate our children and ensure that they can earn enough to pay for their education.

8. We shall always keep our children and the environment clean.

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[1] Source: Hossain (1988)

Appendix B (continued)

9. We shall build and use pit latrines.

10. We shall drink tubewell water. If it is not available, we shall boil water or use alum.

11. We shall not take any dowry in our sons' weddings, neither shall we give any dowry in our daughters' weddings. We shall keep the center free from the curse of dowry. We shall not practice child marriage.

12. We shall not inflict any injustice on anyone, neither shall we allow anyone to do so.

13. For higher income we shall collectively undertake bigger investments.

14. We shall always be ready to help each other. If anyone is in difficulty, we shall all help.

15. If we come to know of any breach of discipline in any center, we shall all go there and help restore discipline.

16. We shall introduce physical exercise in all our centers. We shall take part in all social activities collectively.

Appendix C

Some Grameen Bank Replications in other Countries[2]

Name	Repayment Rate	Number of Members	Cumulative Disbursement (Date Established)	Date of this Information
Amanah Ikhtiar Malaysia (Malaysia)	99.91%	13,736	$2,870,435 (-)	July 1992
Project Dungganon (Philippines)	94.21%	6,106	Pesos 9,060,810 (Aug. 1990)	July 1992
Community Credit Service (Sri Lanka)	95%	5,952	Rs 5.7 million (1989)	–
Rural Development Organization (India)	100%	595	Rs 565,250 (Oct. 1992)	March 1993
Presidential Trust Fund (Tanzania)	95%	189	TSHS 9,692,675 (Dec. 1989)	June 1992
Lift Above Poverty (Nigeria)	94%	358	183,100 (1987)	Dec. 1992
Foundacion Contigo (Chile)	98.8%	625	$111,996,958 (June 1989)	Sept. 1992
Microenterprise Loan Program (North Carolina, USA)	86%	$386,950	151 (Sept. 1989)	May 1993

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[2] Source: Khandker, Khalily and Khan (1995)

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