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Agricultural Finance Review

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Agricultural Finance Review

Department of Applied Economics and Management, Cornell University
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Preface

Agricultural Finance Review (AFR) provides a forum for discussion of research, extension, and teaching issues in agricultural finance. This publication contains articles contributed by scholars in the field and refereed by peers.

Volume 43 was the first to be published at Cornell University. The previous 42 volumes were published by the United States Department of Agriculture. *AFR* was begun in 1938 by Norman J. Wall and Fred L. Garlock, whose professional careers helped shape early agricultural finance research. Professional interest in agricultural finance has continued to grow over the years, involving more people and a greater diversity in research topics, methods of analysis, and degree of sophistication. We are pleased to be a part of that continuing development. We invite your suggestions for improvement.

AFR was originally an annual publication. Starting with volume 61, Spring and Fall issues are published. The *AFR* web page can be accessed at <http://afr.aem.cornell.edu/>. Abstracts of current issues and pdf files of back issues since 1995 are available.

The effectiveness of this publication depends on its support by agricultural finance professionals. We especially express thanks to those reviewers listed below. Grateful appreciation is also expressed to the W. I. Myers endowment for partial financial support. Thanks are also due to Faye Butts for receiving, acknowledging, and monitoring manuscripts, and Judith Harrison for technical editing.

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Foreword

***Agricultural Finance Review* Special Issue on Microfinance in Developing Economies**

The motivation for this special issue of the *Agricultural Finance Review* is to bridge the gap between those agricultural economists who operate under the specialty of "agricultural finance" and those who operate under the various titles of "development economics" or "development finance." It is perhaps an unfortunate tradition that these groups have not previously met as complementary disciplines, although members of each group have no doubt dabbled in the others. Still, there is much the traditional scholar in agricultural finance can learn from the experiences and studies of the development economist and, I suspect, vice versa.

The papers in this special issue deal with a multitude of products and so, as a collection, this issue is probably best described as "microfinance." Richard Meyer and Geetha Nagarajan; Valentina Hartarska and Martin Holtmann; and Manfred Zeller provide exemplary reviews of microfinance in development. Valentina Hartarska and Martin Holtmann clarify the distinction between the terminology of microcredit and microfinance. When Muhammad Yunus (whose biography follows this foreword) began lending to the poor in 1977, he was extending microcredit, because at that time his Grameen Project provided only credit to the poor.

As microcredit expanded, more services were added—such as deposits and savings accounts—and so emerged the institutional structure of microfinance. Today these institutions are known as microfinance institutions or MFIs. Any institution described as an MFI is distinguished from commercial banking or lending institutions in that the MFI operates almost exclusively for the benefit of the poor.

Ani Katchova, Mario Miranda, and Claudio Gonzalez-Vega contribute a dynamic model of group lending which shows how optimal interest rates depend on information regarding moral hazard and adverse selection problems, correlated project risks, and strategic default.

Andrew Mude presents an interesting model of group lending to investigate the ways in which microfinance can unravel and yield perverse outcomes which run counter to its stated objective. Indeed, many of the papers in this issue that examine MFIs are not merely cheerleaders for the cause, but provide the reader with a very balanced and honest view of microfinance—both good and bad.

Other papers deal more specifically with alternative views of development finance. Jerry Skees and Barry Barnett, for example, explore forms of index insurance that can be used to enhance the supply of microcredit to the poor in developing countries, while Felix Baquedano and John Sanders describe an innovative approach to microfinance using an inventory credit program introduced in western Niger to generate savings for farmers' groups to facilitate the purchase of inorganic fertilizers.

Hamish Gow, Aleksan Shanoyan, Lilya Abrahamyan, and Mariana Alesksandryan provide a case study of agricultural production credit clubs in Armenia designed to facilitate investment through market linkages, social capital, and microcredit using vertical linkages between suppliers and growers.

Barnabas Kitiza and Glenn Pederson examine the emergence of microfinance in Uganda to determine the savings and portfolio allocation behavior of households with and without access to formal financial services. Continuing the focus on Uganda, Biruma Abaru, Amin Mugeru, David Norman, and Allen Featherstone investigate factors related to loan approval, disbursement, repayment, and loan rationing among farmers participating in Uganda's Rural Farmers Scheme.

Microcredit is about lending to the poor. Consequently, it follows a dictum that is foreign to anything the traditionalist might uphold, as it requires in most instances no

collateral (or nontraditional collateral), no employment, no credit score, no place of residence [although most MFIs require a "stable" borrower who has a fixed address (but doesn't need to own it) or known place as a residence and/or business], and a level of trust (but with ample incentives to assure contracts can be enforced) that the recipient will make a best-effort to repay the loan, with interest, and in a timely fashion.

As one manuscript reviewer to this special issue pointed out, the manuscript under consideration was not the "usual" type of paper published in the *Agricultural Finance Review*. This of course is precisely the point of our special issue. There is much to be learned.

— Calum G. Turvey
AFR Editor

Biography: Dr. Muhammad Yunus, Founder of the Grameen Bank and 2006 Nobel Peace Prize Recipient

Calum G. Turvey and Rong Kong

Muhammad Yunus, a Bangladeshi economics professor and founder of the Grameen Bank in Bangladesh, viewed by many as the father of modern microfinance or microcredit, is central to many of this special issue's papers. Richard Meyer and Geetha Nagarajan challenge this claim by providing a chronology of microcredit facilities dating to the 18th century. Nevertheless, we can easily set such truisms aside, because what professor Yunus accomplished is absolutely remarkable. Indeed, in the midst of our preparation of this biography, Dr. Yunus and his Grameen Bank were awarded the 2006 Nobel Peace Prize (see Appendix A).



Dr. Muhammad Yunus

Our clients do not need to show how large their savings are and how much wealth they have; they need to prove how poor they are, how little savings they have.

— Source: Grameen Bank

Calum Turvey is the W. I. Myers Professor of Agricultural Finance in the Department of Applied Economics and Management, Cornell University; Rong Kong is an associate professor, College of Economics and Management, Northwest Agriculture and Forestry University, Yangling Shaanxi, PRC. The material in this paper was primarily obtained from the books written by Muhammad Yunus (*Banker to the Poor: The Autobiography of Muhammad Yunus, Founder of the Grameen Bank*, 1998; and *Banker to the Poor: Micro Lending and the Battle Against World Poverty*, 1999) and other documentary information. Citations are provided only for direct quotations or sources other than the biographies. We take leave now and again to provide some economic intuition behind microcredit and hope that in the absence of peer review these interpretations are viewed as being well-intended interpretations rather than the final word. This paper is intended only as an editorial supplement to this special issue on microfinance and credit, and has not been peer reviewed in the usual sense. We would like to thank Richard Meyer for providing additional insight, and Valentina Hartarska, Jaclyn Kropp, and John Turvey for editorial comments. Any errors or omissions are the responsibility of the editor. Finally, the editor would like to thank all of the contributors and reviewers of this special issue.

Moreover, for his work in rural development and providing relief for the poor, leveraging social capital, and promoting social entrepreneurship, he has received over 60 international awards including the coveted World Food Prize (see Appendix B). Yunus is also the recipient of over 25 honorary doctorates.¹

We wonder, however, how the mix of papers in this issue would read if it were not for Dr. Muhammad Yunus, or whether there would even be an interest in a

¹ See <http://www.grameen-info.org/bank/Listofawards.html> (October 29, 2006).

special issue on development finance. Terms such as *microcredit*, *microfinance*, and *microfinance institutions* have entered our lexicon partly due to the lifelong activities of Dr. Yunus, who convinced the world that the poor are creditworthy and that in being creditworthy, providing them access to credit in small amounts could ease the burden of poverty.

The use of microcredit as the solution to world poverty has been criticized in some circles, and this is to be expected. How microcredit is applied, to whom, and for what purposes all matter. But this is hardly the point in the life of Yunus—no matter what capacity one has been gifted in character, intellect, and brawn, Yunus was able to reach into the very fabric of Bangladesh society that bred poverty and provide a remedy. Yunus believes credit is a human right. This view clashes with the conventional wisdom that credit is not a right but a privilege, and this privilege is extended to those who can provide collateral and steady employment. In Yunus' world, the poor are bankable.

While the papers in this special issue provide the reader with an excellent review of the microfinance economy, it seems fitting that readers should also have an understanding of who Dr. Yunus is, how he became the "Banker to the Poor," and why he and his Grameen Bank were recipients of the 2006 Nobel Peace Prize. That is the purpose of this biography, and the reader will no doubt see in all the papers in this issue the influential wand of Muhammad Yunus.

The Early Years

Muhammad Yunus was born in 1940 in Bathua (then Pakistan, a province of India that gained independence in 1947) to a goldsmith father and was raised in a four-room apartment above his father's shop on a dingy Chittagong street. His mother had 14 children, nine of whom survived. Much of Yunus' compassion for the poor was inspired by his mother. He was raised in a very devout Muslim family,

and lived a learned (he and his brother would visit the waiting room of the local physician to read newspapers and magazines) but somewhat mischievous life (on one occasion he obtained a free magazine subscription by calling in with a change-of-address for a recently announced free subscription winner). He enjoyed fine food, art, photography, and stamps, and was a boy scout.

In 1955, he attended Chittagong College which he described as "very exciting," and in 1957, he attended Dhaka University which he described as "very dull," graduating in 1961 at the age of 21. He returned to Chittagong College where he taught economics from 1961 to 1965. While at Chittagong, he started a successful packaging company that manufactured a number of items including breakfast cereal boxes.

In 1965, Yunus was awarded a Fulbright Scholarship. He spent the summer of 1965 at the University of Colorado and entered Vanderbilt University for doctoral studies that fall where he excelled in advanced economics. After graduating, he taught at the University of Colorado and Middle Tennessee University.

During the time of his stay in the United States, East Pakistan sought separation from West Pakistan to form Bangladesh. A Bengali nationalist, Yunus tirelessly worked for an independent Bangladesh. He returned to Bangladesh shortly after the civil war which left 3 million dead and 10 million refugees, and an economy and infrastructure in tatters. After an idle stint in the economic development office of the new government, Yunus joined the faculty at Chittagong University as head of the Economics Department in 1972 at the age of 32.

At Chittagong, Yunus started to explore the local agricultural economy to determine the sources of poverty and the limitations of productivity. This study gained momentum and was pursued in earnest during the 1974 famine. Although he was trained neither as an agricultural

economist nor an agronomist, Yunus persisted in field work—bringing in high-yielding Philippine rice and instructing local farmers on how to use it. Believing that the University was an appendage to the community rather than an island within it, Yunus and his students could often be found in the rice paddies teaching farmers how to plant rice in rows to maximize efficiency. He also helped set up sharecropping arrangements to efficiently use well water to assist in dry season crops, and it was through these activities that he discovered the “poorest of the poor,” most of whom were women, few of whom had hope.

In trying to help the poor, Yunus realized the bank rules were not designed for the illiterate and destitute who have no collateral or steady source of income. Yunus understood that in the absence of capital, only enterprises for which the marginal value of production exceeded the marginal input cost plus interest on borrowed funds would make a satisfactory credit risk so long as the credit leveraged profits. But there was a second dimension based largely on compassion. Yunus recognized that the poor were creditworthy because they placed a much higher value on small amounts of capital than those less poor and, once put to use, the value of the next dollar of capital was higher as well.

These two characteristics are fundamental to the foundation of microcredit, for together they create a paradigm of trust in a manner not previously recognized by commercial lenders or captured in any of the classical economic models that Yunus had studied. The poor, in other words, were more creditworthy because they had more respect for the next dollar of capital available to them. This form of utility was not captured by conventional risk-rating schemes.

It is unclear where the breakpoint between rational credit and usury falls. Perhaps one measure is the point at which the usurious rate exceeds a “fair” rate provided relative to a reasoned probability of default. When credit is constrained, the

value of the credit is ever increasing while the supply is ever decreasing, such that the last dollars available, if demanded, come at tremendous cost. Under the opportunity cost principle, the cost will be paid all the same. In other words, the greater the need for a dollar of credit, the greater in desperation such credit is valued. This desperation is easily exploited by moneylenders.

Informal usurious credit is precisely what Yunus and his students found in the midst of the 1974 Bangladeshi famine in the village of Jobra in the Chittagong District of Bangladesh near his Chittagong University. Distraught over the increasing misery and death arising from the famine, Yunus saw no solutions in the coldness of conventional economic theory. Yunus found in the village a total of 42 people with outstanding loans from moneylenders totaling \$27. They were paying interest up to 10% per week or more.

One woman named Sufiya, 21 years of age with three children, borrowed the equivalent of 22 cents to purchase the bamboo to craft a stool which she was obligated to resell to the lenders for a mere profit of two cents per day. Yunus (1999) writes:

In my university courses, I theorized about sums in the millions of dollars, but here before my eyes the problems of life and death were posed in terms of pennies. Something was wrong. Why did my university courses not reflect the reality of Sufiya's life? I am angry, angry at myself, angry at my economics department, and the thousands of intelligent professors who had not tried to address this problem and solve it (p. 48).

Yunus recognized that the hideous nature of the credit constraint occasioned an outcome so far from rational equilibrium that the value of labor—the reward given to effort—did not accrue to the entrepreneur but was extracted by the moneylenders. The moneylenders understood without scruple that the next best alternative was a life of beggary or death.

Yunus, however, did have scruples and understood that a modicum of flexibility to relax the credit constraints would drive usury rates down, and return to the entrepreneur the value of her labor. He then distributed to the 42 people in the village the \$27 they owed, with flexible repayment and no interest. The idea for a Grameen Bank was born.

The Grameen Project

In January 1977, Yunus started the Grameen Project, where the name "Grameen" was derived from the word "village." Yunus convinced a local banker to provide a line of credit equivalent to \$300, secured by Yunus (even though Yunus made it clear he would not personally guarantee any loan to the poor), which could be distributed as loans to the poor in general and women in particular. It was quickly discovered that lending to women brought about changes faster than when given to men who are guided more selfishly by self-interest rather than maternal instinct. Because of the largely Muslim population, women lived a very traditional and cloistered life and were at first difficult to contact.

The Grameen Project not only attempted to focus on women, but made clear the view that much of the observed poverty in Bangladesh was due to centuries of tradition which caused harm to self, family, and the environment. Thus, to encourage the rise from poverty, Grameen would have to structure its policies to change these habits. So focused on women were the activities of Grameen that in later years, when as a bank Grameen began offering housing loans, the husband was required to sign over the land to the woman applicant.

Using students as intermediaries, a few small loans were made in 1977, but it was also discovered there might be advantages to lending to groups of women. Group lending places peer pressure on performance, but had some unanticipated advantages. Spousal abuse on women

was reduced because other women within the group would not tolerate an inability to meet financial obligations as a consequence of that abuse.

Group lending evolved in groups of five. Loans were made to the group members. There were no individual clients, but the loans were made to individuals within the group, with each having a passbook to record loan amount received, payments, savings, etc. Five percent of each loan was placed in the group fund. The member had to pay interest on this loan, which was used for emergencies. If any member of the group defaulted, no other member could obtain a loan. This rule encouraged the group to cooperate in order to find a solution (predictably, this feature was subsequently dropped as it was realized that not all group members should be penalized because of one bad loan).

Loans were offered at 20% interest, with repayment including interest over one year with equal weekly payments (earlier attempts at daily collection were not successful). While 20% may appear high, it must be understood that the development of group members and loan clients was laborious, entailing solicitation, many initial meetings to train and provide outreach to the groups, and collections. These rates were also lower than the usury rates of the informal moneylenders. But at the same time, Yunus employed a smart strategy of depositing the money Grameen was advanced in fairly high-return financial instruments until he needed it for lending. Through this practice, he enjoyed nice spreads and thereby built up his capital.

While Yunus might declare himself an anti-economist, the opposite is in fact true. His complaint that modern economics did not or could not deal with the economy of the poor is most certainly true, but when one removes the abstraction of process, the economic logic becomes quite clearly a clever application of constrained optimization. The economically significant constraints to advantage are liquidity constraints, literacy constraints, educational constraints, and capital

constraints. But which constraint is most binding to the poor? Capital. Once the capital constraint is relaxed, which constraint emerges as a binding on the poor? Literacy. And so on.

Economists have long known that the most significant constraint is measured by the largest opportunity cost. The problem is that the average economist never thought, as Yunus had, to apply the logic of constrained optimization to resolve issues of poverty, for it was not believed that the most binding constraint could be relaxed without collateral.

A second dimension to the success of microcredit is trust. When Yunus first provided \$27 to 42 entrepreneurs, he made no legal claim on the loans. He trusted that the loans would be repaid to the best of the borrowers' abilities, and they were. Although Grameen lending has become more formal and institutionalized since 1977, including the development of incentive-compatible contracts and effective institutional design, the basic ingredient of trust remains. Without trust, Grameen (and all of its worldwide replicators) would fail.

Yunus, the social scientist rather than the economist, understood the role of trust among the poor. He realized that the poor highly prized the micro-loan as a means to an end from poverty, and the borrowers understood that to betray the spirit of trust would eliminate future loans.

In addition, Yunus recognized it was the culture, at least in Bangladesh, that the poor could be trusted whereas the wealthy could not. This may be due to the corruptibility of the wealthy. Or, for those with access to capital and commercial credit, the next dollar borrowed is simply not as highly valued as it would be for the poor. Social capital was more important than economic capital. Based on trust, bad debts were less than 1%. The conventional wisdom in 1977 Bangladesh was that if the wealthy could not be trusted to repay debt obligations, then most surely the poor would be worse. Yunus proved

the poor indeed are more trustworthy, and in 2006 untrustability of the poor is no longer the conventional wisdom.

Formation of the Grameen Bank

The Grameen Bank was not formally a bank until September 1983, at least in the legal sense. Until then it was the Grameen Project, although Yunus often referred to it as a bank throughout the 1977–1983 period. Between 1977 and 1978, the project made 500 loans to borrowers in the Jobra region. Based on this early success, Yunus convinced the central bank to support an experiment in Tangail. The experiment required the national banks to provide branches for Grameen. In 1978, the Agricultural Bank in Jobra became the first Grameen branch. Throughout 1979, 19 branches of the Agricultural Bank were made available to the Grameen Project in Tangail, despite the fact that there was a micro-war still lingering from the war of independence. In fact, Yunus was able to bring meaning to the lives of many a teenage guerrilla by convincing them to put down their weapons and work for Grameen as loan officers.

The Grameen bank operated on four basic principles:

- Clients should not go to the bank, but the bank should go to the people.
- Loan applicants should form a group of five borrowers who were familiar with one another and shared similar backgrounds in a village.
- The bank as a matter of principle would focus on women, dispense with the requirement for collateral, and extend loans only to the poor, including beggars.
- Loan repayment would be a simple weekly process spread out over a year, and allowances would be made to accommodate hardship and disaster.

By 1982, there were a total of 11,000 borrowers, but less than 50% were women. Growth was spectacular. Loans were made for a variety of micro-enterprises including paddy husking, bamboo works, weaving, making sweet meats, farming, fertilizer purchases, cow fattening, buffalo raising, purchasing fishing nets, pond excavation, purchasing push carts and rickshaws, and the means for trading, peddling, and shop keeping. Dispersals in 1982 were \$10.5 million, while total dispersals up to 1981 were \$13.4 million. These funds were obtained through commercial borrowings and were backstopped by the Ford Foundation.

By 1982, the Grameen Project had proven itself, and despite a certain disdain for its activities by commercial lenders, it applied for and in September 1983 received a bank charter as the world's first specialized Microfinance Institution for the poor, with 40% of shares owned by the government and 60% by borrowers. In 2006, 98% of equity is held by members.

By 2005, the Grameen Bank had made over \$5 billion in loans, with disbursements in 2005 alone of over \$608 million. These funds have been distributed through 877,000 groups to 5.58 million members in Bangladesh.² Ninety-seven percent of borrowers are women. In 1984, Grameen started housing loans for the poor. By 1999, 450,000 houses (home factories) were financed with \$151 million, and in 2005, over 627,000 houses had been built, with more than 19,000 in 2005 alone.

Also by the mid-1980s, Grameen began to expand its services by providing health and retirement services for its members; acting as a middleman or integrator in a program called Grameen Check which collected cloth from 8,000 Bengali weavers and delivered in bulk to wholesalers for international distribution; working with the government to operate under a 50:50 share split with fishers in Nimgachi over

783 ponds amounting to 1,666 acres of water; as well as introducing technological innovations such as cell phones, solar power, and internet access to the poor.

By the mid-1980s, the Grameen experiment was being replicated in many jurisdictions. Indeed, Grameen formed the Grameen Trust to provide funds for "replicators" who would actually travel to Bangladesh and do field work and field study with Grameen. The first in the United States was the Women's Self-Employment Program (WSEP), which was a fledgling organization until Yunus appealed to the Chicago City Council to relax restrictions on deductions of WSEP activities from public assistance.

Yunus has always been concerned about the ability of regulations in public assistance to crowd out innovation by those receiving assistance. He believes poverty is not created by the poor, but by the structure of societies and policies pursued by society. For example, the repayment of loans made available under WSEP would be deducted from welfare checks, thereby providing an adverse incentive for the maintenance of welfare roles. In the United States, the success of WSEP showed that many women were eager to get off public assistance. Moreover, despite their poverty, these women were good credit risks in group lending activities, and flexibility in regulations could work toward rather than against innovation and self-employment.

The Chicago experience has since been leveraged to create numerous microcredit institutions throughout the United States, including a "Good Faith" fund in Arkansas, and microcredit for the Sioux Nation in South Dakota and the Cherokee Territory of Oklahoma. Project Enterprise in New York City, supported by Grameen Trust loans and grants, has made 400 micro-loans totaling over \$800,000, while Dallas' PLAN Fund has aided over 1,000 micro-businesses with average loan sizes of \$1,400.

The scale of these operations is quite small. In July 2006, Project Enterprise

² See <http://grameen-info.org/>.

had 227 active clients with \$201,000 in loans outstanding, while the PLAN Fund had 186 active clients with \$13,101 in loans outstanding. Only 2.7% of loans are at risk (defined by 30 days past due).

Other programs are much larger. For example Pro Mujer in Bolivia has 70,000 active clients (as of June 2006), most of whom are women, with over \$10.6 million in loans outstanding and only 1% at risk, and the Center for Agriculture and Rural Development (CARD) has more than 141,000 active clients receiving \$11 million in loans with only 2.8% of loans at risk.³ Many other examples are provided in the papers appearing in this special issue. Yunus' goal is a movement toward a social-consciousness-driven private sector—i.e., a benevolent sector that shares profits not only with shareholders but stakeholders and consumers; and this should be supported by a government that is less patriarchal in its bureaucratization of the poor. Specifically, a society should not be judged by the quality of life inherited by the rich, but by the way the lowest 25% of the people live theirs.

Yunus (1998) asserts:

The poor are poorer because they cannot retain the returns of their labor. The reason for this is obvious—they have no control over capital, and it is the ability to control capital which calls the tune (p. 225).

Looking at those factors shown to constrain innovation by the poor, Grameen has established enterprises to address them, including energy, communication, literacy, and education.

By the mid-1990s, Grameen's international influence was accelerating, and in 1995, micro-lending was formally internationalized by the formation of the World Bank's Consultative Group to Assist the Poor (CGAP). The first summit was held in 1997 in Washington, DC, to declare a reduction in poverty of 100 million people by 2005. The formation of CGAP within the World Bank was more than symbolic. For many years Yunus had criticized the World Bank and other donor organizations for focusing too much on activities such as training or infrastructure rather than extending capital to the poor directly.

By 2006, Grameen's global network of microfinance partners reached nearly 2.2 million families in 22 countries. Should the goal of poverty reduction for 100 million persons be achieved, this will most surely be Muhammad Yunus' greatest legacy. Clearly, however, even if Grameen had remained an isolated MFI in Bangladesh, the social reformation brought about by Yunus would be legacy enough.

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³ See <http://www.grameenfoundation.org/> (October 29, 2006).

APPENDIX A

Text of the Norwegian Nobel Committee's Citation in Awarding the 2006 Peace Prize to Muhammad Yunus and His Grameen Bank [Oslo, October 13, 2006]

The Norwegian Nobel Committee has decided to award the Nobel Peace Prize for 2006, divided into two equal parts, to Muhammad Yunus and Grameen Bank for their efforts to create economic and social development from below. Lasting peace cannot be achieved unless large population groups find ways in which to break out of poverty. Micro-credit is one such means. Development from below also serves to advance democracy and human rights.

Muhammad Yunus has shown himself to be a leader who has managed to translate visions into practical action for the benefit of millions of people, not only in Bangladesh, but also in many other countries. Loans to poor people without any financial security had appeared to be an impossible idea. From modest beginnings three decades ago, Yunus has, first and foremost through Grameen Bank, developed micro-credit into an ever more important instrument in the struggle against poverty. Grameen Bank has been a source of ideas and models for the many institutions in the field of micro-credit that have sprung up around the world.

Every single individual on earth has both the potential and the right to live a decent life. Across cultures and civilizations, Yunus and Grameen Bank have shown that even the poorest of the poor can work to bring about their own development.

Micro-credit has proved to be an important liberating force in societies where women in particular have to struggle against repressive social and economic conditions. Economic growth and political democracy cannot achieve their full potential unless the female half of humanity participates on an equal footing with the male.

Yunus's long-term vision is to eliminate poverty in the world. That vision cannot be realized by means of micro-credit alone. But Muhammad Yunus and Grameen Bank have shown that, in the continuing efforts to achieve it, micro-credit must play a major part.

(http://nobelprize.org/nobel_prizes/peace/laureates/2006/press.html)

APPENDIX B
Awards Presented to Muhammad Yunus

1. BANGLADESH: President's Award: 1978
2. PHILIPPINES: Ramon Magsaysay Award for "Community Leadership": 1984
3. BANGLADESH: Central Bank Award for Micro-Credit: 1985
4. BANGLADESH: Independence Day Award for Rural Development: 1987
5. SWITZERLAND: Aga Khan Award for Architecture: 1989
6. U.S.A.: Humanitarian Award: 1993
7. SRI LANKA: Mohamed Sahabdeen Award for Science (Socio-Economic): 1993
8. BANGLADESH: Rear Admiral M. A. Khan Memorial Gold-Medal Award: 1993
9. U.S.A.: World Food Prize: 1994
10. U.S.A.: Pfeffer Peace Prize: 1994
11. BANGLADESH: Dr. Mohammad Ibrahim Memorial Gold Medal Award: 1994
12. SWITZERLAND: Max Schmidheiny Foundation Freedom Prize: 1995
13. BANGLADESH: Rotary Club of Metropolitan Dhaka Foundation Award: 1995
14. VENEZUELA & UNESCO: International Simon Bolivar Prize: 1996
15. U.S.A.: "Distinguished Alumnus Award" of Vanderbilt University: 1996
16. U.S.A.: International Activist Award, Gleitsman Foundation: 1997
17. GERMANY: Club of Budapest Planetary Consciousness Business Innovation Prize: 1997
18. NORWAY: Stromme Foundation Help for Self-Help Prize: 1997
19. ITALY: Together for Peace Foundation Man for Peace Award: 1997
20. U.S.A.: State of the World Forum Award: 1997
21. U.K.: One World Broadcasting Trust Media Award: 1998
22. SPAIN: The Prince of Austria's Award for Concord: 1998
23. AUSTRALIA: Sydney Peace Foundation Sydney Peace Prize: 1998
24. JAPAN: Ozaki Yukio Memorial Foundation Ozaki (Gakudo) Award: 1998
25. INDIA: Indira Gandhi Prize for Peace, Disarmament, and Development: 1998
26. FRANCE: Les Justes D'or, Juste of the Year Award: 1998
27. U.S.A.: Rotary International, Rotary Award for World Understanding: 1999
28. ITALY: TUSCAN Regional Government, Golden Pegasus Award: 1999
29. ITALY: Municipality of Rome, Roma Award for Peace and Humanitarian Action: 1999
30. INDIA: Visva-Bharati, Rathindra Puraskar Award: 1998
31. SWITZERLAND: OMEGA Award of Excellence for Lifetime Achievement: 2000
32. ITALY: Award of the Medal of the Presidency of the Italian Senate: 2000
33. JORDAN: King Hussein Humanitarian Leadership Award: 2000
34. BANGLADESH: "IDEB Gold Medal" Award: 2000
35. ITALY: Comune di Forlimpopoli "Artusi" Prize: 2001
36. JAPAN: Grand Prize of the Fukuoka Asian Culture Prize: 2001
37. VIETNAM: Ho Chi Minh Award: 2001
38. SPAIN: International Cooperation Prize Caja de Granada: 2001
39. SPAIN: "NAVARRA" International Aid Award: 2001
40. U.S.A.: M.K Gandhi Institute for Nonviolence, Mahatma Gandhi Award: 2002
41. U.K.: World Technology Network Award for Finance: 2003
42. SWEDEN: Volvo Environment Prize: 2003
43. COLOMBIA: National Merit Order Award
44. FRANCE: UNESCO, The Medal of the Painter Oswaldo Guayasamin Award
45. SPAIN: Spanish TV Network - Channel 5, Telecinco Award: 2004
46. ITALY: City of Orvieto Award: 2004
47. U.S.A.: The Economist, The Economist Innovation Award: 2004
48. U.S.A.: World Affairs Council Award: 2004
49. U.S.A.: Fuqua School of Business of Duke University Leadership in Social Entrepreneurship Award: 2004
50. ITALY: Ina Assitalia Fireuze, Premio Galileo 2000 - Special Prize for Peace: 2004
51. JAPAN: Nikkei Asia Prize for Regional Growth: 2004
52. SPAIN: Spanish Ministry of Labour & Social Affairs, Golden Cross of the Civil Order of the Social Solidarity: 2005
53. U.S.A.: America's Freedom Foundation, Freedom Award: 2005
54. BANGLADESH: Bangladesh Computer Society Gold Medal: 2005
55. ITALY: Fondazione Europea Guido Venosta, Prize Il Ponte: 2005
56. SPAIN: Foundation of Justice: 2005
57. U.S.A.: Harvard University, Neustadt Award: 2006
58. U.S.A.: Patel Foundation for Global Understanding, Global Citizen of the Year Award: 2006
59. NETHERLANDS: Roosevelt Institute, Franklin D. Roosevelt Freedom Award: 2006
60. SWITZERLAND: International Telecommunication Union, ITU World Information Society Award: 2006

An Overview of Recent Developments in the Microfinance Literature

Valentina M. Hartarska and Martin Holtmann

Abstract

This paper presents an overview of microfinance and microfinance research. The objective is to show that microfinance research has come full circle: from policies to lending methodologies and to organizations in the 1990s, and back to a focus on policies. Specifically, developments in the theoretical literature on asymmetric information, transaction costs, contracts, and banking identify the challenges that MFIs must overcome. Recent trends toward intermediation and commercialization have brought about renewed focus on identifying appropriate policies to promote a viable microfinance industry. The paper concludes by describing some current challenges faced by the industry and offers a possible research agenda for agricultural economists.

Key words: financial institutions, microfinance, microfinance institutions, poverty, rural finance

Development of financial institutions boosts economic growth and benefits the poor more than other segments of the population (King and Levine, 1993; Beck, Demirguc-Kunt, and Levine, 2004). Worldwide, microfinance institutions (MFIs) expand the frontier of finance by providing loans and other financial services to the under-served poor. Microfinance has attracted significant attention lately, especially after the United Nations designated 2005 as the International Year of Microcredit.¹

Microfinance started as “a collection of banking practices built around providing small loans (typically without collateral) and accepting tiny savings deposits” (Armendáriz de Agion and Morduch, 2005, p. 1). Today, many MFIs offer payment and savings facilities, insurance, housing, and longer-term loans. Microfinance programs seek to reduce poverty by promoting self-employment and entrepreneurship as well as by alleviating liquidity constraints and contributing to consumption and income-smoothing. Microfinance programs pursue the double bottom-line objective of outreach (serving the poor) and self-sustainability (cost coverage).²

The majority of MFIs still rely on traditional multilateral and bilateral donors for funds. However, new private foundations, such as the Bill and Melinda

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¹ Microfinance is a phenomenon typically associated with the developing countries, but it has also attracted support in developed countries. In the United States, in particular, support led to the revival of Community Development Financial Institutions in the 1990s.

² Zeller and Meyer (2002) include impact as the third element in the “triangle” of microfinance, consisting of financial sustainability, outreach, and impact.

Table 1. Growth of Microfinance Clients Since 1997

Date	Number of Reporting Institutions	Total Number of Clients	Number of "Poorest" ^a Clients	% of Poor Clients
12/31/1997	618	13,478,797	7,600,000	56
12/31/1998	925	20,938,899	12,221,918	58
12/31/1999	1,065	23,555,689	13,779,872	58
12/31/2000	1,567	30,681,107	19,327,451	63
12/31/2001	2,186	54,932,235	26,878,332	49
12/31/2002	2,572	67,606,080	41,594,778	62
12/31/2003	2,931	80,868,343	54,785,433	68
12/31/2004	3,164	92,270,289	66,614,871	72

Source: *The State of the Microcredit Summit Campaign Report 2005* (Daley-Harris, 2005).

^aThe "poorest" clients are defined as those living on under US\$1 a day.

Gates Foundation and the Dell Foundation, play an increasingly active role as both donors and investors. In addition, large private banks such as CITIBANK and HSBC have entered what was formerly a niche market (*Wall Street Journal*, 2006).³ These (quasi-) commercial investors may fund large international microfinance networks (e.g., ACCION International, FINCA, Opportunity International), individual MFIs, or may adopt a "greenfielding" approach and create new micro and small enterprise banks (Schmidt and Zeitinger, 2001).

Microfinance dates back to the 1970s, when economics professor Dr. Muhammad Yunus began making small loans to groups from local villages in Bangladesh. This effort resulted in the establishment of the Grameen Bank in 1976 as an experimental project to combat rural poverty by providing credit to the very poor. By 2005, the Grameen Bank disbursed about US\$5 billion in loans to 5 million borrowers, 96% of them women.

Microfinance has grown significantly on all continents. Data from the *State of the Microcredit Summit Campaign Report 2005* (Daley-Harris, 2005), which traces the

number and poverty level of microfinance clients around the world, illustrates the scale and growth of the industry (Table 1). The number of clients has grown from 13.5 million in 1997 to 92.3 million in 2004. The number of poorest clients (those living on less than \$1 a day) has also grown, from 7.6 million in 1997 to nearly 67 million in 2004. It is also estimated that there are at least 10,000 microfinance programs worldwide.

Microfinance emerged as an innovation in lending to the rural poor in Asia, where previous interventions in rural financial markets (directed and subsidized production credit usually disbursed by agricultural development banks) often failed. These interventions were extensively studied by agricultural economists. The global microfinance movement differs from rural financial market interventions because financial services are viewed independently and are not linked to (agricultural) production. Thus, microfinance has expanded to include the urban poor and now encompasses financial markets for marginalized clientele in rural and non-rural settings. As a consequence, it has been studied less by agricultural economists.

Academic research also reflects changes in policy initiatives and their funding. Although in the past 40 years billions of dollars were spent to support the Green

³For a recent survey of the role of international commercial banks, see Consultative Group to Assist the Poor (CGAP, 2005a).

Revolution, recently there has been a shift of funding away from agricultural projects. For example, agriculture accounted for 31% of World Bank lending in 1979–1981, but by 2000–2001 it had fallen to 10% (Christen and Pearce, 2005). This decrease in lending for strictly agricultural projects was due in part to an increase in support for reform and the strengthening of overall financial markets. A similar shift of funding has occurred in the Inter-American Development Bank, the European Bank for Reconstruction and Development, the African Development Bank, and the Asian Development Bank.⁴

This paper presents an overview of microfinance and microfinance research (including research on rural microfinance), and identifies some directions in which the industry is heading.⁵ We seek to show that microfinance research has come full circle: from policies to lending methodologies and to organizations in the 1990s (Gonzalez-Vega, 1994), and back to a focus on policies. Specifically, developments in the theoretical literature on asymmetric information, transaction costs, contracts, and banking identify the challenges that MFIs must overcome. Recent trends toward intermediation and commercialization have

brought about renewed focus on identifying appropriate policies to promote a viable microfinance industry.

The remainder of the paper is organized as follows. First, we briefly describe the main challenges in lending that are identified in the theoretical literature and show how innovations in lending (e.g., group loans) can alleviate information asymmetry problems and improve the provision of financial services to marginalized clientele. This is followed by a discussion of some organizational dilemmas faced by microfinance institutions. Issues related to the external environment in which MFIs operate are then highlighted. Next are sections providing a brief overview of the state of microfinance impact studies, and a summary of new developments in rural microfinance. The concluding section identifies current challenges in the industry and suggests topics for future research of interest to agricultural economists.

Some Theoretical Underpinnings of Microfinance Methodologies

Donor and government intervention in rural credit markets in the 1960s and 1970s encountered significant problems, and this experience contributed to initial skepticism about microfinance. For example, Adams and von Pishke (1992) concluded that microfinance is “*déjà vu*” in part because they equate it to (micro)credit. While the first microfinance programs provided credit-only (thus microcredit), charging market-based interest rates in an attempt to become free of subsidy, microfinance has since evolved toward intermediation with MFIs introducing savings products as well as more sophisticated financial products (e.g., microinsurance, home purchase loans) and services (various types of payment facilities).

At the other extreme are opinions that are too enthusiastic about microfinance, and misperceptions that microfinance has a clear social impact on all borrowers (addressed here in the section on impact

⁴ For example, Wenner (2002) shows that lending to agriculture by the Inter-American Development Bank fell from \$1.6 billion in 1986–1990 to no lending in 1991–1995, while financial sector restructuring rose from \$410 million in 1986–1990 to \$2.9 billion in 1991–1995. Similarly, financing by the European Bank for Reconstruction and Development to countries in Eastern Europe and Central Asia (ECA region) for financial sector development and micro and small enterprise financing amounted to about \$9 billion by 2005. During the same period, funding for agribusiness projects, of which a very small portion goes to agricultural production, amounted to \$3 billion. In 2005, 5% of the Asian Development Bank financing was allocated for agriculture and 5% was designated for the financial sector development. A portion of this bank lending (\$510 million) was specifically designated to microfinance, and the majority of microfinance lending in Asia is in rural areas. The African Development Bank's lending for agricultural and rural development was 18% and financial sector lending was 13%.

⁵ Comprehensive surveys of recent developments of the literature are: Armendáriz de Aghion and Morduch (2005); Conning and Udry (forthcoming); Brau and Woller (2004); see also Zeller and Meyer (2002).

studies), or that most microfinance programs could both serve the poor and turn a profit (Armendáriz de Aghion and Morduch, 2005).

The original group-based microlending and other innovative lending practices developed parallel to, or even in advance of, the theoretical literature on asymmetric information and the microeconomics of banking and corporate finance (Stiglitz, 2002). Without development of the theory, however, our understanding of these new practices would have been incomplete and superficial. For example, when Dr. Yunus began making small loans to groups of local villagers in Bangladesh in the 1970s, it was to take advantage of economies of scale. However, as time progressed, it became clear that there were many other advantages to this lending practice, and the new theoretical models helped explain the mechanisms behind the success.

It is now accepted that underdevelopment of financial markets is due to market failures rooted in poor information, high transaction costs, and difficulties enforcing property rights. This section presents the basic models of adverse selection and moral hazard (ex post and ex ante) and identifies the challenges posed by information asymmetries on financial contracts as well as how the first microfinance innovation—group lending—helps improve on existing market outcomes.⁶

Adverse Selection

In the standard model of adverse selection, there are two types of borrowers: “safe” and “risky.” The safe borrower can invest \$1 and get \underline{y} with probability 1, while the risky borrower can get \bar{y} ($\bar{y} > \underline{y}$) with a probability p , where $0 < p < 1$.

Assume that $p \cdot \bar{y} > \underline{y}$, and that the lender must cover its cost k by setting its gross interest R (principal and interest) equal to k . The borrower keeps $(\underline{y} - k)$. Under

asymmetric information, the bank does not know the proportion of safe borrowers q , and will set its gross interest rate (R_{at}) equal to

$$R_{at} = \frac{k}{[q + (1 - q) * p]} = k + A < R.$$

Stiglitz and Weiss (1981) show that in equilibrium credit may be rationed because if the interest rate is higher than \underline{y} , only risky borrowers would want to borrow at the higher interest rate and safe borrowers would exit the market (adverse selection). The implication is that there is a need for policies which promote transparency and decrease asymmetric information.

It can be shown that with a joint-liability loan (group loans), the adverse selection problem is mitigated. Under a group-loan scheme, each borrower obtains a loan, but all in the group face consequences if a member encounters repayment difficulties. Thus, under a group contract, we can have assortative matching of safe with safe, and risky with risky borrowers (Ghatak, 1999). Assuming each risky borrower can earn income $\bar{y} > 2R_g$ (R_g is gross interest under group loans), the bank will face (safe, safe) pair with probability q and (risky, risky) pair with probability $(1 - q)$. Therefore, the population probability of success is $g = 1 - (1 - p)^2$ and

$$R_g = \frac{k}{(q + (1 - q) * g)} < R_{at},$$

since $g > p$. Thus, the lender can attract the safe types back into the market. Even under random matching of individuals within a group [such as FINCA groups in the Andes, where groups are formed randomly (Karlan, 2003)], group loans can resolve the adverse selection problem by making risky borrowers cross-subsidize safe types, since the higher returns of risky borrowers can cover losses of both safe and risky partners (Armendáriz de Aghion and Gollier, 2000).⁷

⁶This section presents simplified examples of asymmetric information models summarized in Armendáriz de Aghion and Morduch (2005).

⁷Other notable adverse selection models with joint-liability contracts are provided by Ghatak (1999, 2000).

Moral Hazard

In the typical ex ante moral hazard problem, the principal cannot observe the agent after the agent takes a loan, so the principal (lender) would like to offer a contract that induces effort from a borrower. Assume an investment project takes \$1. A non-shirking borrower will generate revenue y with certainty, while a shirking borrower will generate y with probability p and zero with $(1 - p)$. A borrower's decision is determined by his or her incentive compatibility (IC) constraint $(y - R_{amh}) - c > p(y - R_{amh})$, where R_{amh} is the principal and interest, and c is a borrower's cost of working. This implies that the interest which can be extracted is defined by $R < y - [c/(1 - p)]$.

Stiglitz (1990) demonstrates that under a group lending contract, the lender can do better. In a two-person group, if both put in effort, both will incur the cost of effort. The joint return with effort is $(2y - 2R_{gamh}) - 2c$, but if both shirk, they will repay their joint-liability loan $(2y - 2R_{gamh})$ only p^2 fractions of the time. If one is lucky and the other is not, the lucky individual is responsible for the full payment and there is no surplus; the group's IC is $(2y - 2R_{gamh}) - 2c > p^2(2y - 2R_{gamh})$ and $R_{gamh} < y - c/(1 - p^2)$. Since $(1 - p^2) > 1 - p$, under ex ante moral hazard, the group gross interest is smaller than the gross interest without a group ($R_{gamh} > R_{amh}$).

Under the ex post moral hazard problem, the major concern is that after the outcome is realized a borrower may refuse to repay and the lender cannot discern if the default is strategic or not (Townsend, 1979). In the absence of peer monitoring, everyone will default strategically and the bank will never lend. This problem under group contracts has been the subject of considerable research (Besley and Coate, 1995; Armendáriz de Aghion, 1999).

A group loan can force the borrowers to incur (ex post) costs of monitoring m to find out the actual outcome of a project. If group members incur m , they can observe

the actual outcome with probability q , and if d is the social sanction imposed on a borrower who tries to avoid repayment, then repayment will be chosen if $y - R_{gpmh} > y - g(d + R_{gpmh})$. The gross interest is then $R_{gpmh} < [q/(1 - q)]d$. In the absence of peer monitoring, the chance of observing actual revenue is $q = 0$, and there is no lending. To minimize the probability of suffering joint liability, monitoring will occur under small $m < qy$.

Group-based financial services are not entirely new or used only in microfinance. Historically, models such as credit cooperatives (credit unions), farm credit and insurance mutuals, and other mechanisms such as Rotating Savings and Credit Associations (ROSCAS) existed in rural and low-income areas.⁸ Advances in the modeling of asymmetric information problems also help better explain financial services provision via credit cooperatives (Banerjee, Besley, and Guinnane, 1994). Similarly, the mechanism of ROSCAS, whereby members pool resources by contributing a small amount each period and take turns to use the common pot of money to meet their credit needs, has also been explored (Besley, Coate, and Loury, 1993).

Microfinance is not only about group loans, however. In fact, researchers and practitioners agree that many successful individual microfinance schemes rely on other mechanisms of screening, monitoring, and contract enforcements such as dynamic incentives, or mechanisms incorporating elements explained by the literature on multi-period and repeated contracts, limited commitment, and reputation.⁹ These may be more cost-effective in countries without dense rural populations such as those in the Eastern Europe and Central Asia region or Latin America (Armedáriz de Aghion and Morduch, 2000).

⁸ Ghatak and Guinnane (1999) provide an excellent overview of group-based practices.

⁹ Conning and Udry (forthcoming) provide a recent overview.

There is a perception that microcredit products are well defined and that loan officers react quickly to repayment difficulties, but actual contracts are more state-contingent than generally believed (for example, a lender could agree to let a borrower miss a couple of payments, or forgive a portion), suggesting incomplete market outcomes (Udry, 1994; Townsend, 2003). The literature on multi-period sovereign debt, as well as Holmstrom's sufficient statistics tying up investment outcomes to agent's effort and the environment, suggests an explanation for these "anomalies" in accepted practices (Grossman and Van Huyck, 1988; Holmstrom, 1979).

When financial markets are incomplete, limited commitment is a serious problem. Reputation-updating mechanisms under multi-period moral hazard produce results different from the one-shot moral hazard (Lambert, 1983). Multi-period moral hazard outcomes improve on single-period outcomes only if there is an exclusive relationship between a borrower and a lender and they pre-commit not to renegotiate contracts (Fellingham, Newman, and Suh, 1985). In practice, this may depend on the existence of competitors in the local market. Thus, research focusing on the role of competition among MFIs is becoming important, especially as case studies from many countries (e.g., Bolivia) reveal that competition affects local microfinance markets. This raises the question of whether competition should or should not be promoted.

The Case for Intermediation

Agricultural economists, and the Ohio State Rural Finance Program in particular, discovered rural credit programs were often inadequate because of the incorrect assumptions that the poor do not need saving facilities or noncredit financial products (Gonzalez-Vega, 1994). Unlike previous credit-only interventions in rural credit markets, many MFIs today provide savings facilities because they identified a need among the target population.

Moreover, some of the most successful MFIs, such as the Unit Desa System of Bank Rakyat Indonesia and Equity Bank in Kenya, owe much of their growth to extremely effective savings mobilization.

The result is a trend toward *commercialization* where an NGO MFI grows, achieves scale, and transforms into a commercial financial institution, usually with a license to collect deposits. Larger MFIs move toward financial intermediation and, in addition to saving, provide payment facilities and more sophisticated financial products such as housing loans and microinsurance. These developments highlight the need to focus on the role of MFIs within the financial system of a country.

The literature on the microeconomics of banking has long made the case for delegated monitoring via specialized financial institutions (Diamond, 1984). Theory also suggests that deposit collection presumes regulations (Freixas and Rochet, 1997). However, recent cross-country studies provide evidence of overregulation and argue for market-based disciplining mechanisms for financial intermediaries (Barth, Caprio, and Levine, 2004). The validity of these arguments for microfinance is unclear since the nonprofit literature and some microfinance studies suggest the focus on outreach and impact weakens the case for market competition as a disciplining mechanism (McIntosh and Wydick, 2005). Moreover, examples from countries with competitive markets (such as Bolivia) indicate that too much competition can lead to over-indebtedness and hurt the sector.

Commercialization and intermediation introduce a new set of issues needing to be addressed by academics and policy makers. On the one side are those who believe that microfinance is not unique and that it conforms to other challenges of financial sector development (Honohan, 2004). On the other side is a renewed attempt to refocus microfinance toward impact and outreach. For example, Microcredit Summit II pushed for

refocusing on the very poor—those who live on less than US\$1 a day (adjusted for purchasing power parity). The U.S. Agency for International Development (USAID) now aims to have at least half of its microenterprise funds benefit the very poor.¹⁰

Issues Within Microfinance Institutions

Well-run microfinance institutions make better use of scarce funds by providing better financial services and reaching more poor clients. The main conclusion from the theoretical literature on asymmetric information and contracts is that incentives matter. Incentives within the MFI have also attracted the attention of both researchers and practitioners. For example, Chaves and Gonzalez-Vega (1996) explain the successful outreach and sustainability of rural financial intermediation systems in Indonesia in terms of organizational design.

The use of performance-based compensation to improve staff performance has gained popularity. As it turns out, however, devising successful performance-based incentive schemes is a complicated task. The challenges of creating optimal incentives arise from the fact that microfinance staff perform multiple tasks. In a multi-task environment, high-powered incentives—where a larger portion of the employee compensation is based on performance—may be counterproductive because the efforts to achieve various goals (outreach and sustainability) may be complements or may be substitutes (Holmstrom and Milgrom, 1991).

This is consistent with the experience at PRODEM which, in 1993, introduced

¹⁰ USAID works on developing new tools to measure poverty, and will soon require that institutions receiving microenterprise aid use these tools and report the number of clients who live on less than US\$1 a day. The result is a decrease in funding by USAID, and this initiative is subject to much discussion.

programs with high-powered incentives designed to reward achievements of individual loan officers. There was improvement in financial indicators, but there was also high turnover of loan officers and many cases of corruption which undermined the organizational culture. In 1996, incentives were modified by conditioning rewards upon the success of a team. Even these schemes were dropped, however, because different branches received different rewards. This reward system created tensions, as employees were unable to distinguish between results due to hard work at a branch or simply luck (Bazoberry, 2001). Lower-powered incentives have enjoyed greater success, as demonstrated by Procredit Banks (Holtmann, 2001; Holtmann and Grammling, 2005).

While MFIs experimented with performance-based compensation for loan officers, top MFI managers usually did not receive performance-based bonuses (Holtmann, 2003). The role of management has attracted attention, especially the governance aspect of senior managers and board interaction (Campion, 1998). One challenge of the governance in MFIs is that managers who are agents are supervised by donors who are also agents (Varian, 1990). Traditional governance practices are more effective in private (commercial) microfinance banks where the emphasis on financial results is more pronounced.

Another challenge emerges from the multi-task environment in which MFIs operate. It can be shown that because MFI managers perform multiple tasks and the board has diverse preferences for outreach and sustainability, managers would reveal more information to their supervisory boards than if the managers were focusing on a single task (Hartarska, 2002). Empirical results also confirm that MFI board size and composition affect MFIs' outreach and sustainability (Hartarska, 2005). To promote good governance practices, large networks such as ACCION International have developed various tools. Nevertheless, our understanding of what works and what does not in MFI

governance remains largely incomplete (Rock, Otero, and Saltzman, 1998).

Efficiency of MFIs

Numerous case studies focus on the performance and efficiency of a single MFI or a group of MFIs operating in one country or in similar markets. The role of subsidies has been subject to extensive research (Morduch, 1999). Although these studies provide invaluable information on innovation in technology and organizational design, industry-wide and cross-country studies have the potential to offer more policy-relevant insights. Cross-country studies can control for important variables that capture MFI-specific characteristics, as well as macroeconomic factors and institutional factors such as security of property rights, etc. Empirical work on the relative efficiency of MFIs is scarce, largely because of significant data limitations.

Competition for donor funds and the entrance of private investors into microfinance, however, have brought increased transparency which has, in turn, led to increased availability of data. Data such as performance ratios averaged by geographic region and target market compiled by the *Microbanking Bulletin* (MBB) and the MIXMARKET are now available online (at www.mixmarket.org). These ratios are widely used as "benchmarks," but have their limitations. These limitations are confirmed by Gutiérrez-Nieto, Serrano-Cinca, and Mar-Molinero (2004) who report that MFI performance rankings based on MBB ratios differ from rankings produced by nonparametric (DEA) efficiency analysis.

These newly available data help identify factors associated with successful MFIs. For example, in their study of profitability and outreach of leading microfinance institutions, Morduch, Demirguc-Kunt, and Cull (2005) conclude that differences in institutional design and orientation matter. Specifically, MFIs which focus on lending to individuals invest heavily in

staff in order to protect their portfolios, but those whose emphasis is on group lending do not.

Similarly, Hartarska, Caudill, and Gropper (2006) assert that MFIs' orientation matters. Applying a cost-efficiency approach, they establish that when output of MFIs in the ECA region is measured as the number of loans, MFIs become more efficient over time, and MFIs involved in the provision of group loans and loans to women have lower costs. However, when output is measured as the total volume of loans, the opposite is true.

Estimating a mixture of cost functions, Caudill, Gropper, and Hartarska (2006) observe that there are two types of MFIs in the ECA region, with about half of the MFIs becoming more productive and about half becoming less productive over time. A higher subsidy per loan and a smaller size loan are found to be associated with decreasing productivity over time, while MFIs registered as banks are associated with increasing productivity over time.

The Environment

Annual spending on microfinance is substantial and amounts to between US\$800 million and \$1.5 billion. More recently, MFIs have turned to capital markets to raise funds. Fundraising efforts include local bond issues (Compartamos in Mexico, Mibanco, Peru), international debt issues (Deutsche Bank Microcredit Development Fund, Global Commercial Microfinance Consortium, Global Partnership Microfinance Notes), and equity funds (ACCION Investment, OI Balkan Fund, ProFund).¹¹

The increase in spending on microfinance has prompted donors and investors to look for effective mechanisms of control to ensure MFIs achieve their objectives. Studies have shown that MFI success

¹¹ See "Who Will Buy Our Paper? Microfinance Cracking Capital Markets" (ACCION International, 2006).

depends on the existence of an enabling environment (Cuevas, 1996; Hartarska, forthcoming, 2008). Thus, there is a renewed interest in designing optimal policies to promote a healthy microfinance sector.

Identifying the proper role of governments is among the most important and challenging tasks facing MFIs. In the past, government-led development banks were subject to price (interest rate) and quantity (targeted credit) controls. The main policy goals were redistribution of income in favor of small producers, promotion of technology adoption, and elimination of moneylenders who charge "predatory" interest rates.

Research by the Ohio State Rural Finance Program showed that the use of credit to address these social objectives has failed and may have undermined the development of rural financial markets (Adams et al., 1984). For example, interest rate ceilings designed to improve access to credit for small farmers resulted in misallocation of resources, termed by Gonzalez-Vega (1994) "the iron law of interest rates ceilings." To cover their fixed costs (screening, monitoring, and contract enforcement), banks lent to rich farmers who already had access to loans from unsubsidized sources. As a result, poorer farmers were worse off because many rich farmers defaulted on their subsidized loans, and banks therefore had even less loanable funds (Gonzalez-Vega, 1977).

Today, the debate again centers on how microfinance should be integrated within the country's financial system—whether it should be regulated and subsidized and/or should be commercialized or should rely only on market-based mechanisms of control (shareholder control, microfinance rating agencies, credit bureaus, etc.).

While the asymmetric information literature identifies government's role in financial markets as one of promoting transparency and enforcing contracts, the microeconomics of banking literature also suggests that intermediation requires regulations to prevent negative externalities such as bank

runs (Diamond and Dybvig, 1983). Moreover, when deposits are collected, and because depositors are small, dispersed, uninformed, and cannot effectively monitor managers or exercise control rights, a regulator could better represent depositors' interests and act on their behalf. The regulator's role is to differentiate the conditions under which equity holders would remain in control from those where they would lose control, usually through solvency regulations (Dewatripont and Tirole, 1994). This principle is difficult to implement in microfinance because many MFIs do not use traditional collateral to secure their loans.

At present, MFIs remain remarkably diverse. MFIs can be unregulated or regulated, registered as nongovernmental organizations (NGOs), private banks, or as nonbank financial institutions. The main argument for regulation has been that, in most cases, regulation enables an MFI to attract deposits (Campion and White, 1999). Depending on the types of funds MFIs use (whether donations, or private investment and deposits), none or some level of (prudential) regulation has been recommended (Chaves and Gonzalez-Vega, 1994; Hardy, Holden, and Prokopenko, 2003).

The costs of designing and enforcing regulatory policies to address the specific challenges of microfinance are substantial. For example, supervision of MFIs in Ghana was costly relative to their asset base (Steel and Andah, 2003). However, the benefits of regulation in some Latin American countries have exceeded the costs (Theodore and Trigo, 2002).

Practitioners worry about the impact of regulation on the poverty alleviation mission (Dichter, 1997). Regulatory involvement may lead to a "mission drift" if demands to fulfill regulatory requirements divert attention away from serving the poor (e.g., by shifting the focus from serving poor clients to serving wealthier borrowers to improve capital adequacy ratios) and may hold back innovation in lending technology which has been the driving

force behind MFIs' ability to expand outreach and serve poor clients. As shown by summary statistics reported by *Microbanking Bulletin* No.10 (online at www.mixmbb.org), regulated MFIs serve wealthier borrowers.

Barth, Caprio, and Levine (2004) conclude that too much regulation can negatively affect bank performance. In a similar cross-country study, Hartarska and Nadolnyak (2007) report that regulatory status and regulatory power of the supervisory body have no impact on MFI performance. However, better outreach (measured as number of borrowers, not savers) is associated with higher levels of savings, suggesting an indirect effect of regulation on outreach.

An alternative to regulation is to rely more on a market-based mechanism of external governance (Hartarska, forthcoming 2008). As an example, rating by commercial credit rating agencies and the emergence of microfinance rating agencies in recent years indicate that microfinance has reached a certain level of maturity (*The Economist*, 2005a). Donors have also embraced rating and, to support the rating of MFIs, in 2001 CGAP established a special fund with the purpose of subsidizing rating of MFIs (see <http://www.ratingfund.org>).

Microfinance rating agencies are expected to generate independent information, which can improve efficient resource allocation. However, microfinance rating agencies have little competition, and since most have both consulting and rating operations, they are rigged with conflict-of-interest problems (*The Economist*, 2005b). Hartarska (2004) notes that not all microfinance rating agencies produce the same results and/or help MFIs raise external funds.

The role of competition in microfinance is still unclear, especially because MFIs have an outreach mission and many operate as NGOs. According to findings reported by Besley and Ghatak (2004), the nonprofit status reinforces mission credibility, and

managers perform better in organizations with large endowments as they are less likely to be forced to adjust their mission to attract donations. Thus, competition among mission-driven organizations improves efficiency because it improves matching between donors and managers.

However, McIntosh and Wydick (2005) show that competition among nonprofit lenders exacerbates asymmetric information problems over borrower indebtedness and causes more borrowers to seek additional debt, thereby creating a negative externality that leads to worse equilibrium loan contracts for all borrowers. In a follow-up empirical paper, McIntosh, de Janvry, and Sadoulet (2005) report that in Uganda, entrance of competitors induced a decline in loan repayment and led to the exit of larger borrowers.

Impact Studies

Continuous support for microfinance programs depends on demonstrated results such as improved socioeconomic outcomes (e.g., income, schooling, etc.). Although anecdotal evidence on how access to credit improves client lives across the world is abundant, the impact story is not yet very clear. Early studies found that microfinance has a positive impact by demonstrating better outcomes for program participants than for nonparticipants.¹² A valid impact assessment study, however, should isolate pure credit impact from nonrandom program placement (the choice to open an MFI in one village but not in another) and nonrandom program participation (the effect associated with the decision to participate, presumably made by more entrepreneurial clients).

The next wave of impact studies either used quasi-experiments to evaluate impact (Coleman, 1999) or more sophisticated econometrics techniques to address

¹² See Pitt and Khandker (1998) for a review of early studies.

selectivity issues (Pitt and Khandker, 1998). In general, these studies documented a positive impact of microfinance programs. Still, results are often sensitive to the methodology employed, and the same data could produce inconsistent results (Pitt and Khandker, 1998; Khandker, 2003).

Impact studies also highlight who uses credit and why. A key finding is that the very poor use credit not for productive purposes but to smooth consumption and alleviate their liquidity constraints (Hulme and Mosley, 1997).

Since academic studies have a significant time lag between data collection and publication of results, practitioners have developed their own impact assessment tools, such as the USAID-supported Assessing the Impact of Microenterprise Services (AIMS) methodology which includes panel data collection and better impact measurement techniques (<http://www.usaidmicro.org/pubs/aims/>).¹³ Some studies have raised questions about these techniques. For example, when Alexander (2001) used AIMS data from Peru but applied a different identification approach, she found much smaller impact than the results produced by the AIMS study.

Impact studies typically focus on evaluating the impact of a single MFI, usually at the request of donors who want to know whether to discontinue support for a specific MFI (Zohir and Matin, 2004). Hartarska and Nadolnyak (2006) focus, instead, on the collective impact of all MFIs in Bosnia. They define the role of microfinance not in affecting nonfinancial variables, but in alleviating financing constraints. Their results show that investment by entrepreneurs living in municipalities with MFIs depends less on internally available cash flows than does investment by entrepreneurs who live in

municipalities without MFIs. Such an approach takes into account the fact that, in some regions, there may be too much competition (the relationship between investment and number/size of MFIs in the municipality may be nonlinear), but their paper does not find evidence of over-indebtedness in Bosnia.

Rural Microfinance

Provision of financial services remains a challenge outside densely populated rural areas. Traditional rural finance targeted producers. The philosophy was that there was a need to change agricultural technologies to feed expanding urban populations, and thus targeted loans must be offered to expand agricultural production (Yaron and Benjamin, 2002). Rural microfinance, in contrast, takes advantage of what previous financial interventions neglected—nonfarm rural activities, scale efficiency, and savings mobilization—as well as of improved knowledge of rural households' behavior.

In traditional rural finance, for example, credit was extended for a specific purpose (usually the purchase of inputs to produce a specific crop), while in microfinance the loan repayment generally is not linked to loan use. De-linking loan use from the outcome of a specific productive use of capital emphasizes that the loan is not a grant, and has to be repaid.¹⁴ Moreover, the microfinance industry does not consider its lending practices as agricultural finance, in part because money fungibility is now well understood, and MFIs do not collect information on how households spend the money (i.e., personal or productive use); they only collect information on sources of cash flow in order to match repayment dates (Christen and Pearce, 2005).¹⁵

¹³ In some cases, practitioners partner with academic departments to develop evaluation tools (see ImPact project run by Sussex University, online at <http://www.imp-act.org>).

¹⁴ This practice works best for staple crops or livestock produced year in/year out, that do not require too bulky investment.

¹⁵ At least part of microfinance loans go to agricultural activity, especially in Asia, where most of group microloans go toward agricultural activity.

Household studies find that poor households save and have multiple income sources and financing needs (Adams, Graham, and von Pischke, 1984). Taking advantage of field observations, IPC Internationale Projekt Consult—a consulting company specializing in lending to low-income households—promoted lending based on evaluation of the cash flows of the household. In particular, savings and income diversification permit borrowers to comply with a weekly loan repayment schedule that relies on dynamic incentives and monitoring to improve loan repayment. For example, *Financiera Calpia* in El Salvador perfected such lending in urban settings and then successfully adapted it to rural lending (Navajas and Gonzalez-Vega, 2000).

In rural settings, MFIs adjust loan terms and conditions to accommodate cyclical cash flows and bulky investment and introduce flexible payment options, such as the three-stage loan disbursement and repayment offered by *Confianza*, Peru (Christen and Pearce, 2005). Such lending permits loans to be used for productive purposes or consumption-smoothing which may be more important to poorer households (Hulme, and Mosley, 1997).

Portfolio diversification is important for rural financial intermediaries (Yaron and Benjamin, 2002). Lending to clients with diversified income and cash flows decreases lender losses, although it may also restrict the pool of potential borrowers. For example, *Caja Los Andes* and *PORDEM* in Bolivia do not usually lend to undiversified rural borrowers who grow only one or two crops. Another way to address agriculture-specific risk typically used by credit unions and specialized rural banks is to limit agricultural lending to less than 25% of their portfolios (Christen and Pearce, 2005).

Technology plays an important role in rural areas. Christen and Pearce (2005) argue that rural MFIs “piggyback on existing infrastructure” and exploit technological innovations to develop

alternative delivery mechanisms. The authors note that, instead of building expensive branch infrastructure, MFIs share local institutions’ infrastructure—service centers, schools, rural banks, or intermediaries (such as *Constancia* in Georgia, which rents teller service centers from rural banks), and retail shops (*Xuu Nuu Ndavi* in Mexico, which collects bulk remittances from city banks and for a fee redistributes them via its own rural branches, and the World Council of Credit Unions, which sends remittances from U.S. to local credit unions in Latin America). Other examples cited by Christen and Pearce include mobile banking via specially equipped vehicles with an effective Management Information System (MIS), solar-powered computers successfully used in Kenya and in Vietnam, multi-language ATMs with fingerprint reading capability, smart cards and debit cards that substitute for traditional branch infrastructure used by *PRODEM* in Bolivia, and ATMs in rural Ecuador linked directly to savings accounts in Spain and Italy to access remittances. PDAs and cell phone technology are also used to provide instant access to MIS and central information systems and afford instant loan approval and monitoring.

Numerous additional experiments are carried out across the world. These include incorporating agricultural contractual arrangements (contract farming) in loan and savings products (by MFIs in India, Pakistan, and in Eastern and Southern Africa), introducing leasing services, offering area-based (weather-based) risk insurance (Tanzania), incorporating other insurance products in the loan product (life insurance in Bosnia), and cooperation with membership-based (formal or informal) organizations.

Perhaps the most important factor for the success of rural microfinance is that it is isolated from politically motivated interventions (Adams, Graham, and von Pischke, 1984; Yaron, Benjamin, and Piprek, 1997). With intermediation in

rural areas taking off, the role of the government should continue to be developing a legal and regulatory framework, and securing property rights. In addition, its role should include providing a stable macroeconomic environment, promoting public investments in rural areas, and removing biases against agriculture (Yaron and Benjamin, 2002).

Microfinance Outlook and Possible Research Agenda

Microfinance has made great strides in terms of achieving scale, improving productivity and efficiency, increasing outreach, and pursuing sustainability and positive impact on the intended target clients. This is perhaps why microfinance is currently one of the most prominent poverty alleviation tools.

Total funding of the industry by "traditional" donors remains a nontrivial quantity: it is estimated that annual spending on microfinance is between US\$800 million and \$1.5 billion. Bi- and multilateral agencies account for the bulk of quasi-commercial investment in microfinance organizations through equity, guarantees, and quasi-commercial debt (CGAP, 2005b). In some respects, microfinance is an excellent (and rather rare) example of the benefits of better donor coordination.

Under the leadership of the Consultative Group to Assist the Poor (CGAP), a multinational microfinance resource center housed in the World Bank, leading donor agencies have subscribed to a canon of "donor guidelines" defining the current state of knowledge on donor practices in microfinance. As a result, many leading donor agencies have undergone peer reviews of their microfinance portfolios and activities and have made adjustments to their practices. The most recent examples are significant changes to the funding practices of the United Nations Development Programme and the credit lines of the World Bank (CGAP, 2006b).

Lack of funding does not appear to be a bottleneck holding up the development of the industry. Indeed, the current picture is more accurately described as one of too many investors chasing too few investment opportunities, which sometimes may have adverse effects. For example, the increasing supply of funds by foreign investors has led many MFIs to accept unhedged foreign exchange exposures (CGAP, 2006a). Notwithstanding such risks, microfinance will continue to integrate into local and international capital markets.

The major bottleneck in microfinance is still inadequate retail capacity. In terms of size and sustainability, there is a bipolar distribution in the microfinance industry. More than 600 of the leading MFIs report to the Microfinance Information Exchange (MIX, online at www.Mixmarket.org). Even in this, to date, most comprehensive database, the 145 leading MFIs make up approximately 75% of the clients in microfinance, but there are thousands of small and unsustainable programs.

Transparency and adherence to international financial accounting standards remain a challenge. Much remains to be done in order to create the critical mass necessary to establish truly global reporting standards. There is also an expectation among industry practitioners that just as environmental reporting has become widespread among big industrial corporations, social impact reporting will be accepted by many MFIs.

Another difficulty for microfinance is the result of too much attention by developing countries' governments who have increased their spending on microfinance. This trend creates new challenges for the industry, especially when "Banks for the Poor" in the Middle East and North Africa region and government-sponsored agricultural lending schemes in Central Asia use subsidized lending rates, because these initiatives may crowd out for-profit MFIs.

The prominence of microfinance today may lead to a backlash once taxpayers and the general public realize that microfinance is not a universal tool for dealing with all the challenges of development. For example, microfinance will most certainly not solve the problem of generating employment for the hundreds of millions of youth who will be entering the labor force during the next decade (in the MENA region alone, it is estimated that the labor force will increase by 100 million people over the next 20 years).

Microfinance is no substitute for investments in infrastructure, education, and other basic services. While top-tier MFIs around the world demonstrate sustainability, and even strong profitability, the recent political backlash against high interest rates and aggressive loan collection practices (e.g., by Andhra Pradesh in India) points to future challenges. In addition, the industry will continue to grapple with other fundamental questions, such as the proper use of subsidies, the role of the private versus the public sector in the provision of microfinance, and the role of government.

Most large-scale microfinance is produced in urban and densely populated rural markets. The provision of rural and agricultural finance in large countries and areas with lower population densities (imagine Southern Sudan) with significant outreach and in a sustainable manner is a largely unsolved problem. The advent of new delivery technologies, such as point-of-sale terminals and cell-phone based banking, may help to change the production function of rural microfinance and thus provide the necessary "push" for making finance accessible for the rural poor.

These microfinance trends suggest a potential focus of future research on public versus private provision of microfinance and the role of government (perhaps to explain the bipolar distribution of MFIs), and better ways to measure microfinance impact.

One consequence of recent developments in the microfinance literature is that research has gradually moved away from agricultural economics departments where the emphasis remains on agricultural and production finance, and is now more common in economics (and even in finance) programs where financial markets for marginalized low-income (rural and urban) populations are viewed as a part of the development of a financial system.

To maintain their place in microfinance research, agricultural economists should continue the best traditions of field work that focuses on understanding the complexities of rural households, their cash flows, financing needs, and surplus funds, as well as understanding what products MFIs offer to meet these needs and cover their costs. Adopting a broader view of the rural economy to include nonagricultural activities and using the advances in asymmetric information theory, financial economics, entrepreneurship, microeconomics of banking and financial intermediation, and experimental economics would permit provision of financial services which will also benefit agricultural production activities.

Recently available data could be used to clarify important issues that could affect the direction of microfinance. For example, economies of scope in provision of deposits and loans are yet to be estimated for various environments. Similarly, it is important to establish if there are scope economies in providing financial and nonfinancial services. Agricultural economists may want to study how efficient rural MFIs are, if and when there are cost advantages to serving both rural and urban markets. Answers to these questions would determine in what countries (regions) or under what circumstances financial markets for marginalized rural clientele must be studied separately, and ultimately the scope of work needing the attention of agricultural economists.

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Microfinance in Developing Countries: Accomplishments, Debates, and Future Directions

Richard L. Meyer and Geetha Nagarajan

Abstract

This paper provides an overview of the microfinance industry in developing countries. It highlights the early development of the concept of microfinance and identifies some of the key issues and debates concerning its performance in terms of outreach, sustainability, and impact. Studies are summarized that report on industry performance by region. The frontiers for the industry involve broadening the range and diversity of services provided to existing clients and expanding services to difficult-to-reach populations, especially the remote, poorest, and the youth. In countries where the industry is still small and fledgling, the challenge is often one of addressing the problems of reaching people in remote and conflict-affected areas.

Key words: financial services, impact evaluation, microfinance, microfinance institution, microlending, poverty, remote populations, sustainability, youth

Microfinance has succeeded in delivering small loans to millions of people in developing countries who previously lacked access largely because of low income and limited assets normally required as collateral for bank loans. Savings, insurance, remittance transfers, and other financial services are also beginning to be offered by microfinance institutions (MFIs).

These institutions have learned that low-income people represent a vast market for financial services beyond just loans. Interest in microfinance has spread to developed countries, but supplying sustainable and unsubsidized financial services in these economies has proven to be even more challenging than in developing countries (Schreiner and Morduch, 2002; Schreiner and Woller, 2003).

This paper provides an overview of the microfinance industry in developing countries. The objective is to summarize key aspects of its history, current status, and future challenges.

The primary sections of the paper proceed as follows. First, the evolution and performance of the microfinance industry are highlighted, followed by a discussion of the current status of the industry. Next, we present some key frontier issues facing the industry as it matures and attempts to fulfill its potential of efficiently providing financial services to those who fall outside the mainstream of formal finance. The final section offers a summary overview and concluding remarks.

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Evolution and Performance of Microfinance

Definition of Microfinance

The definition of microfinance has evolved as the industry has grown. When microfinance was beginning to take off in developing countries in the 1980s and 1990s, the term largely referred to microcredit in which nongovernment organizations (NGOs) or specialized financial institutions used a credit methodology with some form of collateral substitute, frequently group lending, for making and recovering short-term, working-capital loans made to poor microentrepreneurs [Consultative Group to Assist the Poor (CGAP), 2003]. Most of the clients were located in urban or densely populated rural areas.

Today, the concept is far more inclusive. It refers to a broad range of services—loans, savings, insurance, remittance transfers, even pensions—offered to the rural and urban poor through a variety of commercial banks, cooperatives, credit unions, specialized banks, post offices, and even retail chains.

This evolution occurred because the industry leaders demonstrated that the poor represent a vast market for financial services which can assist them to operate their businesses, smooth household consumption, and protect them from risks. Once the pioneer institutions (often NGOs) demonstrated the viability of lending to the poor, other institutions jumped on the bandwagon and began to design products for this neglected segment of the market.

A Brief History of Microfinance

Microfinance gained widespread recognition during the past couple of decades, but its roots are much older. For example, Seibel (2003) described several financial arrangements for the poor in Europe in the 1800s. Charitable groups in Ireland made interest-free loans beginning in the 1700s and benefited from

legislation in 1823 that permitted these charity-based entities to become financial intermediaries, collect interest-bearing deposits, and make interest-bearing loans to the poor. The high rates paid on savings cut into the business of banks, however, so they succeeded in passing restrictive legislation leading to the eventual demise of these financial intermediaries by the 1950s.

During the mid-1800s, Raiffeisen in Germany created rural savings and credit cooperatives (now referred to as *Raiffeisenbanken*), and Schulze-Delitzsch established urban savings and credit cooperatives (now called *Volksbanken*). They were formalized by the 1889 Cooperative Act, the first cooperative law in the world. These cooperatives shared a belief in self-reliance, based on savings mobilization with local outreach achieved through creating lasting house-banking relationships. By 1914, the number of rural cooperatives in Germany had increased to more than 15,000 and the model had spread to other countries. An agricultural crisis in the Netherlands in the 1880s led to the establishment of cooperative banks patterned after the German Raiffeisen model that grew to number some 1,250 banks by 1920 (Robinson, 2001).

Indonesia has been identified as one of the birthplaces of modern microfinance. The Dutch colonial administration introduced various forms of People's Credit Banks in 1895, some of which evolved into the well-known Bank Rakyat Indonesia (BRI). In the 1980s, BRI was converted from a failing agricultural lending organization into a highly profitable financial institution serving the rural poor with individual loans. However, in her exhaustive study, Robinson (2001) identified the private Bank Dagong Bali (BDB) in Bali as the longest operating formal sector financial institution providing commercial microfinance (both savings and loans) in a developing country on a substantial scale continuously and profitably since 1970 without ever having

received a subsidy.¹ The owners learned successful banking techniques as informal moneylenders.

Bangladesh is mistakenly credited as the birthplace of microfinance because of the innovative experiments to assist the poor, pioneered by the economics professor Muhammad Yunus in the mid-1970s, that culminated in the creation of the Grameen Bank in 1983, followed by hundreds of replications in dozens of countries (Bornstein, 1996; Yunus, 1999). Grameen became famous because of its focus on poverty, especially landless rural women, the development of group lending, the publicity of supportive donors, and the charismatic personality of Yunus.² In October 2006, Yunus and Grameen were awarded the 2006 Noble Peace Prize in recognition of their microfinance contributions.

A Latin American pioneer of modern microfinance, Pancho Otero, was hired by ACCION International to be the first executive director of Prodem, an NGO created in 1986 to provide solidarity group loans to poor microentrepreneurs, many of whom are market women, in urban Bolivia (Rhyne, 2001). It followed the financial systems view that donor and government subsidies are temporary, and that the scale necessary to reach the potential market can be achieved only if microfinance connects to the mainstream financial system. Prodem emphasized lending to microentrepreneurs, developed more flexible products compared to the rigid ones originally offered by Grameen, and charged higher interest rates to cover costs and generate capital for expansion. Due to its rapid and profitable growth, it was transformed in 1992 from a microcredit NGO into

BancoSol, the first private commercial bank in the world to cater specifically to microentrepreneurs.

Another early microfinance model was created by John Hatch in the form of village banks comprised of 30–50 members. His Foundation for International Community Assistance (FINCA) started many village bank operations in Latin America beginning in 1984, and lent to the banks which on-lend to their members.

Other organizations created variations of the model as it spread throughout the developing world. Westley (2004) found that village banks served more clients and had smaller average loan sizes than did MFIs making solidarity or individual loans in Latin America, and their financial performance was as good if not better, but client satisfaction could be improved through more flexible lending policies.

The success of these initial microcredit experiments, as well as many other less well-known initiatives, demonstrated techniques that were more effective than previous methodologies at reaching large scale, achieving high loan recovery, and covering costs. By 1996, the World Bank concluded there were over 1,000 microcredit institutions founded before 1992, each serving more than 1,000 clients (Paxton, 1996).

Two events in the mid-1990s elevated awareness about microfinance and committed donor agencies to greater support for the emerging industry. The first was the launching of the Consultative Group to Assist the Poor (CGAP) on June 27, 1995, by nine bilateral and multilateral donors with a pledge of approximately \$200 million. Housed in the World Bank, it was charged to increase resources for microfinance and deepen the success of pioneer institutions in the field. Its specific objectives are to: (a) strengthen donor coordination, (b) disseminate best practices, (c) improve the enabling environment for microfinance, (d) support existing microfinance institutions (MFIs),

¹ In a personal communication, Nimal Fernando of the Asian Development Bank reported that the bank was closed a few years ago by the Indonesian Central Bank, but for reasons unrelated to its microfinance portfolio.

² The global recognition of Grameen was heightened when the innovation of group lending led to several theoretical studies by eminent economists including Joseph Stiglitz and Hal Varian (Morduch, 1999b).

and (e) help others to start such services (CGAP, 1998).³

Second, the Microcredit Summit was held in Washington, DC, February 2–4, 1997, with the objective of mobilizing support for the target of reaching 100 million of the world's poorest families, especially the women of those families, with credit for self-employment by 2005. A goal of \$20 billion was established for the task. More than 2,900 people from 137 countries attended this high-profile event (Results Educational Fund, 1997).⁴ Since then, the Summit has been a continuous and vocal advocate frequently holding high-profile meetings around the world to strengthen support for the industry and transfer technology and ideas among the participants.⁵

Objectives of Microfinance and Measuring Performance

Given the initial objective of microfinance to expand loans to the poor, the primary metric for measurement of progress has always been outreach—meaning the total number of people receiving loans with special emphasis on women clients as stated in the Microcredit Summit goals. Nevertheless, over time, that single objective was viewed as inadequate because many of the NGOs and other MFIs that made the loans were highly subsidized and unable to cover operating costs and loan losses out of interest income.⁶

³ Representatives of some of the pioneer institutions, such as Maria Otero of ACCION International and Muhammad Yunus of the Grameen Bank, were included in the first CGAP Policy Advisory Group.

⁴ The Honorary co-chairs were Hillary Rodham Clinton, wife of the President, and Tsuomu Hata, Prime Minister of Japan. Muhammad Yunus was a member of the Organizing Committee. Several heads of state addressed the Summit.

⁵ Most recently, the Global Microcredit Summit 2006 was held in Halifax, Nova Scotia, Canada, November 12–15, 2006. Over 2,000 participants attended (see www.globalmicrocreditsummit2006.org).

⁶ Schreiner (2002) proposed six aspects of outreach (breadth, depth, length, scope, worth, and cost) and applied them to an analysis of BancoSol in Bolivia. Using this framework, he made a rough estimate of the value of the benefits generated from investments made in the organization.

Moreover, operational efficiency was not highly valued when the primary objective was simply maximizing the number of poor clients served.

Failing to achieve sustainability, however, would limit the ability of MFIs to grow and serve more clients. Therefore, Rhyne (1994) proposed that financial development programs needed to be evaluated at two levels: outreach at the level of clients, and profitability at the level of the financial institutions. Because building healthy financial institutions is the long-term goal, Rhyne argued that market tests would be the most relevant indicators of performance reflecting the client's willingness to pay for the services received and the financial self-sufficiency of the financial institutions.

An important metric for evaluating the sustainability of financial operations was created by Yaron (1992) with his Subsidy Dependence Index. The SDI is an accounting technique that involves calculating the ratio between the value of subsidies received by finance institutions and the revenue received from loans. It provides an estimate of the percentage change in the yield of loans required to reduce the subsidy to zero. Although designed initially for evaluating the performance of agricultural development banks supported by the World Bank, the SDI highlighted the significance of developing efficient financial institutions and helped rationalize charging interest rates on loans that would cover costs and risks.⁷

The publication of the *Microbanking Bulletin* beginning in 1997 provided the first systematic way for MFIs to have their financial accounts reviewed by independent analysts and learn how they performed compared with peer groups of institutions. The first participants were some of the market leaders, so over time

⁷ Paxton (1997), for example, used the SDI to show how the increase in real interest rates charged in the CARE village banking program in Guatemala contributed to a reduction in its subsidy dependence.

their performance effectively established quantitative benchmarks for the industry.⁸ In the first issue of the *Bulletin* (November 1997), all 28 of the MFIs analyzed exceeded 90% operational self-sufficiency (cash operating expenses divided by out-of-pocket expenses) and 21 were financially self-sufficient after adjustments were made for factors such as inflation, subsidies received, and loan loss provisions. By 2003, 124 MFIs reported to the *Bulletin*, of which 66 were financially self-sufficient.

Ledgerwood's (1999) influential *Microfinance Handbook* included sustainability as an important criterion for the design and management of MFIs, provided an overview of accounting adjustments needed to obtain better estimates of financial performance, reviewed several performance indicators, and listed financial standards and guides used by institutions such as ACCION International, the World Council of Credit Unions, and CGAP.

The comparative analysis of MFIs prompted the question as to how cost structures would differ because of the depth or level of poverty of clients served. The *Bulletin* reported the commonly used measure of average loan balance outstanding divided by the country's GNP per capita: the lower the ratio, presumably the greater the poverty of the MFI clients, as only the poorest would accept the smallest loans. The realization that this ratio had serious limitations led to other more direct methods for measuring the poverty of clients, using benchmarks such as per capita income and expenditures, and comparing the clientele served by different types of MFIs.

⁸ Although the *Bulletin* is careful to report that it does not verify the information submitted by the MFIs, analysts using the results tend to treat the information as representative. There is a suspicion that those MFIs choosing to not submit their accounting information to the *Bulletin* do not perform as well as those who do participate.

The first comprehensive quantitative attempt to analyze the distribution of poverty levels of clients in MFI portfolios was conducted for sampled clients in five MFIs in Bolivia. The results showed that relatively few clients were rich or very poor (Navajas et al., 2000). The majority were clustered just above and just below the national poverty line. More recent analysis by ACCION International of its affiliated programs in Bolivia, El Salvador, Haiti, and Peru also revealed that clients tended to be somewhat less poor than the urban or national populations as measured by either national poverty lines or the World Bank criteria of \$1 or \$2 per day (Marulanda and Otero, 2005).⁹

As recently reported by Zeller and Johannsen (2006), MFI clients in Peru and Bangladesh also tended to be less poor than non-clients. Westley (2004) found that village banks in Latin America tended to reach poorer clients than did MFIs making group or individual loans. Paxton and Cuevas (2002) found that two rural village banks tended to serve poorer clients than three rural credit unions in Latin America, but they offered fewer products and were less financially sustainable.

Information on income and expenditures to use in measuring poverty is costly and time consuming to collect for smaller organizations such as MFIs operating in limited areas with meager resources. Therefore, efforts are currently underway to develop robust proxies that can be collected at low cost and yield reliable data to measure the poverty status of clients.¹⁰ The proxies tested include household composition, assets owned, housing characteristics, food habits, schooling, and access to health services. The difficulty of

⁹ Marulanda and Otero (2005) observed that many Latin American MFIs concentrate on serving urban microenterprises where roughly three-quarters of the population lives. However, since the greatest poverty is located in rural areas, the MFIs tend not to serve the poorest.

¹⁰ See information posted at <http://www.povertytools.org>. This USAID project is managed by the IRIS Center at the University of Maryland.

identifying simple poverty proxies that MFIs might use which correlate well with measured poverty rates was demonstrated by Meyer, Nagarajan, and Dunn (2000) using data from a Peruvian MFI.

Analysts have tried to determine if the breadth and depth of client outreach might affect MFI financial sustainability. Christen et al. (1995) presented MFI data which suggested increasing the breadth of outreach and sustainability are complementary objectives because larger numbers of clients help MFIs achieve economies of scale and reduce costs. Hulme and Mosley (1996), however, analyzed other cases and concluded a tradeoff might exist because of the high administrative costs of making and recovering small loans to poor clients.

Woller (2000) argued that MFIs serving the poor can be sustainable if they charge high interest rates, but achieving high levels of operational efficiency is likely to be the best long-term strategy. The fear is that raising rates enough to achieve sustainability might crowd out many of the poor with limited ability to repay. The social mission of practitioners, therefore, would be compromised. The increase in rates would be substantial for highly subsidized MFIs. For the 1985–1996 period, for example, Morduch (1999a) estimated the Grameen Bank would have had to increase its nominal interest rates on general loans from 20% to 33% to become free of subsidies. There is also a concern that raising interest rates too high might cause moral hazard and adverse selection problems, thereby actually reducing profits.¹¹

Advocates for the poor have also been concerned that the drive toward commercialization of microfinance and institutional sustainability would lead to mission creep, i.e., MFIs would shift up-market to serve richer clients with

larger loans. Christen (2001) compared changes in average loan sizes over time for regulated and nonregulated Latin American MFIs. He concluded that larger average loans could simply be due to factors such as choice of lending strategy, period of entry into the market, or natural evolution in the demand and borrowing capacity of clients rather than mission creep. Analysts of MFIs in Cambodia, Indonesia, Nepal, and the Philippines also reported commercialization had not led to mission drift in Asia (Charitonenko, Campion, and Fernando, 2004). FINCA concluded, however, that its programs in 2003 were suffering from mission drift caused by choosing to operate in less poor regions rather than by recruiting richer clients (Hatch and Crompton, 2005).

The strong emphasis on institutional sustainability provoked a sharp debate about the sustainability of clients versus the sustainability of the MFIs, between financially-minded donors and socially-minded practitioners (Gonzalez-Vega, 1998; Morduch, 2000). The debate contributed to a proposal for a microfinance triangle in which the issue of impact of financial services, especially loans, on the borrowers should be added to the outreach and sustainability criteria for microfinance (Zeller and Meyer, 2002). Yet, adding the impact criteria greatly complicates evaluation because of the difficult methodological problems that must be addressed in conducting robust quantitative impact studies such as controlling for fungibility, creating effective control groups, accounting for selectivity bias, and measuring the displacement effects on nonborrowers (Dunn, 2004; Hulme, 2000; Meyer, 2002b; Ravallion, 2001). Moreover, MFIs have few incentives to engage in time-consuming and costly impact studies.

The Impact of Microfinance

A search of the literature reveals no studies attempting to evaluate the benefit/cost ratio of microfinance programs. But two recent papers review many studies conducted to evaluate the

¹¹ Cull, Demirguc-Kunt, and Morduch (2005) reported preliminary results suggesting that some MFIs have been able to increase interest rates and profitability without encountering these problems.

impact on MFI clients of access to financial services (Goldberg, 2005; Morduch and Haley, 2002). The authors observed conflicting conclusions produced by the studies, partly due to methodological problems. But in spite of these contradictions, they surprisingly conclude the impacts are generally positive.¹² Two studies of microfinance program impact are noteworthy in having survived most methodological critiques.¹³

The first is the ambitious World Bank evaluation of microfinance in Bangladesh (Khandker, 1998; Pitt and Khandker, 1998). Almost 1,800 borrowing and nonborrowing households in 87 villages were interviewed three times during the 1991/92 farming year. The three MFIs that supply loans in the villages use the Grameen-type lending model and restrict access to the poor defined as households with under a half acre of land. The study used a quasi-experimental design involving participant and nonparticipant households and villages to isolate the effects of participating in microfinance.

The results showed a greater consumption impact and a smaller labor supply impact for women compared to men. The schooling of boys increased when either men or women borrowed, but the results were mixed for the schooling of girls. Findings were also mixed on contraceptive use and fertility. Borrowing improved the ability to smooth consumption across seasons, so program participations appear to be motivated in part by insurance concerns. Morduch (1999b) used this same World Bank data and reestimated the results using different assumptions and control procedures. He found no increase in consumption or education, but evidence of consumption smoothing was traced to

¹² In other work cited here, Morduch (1999b) points out the methodological weaknesses of most impact studies and is cautious about ascribing large positive impacts for microfinance. For unexplained reasons, he is considerably less critical and more positive in this review.

¹³ Hulme and Mosley (1996) estimated the impact of several MFIs, but a number of shortcomings of this work were identified by Morduch (1999b).

increased smoothing of labor use across seasons.¹⁴

Over 1,600 of these same Bangladeshi households were reinterviewed in 1998/99. Econometric estimates for the panel data revealed greater positive consumption impacts for females than for male borrowers as was found in the cross-section estimates. Diminishing returns were found for borrowing as the greatest impact occurred for earlier loans and declined over time. The estimated impacts on overall poverty were smaller than reported for the cross-section data, but microfinance was still shown to reduce moderate poverty levels by about 1.0 percentage point per year and extreme poverty by about 1.3 percentage points per year (Khandker, 2005).

The second study, conducted by Coleman (1999), was a more modest attempt to evaluate the impact of two village banking programs in Thailand. Interviews were conducted with 445 participating and nonparticipating households in treatment and control villages. Coleman found little impact of months of village bank membership on household assets, production, sales, labor time, or expenditures on health care or education. He speculated limited impact might be due to the fact that the loans granted (only \$60 to \$300) added few additional resources to assets the households already possessed for productive purposes, and many borrowers did not have an investment plan in mind when they borrowed.

In subsequent analysis, Coleman (2006) reported the probability of wealthier households self-selecting into the village banks was nearly twice that of poor households. Many held leadership positions in the banks and borrowed considerably more than other members. Greater impact was found for committee members than for the rank and file members, and this may have been due to

¹⁴ The highlights of these Bangladesh results were taken from Morduch (1999b).

the larger amount of borrowing, which would be consistent with Coleman's earlier results.

New approaches to microfinance impact analysis using randomized control procedures have begun to emerge which may resolve some of the methodological problems that have plagued much of the impact literature. For example, Karlan and Valdivia (2006) randomly assigned clients in a FINCA group lending program for women in Peru to test the impact of business training. The treatment groups received entrepreneurship training during their weekly group banking meeting, while the control groups met as usual but without training. Based on the results, training led to higher loan repayment, a 16% improvement in client retention rates, and improved business knowledge and practices, but surprisingly not to any measurable impact on business income or assets.

In another example, Gine and Karlan (2006) report on an experiment conducted to test mechanism design in a Philippines bank that switched from group liability to individual lending. Half of the 169 group liability centers of the bank were randomly selected for conversion, while the other half remained as a control group. The results indicated the conversion did not change the repayment rate of existing borrowers, but led to higher growth in center size by retaining more preexisting borrowers and attracting new ones.

Dissatisfaction with the complexity, high cost, and long intervals between start date and availability of conclusions for quantitative impact studies, coupled with the limited benefits obtained by participating MFIs from such studies, prompted the search for more user-friendly methods of impact analysis. An important initiative was the Ford Foundation support to the Imp-Act (Impact Assessment of Microfinance)¹⁵ action research program involving several MFIs around the world.

As part of this effort, Copestake, Johnson, and Wright (2002) called for more emphasis on impact assessment that produces credible results for use in product development rather than providing statistical evidence to prove impact. They proposed more qualitative analysis based on in-depth, semi-structured narrative or long interviews designed to gain a better understanding of the causal pathways linking the provision of services to diverse effects. A protocol was proposed for construction of the instrument, conducting interviews, and data entry and analysis.

Imp-Act argues for using social performance assessment to improve social performance management (SPM) which is intended to affect both the social and financial performance of MFIs (Imp-Act, 2004, Policy Note No. 1). Implementing SPM involves stating the MFI's goals (such as enhanced client welfare), monitoring breadth and depth of outreach, monitoring number and reasons for dropouts, monitoring effect of services on clients, and using the information to improve services and information systems.

Case studies drawn from the participating institutions are presented in several Imp-Act publications to demonstrate that the resulting improvement in MFI performance more than compensates for the cost of conducting SPM, thereby enhancing both financial and social performance. Woller (2005) extended the Imp-Act work by studying how 17 MFI members of the SEEP Network utilized various types of client assessment tools to evaluate their performance. One of the conclusions is that the members agreed client assessment should be done to improve rather than to prove impact.

Current Status of the Microfinance Industry

There is no definitive estimate of the current size or health of the microfinance industry worldwide. In 2004, CGAP used a very broad definition including all types of alternative financial institutions and

¹⁵ See www.Imp-Act.org.

concluded there may be as many as 750 million savings and loan accounts in financial institutions targeting markets below the level of commercial banks. Because most of these accounts are for savings, access to service may be much greater for savings than for loans (Christen, Rosenberg, and Jayadeva, 2004).

The Microcredit Summit periodically provides estimates of total numbers of the poor reached by microcredit by compiling data from programs reporting number of borrowers with current loans. The most recent report shows a steady increase from over 600 programs reporting some 13 million clients in 1997, to 3,100 programs reporting over 92 million clients at the end of 2004, of which about 67 million were among the poorest clients (Daley-Harris, 2005).¹⁶ Asian countries represented an overwhelming share of the total clients (almost 88%), followed by 8% in Africa, and over 4% in Latin America. Small numbers were reported by programs in the Middle East and industrialized countries.

Although MFIs are widely believed to have improved their financial performance during recent years, evaluating the health of the entire industry is difficult with current data. Useful impressions can be obtained from the recent benchmarking studies of the Microfinance Information eXchange (MIX) that reports key regional indicators and challenges faced by the industry.¹⁷ However, the MIX relies on self-reported data which, in about 20% of the cases, have not been externally audited. Moreover, the MFIs choosing to report are considered to be among the best, so the results probably

reflect an upward bias in important performance characteristics.

Microfinance in Latin American is perceived to have a stronger commercial and microenterprise orientation than in other regions, and this perception is partly reflected in regional MFI performance indicators. The MIX benchmarking study for Latin America (MLX, 2005), covering 91 MFIs for 2004, revealed they earned an average return on assets of 3.2% and a return on equity of 14.5%.¹⁸ A subgroup of MFIs earns lower profits and they tend to provide smaller products using a village banking methodology.

On average, the MFIs serve around 17,000 borrowers, with less than 40% being women, with \$13 million in total assets, and an average loan balance of about \$750. The most productive reach almost 400 borrowers per loan officer. Average loan sizes are growing rapidly in spite of low inflation while operating costs per borrower have been growing less rapidly, indicating increased efficiency in lending larger amounts. However, few MFIs have achieved operating costs of less than 10% of average loan portfolio. Increased competition is placing pressure on interest rates and profitability. Borrower over-indebtedness and politicization of microfinance are emerging threats in the region as the industry has matured, and several governments are threatening to cap the interest rates and commissions charged by MFIs while increasing their tax contributions.

Marulanda and Otero (2005) also conducted a review of Latin American microfinance using the MIX data supplemented with data collected from 47 MFIs in the region. They emphasized that almost 90% of the funds disbursed in the region come from regulated institutions, many of whom started operations as NGOs, and they serve about 73% of the total clients.

¹⁶ These data must be interpreted with a degree of caution. They are self-reported, often are not audited, and are verified only through a visit by another organization. Since the Summit is interested in measuring progress toward meeting the 100 million borrower goal, there is likely to be an upward bias in the borrower data reported.

¹⁷ The MIX is located in Washington, DC, publishes the *Microbanking Bulletin*, and maintains the MIX Market, a global online platform for the exchange of microfinance information (www.mixmarket.org).

¹⁸ Selected features of the premier 80 Latin American MFIs, the so-called Championship League, for 2004 are also published in *Microenterprise Americans* (Gehrke, Martinez, and Stephens, 2006).

The largest regulated MFIs at the end of 2004 were Compartamos in Mexico with over 300,000 clients, and Calpia in El Salvador with almost \$130 million in outstanding loans. The most profitable earned rates of return on equity of 20% to 50% in the 2002 to 2004 period. Commercial banks tended to make the largest loans while NGOs made the smallest. Marulanda and Otero estimated the potential market would include 50% of all microenterprises with fewer than three employees. Using that target, they concluded about 15% of the potential market is currently being served. The range was a high of 56% in Bolivia to a low of less than 1% in Mexico.

Asia is the overwhelming leader in number of microfinance borrowers, but unfortunately, good comprehensive data are lacking on the health of MFIs in the entire region. Recent studies provide information for six South Asian countries (Afghanistan, Bangladesh, India, Nepal, Pakistan, and Sri Lanka) which are among the world leaders in total size measured as number of borrowers or total assets (the largest have several million borrowers and around \$100 million in assets), and the proportion of the poor reached by microfinance.¹⁹

Of the 518 MFIs that reported a total of 21 million borrowers to the MIX in 2003, 121 of them in South Asia served roughly half of the total (MIX/CGAP/World Bank, 2006).²⁰ Just three institutions in

Bangladesh (Grameen, ASA, and BRAC) accounted for nearly 75% of the total regional outreach. However, South Asia accounted for only 9.5% of the total 42 million savers reported to the MIX due to the large amount of subsidized funds received by MFIs in the region and restrictions prohibiting nonregulated institutions from mobilizing savings from the general public.

South Asian microfinance is noted for its poverty focus, and this orientation was reflected in two measures: most MFIs reported 85% or more female clients, and their average loan sizes are small compared to national income. Not only are South Asian MFIs among the largest in the world, several are reporting some of the fastest growth rates in new clients.²¹ But in spite of rapid growth and a tight control on operating costs, these MFIs lag in returns earned on assets, in part because social controls on interest rates contribute to lower loan portfolio yields compared to other regions. Several MFIs hold down their financial costs by using compulsory savings and concessionary funds channeled through apex institutions.

Since many MFIs in the region have evolved from not-for-profit entities focused on the poor, government and donor funding has provided important venture capital to support the industry. One of the big weaknesses is that poor financial disclosure makes it difficult to ascertain the true sustainability of MFI financial

¹⁹ An unfortunate omission is Indonesia with its large microfinance industry, and particularly its highly successful Bank Rakyat Indonesia that was converted from a failing agricultural lender to a highly profitable MFI. It is especially noteworthy for providing savings services to millions of savers and generating large profits in its rural centers (unit desas) that are channeled into its urban corporate division. For key references discussing this important institutional transformation, see Patten and Rosengard (1991); Robinson (2001, 2002); and Yaron, Benjamin, and Piprek (1997).

²⁰ This information is likely to overestimate total microcredit borrowers because the data come from institutional sources that do not account for overlap or borrowers who borrow from more than one institution. In Bangladesh, it is widely believed that overlap may

result in an overstatement of about a third, as clients borrow from multiple MFIs to obtain the total amount of credit desired. Another important limitation stated in this study is that although the self-reported data were cross-referenced with audited financial statements, where available, unlike most other MIX publications, the data were not adjusted for the effects of inflation and subsidy or to set minimum provisioning for default risk.

²¹ India and Bangladesh are leading the growth in clients. After accounting for multiple memberships and lending to the non-poor, it was estimated that 70% of poor households in Bangladesh are reached by MFIs, with Grameen, BRAC, and ASA accounting for almost 80% of the total borrowers. Average loan balance per borrower is just over \$60 in the country, and the clients are overwhelmingly women.

operations and their portfolio quality, and this weakness constrains development of the industry in the region. Most of the future microfinance growth is predicted to come from a few large, profitable institutions in the region. When they meet industry standards for reporting and transparency, they will improve their access to commercial sources of funding (World Bank, 2006).

MFIs in Sub-Saharan Africa tend to be somewhat younger than those in other regions. For example, of the 163 MFIs providing information for a MIX study, 45% were created only in the past four years (Lafourcade et al., 2005). A surprising feature is that they serve about three times as many voluntary savers (6.3 million) as borrowers (2.4 million), demonstrating their traditional emphasis on savings services.

African MFIs fund 72% of their liabilities out of deposits, a significantly larger share than MFIs elsewhere. The Kenyan Post Office Savings Bank (KPOSB) alone serves about a third of the reported savers. Women represent 61% of the borrowers in African MFIs, a proportion lower than in several other regions. The average outstanding loan balances per borrower were \$307 compared to \$137 in average savings balances. Only 47% of the 163 MFIs realized positive returns in 2003, and the group's average return on assets was only 2%. The MFIs average only about \$8 million in total assets.

The region's weak infrastructure, low average population density, rural operations, and high labor costs contribute to high operating expenses, while average financial revenues are lower than in other regions. On average, they achieve high productivity in number of borrowers and savers per staff member because many MFIs offer financial services through solidarity groups or village banks. The important regional challenge for the future is to raise profitability and improve sustainability.

The MIX study of the 2003 results for 16 MFIs in six Arab countries revealed that the industry is quite young and immature, with the MFIs averaging only seven years of age (Laraj and Stephens, 2005).²² They are relatively small in total assets (average less than \$10 million) and loan portfolio, serve an average of about 25,000 clients, and offer few products other than loans. Regulations in most countries prohibit offering savings services, so only one MFI reported savings deposits. Average loan size was \$348, which is smaller relative to income levels than in other regions because most MFIs offer solidarity loans, while average female participation was a high 78%.

Most Arab country MFIs achieve operational and financial self-sufficiency even though profits are low because they maintain low expenses, are almost completely dependent on subsidized donor funding, and have almost no loan losses. The industry is facing the challenge of offering a broader range of products and strengthening its institutions so they can operate on a more commercial basis and become a more integral part of the financial system.

The microfinance industry in Eastern Europe and Central Asia is even younger than other regions (the majority of the MFIs are less than five years old) and is more dominated by NGOs and nonbank financial intermediaries. A 2005 MIX study (Graham) reviewed the 2003 results for 49 MFIs from 19 countries.²³ The MFIs on average serve fewer than 6,000 borrowers, about two-thirds of whom are women, with total assets of almost \$11 million. Average loan balances are over \$1,200, so both breadth and depth of outreach are limited.

²² Unlike some of the other benchmarking studies, the MFI data for this region were adjusted for inflation, cost-of-funds subsidy, in-kind subsidy, and standardized loan loss provisioning.

²³ The MFI data for this region were adjusted for inflation, cost-of-funds subsidy, in-kind subsidy, and standardized loan loss provisioning.

Few services beyond loans are provided to clients, who tend to have higher incomes than in other regions. Competition is limited and portfolio yield is high, but profits are low because of high total operating costs. High salaries drive up costs, and the predominance of individual lending technologies results in an average of only 84 borrowers per staff member. Only about 20% of the loan portfolios are funded out of commercial sources.

The challenges for the region are high costs, low worker productivity, and limited access to commercial capital. Because a large proportion of the population still lacks access to financial services, there is great scope for the MFIs to increase their scale of operations and achieve higher levels of productivity and profits.

One of the important conclusions of each of these regional studies is that portfolio quality is generally good and somewhat equal across all regions. The extremely low levels of portfolio-at-risk is one of the best qualities of microfinance compared to commercial banks. The MFIs have demonstrated that the poor can effectively use small amounts of money to generate incomes and repay even at high interest rates. And the loans are made either entirely without collateral, or with types of collateral considered unacceptable in commercial banking.

Gonzalez and Rosenberg (2006) created and analyzed an integrated data set of about 2,600 institutions drawing from the three databases of the Summit, the MIX Market, and the *Microbanking Bulletin*. They made several general observations about the characteristics and performance of the industry. For example, in spite of the high visibility of NGOs in the industry, about 60% of the borrowers are being served by government institutions, either state-owned banks or self-help groups in India (most of which are financed by state banks).

The number of microcredit clients has grown about 12% per year between 1998 and 2004. Penetration rates, measured as

the percentage of total population with microcredit, ranged from a low of 0.5 in Eastern Europe and Central Asia to 2.5 in South Asia.²⁴ Serving poorer customers does not seem to adversely affect MFI profitability, but the measures used to report the poverty level of clients in the data sets are not robust. Roughly half the MFIs reached a financial break-even point after only three years of operation. Interest rates and spreads appeared to drive profits more than costs or productivity.

Donors have played a large role in the industry, spending close to \$1 billion per year in support (CGAP, 2004). There is disagreement, however, about its impact. On the one hand, donors are credited with stimulating the adoption of good business practices and transferring proven business models, lending technologies, and management systems. On the other hand, donor and government subsidies are alleged to damage incentives for mobilizing savings and creating market-oriented self-sustaining institutions.

Beginning in 2002, CGAP conducted peer reviews to evaluate how well 17 donor members performed in supporting the industry. The results were not flattering. Five core elements contributing to aid effectiveness were identified for improvement: strategic clarity, strong staff capacity, accountability for results, relevant knowledge management, and appropriate instruments (Duflos et al., 2004). These findings led to a revision of donor guidelines for microfinance (CGAP, 2004).²⁵

²⁴ These estimates overestimate penetration because the effects of overlap have not been considered, but underestimate penetration to the extent that not all MFIs are included in the database.

²⁵ The previous donor principles were published as "Micro and Small Enterprise Finance: Guiding Principles for Selecting and Supporting Intermediaries," jointly developed in 1995 by the Donors' Working Group on Financial Sector Development and the Committee of Donor Agencies for Small Enterprise Development of the World Bank.

An insightful paper by Rosenberg (2006a) summarized the results of in-depth portfolio reviews of microfinance projects of the World Bank and United Nations Development Programme (UNDP) and highlighted the types of problems that reduce donor effectiveness. The review covered 66 UNDP microcredit projects that were active in 2003 or had ended in 2001 or 2002, and 69 World Bank line-of-credit projects approved in 1993–2002.

Good projects were given a score of 3 or 4, weak projects were scored 2, and unacceptable ones were scored 1 or 0. The average score was only 1.79 for the UNDP and 1.7 for the World Bank. Projects implemented by units within these organizations with financial sector expertise tended to score better than projects implemented by other units. Multi-component projects in which microcredit was just one of many components scored worse than stand-alone projects. Successes occurred more frequently when the involvement of local governments in the projects was limited.

Rosenberg concluded the root of the effectiveness problem is not weak staff, but rather environments and systems within these agencies that do not give their staff the right incentives, information, and resources required for successful microcredit projects. The problem, therefore, is not largely due to lack of good guidelines, but the will and the resources needed to follow them. A disturbing feature of these findings is that many of them mirror the critiques made of donor-supported agricultural credit projects 20 to 30 years ago.²⁶ Using the agricultural credit experience as a guide, in 1992 Adams and Von Pishke predicted some of these problems would be repeated in microfinance. Foreign assistance programs for the development of financial systems continue to have fundamental flaws which often undermine rather than

strengthen the financial institutions and markets they are intended to support.

The Microfinance Frontier

The microfinance industry has accomplished a great deal but faces several challenges as it matures. Interest rate flexibility and the opportunity to set lending rates high enough to cover the cost of making small loans have been major factors contributing to the success of microfinance compared to the unsuccessful agricultural credit experience of the 1970s and 1980s. However, the possibility that countries may impose interest rate ceilings on microfinance looms as a serious threat.²⁷

The regional differences in the performance of the industry discussed in the previous section imply that the sources of future growth will vary. Two broadly different scenarios exist. In countries where the industry is relatively mature, the frontiers of microfinance require reaching new and existing clients with improved products and processes. In contrast, in countries where the industry is small and fledgling, the frontier largely involves trying to replicate the successes of more mature countries. Replication is not easy, however, because this group of countries includes those engaged in the difficult transition process to market economies, or are emerging from prolonged conflicts, or are fragile due to the risks of natural disasters. These countries also include several in North Africa where the poor are especially remote and very poor, and potential MFI clients lack profitable economic opportunities.

The remainder of this section discusses the key frontier issues regarding emerging opportunities and challenges that exist in these two types of situations.

²⁶ These criticisms have been widely discussed in the literature (e.g., Adams, 1988; Adams, Graham, and Von Pischke, 1984).

²⁷ Recent papers by CGAP (Porteous, 2006) and the Asian Development Bank (Fernando, 2006) reflect the concern of these two international agencies about this threat.

Countries with a Mature or Maturing Microfinance Industry

A mature or near-mature microfinance industry exists where a number of sustainable MFIs have been functioning for several years, penetration rates among the poor are high, and improved access to financial services is making an important contribution to development. Expanding the microfinance frontier in this context involves two major strategies: (a) retain old clients, and (b) reach new clients including especially difficult-to-reach populations.

Retaining Existing Clients

MFIs are finding it necessary to re-engineer their practices and products to reduce dropout rates and retain existing clients.²⁸ Many MFIs have begun to provide bank-like services including term finance, lease finance, remittances, and micro-insurance. A movement toward more flexible products has occurred (Meyer, 2002a), and listening to clients has become important for MFIs desiring to develop products better tailored to meet client demands (Cohen, Stack, and McGuinness, 2004).

To meet demand, to improve efficiency, and to reduce transaction costs, many MFIs are experimenting with automatic teller machines (ATMs) and electronic banking using smart cards and credit cards. Although potentially promising, the benefits of these new technologies need to be evaluated relative to the initial setup costs and servicing requirements for updates and security to protect against identity thefts (Cracknell, 2004). Furthermore, with the drying up of donor funds for more developed regions, MFIs are seeking new sources of capital for developing products and funding further expansion (de Sousa-Shields and King, 2005). Considerable attention is being

given to breaking into commercial sources of funds.²⁹

Another concern in countries with mature microfinance is the potential for overburdening clients with multiple debts. The public clamor raised by heavily indebted borrowers in such diverse places as Bolivia, India, and Sri Lanka has led to political calls for loan writeoffs and subsidized interest rates (Fernando, 2006). If these proposals are adopted, they will affect the sustainability of MFIs and may even lead to their closure or at least constrain their expansion. This would leave MFI clients with few choices for financial services. A more positive development is the expansion of credit bureaus so MFIs can better monitor client indebtedness and loan repayment.

Difficult-to-Reach Populations

As MFIs have begun to saturate traditional urban markets for adults, for women, and for microentrepreneurs, they are being forced to reach out to more difficult populations including rural areas, the poorest, and the young. This frontier requires innovations to reduce costs and to design products that serve special types of clients.

■ *Reaching Rural Clients*³⁰

Studies show that microfinance for rural clients needs to focus on financial products which manage risks and adapt to the long production cycles of farming activities and the remoteness of the population. Initially, loans were the only financial products offered to rural clients, but savings and insurance products are important for risk management, especially due to covariant risks. However, these products are seldom available to rural households at affordable prices, so MFIs

²⁸ Dropout rates of 15% to over 20% have been reported by the major MFIs in Bangladesh (Meyer, 2002a), and higher dropout rates have been recorded in other countries.

²⁹ For example, see recent papers on financing strategies and the transition to private capital posted on the USAID AMAP website (www.microLINKS.org).

³⁰ This section draws heavily from Nagarajan and Meyer (2005).

are piloting new products including flexible savings services and index-based insurance.

Rural savings mobilization is expensive and may produce relatively small amounts of total savings (Richardson, 2003). To increase savings volume, some MFIs are cross-subsidizing their rural operations with urban operations. For example, rural cooperatives in West Africa are entering urban markets to capture larger volumes of savings and to help make rural deposit mobilization more viable (Chao-Béroff, 2003). Some institutions, such as BURO Tangail and ASA in Bangladesh, are increasing savings volume by seeking higher income clients as associate members who are only eligible to save with the institutions, but they run the risk of the regulatory authorities enforcing restrictions that prohibit taking savings from nonmembers. As Kamewe and Koning (2003) caution, obtaining a proper balance between urban and rural operations presents a challenge for reducing costs while continuing to offer efficient services to the rural poor.

Post Office Savings Banks (POSBs) are emerging as significant providers of deposit services in rural areas, especially catering to the poor.³¹ Although POSBs are active in mobilizing rural savings, they are saddled with governance issues and have little capacity to intermediate mobilized funds. This has prompted them to develop linkages with financial intermediaries. For example, the Union Bank (formerly the Workers' Bank) in Jamaica linked up with post offices to use

their outlets as a way to reduce costs for offering deposit services to more than 75,000 depositors in rural areas (Owens, 2003).

Pilot projects were initiated in the mid-1990s to provide affordable life and health insurance to rural populations.³² Some MFIs have begun to experiment with offering death and health insurance for livestock, the most common income-generating asset for rural women microentrepreneurs. Several countries have required insurance when livestock are financed by bank loans. The Grameen Bank in Bangladesh started such a program in the mid-1990s, but its experience demonstrated that the costs of providing livestock insurance during rainy months was prohibitively high due in part to limited staff skills and the difficulty of pooling risks and achieving high volume.

MFIs in some countries are partnering with firms having the specialized skills to design and manage insurance contracts. For example, SHEPARD, an MFI working with SHGs in rural India, offers group-based livestock insurance in partnership with a local insurance agency. The insurance covers cattle purchased with loans against accidental and natural death. The borrower pays 4% of the animal's value as a premium, of which 2.25% goes to the insurance partner. The insurance is voluntary for clients and the number of policy holders has increased, but the product's sustainability has been difficult to assess since the costs associated with insurance delivery have not been measured (Churchill and Ramm, 2004). BASIX, an NBF in India, has offered livestock insurance to its borrowers since October 2002 through a partnership with the Royal Sundaram Alliance General Insurance Company. As of March 2004, it had insured livestock for a value close to \$100,000 (BASIX, 2004).

³¹ For example, POSBs in China, Indonesia, South Korea, and the Philippines actively serve more than 138 million clients through 73,750 branches, mostly in rural areas, with deposit, payment, and money transfer services. The Mongol Post in Mongolia also serves many clients in remote areas. In India, rural clients for POSBs account for 13% of the total volume of deposits and 52% of the clients (Nagarajan, 2003). The Kenya Post Office Savings Bank (KPOSB) operated 486 branches in 2002, of which 80% were in rural areas compared to approximately 370 branches for all commercial banks of which about 45% were in rural areas (Kamewe and Koning, 2003).

³² For literature on insurance, consult www.microinsurancecentre.org and www.microfinancegateway.org/section/resourcecenters/microinsurance.

There are problems in managing livestock insurance projects when the trigger mechanism to settle claims is not transparent. To increase transparency and reduce the time required to settle claims, index-based schemes for livestock insurance (building on the concepts of index-based crop insurance) are now being considered in which weather predictions are used to gauge the severity of damages. The World Bank is piloting index-based livestock insurance in Mongolia in *Dzud* (winter blizzards) affected areas. The insurance is expected to enhance the financial security of households by reducing the impact of livestock deaths due to blizzards (Mahul and Skees, 2005).

Other new products such as leasing and term finance are being tested to finance long gestation production activities and long-term investments in machinery, equipment, land, and buildings (Hollinger, 2004). However, the lack of secondary markets for machinery and equipment financed and problems of land titling have limited the expansion of the financial frontier for these products.

New methods to deliver financial services are being tested to reduce the costs of serving dispersed rural clients. For example, mobile banks of the Equity Building Society (EBS) in Kenya use a Global System for Mobile Communications (GSM) technology to process transaction data online and extend a greater range of services to rural clients. Solar units, rechargeable batteries, and inverters provide uninterrupted power to laptops used in the mobile banks.

As of July 2003, about 10,000 clients were served by 28 mobile units connected to seven branches, and loans were made to 65% of the clients. Three of the seven branches were profitable. Profitability was determined by portfolio size, savings balances, and number of clients served (Coetzee, Kabbucho, and Njema, 2003).

In August 2003, a public-private consortium of microfinance leaders, technology specialists, and businesses

agreed to test Hewlett-Packard's Remote Transaction System (RTS) in Uganda. The RTS will enable MFI clients to make cash deposits and withdrawals through a network of loan officers, rural branches, and/or agents. The RTS will electronically transfer transaction data on individual and group clients for MFIs. The technology infrastructure required for the RTS is functionally represented by a point of sale (PoS) device with a card reader and cell phone kept by an MFI agent. Clients will be issued electronic identification cards to authenticate deposits or withdrawals, and middleware technology (hardware and software) will allow transaction requests to be routed to the appropriate MFI and/or commercial bank.

The costs involved in these high-technology delivery methods must be carefully assessed relative to the benefits obtained from expanding further into rural areas. The need to educate consumers about the technologies is important for successful marketing. Moreover, because identity thefts and data hacking related to electronic transactions have heightened the importance of information security, the regulation of technology support providers has emerged as a major issue (Nagarajan and Meyer, 2005).

■ *Reaching the Poorest*

Another financial frontier in mature markets involves reaching poorer segments of both the urban and rural populations not currently served by microfinance. The Income Generation for Vulnerable Groups Development (IGVGD) program of the Bangladesh Rural Advancement Committee (BRAC) in Bangladesh provides the best documented evidence that the poorest can be reached with financial services when provided with sufficient complementary nonfinancial support services. The program targets destitute, rural Bangladeshi women who have few or no income-earning opportunities. The IGVGD program has provided food-grain assistance and savings and credit services to nearly a million participants over a

10-year period. About 85% have also received training and support in poultry and livestock rearing, vegetable gardening, agriculture, fishery production, or grocery business. Two-thirds of the women have graduated from absolute poverty to become microfinance clients, and have not slipped back into requiring government handouts (CGAP, 2001).

BRAC provides smaller loans to IGVDG clients which are cross-subsidized by its regular microcredit programs. The subsidy for both the credit and training services has been estimated at Taka 725 (about US\$16) per client. Adding the cost of the food grain provided by the World Food Program (WFP) brings the total subsidy for each woman to about Taka 6,275 (or approximately US\$135). This experience suggests that programs which combine livelihood protection (food aid) and promotion (skills training and microfinance) can reach greater depths of poverty than purely promotional schemes. In spite of its impressive results, it was found that about a third of the women did not benefit significantly in the long term. BRAC also excludes from the program about 10% of the women to whom it provides food grain because they are too old or disabled (CGAP, 2001). Since the program is subsidized in order to reach the vulnerable who are not economically active, it raises the issue of how to provide smart subsidies without distorting markets and creating disincentives for market-based financial transactions. The debate continues about how and when to subsidize finance (e.g., Morduch, 2005; Armendariz de Aghion and Morduch, 2005).

■ *Reaching the Young*³³

Recent work has identified that the youth, defined as ages 14 to 25, represent another microfinance frontier. Many MFIs accept clients as young as 18, but these

individuals represent less than 20% of total clients. Advocates argue that the youth need to be initiated into livelihood activities, especially those who cannot access formal jobs in tight labor markets and those who need to support families in fragile and poorer areas. Microfinance may be effective in support of livelihood support services.

Studies have demonstrated an unmet demand for financial services among the youth because existing products are not suited for them (Donahue et al., 2006; James-Wilson and Hall, 2006). Perceptions widely exist that the youth are risky and costly to serve because of the high failure rate of youth-operated businesses and the small size of loans involved. The MFIs currently serving the youth have different perceptions; however, they cannot support their views with data (McNulty and Nagarajan, 2005).

Loans may be less suited for the youth than other financial products, because not all the youth want to become entrepreneurs or have sufficient entrepreneurial capacity and experience. Savings services, therefore, may be more appropriate for many. The Children's Development Bank in India and SafeSave and Padakhep Manbik Unnayan Kendra in Bangladesh provide daily deposit services for street and slum children. The Population Council in Bangladesh is now linking with local commercial banks to experiment with mobile banking to collect daily deposits from young migrant girls employed in the garment factories. Deposit services are the primary service demanded by street children since they have few safe places to accumulate their daily earnings. To avoid theft by adults, many children immediately spend their earnings. Similarly, some MFIs in Africa are allowing children of HIV/AIDS-affected victims to open their own savings accounts and to operate their parents' savings accounts.

Savings education is important for young people so they learn their rights and improve their ability to manage savings

³³The latest USAID reports on serving the youth with microfinance are posted on the website at www.microLINKS.org.

without much adult supervision. SEWA in India is using an intergenerational approach to involve young girls over 10 years of age, along with their mothers and/or grandmothers, in learning about financial transactions and management. Some MFIs that are not legally allowed to mobilize savings are attempting to link with formal financial institutions to promote youth savings (Nagarajan, 2005).

Microfinance for the youth requires the careful packaging of training and financial services, as demonstrated by K-Rep in Kenya (Erulkar et al., 2006). The packaged services are complex and require a long-term commitment and adequate microfinance capacity. Several failed programs suggest the involvement of experienced MFI and/or organizers aware of both microfinance best practices and youth issues is critical for success.

While many pilot projects are underway, major uncertainties exist that limit making firm conclusions about the viability of youth clients for MFIs and the appropriate support services needed for success. Rigorous studies examining the costs and risks are rare because of the lack of MFI information disaggregated by age of clients. Therefore, many MFIs are reluctant to enter the field because of perceptions that the youth are risky and costly. Moreover, the youth, like the rural and poorest clients, represent a politically sensitive group, so subsidization of interest rates and loan forgiveness tend to be advocated—but these views are at odds with industry best practices.

Countries with a Nascent or Weak Microfinance Industry

Several countries have nascent or weak microfinance industries with a few young MFIs with limited outreach and questionable sustainability. These countries often have limited development potential, have fragile areas prone to and affected by natural disasters and/or conflicts, and several are transitioning from centrally planned to market economies.

To succeed in these challenging environments, MFIs need to adapt their technologies and products to reach clients affected by war and other crises, and those who are entering the private sector for the first time. Many potential clients are not prepared to effectively utilize microfinance services; therefore, client financial education and complementary business development services (BDS) may be critical to prepare clients for borrowing and to build markets so finance can be used efficiently.

■ *Remote Areas and Very Poor Countries*

The high transaction costs involved in serving remote areas and the very poor limit many MFIs from venturing into these markets. However, some types of institutions have a comparative advantage in these situations as they transfer part of the transaction costs to the clients in the form of self-help groups and member-owned institutions such as cooperatives and credit unions. For example, Savings and Credit Cooperatives (SACCOs) are active in the remote hilly areas of Nepal (Staschen, 2001). While the NGO DEPROSC supports Grameen-style MFIs in the plains, it promotes autonomous cooperatives, such as the Bhumiraj Savings and Credit Cooperative Society Ltd., in the remote hilly areas. Similarly, another hill cooperative, VYCAI, is one of 106 SACCOs supported by the Centre d'Étude et de Coopération Internationale (CECI).

All of the above SACCOs were found to be profitable partly because board members handle transactions until they can hire bookkeepers. They serve an average of 140 members and become self-reliant in three to five years. During the startup period, the promoting NGO mobilizes the groups, provides technical support, trains the members, and monitors their work. The developmental cost for each cooperative ranges from US\$1,700 to US\$3,000, or US\$12 to US\$21 per member. Unfortunately, neither CECI nor

DEPROSC provide data on loan capital or operating expenses to fully assess sustainability (Hirschland, 2005).

Village banks serve sparsely populated Sahelian areas in Africa. The *Caisses Villageoises d'Épargne et de Crédit Autogérées* (CVECAs) are autonomous village banks that serve a low-income, sparsely populated region of Mali where the illiteracy rate exceeds 95%. The banks provide high-interest time deposits and no-interest passbook services in client villages. Nearly 10% of the region's adults are active members, with an average of 231 persons per bank. More than two-thirds of the accounts have balances of less than \$50. The banks receive an initial subsidy covering investment costs, training, and supervision, but they cover operating and financial expenses from the outset. They have decentralized operations, use local labor and resources, volunteers, part-time staff, simple record keeping, and a limited number of products (such as short-term loans, passbook accounts, and time deposits) to reduce costs (Hirschland, 2005).

The general conclusion is that although some SACCOs and village banks perform well in remote areas, only those member and community-based financial groups who mobilize their own resources (intermediate funds at rates that cover all costs) and are efficiently governed by members without political intrusions tend to be sustainable and provide useful financial services (Rosenberg, 2006b).

Some MFIs reduce the cost of providing financial services in remote areas by piggybacking financial services onto nonfinancial service delivery systems that already attract clients for other reasons, such as selling milk in dairy cooperatives. Other MFIs use mobile banking to reach remote areas, but such use depends on the status of security, law and order, the availability of good roads for transport, and regulatory issues regarding the collection of savings.

Hashemi and Rosenberg (2006) identified several steps that need to be addressed in order to reach the poorest and remote areas in a sustainable way: (a) cultivate appropriate institutions, products, and services as well as innovative programs and delivery mechanisms to provide products and services at affordable prices; (b) invest significantly in institutional efforts to improve retail capacity and offer adequate incentives for institutions to provide services; (c) develop economic opportunities so potential clients can generate incomes; (d) improve physical infrastructure to reduce the costs of reaching the poorest populations and remote areas; (e) develop structures for institutional governance which are suitable for remote areas; and (f) foster a long-term commitment to reach remote areas sustainably and in large numbers.

■ *Conflict-Affected Areas*

Conflict-affected areas represent another microfinance frontier. Several early attempts to provide microfinance in these areas failed due to incorrect timing, faulty designs, and poor project implementation. More recently, it has been demonstrated that demand exists for microfinance in conflict areas and it can be effectively provided once reasonable security exists, the population is fairly stable, and markets have revived. Initial startup and operating costs tend to be high, and it takes more time to reach financial sustainability than elsewhere [see Nagarajan (2004) and Nagarajan and McNulty (2004) for literature reviews].

It is difficult to serve mobile populations, such as refugees and internally displaced persons (IDPs), because they are mobile, have difficulty in establishing relationships with MFIs, and have less social and physical capital to offer as loan guarantees. They also tend to require psycho-social counseling and some business training before accessing finance. However, demand exists for financial services to help restart livelihoods and ease the transition out of relief.

Innovations are required because standardized microfinance products used in normal conditions tend to be inadequate and inflexible.

In Guinea, Liberia, and Sierra Leone, for example, the American Refugee Committee International (ARC) has developed an effective Refuge to Return program. Refugees and IDPs in relief camps are provided with business training and small loans to restart livelihood activities. Financial services for refugees with good repayment records in their country of refuge are linked to MFIs in their country of return through a transferable credit history. ARC has now successfully provided loans to Sierra Leonean refugees in Guinea and Liberia, and built the leading MFI in Sierra Leone to serve them upon their return (Nourse, 2004).

There are different views about the best development path to quickly establish viable microfinance in conflict areas. A narrow approach practiced in Bosnia-Herzegovina and Mozambique during early post-conflict periods, and now in Sudan, involved strengthening only a few MFIs. This approach is believed to be costly and slow because of a lack of support structures. Therefore, a broader approach that involves the simultaneous development of MFIs, in combination with support organizations including networks and regulatory bodies, collateral registries, credit bureaus, and apex institutions, is being tried in Liberia, Sierra Leone, and Afghanistan. However, this effort involves greater donor coordination and governmental support (CGAP, 2004). It is unclear if this broad approach is applicable in all types of conflict areas or if some conditions still warrant the narrower approach. An ongoing research project funded by USAID is examining several frontier issues involving conflict areas (see www.microLINKS.org).

Conclusions

Microfinance has achieved major accomplishments in the developing world in the past two decades. One of the most

important has been to demonstrate that poor people can be good credit risks for small non-collateralized loans. Microfinance has also shown that the poor represent a good market for savings, insurance, remittance transfers, and other financial services.

Microfinance is now considerably more commercialized compared to its early days when subsidized NGOs were the primary engine of its development and growth. Today, commercial banks and other for-profit organizations are expanding their role in marketing financial services to the poor in many mature markets.

Nonetheless, the industry faces many major weaknesses and challenges. Many providers, especially in South Asia, have achieved large outreach but are still dependent on donors and subsidized funds. Many are unsustainable without subsidies and lack transparency; consequently, they cannot attract commercial sources of capital to fuel their growth. In many parts of the developing world, especially in Africa and Eastern and Central Europe, the industry is only reaching a fraction of the total market.

Although there is substantial demand for finance, rural areas and the very poor generally fall outside the expanding microfinance frontier because of the lack of appropriate financial products and technologies. Major innovations are required in terms of new products, institutional linkages, and delivery mechanisms to provide sustainable finance to these especially difficult market segments in order to move the industry forward.

The biggest single threat now facing the industry is that the high rates of return earned by a few MFIs have attracted almost too much attention. On the one hand, this fact helps attract commercial funding and institutions into the industry. On the other hand, political appeals for protecting the poor have created pressures to impose interest rate controls on microloans. Such controls were one of the

biggest factors contributing to the failure of most small farmer credit programs, and would strangle the development of microfinance in the same way.

Concerns are also emerging about the widening gap between the reality and propaganda of microfinance, between what it contributes to the poor versus the elusive goal of accelerated economic development (Dichter, 2006). Although the consumption-smoothing benefits may be important for poor households and a minority of clients may be able to significantly grow their businesses with microloans, the broader impacts on economic development have been much more limited than the industry's propaganda would have us believe.

The paradox of poverty may be that the poorest can do little with credit unless the myriad of other limits to growth are addressed, while the persons who can do the most with credit may need much larger amounts for longer periods than are normally provided by most microloans. Therefore, the reemergence of interest in coupling finance with nonfinancial and business development services reflects an appreciation for the limits of finance as an engine for growth.

The real frontier for greater success in poverty reduction may be in developing models for the sustainable delivery of nonfinancial services to the poor which are needed to break the barriers that constrain the impact of finance. This brings us full circle in development assistance. The realization that the poor were willing to pay for financial, but not for nonfinancial, services is precisely one of the factors responsible for inducing donor agencies to focus on microfinance 25 years ago. The challenge for development assistance today is to provide resources needed to discover new ways to deliver sustainable nonfinancial services without starving the microfinance industry of the resources it needs to address its many frontier challenges.

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A Comparative Review of Major Types of Rural Microfinance Institutions in Developing Countries

Manfred Zeller

Abstract

This paper describes different types of rural microfinance institutions, and examines their comparative advantages as well as related challenges to and strategies for deepening rural financial systems. The focus is not about which type of institution is better or worse for a particular target clientele in a particular operating environment. Instead, one of the major recommendations of this study is that there is no blueprint for rural microfinance. Institutional diversity is desired to enhance competition, depth and breadth of outreach, and welfare impact.

Key words: agricultural development, financial sustainability, microfinance institutions, outreach, rural development, rural finance, savings and credit cooperatives, solidarity group lending, village banks

Why Is There a Renewed Interest in Rural and Agricultural Finance for Developing Countries?

Since the widespread recognition in the mid-1980s of the failure of the old paradigm of directed agricultural credit with subsidized interest rates, rural and agricultural finance kept a low profile on the agenda of many governments and donors. Recently, there has been a renewed interest by policy makers, donors, and international development organizations in rural as well as agricultural finance, prompted by publication of new strategy papers on rural and agricultural finance by major development organizations [see Wenner, 2002; Food and Agriculture Organization, 1998; Klein et al., 1999; and International Fund for Agricultural Development (IFAD), 2000]. I basically see three principal motivations for this renewed interest, discussed below.

The Decline in Formal Rural and Agricultural Credit Supply

First, with the dismantling of government and donor support to subsidized agricultural finance starting in the mid-1980s, and in conjunction with structural adjustment programs delinking and privatizing the supply of agricultural inputs, marketing of agricultural produce, and provision of credit previously given by parastatal organizations in many countries, the supply of formal rural and agricultural credit appears to have declined considerably. Little is known

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Review coordinated by Calum G. Turvey.

about how much of this commonly perceived decline of state-driven credit has been compensated for by an increase in informal credit granted by traders, agribusiness firms, and informal savings and credit groups.¹

In most developing countries, commercial banks have not entered the rural and agricultural credit market on a substantial scale. After liberalization, some commercial banks actually closed rural branches (Wenner, 2002). Macroeconomic stability, sound legal frameworks, and financial sector liberalization are necessary, but not sufficient conditions for expanding the financial frontier. A few developing countries, mainly in North Africa, the Middle East, and South and East Asia (Steinwand, 2003), such as Egypt, China, India, and Pakistan, continued with their state-owned subsidized rural banking infrastructure (Zhu, Zhongyi, and von Braun, 2002; Meyer and Nagarajan, 2000; Ali, Malik, and Zeller, 1994; Sharma, Foda, and Zeller, 1999).

Other countries experienced success because they transformed their agricultural development banks with a focus on designing demand-oriented services and recovering costs, as is the case with the Bank for Agriculture and Agricultural Cooperatives (BAAC) in Thailand and the microbanking system of the Rural Bank (BRI) in Indonesia (Yaron, 1992; Yaron, McDonald, and Piprek, 1997; Patten, Rosengard, and Johnston, 2001).

Today, it is still important to recall why these institutions need to be either dismantled or transformed. Indeed, repeating the same mistakes would be a waste of scarce resources.² I therefore

begin with a recommendation: *We must learn from the past failures of directed, subsidized agricultural credit programs even if these failures have been documented many years ago. This knowledge is still relevant today.* Yet, many view the decline of rural and agricultural credit as disconcerting, and questions naturally arise as to whether it could be done any better in the future.

The Role of Rural Finance for Agricultural and Economic Growth, Food Security, and Poverty Reduction

Second, while agriculture is, relatively speaking, a declining sector in the course of development, in many developing countries it is still a leading economic sector, the main exporter, and the major employer, especially for the poor and women. Improved financial markets accelerate agricultural and rural growth. Financial services assist households in maintaining food security and smoothing consumption, thereby safeguarding or enhancing labor productivity, the most important production factor of the poor (von Braun et al., 1992; Heidhues, 1995; Morduch, 1995; Zeller, 1995; Zeller et al., 1997; Zeller, 2001).

Because of agriculture's strong forward and backward multiplier effects for the overall economy (Mellor, 1966), economic growth in agriculture—especially in subsectors that directly or indirectly benefit smallholders, tenants, and wage laborers—is a key precondition for overall economic growth and poverty reduction. At present, most of the poor still live in rural areas.

Doing Better This Time?

Third, and possibly most important, the hope of being able to do it better this time clearly comes from our recognition of the financial sustainability of a small, but increasing number of microfinance institutions (MFIs) and their considerable achievements in reaching large numbers

¹Two studies, each covering four African countries, have not identified any effects of financial liberalization on the price and availability of informal credit (Mosley, 1999; Steele et al., 1997).

²For a comprehensive critique of the old paradigm of subsidized and directed agricultural credit and on changes in paradigms and views, see Adams (1988); von Pischke and Adams (1980); Adams and von Pischke (1984); Krahn and Schmidt (1994); and Meyer and Nagarajan (2000).

of relatively poor women and men. Successful MFIs (some, for example, featured in the *Microbanking Bulletin*) already operate—at least partially—in rural areas, albeit much of their lending is for nonfarm enterprises.³ There is also more hope this time around because of more suitable conditions in both the macro-economy and agricultural sector in many countries (see Gonzalez-Vega, 2003) that underwent structural adjustment, financial, and agricultural sector reform.

Recent experience during the 1990s in transformation countries also strongly supports the view that macroeconomic and sectoral reforms need to precede efforts to build rural financial systems and institutions. There is little hope in building sustainable, self-reliant banking structure as long as they are financially tied (and often dependent on) loss-making public-sector enterprises that are kept in business by state subsidies (Heidhues, Davis, and Schrieder, 1998). Moreover, the improved theoretical framework and empirical knowledge on how demand and supply of credit is determined and on the role of information asymmetry creating transaction costs help to foster a better understanding of the potentials and limits of financial services for poverty reduction and economic growth.

Learning from Informal Demand and Supply

This section highlights lessons learned from informal financial institutions. This knowledge has been important for

³ Pioneering innovations include, for example, (a) the Association for Social Advancement (ASA), the Grameen Bank, and BRAC in Bangladesh who began as non-government organizations (NGOs) in the mid-1970s; (b) transformation of the rural bank network of BRI in Indonesia; (c) Prodem, an NGO that transformed into today's Bancosol in Bolivia; (d) the Self-Employed Women's Association (SEWA), a women's movement in Gujarat, India, that was one of the first NGOs to form a bank and to retail insurance products such as life and health insurance to poor women; and (e) Calpita, a microbank in 10 states that offers financial services to a broad clientele, including small farmers.

institutional innovation and differentiation in formal rural finance.

Lending Among Relatives, Neighbors, and Friends

Borrowing from socially close lenders within the moral economy is often the first recourse of poor households for financing expenses, especially those related to essential consumption expenditures. Transactions are collateral-free, and in most cases interest is not charged. These are essentially informal mutual aid schemes that have the principle of reciprocity at the core of transactions. Hence, both the lender (deposit-taker, or insurance provider) and the client gain from the transaction, and the process is self-sustaining.

The borrower is able to finance urgently needed expenditures quickly and with few transactions costs: a lengthy appraisal process does not exist, little or no paperwork or travel time is involved, and the terms of transactions are well understood. The lender gains a right to reciprocity that he or she can lay claim to in the future. Furthermore, the risk of loan recovery is at a minimum since the lender only lends to persons who are part of his or her social network, within which contracts can be enforced. For each partner, therefore, the long-term gains associated with maintaining borrowing privilege is greater than the short-term gain of renegeing on the payback. *Such social capital and informal financial contracts can be exploited and used through the formation of member-based institutions.*

Rotating Credit and Savings Associations (ROSCAs)

Found in many countries, ROSCAs are also network-based. These associations, which may even operate under a designated, sometimes remunerated manager, pool savings from members each period and rotate the resulting pot among them using various rules. The process is repeated until the last member receives

the pot. Because of the rotation rules, these schemes are less suited to address household risk unless the timing of the receipt coincides with unexpected events.

Other ROSCAs auction the fund. Still others allow the fund to be paid out earlier in times of crisis of one of its members, at times requiring a premium payment. Also, unlike demand deposits, once the savings are committed, they cannot be withdrawn immediately and the member is required to wait her turn.

The main purpose of a ROSCA is to accumulate savings and channel this to borrowers in some prespecified order, thereby fulfilling an important intermediation function. *Informal financial self-help groups exist in many countries, and have inspired to some extent the innovations in solidarity group lending as well as linkage banking.*

Informal Moneylenders and Pawnbrokers

Typically, informal moneylenders and pawnbrokers are approached when the amount demanded (e.g., loan amount and its timing, sometimes requiring a need for confidentiality) cannot be fulfilled by socially close lenders, such as friends, neighbors, or ROSCAs. Moneylenders charge explicit interest rates in order to obtain real positive returns on their capital. In fact, interest rates are usually high, and real rates in the range of 5–10% per month are common.

Commonly, moneylenders lend only to households about whom they possess enough information. However, they may also lend to others about whom they possess less information if punitive actions against those who default are feasible. Lending may be secured either by physical collateral (e.g., land, movable property such as gold and jewelry, or by production assets such as animals and standing crops), or by social collateral, such as third-party guarantees or loss of reputation in one's social network.

These collateral substitutes are effective in sustaining the informal lending business because contract enforcement is legitimized by social norms. *Member-based institutions, such as village banks, groups, and savings and credit cooperatives, have a comparative advantage over socially distant banks in using social capital for the enforcement of their contracts. Also, deposit-taking institutions have a comparative advantage in using informal enforcement mechanisms compared to institutions that lend "cold" money.*

Tied Credit

Informal, but socially and/or spatially distant lenders frequently tie their loans to complementary transactions in land, labor, or commodities as they lack adequate information about the creditworthiness of the borrower or suitable physical or social collateral. Thus, traders disburse input and consumption credit to farmers in exchange for the right to market the growing crop; shopkeepers increase sales by providing credit for food, farm inputs, and household necessities; and landowners secure access to laborers to whom they lent in the hungry season.

The important feature of these types of transactions is that the lender also deals with the borrower in a non-lending capacity and is able to use this position to screen applicants and enforce contracts at relatively low transaction costs compared to a pure money-lending contract. In the complementary nonfinancial contract, the lender often exercises near-monopoly power (such as often occurs between landlord and tenant or employer and laborer) that may feature usurious (i.e., monopolistically priced) interest rates.

Tied credit has frequently been used by state-owned marketing boards that monopolize agricultural input supply and output marketing. It is also used by agribusiness processing firms that control critical bottlenecks in the production or marketing of agricultural and often perishable products. *However, the*

deregulation and liberalization of agricultural markets has reduced the scope of using tied contracts as collateral substitutes in rural lending.

The four informal institutions described above provide valuable financial services, and much may be learned from them. However, they should not be romanticized. Lending among family members and friends as well as ROSCAs may bear a high risk for poor people, for example with respect to default or social exclusion. Information tends to be segmented and to circulate within specific groups or networks excluding others (Robinson, 2001). Communities can be driven by vested interests of the local elite. Moreover, *all of the above institutions have serious limitations with respect to term and size transformation, liquidity, and risk diversification* because they are based on personal relationships and reciprocity and deal in socially, culturally, economically, or geographically limited sectors.

While finance is certainly not charity, institution-building and innovation in rural finance can be significantly fostered by public investment. Such investment must be appraised with the same evaluation criteria as for any other public investment. The social benefit-cost ratio of public support for MFIs will be affected by many factors, including the macro policy, socioeconomic, and agroecological environment (Zeller and Meyer, 2002). *Some environments may be so hostile to financial-sector development that public investments in MFIs will certainly generate a negative social return, whereas in others the same investment can be highly profitable.*

Types of Rural Financial Institutions

Introduction

The highly diverse rural and agricultural characteristics call for different types of financial institutions, each having comparative advantages and addressing specific market segments.

Institutional innovations in microfinance are rarely the pure product of market forces. Instead, the major innovations in conformity with market principles have been fostered by public investments or by private altruistic action.

The large and successful MFIs reaching the poor in developing countries have all relied on public investments by donors and governments, at least during their formation stage. Because of widespread market imperfections concerning financial services to the poor, institutional innovation and expansion in microfinance are seldom solely market-driven, but a process that has been nurtured by the public sector, civic organizations, and altruistic leaders.⁴ The following examples may substantiate this claim.

■ Solidarity Groups: The Grameen Bank.

Professor Muhammad Yunus addressed the banking problem faced by the poor in Bangladesh through a program of privately funded, altruistically motivated action-research. In 1976, with help from his graduate students at Chittagong University, he designed an experimental credit program to serve the poor. It spread rapidly to hundreds of villages. Through a special relationship with rural state-owned banks, he disbursed and recovered thousands of loans. However, the bankers refused to take over the project at the end of the pilot phase. They feared it was too expensive and risky in spite of Professor Yunus' success. Eventually, through the support of donors, the Grameen Bank was founded in 1983, and now serves more than two million borrowers.

⁴ *Private-for-profit R&D has contributed little to the microfinance revolution that we have witnessed in the past 15 years. Private-for-profit MFIs will be needed to go to scale, and have entered the microfinance market, e.g., through the foundation of microbanks from scratch. Going to scale was enabled by creation of microbanking knowledge—mainly through non-government organizations—that was greatly facilitated by altruistic action and public investment.*

■ **Credit Union Movement in 19th Century Europe.** The origins of the microfinance movement lie in Germany, where the concept of the credit cooperative was developed by Friedrich Wilhelm Raiffeisen and Herrmann Schulze von Delitzsch in the 1840s and 1850s. Their altruistic rather than profit-maximizing action was motivated out of a concern to assist the rural population to break out of their dependence on moneylenders and to improve their welfare. After this institutional innovation, since about 1870, the unions expanded more and more rapidly within Germany with little or no government support. Similar experiments were conducted in other European countries at the time, and the cooperative movement quickly spread to North America and other regions (Hollis and Sweetman, 1998). For example, by 1920, the Ukraine had over two million members of savings and credit cooperatives, and post-socialist Poland now has 700,000 members.

■ **State-Owned Microbanks in Indonesia.** A much-heralded example of the microfinance movement is the village-level microbank system of the BRI in Indonesia. This state-owned bank serves about 22 million microsavers with autonomously managed microbanks. They are highly profitable. The microbanks of BRI are the product of a successful pro-business transformation of a state-owned rural credit program during the mid-1980s.

The above innovations have something in common. They were created as the product of action by the state, donors, or altruistic leaders who facilitated social experimentation and institutional innovation.

Major Types of Rural Microfinance Institutions

Institutional Innovation. This term does not necessarily mean to create a new institutional type at the international level (as the pioneers of the cooperative

movement did), but includes the adaptation of an existing institutional type to the constraints and potentials of a certain client group in a specific local environment. The many different types of MFIs can be distinguished by two criteria: their legal status and their lending technology. With respect to their legal status, one can distinguish credit projects, credit unions,⁵ village banks, and private-for-profit microbanks.

Credit Projects. Credit projects are implemented by a supporting organization [state development agency or a non-government organization (NGO)] and are limited in time. Usually as part of or linked to a larger (integrated) rural development program, the rationale of the credit project is to finance critical inputs of so-called project beneficiaries. Issues of financial sustainability usually receive little or no consideration at all: interest rates are often subsidized, repayment is low, and overhead is high. These give-and-forgive credit projects undermine systematic, long-term efforts to strengthen the financial system. The practice of *revolving credit funds* features similar weaknesses (Krahn and Schmidt, 1994). As credit projects and revolving credit funds lack vision for institution-building, they will not be discussed further.

Credit Unions. Credit unions are owned and controlled by their members and function according to democratic rules (if not disturbed by the central or local government, as is the case in many developing countries, or by cronyism among members). Profits are reinvested, or shared among members. Credit unions—especially larger ones with remunerated staff and professional management—are focused on profit, but the cooperative origins and the member-based governance structure also feature equity concerns for weaker members.

⁵ In this paper, the term credit union is also used for savings and credit cooperatives.

The one-person/one-vote rule is a clear expression of the cooperative spirit of self-help and care for weaker members in the cooperative movement. Credit unions are registered under a country's cooperative law or are included as a special category in the banking law, but may lack effective external supervision or authorizing legislation. The unions form regional and national networks that enable them to transfer excess liquidity. Credit unions are a viable institutional type for rural microfinance: They can draw on 150 years of experience in rural and urban areas, and are in fact the number one provider of microfinance.

The major comparative advantages of credit unions lie in their ability to service large numbers of depositors, and use these savings to provide a diversified range of loans to individual members. Other key strengths are their ability to sustainably achieve a large breadth of outreach, and also considerable depth as suggested by median savings deposit and loan size and their distribution in several countries such as Bolivia, Ecuador, the Philippines, and Sri Lanka (Branch and Evans, 1999; Evans, 2001).

While most members of credit unions are non-poor, they also reach many poor people because of their breadth of outreach. Recent innovations in rural areas include lending to village banks (in cooperation with Freedom from Hunger in the Philippines) and to solidarity groups. Here, one key innovation is that potential credit union members are offered a *choice* of a *group loan* (village banking) *product* or an *individual loan product* or a *voluntary savings product* (not tied to borrowing).

Government institutions have often misused the cooperative movement for political purposes. In fact, government interference is a major cause of cooperative failure—especially in developing countries. Cooperative performance in rural areas is mixed (Braverman and Guasch, 1989; Huppi and Feder, 1990), and changes in the regulatory and supervisory framework

as well as technical assistance are often called for to improve performance.

Krahnen and Schmidt (1994) assert that the ownership and governance structure of credit unions tends to favor depositors over the interests of owners and borrowers, leading to a safety-oriented policy that sacrifices profitability and efficiency. However, under the risky conditions of rural areas in developing countries, this conservative policy can indeed be risk-efficient in the eyes of risk-averse depositors and low-income owners. As Krahnen and Schmidt conclude, this conservatism is one of the reasons why credit unions are so widespread and have persisted for so long. After all, it is the majority of savers who are the backbone of a credit union.

Village Banks. Village banks are semi-formal, member-based institutions that are promoted by international NGOs, first by FINCA and then later (with modifications to the original type with respect to complementary services or greater decision autonomy granted to members) by Freedom from Hunger, CARE, Save the Children, and others. Members own the village bank, but ownership is not formally registered. Members can decide on interest rates for internally generated savings deposits and on-lending their internal account.

Village banks usually feature high interest rates on loans and savings deposits compared to going rates in the commercial banking sector. The banks serve a poorer clientele compared to credit unions, and have a high share of female members. Village banks are promoted with the ultimate objective of reducing poverty. Emphasis is therefore on depth of outreach and impact on poverty reduction, and NGOs often provide complementary services such as education or business training to enhance impact.

A village bank is less complex in structure and administration than a credit union, thus enabling less educated members to manage the bank. However, start-up costs

for formation and training are believed to be relatively high and are externally financed by the supporting NGO and its donors. The main form of credit guarantee relies on social pressure.

One of the major comparative advantages of village banks—especially for rural areas—is that they can operate as member-governed, autonomous institutions, and thus are highly flexible in determining rules of admission and the level of savings and loan interest rates adapted to local socioeconomic conditions. While the expectation is that the village banks accumulate and retain sufficient equity capital to become self-reliant, this objective of financial sustainability has for the most part not been achieved. Village banks have shown great strength in reaching poorer clientele but not in reaching financial sustainability, most likely because they chose more disadvantaged locations and clientele initially.

Unless they are linked with a bank, credit union, or federation of village banks, a major disadvantage of village banks is that their savings and loan portfolio is constrained and influenced by the local village economy, including the threat of covariant risk. Because of the small size of village banks (30–50 members), it is unclear whether they have significant comparative advantage over informal community-based institutions in financial intermediation and pooling of risks, other than the access to donor-funded external capital for on-lending to the local rural economy.

From a financial systems perspective, the long-term sustainability and outreach of village banks hinges upon their ability to integrate into the formal financial system. They need to establish linkages with banks or credit unions for refinancing and for earning return on otherwise seasonally idle funds, as this seems to be their long-run competitive advantage compared to informal institutions. Federations of village banks may also serve these intermediation functions across villages and rural areas. If they choose this mode of market integration, they will come close

to cooperative models. Chao-Beroff (1999) describes the successful example of the formation of self-reliant village banks that established a refinancing linkage with the National Agricultural Bank in Mali.

Member-Based Institutions. Being member-based institutions, credit unions and village banks have some common characteristics and strengths, as reported in Table 1. These include building institutions that can empower communities as a whole and create social capital; their lower-cost in-depth information, for example, on low-income or illiterate clients; and the flexibility (at least in principle) to adjust interest rates and other terms for savings and credit products to location-specific demand schedules. All these points are highly relevant for extending finance to heterogeneous rural areas and clientele groups. *To be sustainable in rural and agricultural finance, it is critical that credit unions and village banks have mechanisms in place to deposit excess liquidity or call in loans through a linkage with banks, or a second-tier or even national-level federation. Covariant risks and seasonality constitute clear limits to expansion and threats to survival for local stand-alone institutions.*

Solidarity Credit Group. With respect to lending technology, there are differences between individual lending and solidarity group lending. The major characteristics of solidarity groups are listed in Table 1.⁶ Major rural MFIs (such as Grameen Bank, ASA, SHARE, and the rural operations of the women-owned SEWA bank in India) offer loans to solidarity credit groups. *The use of solidarity groups as retail institutions allows MFIs to reduce their transaction costs, and thereby increase their depth of poverty outreach.*⁷

⁶In this paper, solidarity groups are not considered to be MFIs, as Table 1 may suggest. However, because they are an institution, they feature comparative advantages as well as disadvantages that are relevant for rural agricultural lending or lending to the poor.

⁷On measurement of poverty outreach of micro-finance institutions, see Zeller et al. (2006) and van Bastelaer and Zeller (2006).

Large-scale solidarity group lending schemes operate either as banks (e.g., Grameen Bank, SEWA), or as NGOs (ASA, SHARE) that use the services of rural banks for deposits and payments between NGO branches and headquarters. ASA, an NGO founded in the 1970s, is financially sustainable in its established branches, perhaps because it efficiently uses the existing rural (state-owned) banks, thereby reducing overhead costs.

The four MFIs listed above are widely considered as successful in reaching poor women *so that the amount of subsidy they have required or currently require appears well spent from a social investor's point of view* (Morduch, 1999).

Because they charge interest rates above the "market" rates of banks, and because they reach highly unattractive segments in the eyes of for-profit financial providers, the potential detrimental effects on competition in the financial system may have been low in the past. However, as competition becomes fiercer between the large, group-based MFIs in Bangladesh, subsidies for individual poverty-focused MFIs may need to be reviewed in order to provide a more level playing field. The comparative advantages of solidarity credit groups in increasing depth of outreach are increasingly recognized and used by other MFIs.

Linkage Type. This alternative retail group-based type builds on preexisting informal self-help groups (SHGs), such as ROSCAs. Its major advantage is that group formation costs were already borne by the members. Like other member-based institutions, the "linkage model" (Kropp, 1989; Seibel, 1985; Seibel, Bassele, and Michell-Auli, 1994) seeks to combine the strengths of existing informal systems (client proximity, flexibility, social capital, reaching poorer clients) with the strengths of the formal system (e.g., risk pooling, term transformation, provision of long-term investment loans, financial intermediation across regions and sectors).

Linkage banking has been promoted by the German Agency for Technical Cooperation (GTZ) in Indonesia and other Asian and African countries, and by the National Bank for Agriculture and Development in India (Meyer and Nagarajan, 2000). Although "linkage banking" certainly has some comparative advantages for rural intermediation, especially for poorer clientele, little empirical evidence exists to date on its performance.

Does Retail Lending by Member-Based Institutions and Solidarity Groups Transfer Transaction Costs to Clients?

Yes—but by doing so, MFIs can exploit the informational cost advantages of member-based institutions, thereby lowering MFIs' overall system transaction costs when reaching poorer clientele (compared to a direct, individual relationship between lender and borrower).

This question is raised as a point of critique against member-based and member-owned institutions, most forcefully against village banks and solidarity group lending. While credit unions offer individual loan contracts, their participatory decision making creates transaction costs as well, albeit presumably not as high on a per capita basis as they are in village banks or solidarity credit groups that feature weekly meetings. However, this disadvantage of higher transaction costs for clients does not weigh heavily in the eyes of those clients of member-based MFIs who are not able to get an individual loan contract from a commercial or microbank, precisely because individual contracts carry higher transaction costs for the lender when dealing with poor, illiterate clientele—all other things equal.

Microbanks. Microbanks, as defined in this paper, represent a wide array of institutions. They do, however, have in common the primary operational focus of reaching financial sustainability. They differ from commercial banks in two respects. First, they acknowledge and wish to serve the demand for financial services for micro- and small-scale

Table 1. Types of Microfinance Institutions and Major Characteristics

Type of Institution	Size of the Local Organization	Ownership of Equity	Rules/ Decision Making	Eligibility/ Screening
[1] Credit Unions (e.g., supported by WOCCU, Raiffeissen, Desjardins)	New group, on average 100–200 members	Member (equity shares)	Democratic (one person = one vote)	Purchase of shares; sometimes type of occupation or social group
[2] Village Bank (e.g., supported by FINCA or CIDR)	New group, on average 30–50 members	Members	Bottom-up/ democratic (members); links with banks supported by NGO/state	Village member; payment for membership
[3] Microbanks (e.g., BancoSol, BRI village banks, IPC-supported banks)	Individual relationship with the client	Investors: Donors providing equity, private firms or individuals, foundations, or state (e.g., BRI)	Top-down	Information on the client
[4] Solidarity Group Retail Model , either by NGOs (e.g., ASA, SHARE) or banks (Grameen Bank), but lately also by other MFI types used	New group center (5–6 groups of 5–10 members each)	Members	Top-down	Accepted as a member of a group by peers, or (worse) by supporting institution
[5] Linkage Retail Model (e.g., promoted by GTZ/IFAD and NABARD in India)	Preexisting informal group or groups with variable size who can obtain loans and save as a group with a public or private bank	Members	Mix of bottom-up and top-down approaches (supporting agency/ members)	Member of a preexisting SHG; peers, bank, or NGO approval

Source: Adapted from Lapenu and Zeller (2001).

entrepreneurs, but often avoid mentioning the words “poor” or “poverty” in their mission statement. Second, they use collateral substitutes and other innovations, just like other MFIs.

Microbanks include the state-owned community-level banks of BRI in Indonesia, Bancosol in Bolivia (transformed from an NGO), Calpiá in El Salvador, the present-day Sparkassen in Germany, or microbanks “built from scratch” with technical assistance from companies such as International Projektconsult (IPC). Their main difference from credit unions and village banks (or NGO-led banks such as Grameen Bank and SEWA Bank) is that they are not

owned by their members, but instead are owned by individuals or by legal entities. Legal entities can be the state, NGOs, or private companies.

While the social and poverty focus of member-based MFIs is clearly embedded in the ownership and therefore incentive structure, microbanks depend on the social commitment of their owners to make compromises between making more profit or staying at the lower end of the market. Although profits can be increased by moving up the market, this does not necessarily require a reduction in services to poorer clientele, as serving a range of clients is often a safer and better long-term strategy.

Table 1. Extended

Main Source of Funding	Relations Savings/Credit	Structure	Main Type of Guarantee	Management
Member savings	Focus on savings; credit mostly from savings	Pyramidal structure; unions or federations/ local branches; bottom-up	Savings	Salaried staff and elected, voluntary members
External loans; later member savings through growing internal account	Focus on credit, less on savings	Decentralized at the village level (linkage with a formal bank, credit union, or federations of village banks possible)	Savings, social pressure	Elected members (self-managed); some may be remunerated
Client savings, equity (partially provided by donors or state), and commercial loans	Focus on both credit and savings services	Centralized with local branches	Conventional collateral as well as innovative collateral substitutes	Salaried staff
External loans and grants	Focus on credit; mainly compulsory savings, some with micro-insurance products	Pyramidal structure, mostly top-down	Group pressure	Salaried staff
External loans; member savings	Savings first (but just as collateral)	Decentralized at the village level; linkage with closest bank branch	Savings, social pressure, NGO intermediation	Salaried workers from the formal institution; may be NGO staff

Due to their heterogeneous origins, the ownership structure differs widely in practice. Calpiá, for example, grew out of a credit program with a strong sustainability focus (Navajas and Gonzalez-Vega, 1999), and is owned by nonprofit NGOs. Microbanks lend mainly on an individual basis (such as BRI community banks or IPC-supported banks) but also feature solidarity group lending (such as BancoSol).

Clearly, clients would prefer to have an individual loan if they could get it with the same terms as those provided by member-based institutions (if we for now ignore other benefits of member-based MFIs, such as social capital formation and sense of ownership, self-help, and pride). This is

so because participation in any of the above MFI types carries additional transaction costs on behalf of the client, e.g., for meetings. Yet, because of informational advantages of member-based institutions dealing with poorer clientele, member-based institutions can be more efficient in environments with lower population density, higher illiteracy, and poor road and communications infrastructure.

Microbanks offer relatively high loan sizes (see Table 2), indicating their depth of poverty is weaker compared to the other MFI types shown in Table 2. It follows that their breadth of outreach to the poor (i.e., numbers of poor reached) will depend more on their scale as opposed to other

Table 2. Indicators of Financial Sustainability and Poverty Outreach, by Type of MFI

Indicators	Microfinance Institution				
	Coop- erative	Solidarity Group	Village Bank	Microbank with Individual Contract	Linkage Model
Repayment Rate of Loans (%)	93	99	95	96	96
Indicators of Poverty Outreach:					
▶ Percent of female members (%)	55	87	84	40	76
▶ Average loan size (\$)	369	255	122	737	218
▶ Loan size (as % of per capita GDP)	94	52	25	173	45
▶ Average size of savings deposit (%)	301	37	32	78	28
▶ Savings deposit (as % of per capita GDP)	28	8	6	61	8

Source: Lapenu and Zeller (2001).

Notes: The data are derived from a postal survey conducted by the International Food Policy Research Institute (IFPRI) in 1999. The survey respondents were international NGOs involved in microfinance as well as national, regional, and international microfinance networks. These respondents were asked to identify a number of characteristics of the MFIs they support in Asia, Africa, and Latin America. Of the 43 international NGOs contacted, 29 (67%) responded, and of the 26 networks contacted, 12 (46%) responded. Though less than half of the microfinance networks responded, the information provided a broad overview of MFIs by region or country. In total, the data refer to 1,468 MFIs in 85 developing countries with an estimated number of 43 million savers and 17 million borrowers. Most of the networks that did not answer are national networks with more limited coverage of institutions. This type of sampling has a number of shortcomings, which are acknowledged elsewhere (Lapenu and Zeller, 2001). Nonetheless, the results reported in this table suggest some general patterns that appear plausible.

MFIs.⁸ However, the presumably better-off clients of microbanks may not have any access to traditional commercial banks, and loans to small and medium enterprises as well as larger commercial farmers can make an indirect contribution to poverty reduction, e.g., by creating salaried jobs for poor people.

While depth of outreach is certainly not their comparative advantage (unless they begin to link up with village banks or solidarity groups, as BancoSol did at one time), the advantages of microbanks lie in servicing the neglected middle market.⁹

⁸As noted earlier, there are flaws to using average loan size as a reflection of depth of outreach. Median loan size or even better, distributions of size of loan and savings deposits, provide more reliable information on depth of outreach. Using average loan size can inadvertently mask the depth and breadth of outreach to the poor.

⁹IPC describes its target clientele as "micro and small enterprises, small farmers, and other comparatively weak economic units." According to calculations from data reported at IPC's website in January 2003, the average outstanding loan size of IPC-supported microbanks as a percentage of GDP per capita lies at 218. This is well above the averages

For rural areas and agricultural finance, microbanks offer comparative advantage for larger, commercial farmers (with or without classical collateral), agribusiness

reported in the *Microbanking Bulletin* (MBB), which are 45 for all MFIs and 83 for financially sustainable MFIs. This comparatively high value could be attributed to the circumstances of IPC's approach: (a) most microbanks operate in former socialist countries of Eastern Europe, (b) the lending methodology (individual versus group lending), and (c) the charter (banks versus credit unions or NGO-supported village banks). Still, the respective numbers according to the MBB are lower than IPC's numbers: 86 for Eastern Europe, 88 for individual lending, and 135 for banks. It seems more likely that microbanks supported by IPC target the high-end and small enterprises (and not the population with incomes around the poverty line). The respective numbers from the MBB are 189 for high-end and 467 for small enterprises, in contrast to 16 for low end and 64 for broad. However, IPC's numbers vary strongly by country, ranging from 12 in the Philippines up to 711 in Moldova. IPC definitely serves a wealthier clientele in Eastern Europe (297); the data for their projects in other countries (79) seem more in line with MBB's general numbers. For example, according to personal communication with Juan Buchenau, a recent study by the Ohio State University in El Salvador on Calpiá (which receives technical assistance from IPC) found that 40% of its rural clients were poor, and 20% of these were extremely poor.

traders, and processors. However, microbanks offering lower loan sizes, such as IPC-supported banks in the Philippines and Mozambique, will certainly also penetrate the middle end of the microfinance market. This competition—mainly with credit unions—should be seen as healthy (if carried out on a level playing field), as it will force credit unions and microbanks to further innovate. Because credit unions and microbanks have distinct comparative advantages, they may coexist and fiercely compete in some market segments, while dominating others. *After all, this is exactly what we want.*

As suggested by Table 2, the village bank, linkage type, and the solidarity group reach relatively more women and poorer clients compared to the cooperative and the microbanking models.

Other Rural Financial Institutions

Each of the above MFI types shows comparative advantages and disadvantages. Our discussion now turns to state-owned development banks, commercial banks, and other providers of rural and agricultural finance.

Development Banks. Development banks focus on medium- and long-term financing of larger rural and agricultural projects (with a high content of public goods, or high impact on economic growth that the private sector for one reason or another fails to finance). Some of these banks focus on particular economic sectors. Due to their development objectives, they can and do support microfinance networks and apex institutions, and provide refinancing to member-based financial institutions, such as rural village banks [see, e.g., the case of the National Agricultural Development Bank in Mali described by Fruman (1998) and Chao-Beroff (1999)].

National and international development banks, such as the German Bank for Reconstruction (KfW), the Interamerican Development Bank (IDB), and the

European Bank for Reconstruction and Development (EBRD), provide funds for “upgrading” promising NGO-run schemes (such as Calpiá) or by giving equity grants for newly built microbanks. Because these banks are (partly) privately owned for-profit banks, questions may arise (as with credit guarantee schemes) as to whether this results in true additional lending to microfinance clients (i.e., higher economic growth), or in a crowding-out type of competition with credit unions which receive (but in my opinion, not substantiated by data) the lowest amounts per client in public investments by donors and governments.

The equity investment can be critically considered a transfer of public funds to private owners, and if the primary (or even declared secondary) objective is not depth of outreach or impact on poverty reduction, it is difficult to justify these public investments on equity grounds as well. However, they can be justified provided that these microbanks constitute critical elements in the rural financial system (for example, serving agro-industry and rural small and medium enterprises, and as second-tier institutions serving credit unions and village banks).

Transformation of State-Owned Agricultural or Rural Banks. If not transformed based on business principles, these banks are a continuing burden to the taxpayer and to rural financial systems building. They constitute the classical case of government failure in rural finance. The lessons learned from the old paradigm still apply today in many countries such as China, India, Egypt, and Pakistan. However, provided there is true political commitment and ownership of reforms, some of these banks can be successfully transformed (as BRI and BAAC demonstrated) with business-oriented management reforms.

In a study of rural state-owned banks in Nepal, Sri Lanka, and India, Steinwand (2003) analyzes recent reform efforts that seek to apply and adapt some of the lessons learned in Thailand and Indonesia.

*Profit and success in business is not necessarily incompatible with public ownership if management is given the right incentives. Therefore, it is too early to write off the transformation approach and to argue that BAAC and BRI are exceptional cases from which one cannot learn lessons applicable to other countries. Often, state-owned development banks possess large branch networks for rural financial intermediation, and have staff who are especially familiar with agricultural enterprises.*¹⁰

Downscaling Commercial Banks.

Downscaling aims at inducing commercial banks—through technical assistance and staff training, for example, funded by public funds—to enter into the neglected upper and lower middle market. However, recent experiences by IPC with this approach highlighted many obstacles, such as those described by Schmidt (2001) and von Pischke (2003). These obstacles are likely to be more challenging for banks entering into rural and agricultural finance because their staff are not skilled in financially assessing investments in crop and livestock production and may cherish big-bank investment culture.

Microbanks for Wholesale Traders, Agro-processors, and Larger Farmers.

Many present-day rural financial institutions effectively screen out this relatively wealthy group either directly by setting targeting criteria or indirectly by offering financial products of little relevance to this clientele, who demand larger short-term credit lines as well as long-term investment credit. Larger traders and farmers as well as agribusiness processors are an equally neglected clientele who have critical functions to fulfill in agricultural development and therefore rural poverty

reduction. Microbanks targeting this clientele in rural areas could have considerable potential compared to credit unions, as these types of clientele are too wealthy for credit unions.

In countries with a booming agricultural economy, such as many in Asia, trader input credit to farmers is important. Equally important can be the provision of finance to capital-intensive agro-processors such as dairy farms. Partnerships of public and private banks can play a role in enabling larger-scale investments with high expected social payoff.

Contract Farming. In so-called “bottleneck” markets, agribusiness firms play a viable role in rural finance and technology transfer through contract farming. Bottleneck markets exist because of the specific characteristics of some crops (cut flowers, export pineapple and other fruit, and organic coffee) and animal produce (milk) which offer a high likelihood to the processor that the farmer will not sell his or her produce in another competing marketing channel.

Before agricultural liberalization, there were many politically created bottlenecks through which crops were sold. After liberalization, the array of potential crops shrank tremendously, and competition in the processing sector rose even for classical plantation crops such as oil palm trees.

Contract farming can reduce the risks of processors and farmers, enhance provision of technology, inputs, and loans to farmers, and increase the quality and quantity of produce for processing. These intrinsic risks and other advantages could be better exploited in repeating, long-term contracts, and agribusiness firms may be able to borrow against these contracts from commercial banks. *It appears that contract farming is a viable, but under-exploited and under-researched commercial option for agricultural finance in developing and transitioning countries.*

¹⁰ See also IFAD's rural finance policy on this point. Gonzalez-Vega and Graham (1995) raised the question of whether state-owned (agricultural) development banks could potentially play a significant role as a source of rural and microfinance. They identify conditions and opportunities for successful transformation.

Conclusions

This paper began with a recommendation: *Learn from past failures.*

Which institutional type (or model) is best suited for rural and agricultural finance? Three major reasons call for institutional diversity in rural areas, and further public investments in institutional innovation and adaptation.

- First, donors and governments and other social investors differ in their relative emphasis on direct or indirect pathways of poverty reduction through financial systems development. So, too, do the types of rural financial institutions reviewed in this paper.
- Second, the diversity of socioeconomic contexts and the different levels of political, social, and economic development require that the various institutional types are adapted to the local context. Because of the diversity, there is need for several institutional types that compete with one another in some market segments while dominating others. Because of the specific characteristics of rural areas and of agriculture, institutional and technological innovation and adaptation are crucial to reduce transaction costs for institutions and clients alike. Progress is achieved by testing different strategies and learning from failures. Such innovation can be enhanced through participatory processes—with, by, and for poor women and men—which address the diverse demand for financial services. Innovation can also be enhanced by public/private partnerships to strengthen financial and other services provided by agribusinesses and traders to farmers, for example through contract farming or leasing of specialized equipment.
- Third, the main institutional retail types in rural finance (i.e., credit unions, microbanks, and village banks) all have their justification because of their specific comparative advantages.

Instead of choosing one approach (targeted to the poor vs. targeted to non-poor), the best use of public support is to allow both extremes and in-between approaches within a rural financial systems perspective—specifically, to allow and support the building of a diverse system of financially sustainable institutions. *Indeed, the second major recommendation of this paper is that there is no blueprint for rural finance, and institutional innovation and adaptation to specific socioeconomic and agroecological contexts as well as to specific clientele groups are always required.*

The paper's third recommendation is that public investment in specific rural financial projects should be pursued with a *financial systems perspective*. This implies that, when building financial institutions, public action and public/private partnerships need to also foster horizontal and vertical integration in a necessarily decentralized rural financial system.

Village banks, solidarity groups, and preexisting self-help groups are possible first-tier types at the rural retail level with a high depth of outreach. The village bank as a first-tier retail institution has comparative advantages over solidarity groups and informal self-help groups, but lacks the size and diversification needed to become a stand-alone institution able to deal with seasonality and covariant risks that can be pervasive in rural areas.

Of course, this need for integration (i.e., linking with commercial and development banks) also arises for credit unions and for microbanks. Hence, integration of first-tier institutions, be they village banks, credit unions, or microbanks, is very essential. The issue of size is in this context very important: Any MFI will be strongly affected in rural areas by seasonality and covariant risks. *Stand-alone retail rural financial institutions are doomed to vanish once public support is phased out.* Consequently, larger size and diversification of clientele and products are very desirable to sustainably serve rural populations.

Greater exposure to rural areas, or to agriculture in general, and to specific crops and animal husbandry enterprises in particular, all raise the need for horizontal and vertical integration of village banks, credit unions, and microbanks. The latter two can also assume a useful role in rural areas (in addition to their first-tier retail function) as second-tier financial providers to village banks or solidarity and other self-help groups.

The third tier of rural finance will then consist of commercial, (transformed) state-owned, and cooperative banks. These institutions fill important functions in rural financial systems development, and are also needed to fund larger rural and agricultural investments, some of them through public/private partnerships investing in new agribusiness processing and trading firms. However, these third-tier institutions do not have any comparative advantage in dealing with the micro- and small enterprise sector, farmers, and other poor or not-so-poor rural dwellers.

Fourth, designing, experimenting with, and building financial institutions benefiting the rural poor and not-so-poor require economic resources and adequate consideration of longer-term social returns, and the case of publicly funded research and development (R&D)—performed in partnership with the private and civic sectors—in rural finance appears strong.

Given the renewed interest in rural and agricultural finance, a word of caution against over-emphasizing its role for poverty reduction and economic growth concludes the paper. Rural households, especially the poor, face complex, multiple constraints on earning these opportunities, and addressing these constraints—such as lack of access to knowledge, infrastructure, and markets—may often prove a better strategy for agricultural and rural development and poverty reduction than investing in financial institutions.

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The Uganda Rural Farmers Scheme: Women's Accessibility to Agricultural Credit

Biruma M. Abaru, Amin W. Mugeru, David W. Norman, and Allen M. Featherstone

Abstract

This study investigates factors related to loan approval, disbursement, repayment, and loan rationing among 1,012 farmers in the Rural Farmers Scheme (RFS), Uganda, between 1987 and May 1995. Results indicate that women had a higher loan approval rate and loan repaid/loan borrowed ratio than men, but lower actual disbursement levels. Loan rationing among women and men was not statistically different, and no justification was found for microfinance institutions discriminating against women in giving loans based on repayment rates. A wide gap exists between loan amounts approved and disbursed. Strategies are outlined for improving the pool of women loan applicants.

Key words: loan application, loan approval, loan disbursement, loan rationing, smallholder farming, women

Agriculture is the mainstay of the economy of Uganda. It accounts for 41% of the gross domestic product (GDP), employs over 70% of the labor force (Republic of Uganda, 2000a), and contributes over 65% of the foreign exchange earnings (Van Buren, 1994; Sharer, De Zaysa, and McDonald, 1995; World Bank, 1992). Farming is predominantly subsistence in nature, with about 85% of the farming population operating on less than two hectares of land (Sharer, De Zaysa, and McDonald, 1995). Almost two-thirds of government revenue comes from the taxation of agriculture, with the main cash crops being coffee, cotton, tea, and tobacco. The industrial sector is largely dependent on raw materials from agriculture; thus the agricultural sector is very important in fueling the development of the overall economy of Uganda.

Smallholder farming, the dominant type of farming system, is characterized by a mixture of both crop and livestock production, and is operated mainly with hand labor usually provided from household sources. Consequently, production and consumption units tend to overlap and often are synonymous. Only a small portion of total production is marketed, resulting in low cash earnings for the agricultural sector. Other factors that limit the full exploitation of the sector include lack of skilled labor, limited research and extension services, poor technology, lack of purchased inputs, and low capital (Republic of Uganda, 2000b,c).

Some studies on traditional agriculture have concluded capital is not a constraint since farmers allocate their resources

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efficiently (Schultz, 1964, 1983). Indeed, Long (1974) argued that credit, if available, would be used for consumption rather than productive purposes. However, most small farms are going through a modernization process requiring the purchase of external inputs. Savings are often relatively low at the beginning of the modernization process; therefore, there is an increased need for working capital which is mainly financed with credit.

The Ugandan government, in recognition of the credit needs of smallholder farmers, instituted a number of different types of credit programs, including the use of cooperatives, with limited success in terms of equitable access and repayment. Consequently, in 1987, the government introduced the Rural Farmers Scheme (RFS), via the Uganda Commercial Bank (UCB), specifically designed for small-scale farmers.

Several studies have reported that women lack the necessary resources for increasing agricultural productivity (Due and Magayane, 1990; United Nations Economic Commission for Africa, 1974; Boserup, 1970) and access to credit is one of the major constraints (Adams, 1988; World Bank, 1992). Therefore, to address this problem, the main goal of RFS was to lend 60% of its total funds to women. Normal formal credit eligibility requirements were relaxed for both men and women to ensure women could access such credit. Specifically, loans were based on character assessment rather than collateral; women borrowers, in particular, did not need to have prior credits; and credit was made available for both crop and livestock enterprises.

By 1995, the RFS operated in 16 of the 39 districts of Uganda with the following procedures for obtaining a loan:

- The potential borrower forwarded a handwritten letter requesting to borrow a specific amount of loan that first had to be endorsed by a responsible local official;

- A loan officer made a farm visit to verify information and confirm credit need; and
- If the loan officer was satisfied, the farmer completed an application form, which was then presented to the RFS loan committee for approval/disapproval.

The RFS preferred to give credit-in-kind rather than cash to ensure the borrowers used the credit for its intended purpose and that appropriate amounts of inputs were used.

Given the above overview of the RFS credit program, the objectives of this study are to evaluate factors related to RFS loan approval, funds disbursement, and loan repayment, and to determine the degree to which borrowers' credit demands were met (i.e., credit rationed).

Literature, particularly in Africa, is somewhat sparse in terms of empirical evaluation of the objectives underlying this paper. Women in Africa have not generally participated in formal credit programs, and therefore most previous studies focused on women's access to credit rather than loan amounts received (De Groote and Kebe, 1995; Fendru, 1995; Meyer, 1991; Malik, Mushtaq, and Gill, 1991; Buvunic and Rekha, 1990; Due and Magayane, 1990). These earlier studies argue that women lack access to credit because of socioeconomic constraints, tacit discrimination, location of lenders, tenure systems that affect using land as collateral, the riskiness of agriculture, and the high transaction costs involved in processing a formal loan.

Theoretical and Conceptual Issues

Different definitions of loan rationing are provided in the literature. In this study, loan rationing occurs if some borrowers have limited access to credit or if loan applicants obtain a loan but are restricted by the amount they can borrow (Latruffe and Fraser, 2004). A potential borrower is

rationed if his/her private demand for credit exceeds the loan amount offered by the lender (Petrick, 2005).

The theoretical and empirical literature provide different explanations for the causes of credit rationing—ranging from adverse selection to moral hazard to contract enforcement problems. Stiglitz and Weiss (1981) argue that lenders cannot distinguish between borrowers of different degrees of risk and that loan contracts are subject to limited liability whereby borrowers are not responsible for repaying loans out of their pockets if the project's returns are less than the debt obligations. They assert adverse selection exists when the bank offers a higher interest rate so that the agents who respond are the ones with more risky projects and are willing to pay a higher interest rate because they perceive their probability of repaying the loan as low. Thus, the lenders can hold interest rates below market clearing and ration borrowers in order to achieve a less risky and better composition in their portfolio.

Besley (1994) explains loan rationing based on market failure, imperfect information, and the high cost of contract enforcement. Arnold (2005) extends the Stiglitz and Weiss (1981) model by modeling loan rationing as a two-stage game. In the first stage, a lender lends all or part of its funds to borrowers at a given interest rate. The lender lends any remaining funds at a higher interest rate to borrowers who did not receive credit in stage one. It follows that loan rationing only occurs if one assumes lending is a one-stage process. Demand equals supply in stage two, and therefore excess demand is eliminated.

Ghosh, Mookherjee, and Ray (1999) provide a theoretical framework to explain loan rationing as problems arising from contract enforcement and a borrower's possibility of voluntary default. Foltz (2004) cites market imperfections in developing countries as a main cause for loan rationing. Those imperfections include interest rate ceilings imposed by

governments, monopoly power exercised by informal lenders in credit markets, large transaction costs incurred by borrowers in applying for loans, and moral hazard problems. A combination of those imperfections rations farmers out of the loan market.

To address the problems cited above, Latruffe and Fraser (2004) develop a model of rural credit that evaluates the relative effectiveness of government intervention in improving credit access to rationed farmers to reduce transaction costs and increase the supply of funds, as well as provision of credit subsidies and loan guarantees. The responsiveness of demand for loans among borrowers is shown to depend on the distribution of own collateral and the reservation utility levels of individual borrowers. Loans to small farmers are more responsive to interest rate schemes, while large farm loans are more responsive to collateral guarantees.

Petrick (2004) observed that experience from developing countries suggests subsidies on interest rates have often failed to mitigate loan rationing for rural borrowers. Impavido (1998) developed a theoretical model to demonstrate that the poor can overcome the problem of loan rationing by using social collateral. Although poor borrowers can be rationed, social norms in small groups which sanction loan defaulters make group lending attractive to formal lenders. In an empirical study of repayment performance in group-based credit programs in Bangladesh, Sharma and Zeller (1996) found social capital results in very high repayment rates compared to traditional physical collateral-based financial institutions.

Petrick (2005) provides a review of the six main approaches used for empirical investigation on loan rationing in agriculture. While Jaffee and Modigliani (1981) have emphasized that credit-rationing issues require an analysis of supply and demand and the interaction of the two in determining the price, most

empirical work tends to focus on the demand side only.

Mpuga (2004) investigated the determinants of the demand for credit in the rural areas of Uganda. Those factors are categorized into two groups: (a) individual household characteristics (income, sex, age, education, and marital status), and (b) financial institution factors (interest rate, other credit terms, and distance from loan providers). Mpuga uses the life cycle hypothesis to argue that young people have a higher demand for credit than older people, and social norms in African societies explain the differences in credit demand between men and women. The study finds that demand for credit is strongly influenced by location, age, education level, the value of household assets owned, and occupation of the borrower. Availability of different sources of credit is shown to have a limited impact on the demand for credit, and women apply for less amount of credit than do men. Demand for credit is higher from wealthier households, suggesting those households have collateral to secure credit. Finally, formal banks are found to be beyond the reach of the rural population.

Okurut, Schoombee, and Berg (2005) employed a logit model to investigate factors that influence both credit demand and supply in Uganda by using observed household and individual characteristics. Household characteristics influencing demand include age, education, household expenditure per adult equivalent, household composition, and migration status. Credit demand is higher for males than females and for households with a higher dependency ratio.¹ Demand for credit is less in households with sick members and more land assets per adult equivalent. Gender does not play a significant role in the demand for credit. A Heckman two-stage selection model is

used to model factors that influence credit supply. The selection equation considers gender, regional dummies, an urban dummy, and the dependency ratio. The equation of interest contains age, household expenditure, asset holdings per adult equivalent, and household size. Household expenditure, household assets (excluding land), and household size are found to significantly and positively influence supply of credit.

Zeller (1994) used probit models to investigate factors that influence the decision to apply for a loan (demand factors) and the decision of the lender to ration loan demand (supply factors) by informal lenders and members of community-based groups in Madagascar. Demand factors include individual characteristics (age, sex, education, head of household, social responsibility), household characteristics (size of household, dependency ratio, formal and informal debt, asset value), and household events which positively affect credit demand. All the demand factors also enter into the supply function in addition to a vector of repayment ability variables such as outstanding debt. Zeller concludes community-based groups have an information advantage over formal banks because they can obtain information about the creditworthiness of potential loan applicants. The leverage ratio of a household is identified as the most important determinant for loan rationing, for both informal lenders and community-based groups. Physical collateral plays only a minor role in credit rationing.

Study Area

This study used RFS records for loan applications from farmers in the Tororo District of eastern Uganda. The Tororo District, consisting of four counties—Tororo, Bunyala, Buduma, and Samia—has been involved in most of the rural credit programs attempted since 1962, and has great diversity in its agricultural systems. It produces both cash crops (mainly

¹The dependency ratio is equal to the number of individuals aged below 15 or above 64 divided by the number of individuals aged 15 to 64, expressed as a percentage.

cotton) and nontraditional cash crops (maize, beans, soybeans, groundnuts, onions, etc.) which the government is promoting for purposes of export diversification. The area cultivated is about 0.40 hectares per person and the soils are moderately good. Crops are the dominant enterprises, with some livestock. People of different religious backgrounds and tribes live in the district, representative of the ethnic diversity in Uganda (i.e., Bantu, Nilotics, and Nilo-Himites).

Econometric Model

This study uses an econometric household modeling approach which lends itself to rigorous interpretation in the framework of neoclassical equilibrium theory (Petrick, 2005). We follow Zeller (1994) to model loan rationing except that we use a Tobit model. A farm household is credit-rationed when the total loan requested (TR) is more than the total loan received (AC). If the total loan received is less than the total loan requested ($AC < TR$), G is defined as the excess demand for credit. The loan-rationing score (LRS) is estimated as follows:

$$(1) \quad LRS = 100(G)/TR.$$

The ratio can range from a negative value (i.e., credit demand more than satisfied) to 100 (i.e., credit demand not met at all). To investigate the factors associated with loan rationing (LRS), we are interested in farmer characteristics and other related factors that influence LRS^* , the latent variable observed when LRS takes a positive value. The dependent variable (LRS^*) is truncated at zero and the credit-rationing model is estimated by the Tobit² maximum likelihood technique (Maddala, 1988) using the following equation:

$$(2) \quad LRS^* = F(\mathbf{CR}, \mathbf{FC}, \mathbf{CR}, \mathbf{L});$$

$$LRS = \begin{cases} 0 & \text{if } LRS^* \leq 0, \\ LRS^* & \text{otherwise,} \end{cases}$$

where \mathbf{CR} is a vector of supply-related factors (amount borrowed, interest rate, and duration of loan repayment); \mathbf{FC} is a vector of farmer characteristics (gender, marital status, age, household size, off-farm income, occupation, education, and social affiliation); \mathbf{CR} is a vector of crop enterprises (cotton, groundnuts, beans, and rice); and \mathbf{L} is a vector of regional dummies (Tororo, Bunyala, and Samia).

In addition to the loan-rationing model, estimated using equation (2), we estimate a multiple regression to investigate factors associated with loan amounts approved and loans received, using equation (3). The dependent variables, loan amount approved and loan amount received, are influenced by both quantitative and qualitative independent variables. Thus, binary variables are constructed for the qualitative variables, taking a value of 1 or 0, with 0 showing the absence of the attribute and 1 showing the presence of the attribute. The independent variables are the same as those used in the Tobit model above. The multiple regression models are estimated using ordinary least squares as follows:

$$(3) \quad \gamma_{it} = \alpha + \beta \mathbf{x}_{it} + \partial_i + \varepsilon_{it},$$

where γ_{it} is the loan amount approved/received, α and β are coefficients, \mathbf{x}_{it} is a vector of continuous variables, ∂_i represents qualitative variables, and ε_{it} is an error term.

Data

The data used in this study are from the RFS records for loan applications from farmers for the period 1987 to March 1995. The management of the Uganda Commercial Bank was interested in the study and authorized the use of the records for the stipulated period only. During that period, the district received

²The Tobit model improves the estimates because LRS is a censored variable. A regression model that ignores either right or left censoring would produce biased parameter estimates.

Table 1. RFS Applications Received and Approved (1987–March 1995)

Type of Application	Applications		Percent Applications Received That Were Approved
	Received (Percent of Total)	Approved (Percent of Total)	
Individual:			
▶ Male	75.3 [83.0] ^a	65.7 [81.6]	28.6
▶ Female	15.4 [17.0]	14.8 [18.4]	31.5
Groups:			
▶ Male	1.7	0.7	14.0
▶ Female	0.3	0.5	45.8
▶ Mixed	7.3	18.3	82.2
Total Number	6,771	2,222	32.8%

^aThe figures in brackets represent the percentage breakdown for individual loans.

6,771 loan applications, of which 33% were approved (Table 1). Of those approved loans, 1,012 had the requisite data that formed the basis of the econometric analysis presented in this paper.

More than 90% of the loan applications came from individuals, with mixed male/female groups making up most of the remainder. Only 17% of the individual loan applications came from women, while 18% of all individual loans approved were women. Thus, because of the low number of female applicants, the RFS was unable to meet its goal of lending 60% of its total funds to women. A review of literature, together with a study of the situation in Uganda, resulted in the selection of 26 exogenous variables (not including four omitted variables to avoid problems of perfect collinearity) classified into six different groups, available for the regression models.

The average amount borrowed was 159,400 shillings (equivalent to about US\$159), which was 80% (199,300) of the amount approved and 74% (214,900) of the amount requested (Table 2). Reasons for the discrepancy between the amounts approved and received included: significant time gaps between forwarding of the initial loan application, loan approval, and disbursement, thus acting as a disincentive for potential borrowers to follow up on their initial applications; RFS

disbursing 33% of its credit in-kind to minimize the chances of credit being used for consumption rather than productive purposes; RFS generally approving loans (i.e., to impress the public and policy makers) but not disbursing the approved amount because of specific concerns relating to loan recovery records (Acigwa and Musana, 1992); and RFS loan officers did not disburse all of the loan amount at one time, but withheld the remainder of the loan if they had evidence that loan repayments were not occurring at the agreed times.

On average, only 68% of the total loan requested was met (Table 2). The average loan duration was about 6.5 months and the average interest rate was about 37% per annum. The discounted cash flow of repayments on loans amounted to an average of 50,210 shillings, which meant the average principal loss on loans was 118,230 shillings, or an average loan loss-to-borrowed ratio of about 74%. The loan repayment cash flows are discounted to account for the time value of money and loss associated with default because investors are typically more concerned about the impact of default loss on the overall portfolio than they are about individual loans (Featherstone and Boessen, 1994). The high interest rate on loans is attributed to the high agricultural lending rates that averaged 25% in 1993 when the inflation rate was 29% between 1991 and 1993.

Table 2. Descriptive Statistics of Sample

Variable	Units	Mean	Standard Deviation	Percent Who Were Women
Credit-Related:				
▸ Requested	100,000 shillings	2.1489	3.2816	
▸ Approved	100,000 shillings	1.9932	2.7852	
▸ Borrowed	100,000 shillings	1.5944	2.9557	
▸ Duration	months	6.4856	1.0493	
▸ Interest Rate	percent	36.8560	5.2515	
▸ Credit Need	proportion	0.3220	0.2971	
▸ Repaid	100,000 shillings	0.5021	1.7603	
▸ Paid	proportion	0.1364	0.3433	
▸ Outstanding	100,000 shillings	1.9970	3.1347	
▸ Loss	100,000 shillings	1.1823	2.2772	
▸ Loss/Borrowed Ratio	proportion	0.7378	0.3537	
Farmer Characteristics:				
▸ Gender				18%
▸ Married	proportion	0.9593	0.1977	
▸ Age	years	40.0277	9.8330	
▸ Household Size	number	9.1251	5.3658	
▸ Off-Farm Income	proportion	0.1966	0.3976	
▸ Cooperative Member	proportion	0.6514	0.4768	
▸ Farm Experience	years	13.3158	8.9546	
Education:				
▸ No Education	proportion	0.0566	0.2312	16%
▸ Primary	proportion	0.3277	0.4696	18%
▸ Junior	proportion	0.2006	0.4007	21%
▸ Ordinary	proportion	0.2910	0.4544	23%
▸ Advanced	proportion	0.0953	0.2938	9%
▸ University	proportion	0.0288	0.1673	7%
Occupation:				
▸ Peasant	proportion	0.4042	0.4910	20%
▸ Farmer	proportion	0.4240	0.4944	17%
▸ Civil Servant	proportion	0.1102	0.3133	19%
▸ Business	proportion	0.0189	0.1361	26%
▸ Other (including Chiefs)	proportion	0.0427	0.1833	7%
Crops:				
▸ Cotton	proportion	0.2234	0.4168	15%
▸ Maize	proportion	0.3496	0.4771	26%
▸ Beans	proportion	0.2691	0.4437	13%
▸ Groundnuts	proportion	0.0785	0.2690	23%
▸ Rice	proportion	0.0794	0.2706	12%
Location:				
▸ Tororo	proportion	0.2562	0.4368	11%
▸ Bunyole	proportion	0.2076	0.4056	26%
▸ Budama	proportion	0.4181	0.3858	18%
▸ Samla	proportion	0.1182	0.3230	13%

Note: US\$1 = approximately 1,000 Uganda shillings.

Furthermore, lending rates for microfinance institutions on average ranged from 20% to 72% depending on the cost of operation, cost of funds, inflation rate, and the prevailing interest rate in the formal sector. The rates were as high as 50% in the 1990s (Bank of Uganda, 2000).

RFS addressed the needs of some of the more disadvantaged people in the rural areas, with almost 80% of the loans approved being given to peasants and farmers.³ Maize was the dominant crop for which credit was given (i.e., 35% of the approved loans), a major food crop of particular interest to women.

Table 2 provides a breakdown of credit disbursement by gender according to the different groups of variables. It would appear the probability of women receiving credit improved if they had a reasonable level of education (i.e., junior or ordinary), if they were in business, used the credit for maize or groundnuts, and were located in Bunyole County. Even for women with these characteristics, their chance of receiving credit vis-à-vis men was only marginally better.

There are several possible reasons for the low number of loan applicants among women: (a) women were not forthcoming in loan applications because they are not accustomed to having access to formal credit; (b) formal credit programs are usually directed toward household heads, but only 30% of households in the Tororo District were female headed; (c) there are gender-based biases against women in encouraging them to apply for loans for improving agricultural productivity; (d) women tend to be less educated than men, making it more difficult for them to go through the formal credit application process; (e) the predominantly male extension service tends, for practical and cultural reasons, to focus on men; and

³ RFS defines peasants as small farming households that operate 2.2 hectares or less of rented or owned land; farmers are defined as those who operate 2.2 hectares or more of rented or owned land.

(f) Uganda women, because of domestic household responsibilities, prefer to receive credit for types of activities they can undertake close to their residence, such as poultry farming (Acigwa and Musana, 1992). Table 3 lists the independent variables and provides a discussion of the expected signs for the loans approved and the credit needs models.

Regression Results

Loans Approved and Received Models

Multiple regression models investigating the factors associated with the loan amounts approved and received are given in Table 4. Thirteen variables in the loans approved model and eight variables in the loans received model were significantly different from zero at either the 1% or 5% levels. In terms of application approval, RFS (as hypothesized in Table 3) appears to have favored women over men—i.e., the loans approved for men were 98,860 shillings lower under *ceteris paribus* conditions. However, contrary to what was hypothesized, the amount actually borrowed or received by men was significantly higher (91,990 shillings). A number of possible reasons were given earlier for the difference between the amounts approved and received, but the only one that could a priori explain the gender differences relates to loan officers being reluctant to disburse bigger loans to women perhaps because of their perception that women are riskier borrowers.

In terms of the credit-related variables (Table 4), the amounts requested and approved were significant in the hypothesized way in both the approved and received models. The duration of loan was also significant in both models, but in the received model had a sign opposite from that hypothesized. One possible explanation for this is that longer loans tend to be larger and RFS may have deliberately tried to use its limited funds to serve more people by favoring loans of shorter duration.

Table 3. Independent Variables in the Models and Rationale

Variable	Measurement	Hypoth. Sign ^a		Justification
		[A]	[B]	
Credit-Related:				
▶ Requested/Borrowed ^b	shillings	+	-	Larger amounts are more attractive to lender (i.e., lower administrative costs per unit loaned), and credit needs of borrower are more likely to be met.
▶ Duration	months	+	-	Longer duration loans tend to be larger; thus credit needs are more likely to be satisfied.
▶ Interest Rate	percent	-	+	Higher interest rates result in less being approved and received; consequently, credit needs are less likely to be satisfied.
Farmer Characteristics:				
▶ Gender	1 = male 0 = female	-	+	Given the goal of RFS to focus loans on women, women are more likely to get loans approved, receive larger loans, and have credit needs better met.
▶ Married	1 = Yes 0 = No	-	+	Focus of RFS on women means many loans will go to female-headed households—indicating being married results in amounts of loans approved and received being lower and credit needs not being met.
▶ Age	years	?	?	Increasing age up to a certain level would encourage lender confidence in borrower; hence higher approval and reception of loans and credit needs are met to a greater degree.
▶ Household Size	number	+	-	Larger household size implies a larger labor force to implement improved technologies with loans. But because of consumption needs, the degree to which credit needs are likely to be met might be less.
▶ Off-Farm Income	1 = Yes 0 = No	-	+	Off-farm income reduces time/dependence on farm activities, reducing loans approved and received and the degree to which credit needs are met.
▶ Cooperative Member	1 = Yes 0 = No	+	-	Member of responsible formal organization plus formal credit experience are viewed positively by RFS for loan approval/reception and credit needs being met.
▶ Farm Experience	years	+	-	Experience in agriculture is viewed positively by RFS in approving and disbursing loans and helping to ensure credit needs are met.
Education:				
▶ No Education	1 = Yes 0 = No	+	-	Since RFS is designed for the disadvantaged, RFS should approve and give loans to such people, and credit needs should be met to a degree better than if trained to primary school level.
▶ Primary ^c				
▶ Junior	1 = Yes 0 = No	-	+	Because of RFS target group, higher levels of education relative to primary school (i.e., therefore not disadvantaged) should result in reduced loan approval/disbursement, and thus less likelihood of credit needs being met.
▶ Ordinary	1 = Yes 0 = No	-	+	
▶ Advanced	1 = Yes 0 = No	-	+	
▶ University	1 = Yes 0 = No	-	+	

(continued . . .)

Table 3. Continued

Variable	Measurement	Hypoth. Sign ^a		Justification
		[A]	[B]	
Occupation:				
▶ Peasant	1 = Yes 0 = No	?	?	RFS is targeted to the disadvantaged, which would include farmers. Therefore, a priori, there is no reason to assume peasants are different from farmers in terms of amounts approved/received and meeting credit needs.
▶ Farmer ^c				
▶ Civil Servant	1 = Yes 0 = No	-	+	Relative to farmers, since civil servants and those in business and other occupations are not part of the RFS target group, amounts of loans approved and received and the degree to which credit needs are met are lower.
▶ Business	1 = Yes 0 = No	-	+	
▶ Other	1 = Yes 0 = No	-	+	
Crops:				
▶ Cotton	1 = Yes 0 = No	+	-	Cotton production is an organized marketing system permitting easy loan recovery relative to maize, is an export cash crop (i.e., non-food), and is the traditional focus of formal credit. Thus, amounts of loans approved and received are higher, and credit needs are better met.
▶ Maize ^c				
▶ Beans	1 = Yes 0 = No	+	-	Government wants increased emphasis on other potential cash crops such as beans and groundnuts in export diversification strategy. Therefore, RFS will support loans for such purposes, and credit needs are likely to be met. Rice is not an important crop relative to maize and is not targeted in export diversification strategy. Therefore, smaller loans are likely to be approved and received, and credit needs are less likely to be met.
▶ Groundnuts	1 = Yes 0 = No	+	-	
▶ Rice	1 = Yes 0 = No	-	+	
Location:				
▶ Tororo	1 = Yes 0 = No	?	?	Agriculture is more important in Bunyole and Budama counties (i.e., therefore farmers are likely to be approved for, and receive loans, and have credit needs met), but market accessibility is better in Tororo and Samia counties (i.e., therefore making it easier to obtain revenue for repaying loans, thus encouraging RFS to approve and disburse larger loans, and better meet credit needs). Hence, a priori, it is difficult to hypothesize specific relationships. In addition, ethnic composition differs somewhat in the different counties.
▶ Bunyole				
▶ Budama ^c	1 = Yes 0 = No	?	?	
▶ Samia	1 = Yes 0 = No	?	?	

^a Column [A] signs reflect loans approved and received models; column [B] signs reference the credit needs model.

^b The amount requested was used in the loans approved model, and the amount borrowed (received) was used in the loans received model.

^c The *Primary*, *Farmer*, *Maize*, and *Budama* variables were omitted to avoid perfect collinearity.

Table 4. Factors Associated with Loan Amounts Approved and Received, Multiple Regression Analysis

Variable	Loans Approved			Loans Received		
	Estimated Coefficient	t-Statistic	p-Value	Estimated Coefficient	t-Statistic	p-Value
Constant	25.8239**	9.5040	0.000	7.4222**	4.2363	0.000
Credit-Related:						
▶ Borrowed	0.4832**	24.6596	0.000	0.7920**	36.2726	0.000
▶ Duration	0.6506**	5.5621	0.000	-0.7633**	-6.3195	0.000
▶ Interest Rate	-0.0374	-1.4061	0.156	-0.0313	-1.1070	0.268
Farmer Characteristics:						
▶ Male	-0.9886*	-2.4347	0.014	0.9199*	2.3075	0.020
▶ Married	-0.8253	-1.2073	0.225	0.4407	0.6539	0.521
▶ Age	-1.3076**	-12.4634	0.000	-0.0419*	-2.1444	0.030
▶ Age ²	0.0155**	12.9370	0.000	0.0000	1.6539	0.094
▶ Household Size	0.1239**	4.0681	0.000	-0.0192	-0.6231	0.541
▶ Off-Farm Income	0.0373	0.0507	0.913	-1.1134	-1.5481	0.118
▶ Cooperative Member	0.1180	0.3371	0.733	-0.6738	-1.9086	0.054
▶ Farm Experience ^a	-0.0014**	-2.7080	0.007	0.0111	0.5625	0.581
Education:						
▶ No Education	0.8721	1.3778	0.165	-3.3059**	-5.2598	0.000
▶ Junior	0.1130	0.2497	0.791	-1.2732**	-2.8171	0.005
▶ Ordinary	-1.5282**	-3.8484	0.000	-0.9090*	-2.2550	0.023
▶ Advanced	2.1756**	4.1605	0.000	-0.8179	-1.5253	0.123
▶ University	1.0848	1.2151	0.222	-0.8321	-0.9672	0.336
Occupation:						
▶ Peasant	-0.6972*	-2.0619	0.037	0.5693	1.6488	0.095
▶ Civil Servant	-0.7520	-0.9315	0.355	0.9742	1.2350	0.215
▶ Business	-0.3299	-0.2470	0.792	1.6215	1.2503	0.209
▶ Chiefs ^b	-0.7504	-0.3853	0.701			
▶ Other ^b	2.1024*	2.1922	0.027	-1.2750	-1.4262	0.150
Crops:						
▶ Cotton	0.3829	0.9276	0.357	-0.4433	-1.0892	0.276
▶ Groundnuts	0.1074	0.2332	0.801	-0.2436	-0.5402	0.596
▶ Beans	0.8399	1.4128	0.154	-0.9579	-1.6090	0.104
▶ Rice	-3.3831**	-6.2989	0.000	4.1483**	7.1296	0.000
Location:						
▶ Tororo	-1.1810**	-2.9137	0.004	0.5054	1.2220	0.220
▶ Bunyole	0.1715	0.4048	0.688	-0.0571	-0.1326	0.864
▶ Samia	-0.2879	-0.5849	0.566	0.4259	0.8560	0.397
E(y)	201,227 shillings			130,779 shillings		
R ²	0.76			0.70		
Adjusted R ²	0.75			0.69		
Number of Observations	1,012			1,012		

Note: Single and double asterisks (*) denote significantly different from zero at the 5% and 1% levels, respectively.

^a Farm Experience is squared to avoid multicollinearity with Age.

^b Apart from the loans approved model, Chiefs are included in the Other occupational category.

Turning to variables associated with farmer characteristics, other than gender, marital status was not significant in determining loan size approved or received (Table 4). This finding is contrary to results reported in some literature indicating married people tend to be favored over single people (Due and Magayane, 1990), presumably because those with families are viewed as more stable and responsible. However, the focus of RFS on women borrowers may have neutralized this relationship.

The age variables for the loan size approved model were both significant but the signs were contrary to those hypothesized. Solving for age indicated loans decreased with increasing age from 19 to 42 years, and increased with later years. It is not easy to rationalize this relationship, especially at the younger ages when farm experience is less. (Note that the level of experience was also negatively related to loan size.) It could be argued that younger and less experienced people are less set in their ways and less risk averse, and therefore are likely to be more amenable to adopting the technologies RFS associates with its loan program.

Another more likely explanation, however, relates to the issue of AIDS.⁴ In recent years, AIDS has reduced life expectancy to 46 years and has the biggest impact in the 30- to 40-year age range. RFS may then prefer to approve loans to the age groups less likely to succumb to AIDS⁵ (i.e., the younger and older). It is interesting to note that in principle, this age relationship also applies when examining actual size of loan disbursed.

⁴ During the early 1990s, HIV prevalence in Uganda was about 15% among adults. The Ugandan government established the first AIDS control program in 1986, and launched a nationwide campaign to educate the population on how to combat the spread of the disease (AVERT.org).

⁵ Microfinance institutions that do not address HIV/AIDS in their statutes may pursue discriminative lending policies toward HIV/AIDS clients, especially female-headed households because of their reduced ability to repay loans [German Agency for Technical Cooperation (GTZ), 2005].

The only other statistically significant farmer characteristic variable was household size in the loans approved model, which had a positive sign consistent with that hypothesized. However, statistical significance was not maintained under the loans received model, possibly reflecting personal perceptions on the part of loan officers that the benefits of a larger labor force to facilitate adoption of the improved technologies are more than counteracted by their increased consumption requirements, thereby increasing the riskiness of the loan.

With reference to the educational variables, there is no evidence of RFS discriminating against applicants with no education relative to those with primary-level education. Our findings reveal no discrimination against those who are disadvantaged (Table 4). Once again, however, loan officer perceptions may play an important role in disbursing significantly lower funds to those with no education. It is interesting to note, in the loans approved model, a mixed picture emerged in terms of the influence of levels of education higher than the primary level of schooling. Specifically, those with education to the ordinary level were approved for significantly lower loan sizes than those with primary-level schooling, but for individuals with advanced-level training, significantly higher loan sizes were approved. One possible explanation for this seemingly contradictory result is that extension staff often have attained this advanced level of education, and since they frequently interact with RFS loan officers they may be able to influence the lending decisions. Nevertheless, with respect to RFS, this may not be a major problem because (as reported in Table 2) less than 10% of the loans were given to those with advanced-level education. When examining the results for actual disbursement of loans, we find those with levels of education higher than primary either received loans that were no larger than loans granted to individuals with primary-level schooling (i.e., advanced or university) or received significantly lower amounts (i.e., junior or ordinary).

For the occupational variables (Table 4), the results indicated that the loan amounts approved for peasants were significantly lower than for farmers. Given the smaller sizes of peasant farm operations relative to farmers' operations, this finding is not unreasonable (Table 4). In any case, the percentage of loan applicants approved for loans who were peasants and farmers were almost the same (i.e., 40% and 42%, respectively; Table 2). Yet, at the time of actual loan disbursement, there was no significant difference in the amounts received by farmers and peasants.

A result of some potential concern, however, is the finding that those with influence (i.e., the "other" occupational category, Table 4), who consist of members of the Revolutionary Councils, heads of parastatal bodies, religious leaders, etc., appear to be approved for significantly higher loans than those approved for farmers. Although this finding implies a degree of political influence/patronage, it may not be a major issue because those in this category amounted to only 4% of the total number of applicants approved for loans (Table 2). Moreover, the results for the loans received model (Table 4) show, when actual disbursements were made, those with such influence did not receive significantly higher loan levels than farmers. In fact, no occupation seemed to be favored in association with disbursement of funds.

In terms of the crop-related variables, the signs on the different crop coefficients were consistent with expectations, but only rice was statistically significant (Table 4). However, in the loans received model, the sign on the only statistically significant variable (once again rice) was opposite from what was expected. There are two possible reasons for this finding. First, because of the labor intensity of rice crops, most of the credit is given in cash rather than credit-in-kind, thereby minimizing delays in disbursement. Second, rice is also a relatively reliable crop grown under favorable environmental conditions, and hence, from the perception of the loan officers, is associated with minimal risk.

Finally, with reference to the location variables, the only variable found to be statistically significant in either model was that for Tororo County in the loans approved model (Table 4). Loan applicants from Tororo had significantly lower levels of loans approved than those in Budama. This result is perhaps not surprising; Tororo is the most urbanized of the four counties, and loan sizes approved are therefore likely to be lower because farming tends to be a part-time rather than full-time occupation. This result is encouraging, since it dispels the notion that RFS is biased in its lending program to those near its office (i.e., Tororo) or to those with more of an urban orientation. Another encouraging finding in the actual disbursement of loans is that no significant differences were observed in the average amount of loan received. As noted in Table 2, the counties are indirect proxies for ethnicity. Consequently, the absence of any significant differences in the levels of loans received possibly implies ethnicity (as far as RFS is concerned) is not such a paramount issue as others have suggested (Morris, Lobao, and Wavamuno, 1994).

Loan Rationing Model

The loan rationing model assesses the relative degree to which credit demand was met (Table 5). While the previous results provide input on the credit requested and the credit obtained, this section compares the degree to which the credit needs were met. The Tobit model accounts for 28.7% of the variation, as indicated by McFadden's R^2 . Specific factors associated with the loan rationing score result in 17 statistically significant variables at the 1% or 5% levels. There was no statistically significant difference between men and women in terms of whether credit demand was met.

All three credit-related variables were highly significant, and two of them (amount borrowed and interest rate) were consistent with what was hypothesized (Table 3). In the case of amount borrowed,

Table 5. Factors Associated with the Credit Needs of Borrowers, Tobit Analysis

Variable	Estimated Coefficient	t-Statistic	Change in Prob.	Total Change		Change Above Limit	
				Derivative	ε	Derivative	ε
Constant	-1.807**	-8.779					
Credit-Related:							
▶ Borrowed	-0.024**	-12.937	-0.004	-0.013	-0.021	-0.009	-0.008
▶ Duration	0.075**	8.835	0.014	0.042	0.264	0.030	0.105
▶ Interest Rate	0.021**	10.225	0.004	0.012	0.428	0.009	0.171
Farmer Characteristics:							
▶ Male	0.013	0.451	0.002	0.007	0.006	0.005	0.002
▶ Married	0.026	0.555	0.005	0.014	0.013	0.010	0.005
▶ Age	0.027**	3.233	0.005	0.015	0.591	0.011	0.235
▶ Age ²	-0.000**	-3.320	-0.000	-0.000	-0.311	-0.000	-0.124
▶ Household Size	0.001	0.709	0.000	0.001	0.007	0.001	0.003
▶ Off-Farm Income	0.025	0.498	0.005	0.014	0.003	0.010	0.001
▶ Cooperative Member	-0.064**	-2.586	-0.012	-0.036	-0.022	-0.025	-0.009
▶ Farm Experience ^a	0.005**	3.645	0.001	0.003	0.035	0.002	0.014
Education:							
▶ No Education	0.152**	3.370	0.028	0.085	0.005	0.061	0.002
▶ Junior	0.065*	2.072	0.012	0.036	0.007	0.026	0.003
▶ Ordinary	-0.011	-0.416	-0.002	-0.006	-0.002	-0.005	-0.001
▶ Advanced	0.164**	4.291	0.030	0.092	0.009	0.065	0.003
▶ University	-0.127*	-2.122	-0.023	-0.071	-0.002	-0.051	-0.001
Occupation:							
▶ Peasant	0.065**	2.730	0.012	0.036	0.014	0.026	0.006
▶ Civil Servant	0.163**	2.910	0.030	0.092	0.010	0.065	0.004
▶ Business	-0.047	-0.528	-0.009	-0.027	-0.000	-0.019	-0.000
▶ Other	-0.077	-1.247	-0.014	-0.043	-0.002	-0.031	-0.001
Crops:							
▶ Cotton	0.190**	6.377	0.035	0.107	0.023	0.076	0.009
▶ Groundnuts	-0.111**	-3.762	-0.020	-0.062	-0.016	-0.044	-0.006
▶ Beans	0.168**	4.039	0.031	0.094	0.007	0.067	0.003
▶ Rice	-0.098*	-2.341	-0.018	-0.055	-0.004	-0.039	-0.002
Location:							
▶ Tororo	-0.020	-0.708	-0.004	-0.011	-0.003	-0.008	-0.001
▶ Bunyole	0.016	0.534	0.003	0.009	0.002	0.007	0.001
▶ Samia	-0.044	-1.282	-0.008	-0.025	-0.003	-0.018	-0.001
Sigma	0.345**	37.248					
Expected output ($E(y)$)	0.9090						
Estimated output ($E(y')$)	1.7518					$\chi(0) = -743.057$	
Estimated $F(z)$	0.5189					$\chi(c) = -1,041.96$	
Estimated $f(z)$	0.3985					$\chi(\hat{\beta}) = -743.159$	
Number at the Limit	308					$\rho^2 = 28.7$	
Number of Observations	1,012						

Note: Single and double asterisks (*) denote significantly different from zero at the 5% and 1% levels, respectively.

^a Farm Experience is squared to avoid multicollinearity with Age.

the results indicate that increasing the amount by one Ugandan shilling would on average reduce the credit demand of the borrower by 2.1% (1,300 shillings) (Table 5). Breaking this effect down suggests borrowers whose credit demand was not met (i.e., above the limit) would have their credit demand lowered by about 0.8% (900 shillings). The sign on the coefficient for the length of loan was not consistent with that hypothesized, but possibly relates back to the discussion about the reluctance of RFS to give longer duration loans in order to service more borrowers. It may also relate to the preference of giving credit-in-kind, which is more compatible with shorter-term credit.

For the variables associated with farmer characteristics, the results reveal loan rationing increased up to an age of 41.2 years before it started decreasing (Table 5), thus accounting for the unexpected sign on the farm experience variable. This result is consistent with the earlier explanation concerning the possible impact of AIDS, and could account for the unexpected sign on the farm experience variable. The significance of the cooperative member variable was consistent with expectations. Additionally, RFS may favor borrowers who are cooperative members because loan recovery may be easier since cooperatives are often involved in facilitating crop marketing, and distributing credit-in-kind is easier through cooperatives.

With respect to the education-related variables, it is not surprising that the credit demands of borrowers with no education and junior-level education resulted in a smaller proportion of loans requested than those with a primary-level education (Table 5). Given the goal of RFS in targeting the needs of the more disadvantaged, it is not unreasonable to observe that the credit demands of those with an advanced level of education (in terms of the RFS program) are less satisfactorily met than those with a primary-level education.

The same arguments apply to some extent with those having a junior level of education, although possibly some farmers have this level of education. What is of much greater concern is the finding that the credit demands of those with a university level of education were significantly better met than those with a primary level of education—although, as reported earlier (Table 4), the levels of loans approved and received were not significantly different from those with primary-level education. The reason for this is not clear, apart from the possibility of some link to the political influence argument raised earlier with reference to occupation and, because of their higher educational level, university-educated persons have better access to information about the services of RFS and what this credit program could or could not do.

Focusing next on the occupational variables, it is not surprising that the credit demands of peasants were significantly less well met than those of farmers (Table 5). It is also interesting to note that the credit demands of civil servants were also significantly less well satisfied, a reasonable finding given these individuals do not constitute part of the RFS target group.

For the crop-related variables, all were statistically significant (Table 5). However, three crops (cotton, beans, and rice) did not have the hypothesized signs. It is not easy to rationalize the reason for this finding, apart from cotton (and possibly beans) requiring a larger credit package per unit area than maize, therefore making it possible that the credit demand is less likely to be met. For example, maize requires seed and fertilizer, while cotton requires seed, fertilizer, spraying equipment, and insecticides, and substantial amounts of labor for picking the cotton. Satisfactory maize yields often can be obtained using less fertilizer, but analogous reductions in spraying have a much worse impact on cotton yields. In terms of rice, the main input is labor. Consequently, as this involves cash credit and is likely to be small, credit demand is better met.

Finally, none of the locational variables were statistically significant, indicating there were no biases in terms of the degree to which credit demand in the different locations was met. Once again, this result supports the assertion made earlier that there was no apparent ethnic bias in the distribution of credit.

Discounted Cash Flow Repayment Model

The discounted cash flow repayment model used Tobit analysis to assess the factors associated with repayment, where the dependent variable is the discounted amount repaid (Table 6). Given the high level of inflation the Ugandan economy was experiencing during this period, it is important to adjust the repayments for the actual purchasing power.

Factors that significantly increased discounted cash flow repayment at the 1% statistical level were loan amount borrowed, cooperative members, borrowers with a university education, borrowers employed in the non-farm sector (except for civil servants), rice growers, and borrowers from Tororo and Bunyole counties. Factors found to significantly reduce repayment at the 1% statistical level were interest rate, peasant borrowers, civil servants, and cotton, groundnut, and bean growing. The McFadden R^2 is 0.205, implying these factors explain 20.5% of the variation in the model. The model predicts the sample mean to be 8,944 shillings and the mean for cases above the limit to be 99,563 shillings.

The amount borrowed was significant in explaining repayments. An increase in amount borrowed increased the repayment and the probability of some repayment in the future. Hence, unless loan amounts are large enough for the farmers to make meaningful investment, default rates will still be high. An increase in lending to borrowers in Bunyole and Tororo counties increased repayments by 22.1% (110,300 shillings) and 40% (161,200 shillings), respectively, and reduced the

corresponding probability of default by 36.1% and 52.7% (Table 6).

The gender variable was negative but not significant, suggesting no gender differences in repayments (Table 6). The marital status coefficient was negative and significant at the 5% level, indicating that married borrowers reduced repayment. A large household also reduced discounted cash flow repayments. An increase in household members by 1% would reduce repayment by 35.4% (4,000 shillings) and increase the chance of default by 1.3%, likely because credit is diverted to finance household consumption.

An increase in lending to peasants and civil servants would reduce repayment and increase default, while an increase in lending to cooperative members and borrowers employed by the private sector would increase repayment and reduce default (Table 6). These findings help to explain why the credit demand of peasants and civil servants was not met. Low repayment among peasants can be related to the fact that small farms are both firms and households. Hence, they might use credit to finance consumption and emergencies such as a death in the family or to pay medical bills. In addition, peasants may receive low returns on their output due to lack of transportation and information about alternative markets that pay higher returns, and due to a lack of expertise in managing their enterprises and credit.

As shown by results for the education variables in Table 6, borrowers with university education improved discounted cash flow repayment rates, while high interest rates reduced repayment. Except for the rice growers, increased lending to cotton, groundnut, and bean growers would reduce repayment and increase default rates. As noted earlier, because rice production uses fewer purchased inputs compared to the other crops, credit needs were likely to be met. Hence, rice growers are likely to repay their loans.

Table 6. Factors Associated with the Discounted Cash Flow Loan Repayment, Tobit Analysis

Variable	Estimated Coefficient	t-Statistic	Change in Prob.	Total Change		Change Above Limit	
				Derivative	ϵ	Derivative	ϵ
Constant	1.235	0.394					
Credit-Related:							
▶ Borrowed	0.426**	30.861	0.078	0.239	0.369	0.170	0.147
▶ Duration	-0.028	-0.206	-0.005	-0.016	-0.097	-0.011	0.039
▶ Interest Rate	-0.207**	-7.247	-0.038	-0.116	-4.143	-0.082	-1.650
Farmer Characteristics:							
▶ Male	-0.714	-1.623	-0.131	-0.401	-0.317	-0.285	-0.126
▶ Married	-1.539*	-2.036	-0.282	-0.864	-0.802	-0.613	-0.320
▶ Age	0.242	1.849	0.044	0.136	5.261	0.096	2.096
▶ Age ²	-0.003	-1.697	-0.000	-0.001	-2.442	-0.001	-0.973
▶ Household Size	-0.072*	-2.126	-0.013	-0.040	-0.354	-0.028	-0.141
▶ Off-Farm Income	-1.476	-1.818	-0.271	-0.828	-0.159	-0.588	-0.063
▶ Cooperative Member	1.570**	3.944	0.288	0.881	0.555	0.625	0.221
▶ Farm Experience	0.017	0.824	-0.003	0.010	0.123	0.007	0.049
Education:							
▶ No Education	-1.342	-1.762	-0.246	-0.753	-0.041	-0.535	-0.016
▶ Junior	0.717	1.470	0.132	0.402	0.078	0.286	0.031
▶ Ordinary	0.728	1.770	0.134	0.409	0.115	0.290	0.046
▶ Advanced	0.057	0.095	0.010	0.032	0.003	0.023	0.001
▶ University	4.747**	5.173	0.871	2.664	0.076	1.891	0.030
Occupation:							
▶ Peasant	-1.362**	-3.693	-0.250	-0.764	-0.299	-0.543	-0.119
▶ Civil Servant	-3.246**	-3.570	-0.596	-1.822	-0.197	-1.293	-0.078
▶ Business	0.111	0.073	0.020	0.062	0.001	0.044	0.000
▶ Other	2.995**	3.147	0.550	1.681	0.069	1.193	0.028
Crops:							
▶ Cotton	-4.365**	-9.063	-0.801	-2.449	-0.530	-1.739	-0.211
▶ Groundnuts	-1.432**	-3.250	-0.263	-0.804	-0.209	-0.570	-0.083
▶ Beans	-2.694**	-3.306	-0.494	-1.512	-0.114	-1.073	-0.046
▶ Rice	4.274**	7.579	0.784	2.340	0.184	1.703	0.073
Location:							
▶ Tororo	2.873**	6.736	0.527	1.612	0.400	1.144	0.159
▶ Bunyole	1.966**	4.184	0.361	1.103	0.221	0.783	0.088
▶ Samia	0.219	0.386	0.040	0.123	0.014	0.087	0.006
Sigma	5.084**	36.087					
Expected output ($E(y)$)	8,944						
Estimated output ($E(y')$)	99,563					$\mathcal{L}(0) = -2,699.85$	
Estimated $F(z)$	0.0898					$\mathcal{L}(c) = -3,394.32$	
Estimated $f(z)$	0.1622					$\mathcal{L}(\hat{\beta}) = -2,701.16$	
Number at the Limit	567					$\rho^2 = 20.5$	
Number of Observations	1,012						

Note: Single and double asterisks (*) denote significantly different from zero at the 5% and 1% levels, respectively.

Conclusions and Policy Implications

The purpose of this study was to evaluate factors related to Uganda's Rural Farmers Scheme (RFS) loan approval, funds disbursement, and repayment, and to determine the degree to which borrowers' credit demands were met. Results indicate that the socioeconomic characteristics of the households are useful in modeling loan approval, disbursement, loan rationing, and repayment. However, although the RFS collapsed due to the consequences of poor loan repayment, perception of the scheme as public funds, and lack of linkage between production and marketing of farm produce (Okurut, Banga, and Mukungu, 2004), results from this study are important to other microfinance institutions targeting women.

An important finding is that women did not perform more poorly in loan repayment than did men. Although women received a higher loan approval rate than men, actual disbursement levels tended to be lower. Consequently, there is no justification for discriminating against women in giving loans based on repayment rates. This finding and the fact that only a small percentage of the total loan applicants are women is a cause for concern, given the main goal of RFS was to target rural women.

Women in Uganda, vis-à-vis men, are often not so well educated or independent, often have less control over productive resources and income streams that result from productive activities, and have weaker linkages with the outside world (e.g., less likely to be a cooperative member). Given these disadvantages, several strategies can be adopted to improve the participation of women in the credit program:

- Establish a higher ratio of well-trained women extension officers and women loan officers who would encourage and nurture women applicants.
- Provide credit for micro-enterprises or farming activities near the residence that yield relatively high returns and

require less time for women (Fendru, 1995; Morris, Lobao, and Wavamuno, 1994).

- Encourage women's groups that provide supportive farmer-to-farmer networks, ensure borrowers are reliable and responsible in terms of repayment (i.e., if women themselves form the groups), and provide efficient focal points for the activities of relatively scarce women extension and loan officers.
- Educate women on the procedures involved in applying for formal credit and on efficient management skills (e.g., entrepreneurial development, improved technological practices, etc.).

Although there was some evidence of bias in the approval of credit loans, this was not a problem when it came to the actual disbursement of funds. However, there is need to investigate reasons for the large gap between the levels of funds approved and those actually disbursed, and to develop appropriate strategies to bridge this gap. Providing credit-in-kind also needs further investigation. Although credit-in-kind has advantages, it can certainly complicate the administrative responsibilities of microfinance institutions (MFIs) by extending the time required by the lender to deliver credit. Greater use of the group approach to giving credit could possibly simplify administrative responsibilities but, in the long run, the development of the private sector to provide farm inputs is a more efficient solution. MFIs need to direct their credit to crop enterprises (cotton, maize, groundnuts, beans, and rice) which have a higher potential payoff. Finally, there is a need for greater focus on providing loans to more women in Uganda.

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Enhancing Microfinance Using Index-Based Risk-Transfer Products

Jerry R. Skees and Barry J. Barnett

Abstract

While significant progress in microcredit and microfinance has been made in low-income countries, lending for small farming enterprises has been limited. This article reviews how innovative index-based risk-transfer products (IBRTPs) can be used to transfer the correlated natural disaster risks that often hamper the development of farm-level microcredit. By linking lending to IBRTPs, access to microcredit can be enhanced while also providing opportunities to offer mutual sharing of the basis risk that remains after correlated risks are transferred into global markets. This opens the way for new thinking about developing agricultural insurance in low-income countries.

Key words: agricultural finance, agricultural insurance, agricultural poverty, disaster risk management/mitigation, index-based risk transfer, microcredit, microfinance, microinsurance, rural credit markets

The microfinance movement is largely motivated by a desire to expand financial services to small households in low-income countries. An extensive literature exists on mechanisms for making unsecured microloans (e.g., Kritikos and Vigenina, 2005) that emphasizes joint liability within cooperative savings and lending groups, as well as dynamic incentives for increasing loans based on previous payback performance. However, there is very little literature on how access to microfinance can be enhanced using "collateral-like" contingent claims. This article is targeted at filling that gap by addressing how innovative index-based risk-transfer products (IBRTPs) can be used to transfer the correlated natural disaster risk which often exists in microfinance loan portfolios.

Although the primary focus of this article is on microcredit and microfinance, the ideas presented can be extended to any financial entity that lends in a small market and is exposed to one or more clearly identified natural hazards. When a large percentage of borrowers are exposed to correlated natural hazards that either destroy household assets or severely reduce cash flow, loan defaults can spike following a natural disaster. This has important implications for the availability of microcredit, the sustainability of small-scale lenders, and the terms of credit offered to borrowers. While microfinance exists in both rural and urban settings, the primary focus here is on expanding financial services for rural households in low-income countries. This emphasis is consistent with the United Nations Millennium Development Goals (MDGs):¹

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¹ See <http://www.un.org/millenniumgoals/>.

About 70 percent of the MDGs' target group lives in rural areas, particularly in Asia and Africa, and for most of the rural poor, agriculture is a critical component in the successful attainment of the MDGs (Rosegrant et al., 2005, p. 10).

A growing literature in development economics describes how households in low-income countries can be trapped in chronic poverty. In the next section we briefly summarize this literature with a particular focus on how limited availability of financial services contributes to the existence of poverty traps. More generally, it is often argued that increased access to financial services—savings, lending, and insurance—can enhance risk-taking behavior, technological adoption, and economic growth among the rural poor. Thus, it may be possible to justify, both on the basis of economic growth and equity, some forms of government support for the provision of financial services to the rural poor. However, to develop sustainable rural financial systems, the specific mechanisms used to provide such support must be carefully considered.

The article next turns to the economics of providing financial services to poor households that have limited collateral. This discussion is motivated primarily by insights from the literature on transaction costs economics and information economics. These insights help explain the growth of microcredit and microfinance in many low-income countries—which is the focus of the third section of the article.

The fourth section describes how, for poor households exposed to natural disaster risk, IBRTPs can be used to enhance access to savings and credit. The success of these efforts is conditioned on finding unique ways to link IBRTPs to small-scale lending. In the article's fifth section, case studies from India, Mongolia, and Peru demonstrate current attempts to build such links. The sixth section, motivated by current efforts in Peru, describes how the linkages between IBRTPs and small-scale lending could evolve over time through a sequence of stages. The seventh section briefly describes some promising

technologies that could further enhance the availability of relatively low-cost/loan-linked insurance products in rural areas of low-income countries. Concluding comments are provided in the final section.

Natural Disasters and Poverty

Because the returns from agriculture (and other economic endeavors) are stochastic, many households in rural areas of low-income countries can experience poverty on a transitory basis. Chronic poverty, on the other hand, occurs when the *expected* return from a household's productive assets is less than some defined income measure of poverty. Thus, an important policy question is whether households can accumulate sufficient assets to grow out of chronic poverty.

Households can become trapped in chronic poverty when their assets' expected growth trajectories contain multiple dynamic equilibria—i.e., when segments of the trajectory are characterized by locally increasing marginal returns on assets (Barrett et al., 2006; Barrett and Swallow, 2006; Carter and Barrett, 2006). This may occur for a number of reasons. Input prices, output prices, or transaction costs may be related to scale over certain levels of assets. A more common cause is that barriers to entry, in the form of large required investments, exist for economic enterprises which promise higher returns (Barrett et al., 2006; Dercon, 1998; Dercon and Krishnan, 1996; Banerjee and Newman, 1993). Even with such barriers to entry, it is possible that households can grow out of poverty through autarchic savings and accumulation. However, for poor households, the opportunity cost of savings, in the form of foregone consumption, can be quite high.²

Rural households in low-income countries are often susceptible to extreme events that contribute both directly and indirectly

² For a broader discussion regarding how the poor manage and cope with various types of risks, see Siegel (2003).

to the existence of chronic poverty. Productive assets (such as livestock) that have been acquired at high opportunity cost can be destroyed by natural disasters (Carter et al., 2005; McPeak and Barrett, 2001; Dercon, 1998) or liquidated to smooth consumption following a shock (Zimmerman and Carter, 2003; Dercon, 1996; Rosenzweig and Wolpin, 1993).

But the risk of such shocks also contributes indirectly to chronic poverty. Households living near subsistence levels may become extremely risk averse. For example, they may adopt low-return economic enterprises rather than take on the additional risk required to engage in enterprises that promise higher returns. This is particularly true if the higher return enterprise requires an investment in highly illiquid assets (Moser and Barrett, 2003; Zimmerman and Carter, 2003; Carter and May, 1999; Dercon, 1998; Eswaran and Kotwal, 1989, 1990). For these reasons, risk exposure can contribute to low-income households becoming trapped in chronic poverty.

Access to financial markets (insurance, savings, and lending) can help alleviate some of the conditions that tend to trap households in chronic poverty. Insurance allows households to make *ex ante* investments in instruments to protect income streams against well-defined negative shocks. Borrowing allows households to acquire the assets required for economic enterprises that promise higher returns. Savings and borrowing can be used to smooth consumption over time, thus reducing the need to liquidate productive assets following negative shocks. However, in rural areas of many low-income countries, access to financial markets is extremely limited.

Economic Constraints for Providing Financial Services to the Poor

Insurance for protection against asset losses or agricultural production shortfalls is generally not available in low-income

countries due to asymmetric information, high transaction costs, and high exposure to correlated risk. Agricultural insurance is highly susceptible to the asymmetric information problems of moral hazard and adverse selection (Just, Calvin, and Quiggin, 1999; Coble et al., 1997; Smith and Goodwin, 1996; Quiggin, Karagiannis, and Stanton, 1994; Chambers, 1989; Skees and Reed, 1986). Asymmetric information contributes to high transaction costs associated with underwriting, monitoring, and loss adjustment. Most of these costs do not vary significantly with the amount of insurance protection purchased; thus, for relatively small policies, the transaction costs of insurance protection per currency unit are extremely high. Insurance delivery costs can also be quite high in rural areas. Again, this is particularly true when measured relative to the small amount of insurance protection per policy.

The very same asymmetric information and transaction costs problems also plague financial markets in rural areas of low-income countries, contributing to high market interest rates. Market interest rates are also affected by default risk. Ray (1998, pp. 544–545) provides a simple model of how default risk is loaded into interest rates. Assume a lender's expected profit π is calculated as:

$$(1) \quad \pi = p(1+i)L - (1+r)L,$$

where p is an exogenous probability of non-default ($1-p$ is the probability of default) that is constant across all loans, i is an interest rate charged to borrowers, r is the lender's opportunity cost of funds used for loans, and L is the amount of funds loaned. In a perfectly competitive market, profits would equal zero in equilibrium; thus,

$$(2) \quad i = \frac{1+r}{p} - 1.$$

A relatively simple example demonstrates how sensitive market interest rates are to default rates. Assume the opportunity cost of funds r is 10%. If the probability of

default is zero ($p = 1.00$), the market interest rate is also 10%. If the probability of default is 0.10 ($p = 0.90$), the market interest rate would more than double to 22%.

Exposure to spatially correlated risks (e.g., drought) further limits the availability of both financial and insurance services in low-income countries (Hoff and Stiglitz, 1990; Rosenzweig, 1988; Binswanger and Rosenzweig, 1986; Braverman and Guasch, 1986). When the losses experienced by borrowers are highly correlated, loan defaults are also likely to be highly correlated.

Lending institutions attempt to reduce aggregate risk exposure by pooling loans. However, if the loans comprising the portfolio are susceptible to correlated shocks, the lender will be vulnerable to catastrophic losses. Unless this exposure to correlated shocks can be transferred out of the portfolio, a prudent lender will limit the amount of loans provided in a given area. The same logic holds for insurers. In this way, correlated risk exposure further contributes to the limited availability of formal financial and insurance services in rural areas of low-income countries. If these services are available, the costs are likely to be prohibitively high for most low-income households.

Consider an extension of the simple algebra presented in equation (2). Assume that while the normal probability of default is 10% (as presented above), every 1 in 10 years there is a correlated natural disaster which causes a 50% default rate. The average default rate is then 14%, which, given a 10% opportunity cost of funds, implies a market interest rate of 28%. However, a risk-averse lender will likely also add an additional interest rate load to account for the extreme default risk—in the same manner that a reinsurer loads reinsurance premium rates for the risk of extreme correlated loss events. In the case of reinsurance, it is not uncommon to see premium rate loads calculated by doubling the expected magnitude of loss for the extreme event.

Applying this “rule of thumb” to this example, the lender would charge an interest rate that reflects a 100% default rate when the correlated natural disaster occurs. This generates an average default rate of 19%, which translates into a loaded interest rate of 36%. More likely, a small geographically bound rural lender would simply choose not to offer loans under these conditions. Finally, note that these numerical examples are based on the unrealistic assumption of a perfectly competitive loan market. To the extent that loan markets are less than perfectly competitive, this would cause market interest rates to be even higher relative to the opportunity cost of funds.

Market failures associated with asymmetric information, high transaction costs (including delivery costs), and correlated risk exposure are sometimes used to justify government intervention in financial or insurance markets for rural areas. However, such interventions should be carefully considered. Much has been written about the unintended consequences of providing direct subsidies tied to either loans or insurance products (Gonzalez-Vega, 2003; Morduch, 1999; Skees and Barnett, 1999). A more promising form of intervention is described by Gonzalez-Vega (2003):

Spontaneous rural financial deepening does not proceed at the socially desired speed. Many market transactions are missing because the environment is not conducive to their emergence or because the required infrastructure is not available. Development of a more complete physical and institutional infrastructure is needed for the emergence and operation of formal rural financial markets. As most of this infrastructure consists of public goods, the central role of the state is to provide these goods. This type of state action is very different from the interventions that characterized earlier strategies of subsidized agricultural credit (p. 26).

The regulatory environment is an important part of the institutional infrastructure described by Gonzalez-Vega. Financial regulations can protect the interests of consumers by reducing information asymmetries. However, regulations that

are not sufficiently flexible to accommodate financial innovations can greatly increase the transaction costs of providing financial services to the poor.

Progress in Microcredit and Microfinance

In recent years, microfinance institutions (MFIs) have emerged as an increasingly important source of savings and lending in rural areas of many low-income countries. In the 1970s, experimental programs in Bangladesh, Brazil, and parts of Africa illustrate that groups of poor women could act collectively to make loans for microenterprises. Through the 1980s and 1990s, the Grameen Bank microfinance model in Bangladesh was extended into many other parts of the world. While many early microfinance efforts were donor funded, MFIs are now building linkages with commercial interests (e.g., BASIX of India and its links to ICICI Bank). While progress has been made in lending for microenterprises in many countries, it is not uncommon to see reviews offering conclusions such as the following:

The microfinance (MF) sector has developed rapidly in developing countries over the last two decades, making credit available for many poor microentrepreneurs, although in most cases it has practically skipped the rural poor and most particularly their agricultural activities as smallholders (Valdivia and Bauchet, 2003, p. iv).

The primary defining characteristic of MFIs is that they are organized as member-owned cooperatives, or mutuals. However, MFIs can vary from small cooperative savings and lending associations to relatively large organizations much like the so-called "credit unions" in the United States. With regard to their lending activities, MFIs generally have the following characteristics: (a) loans are made only to members of the MFI, (b) loans are relatively small and generally unsecured, (c) all assets and liabilities of the MFI are owned jointly by the members, and

(d) internal monitoring and social sanctions are often used to enforce MFI loan contracts.

MFIs are able to address several of the problems that tend to keep formal lenders from locating in rural areas of low-income countries. The cooperative nature of MFIs greatly reduces asymmetric information problems. Since all assets and liabilities are jointly owned, members have an economic incentive to monitor how loan proceeds are being invested. To the extent MFIs can enforce loan contracts through internal monitoring and social sanctions, they avoid the high transaction costs associated with using the legal system.

Unlike larger lenders, it is very difficult for MFIs to diversify spatially. This leaves MFIs highly vulnerable to correlated risk exposure from events such as natural disasters. In the wake of a major natural disaster, many (or perhaps even all) borrowers may default on their loans. Recognizing this vulnerability, MFIs may attempt to build financial reserves in the years when natural disasters do not occur. But in a credit-constrained environment, the opportunity cost of building reserves (by offering fewer loans than would otherwise be provided) is quite high. Moreover, due to the magnitude and correlated nature of the risk, very large reserves will be required to assure the long-term sustainability of the MFI. It is also possible that a natural disaster could occur before sufficient financial reserves have been accumulated. Thus, natural disasters can be a major constraint to the emergence of MFI activity in some areas.

When MFIs attempt to ensure long-term sustainability by building and maintaining adequate reserves, they are effectively attempting to insure their borrowers (up to the value of their loans) against the financial consequences of natural disasters. Given the high opportunity cost of building and maintaining financial reserves, many MFIs would be interested in mechanisms for transferring at least part of their natural disaster risk exposure to other parties.

Index-Based Risk-Transfer Products (IBRTPs)

Index-based risk-transfer products (IBRTPs) are a class of financial instruments designed to transfer correlated risks between parties. IBRTPs can be structured as options, bonds, derivatives, or insurance products. The legal and regulatory environment of the host country will be a major determining factor in how an IBRTP is structured. Thus far, the major implemented pilot programs have classified IBRTPs as insurance products. Regardless, the characteristic feature of IBRTPs is that the payout on the instrument depends on realized values of a specifically designed measure, or index, correlated with the risk of concern (Skees and Barnett, 1999). Unlike traditional insurance that makes payouts based on the actual loss incurred, IBRTPs make payouts based on the realized value of an index which is correlated with actual losses.

IBRTPs are increasingly being used in developed countries. Examples include area-based yield and revenue insurance products such as the Group Risk Plan (GRP) and Group Risk Income Protection (GRIP), which are agricultural insurance products offered through the U.S. Federal Crop Insurance Program (Barnett et al., 2005; Vercammen, 2000; Mahul, 1999; Wang et al., 1998; Skees, Black, and Barnett, 1997; Miranda, 1991); catastrophe bonds and options used by property and casualty insurers (Bantwal and Kunreuther, 2000; Hommel, 2000; Croson and Kunreuther, 1999; George, 1999; Lewis and Davis, 1998; Jaffee and Russell, 1997); and weather derivatives used primarily by firms in the energy sector (Alaton, Djehiche, and Stillberger, 2002; Müller and Grandi, 2000; Zeng, 2000).

Agricultural applications of IBRTPs have generally been limited to area-based yield and revenue insurance products, though some studies have examined the potential for using other types of IBRTPs in

agriculture (Vedenov, Epperson, and Barnett, 2006; Vedenov and Barnett, 2004; Mahul, 2001; Martin, Barnett, and Coble, 2001; Miranda and Vedenov, 2001; Turvey, 2001, 2005). Since low-income countries typically do not have the data systems necessary to develop and maintain area-based yield and revenue IBRTPs, several recent studies have examined the potential for using weather IBRTPs as a means to transfer the correlated risk inherent in agricultural sectors of low-income countries (Skees, Barnett, and Hartell, 2005; Hess et al., 2005; Skees, 2003; Varangis, Skees, and Barnett, 2002; Skees 2000). The World Bank has recently supported IBRTP projects in countries such as Morocco (Skees et al., 2001), India (Hess, 2003), Malawi (Hess and Syroka, 2005), and Mongolia (Mahul and Skees, 2006).

IBRTP payoffs are based on a widely available and objectively measured index, such as the cumulative rainfall measured at an official weather station over a specified period of time. This eliminates the potential for adverse selection. Because those who purchase IBRTPs cannot affect the realized values of the index, there are also no moral hazard problems. IBRTPs also have relatively low transaction costs because there is no need for monitoring or loss adjusting. In the United States, standardized temperature-based IBRTPs for a few major cities are traded in exchange markets. These instruments are targeted to the energy sector. However, most weather-based IBRTPs are customized to the needs of the end user and sold by reinsurers.

IBRTPs are subject to basis risk. It is possible for a purchaser to experience a loss and yet not receive a payment. Conversely, it is possible for a purchaser to receive a payment without actually experiencing a loss. The higher the correlation between the underlying index and the loss incurred, the lower the basis risk. Thus, basing an IBRTP on a carefully constructed index can reduce (though not eliminate) a purchaser's exposure to basis risk.

Linking IBRTPs with Micro-credit and Microfinance: Case Studies

In rural areas of low-income countries, many households are trapped in chronic poverty due, in part, to a lack of adequate financial services, which are limited, in part, by correlated risk exposure. Current efforts to introduce IBRTPs into low-income countries are motivated by a belief that the availability of such mechanisms for transferring correlated risk exposure should reduce the financial market limitations contributing to chronic poverty.

Recent efforts to introduce IBRTPs into low-income countries have faced two challenges. The first is finding low-cost mechanisms for delivering the benefits of IBRTPs to small farmers in rural areas. The second is attempting to address the basis risk inherent in IBRTPs. An ongoing World Bank project in Malawi is addressing the first challenge by linking IBRTPs to production loans provided by input suppliers. Another alternative would be to link IBRTPs to loans made by rural financial institutions that are providing microcredit to households. If the benefits of IBRTPs can be passed to small holders via the lending process, it could be significantly less costly than attempting to sell small holders any form of farm-level agricultural insurance. As developed below, if IBRTPs are linked to loans, it may also be possible to reduce some of the basis risk exposure.

There are numerous ways to link IBRTPs to lending. In India, the MFI, BASIX, is both retailing rainfall insurance (a form of an IBRTP) and using an aggregate rainfall risk-transfer product to protect against default risk. In Mongolia, a new project that offers index-based insurance to livestock herders is working to link these contracts into the borrowing activities of small herders. In Peru, a USAID-supported effort is underway to transfer the risk of El Niño-related catastrophic flooding by working with MFIs to develop a new process for passing indemnity

payments from the IBRTP to small borrowers who experience crop losses.³

India: Rainfall Insurance to Protect Against Loan Default Risk

Since 2003, the insurance group ICICI-Lombard of Mumbai has been developing rainfall insurance products. Its model has been to use MFIs in India as the delivery mechanism to reach small farmers. ICICI-Lombard has expanded its efforts to a number of areas around the country. One of the first MFIs to be involved was BASIX of Hyderabad in the state of Andhra Pradesh. The BASIX group delivers a host of services—savings, lending, technical expertise, insurance, etc. Previous experience indicated that when major droughts occurred during the *khariff* (the prime growing season, from June to September), there was a significant increase in loan defaults.

In 2004, BASIX began purchasing a basket of rainfall insurance contracts from ICICI Bank to transfer this loan default risk. Previously, these rainfall IBRTPs have been tied to insufficient rainfall during a period which impacted ground nut and castor production. For 2006, BASIX is also purchasing excess rainfall contracts (with no reference to specific crops) since flooding is also highly correlated with increased loan defaults among borrowers.

Mongolia: Index-Based Livestock Insurance

Nearly one-third of Mongolia's gross domestic product is tied to livestock herding. From 2000–2002, roughly one-third of the livestock in Mongolia died due to *dzud* (the phenomenon created by extreme conditions of a hot summer, e.g., major droughts, followed by a harsh winter). The government of Mongolia requested assistance for this problem from the World Bank. Skees and Enkh-Amgalan (2002)

³The authors are involved in the development of this ENSO insurance effort.

recommended creating a mortality index by species and *soum* (county) to transfer the correlated risk of livestock deaths. In the spring of 2005, the government of Mongolia negotiated a unique loan to fund a pilot test of an IBRTP, known as Index-Based Livestock Insurance (IBLI), in three *aimags* (states) over three sales years.

The IBLI is based on government estimates of mortality within the *soum*. When mortality rates of adult animals exceed 7%, herders begin to receive payments based on the average mortality rate for the *soum*. The risk exposure is layered so that insurance companies pay for losses between 7% and 30%. The government pays for extreme losses beyond 30%. Payments occur with no need to count the herder's actual death loss—a nearly impossible task in the vast regions of Mongolia.

The IBLI project is also tied to an existing project on sustainable livelihoods. That project includes financing to support microcredit and microfinance. There is an ongoing effort to make strong links between these two projects. In 2002, the last year of a major dzud in Mongolia, there were less than 10,000 outstanding loans to herders. The 2002 dzud caused the deaths of around 3 million adult animals (12% of the total). In some areas, herders lost entire herds of animals. Microloans to herders in Mongolia have increased significantly in recent years. Now roughly 50,000 herder families have loans at some level. Thus, when another major dzud occurs, loan defaults will almost certainly increase.

In Mongolia, lenders and insurers are currently considering how they should link the IBLI product to lending. Such linkages should reduce default risk associated with dzud. Also, when herders purchase the IBLI product with their loans, the cost of delivery should be less than with the current agent-based system for selling IBLI products. Hence, the loan-linked IBLI should result in lower premiums paid for the IBLI and lower interest rates. The contract would allow the lender to have first claim on IBLI payments to pay off

herder loans following a major dzud. The mechanisms for doing this are largely in place since herders' banking information is collected when the IBLI products are sold.

Herders tend to pay off loans quickly and may take out several loans during the insurance cycle of the IBLI. Therefore, the IBLI product can serve as a rolling form of "collateral." Herders take out loans for a variety of purposes but primarily to smooth cash flow. The IBLI contract will span at least one year from the time of sale until potential indemnity payments are received. Banks in Mongolia have expressed an interest in linking IBLI insurance with lending as described above. All three banks that loan to herders have agreed to post two interest rates in the second year of the IBLI sales even through they do not yet have the strong linkages outlined above. Herders with IBLI products will receive an interest rate that is 1% per year lower than those without the insurance.

Peru: El Niño-Based Indexes

Along the entire coast of Peru (and particularly in its northern regions), El Niño events can create tremendous flooding. When sea surface temperatures rise in the central equatorial Pacific, the warm air movements coming off the ocean collide with the cold air masses from the Atlantic as they cascade down the Andes Mountains into the foothills. The massive front causes extreme rainfall, creating extensive flooding as the rainwater runs down from the lower highlands toward the sea.

During the 1997–1998 El Niño, parts of northern Peru had in excess of 1,000 mm of rain during the critical growing season of January–April. Households lost not only their annual crop production but also assets such as terraced fields and buildings. Loan defaults were widespread both because of actual losses and because the government intervened and allowed farmers to default on loans. Had the MFIs had effective risk protection, they may have mitigated the government intervention to some extent. Recent interviews with MFI managers in the region

indicate many of them have since ceased making agricultural production loans.

A project funded by the U.S. Agency for International Development (USAID) is attempting to improve access to credit for Peruvian farmers who are subjected to these catastrophic risks from El Niño events. Agricultural insurance could fill the void. Peru had experience with traditional indemnity-based agricultural insurance during the mid-1990s. While this insurance product was being introduced, the 1997–1998 El Niño created massive crop failures. This immediately halted any further interest in agricultural insurance. The current USAID project in Peru has turned around completely the traditional agricultural insurance development process. Rather than starting with an indemnity-based insurance product for individual farmers, the project is attempting to use rural financial markets to deliver the benefits of IBRTPs to small farmers.

Unpublished work conducted by Miranda et al. (2006) shows that the El Niño Southern Oscillation (ENSO) 1+2 index, which measures sea-surface temperatures off the coast of northern Peru, is an excellent predictor of excess rainfall in this region of Peru. A major reinsurer has expressed willingness to write an ENSO-based IBRTP. ENSO measures are a good underlying index for an IBRTP because they are independently determined. In addition, there are nearly 150 years of historical ENSO data. MFIs have expressed their interest in purchasing such IBRTPs to transfer their portfolio risks associated with major flooding. Finally, the banking and insurance regulator in Peru has approved this special form of insurance, and the market for ENSO insurance in Peru is now open.

Sequential Development of IBRTP-Linked Lending

A model currently being discussed for Peru suggests a general process for developing IBRTP-linked lending. The model consists of four sequential stages of development.

- STAGE 1. IBRTPs provided to MFIs by global reinsurance markets to offset the natural disaster-linked default risk in the MFIs' portfolios.
- STAGE 2. MFIs as a conduit for borrowers to purchase IBRTP protection that is proportional to their loan values. No attempt is made to assess the actual loss incurred by each borrower.
- STAGE 3. Linkages to individual loans whereby proceeds from an IBRTP are used to make indemnity payments to farmer-borrowers based on the extent of the actual loss experienced.
- STAGE 4. Local insurance companies use IBRTPs as reinsurance and underwrite individual farm-level crop insurance policies that are linked to MFI loans. The MFI serves simply as a low-cost insurance delivery mechanism.

The model is sufficiently flexible to be adapted to various market and regulatory institutions existing within different countries. In general, as one moves through the sequential stages, the borrower's exposure to basis risk on the IBRTP is reduced but transaction costs are increased. How far an MFI would (or could) proceed through these sequential steps is highly dependent on the regulatory structure within the country, the basis risk associated with the underlying IBRTP product, the availability of insurance partners, and the transaction costs of conducting farm-level underwriting, rating, and loss adjusting.

In Stage 1, an MFI would purchase an IBRTP using proceeds from an interest rate load. Any indemnity payment from the IBRTP would then be used to offset the cost of default risk associated with a major natural disaster. In areas having significant exposure to natural disaster risk, MFIs are likely already loading interest rates for default risk. By purchasing the IBRTP, the MFI could reduce the load for default risk, thereby reducing the net additional cost of purchasing the IBRTP to borrowers.

The MFI would use the proceeds from the IBRTP to compensate for losses that the entire entity suffers without a direct tie to individual loans. In this case, the key issue is the cost of capital for the MFI during a major crisis versus the cost of capital for the IBRTP. When a common disaster is impacting most of the MFI customers, a significant liquidity problem is likely to emerge. On the one side, depositors are more likely to be withdrawing their savings due to the disaster and on the other side, defaults are likely increasing and the MFI is more likely to need reserves or provisions to compensate for these defaults.

Stage 2 would involve simply distributing the IBRTP payments to every borrower on a pro rata basis with no effort to conduct individual loss adjusting. This stage is very similar to what is currently done with loan-linked area-yield insurance products in India. The MFI is simply a conduit for borrowers to purchase IBRTP protection that is proportional to their loan value. Stages 1 and 2 address the challenge of getting IBRTP benefits to small farmers but do not address the problem of basis risk.

Stages 3 and 4 extend these ideas in an attempt to address basis risk. Stage 3 would use the IBRTP payments to pay down some portion of the loans of only farmer-borrowers *who suffer losses* caused by the natural disaster that triggered the IBRTP payment. The maximum indemnity would equal the amount of the loan. It is a standard international regulatory practice to preclude banks and other financial institutions from acting as insurers. In the proposed arrangement, the lender is not exposed to financial risk for the IBRTP component, as the only payments for those losses would come from the global reinsurer.

Furthermore, the arrangement being proposed in Stage 3 should not be classified as insurance since the payments are not directly equivalent to farm-level losses. The MFI assumes no liability for losses exceeding the proceeds received from the IBRTP, and there is no guarantee

that the proceeds received from the IBRTP will be sufficient to pay for all farm-level losses. Thus the loan-linked product in Stage 3 would be better classified as a quasi-formal financial service offered by the MFI.

To reduce the loss adjustment cost, the arrangement would begin with a self-declaration of losses with some guidelines and local monitoring provided by the MFI. Borrowers could also opt to pay off the loans should they have the cash flow. Those paying off loans during an extreme event would be rewarded with more favorable terms of credit in the future. Once all losses were determined, borrowers' individual payments would be based on the aggregate loss assessment and the total amount of funds received from the IBRTP.

If the IBRTP payment exceeds the aggregate loss assessment, the excess could be applied to a reserve designated to help cover losses for future disasters. If the IBRTP payment is less than the aggregate loss assessment, individual payments would be calculated on a pro rata basis. There would be a natural tension in the system because the pro rata distribution creates a zero-sum game. Each borrower would have an incentive to make certain that other borrowers are honest in their self-declaration of losses since any payment made to one borrower reduces the amount available for other borrowers. With experience, MFIs could modify the specific rules and arrangements for how losses are calculated and IBRTP payments are distributed. As a further extension, MFIs could build reserves to supplement IBRTP payments.

Transaction costs are higher in Stage 3 because individual losses must be assessed whenever an IBRTP payment is received by the MFI. Of course, it is this same feature that reduces the basis risk on the IBRTP payment. Rather than simply allocating the IBRTP payment in proportion to the size of each loan (as in Stage 2), Stage 3 attempts to limit indemnities only to those who actually

experienced natural disaster-induced losses. This also reduces basis risk by increasing the funds available to indemnify those who actually experienced losses. The transaction costs, which would be passed on to borrowers as an interest rate load, would be higher than in Stage 2 but less than would exist with a traditional farm-level crop insurance product.

In Stage 4, the MFI would approach a primary insurance provider and begin offering a true loan-linked crop insurance product. The insurance provider would offer a traditional farm-level crop insurance product up to the value of the loan and reinsure against natural disaster risk using IBRTPs. In this stage, the basis risk is transferred from the farmer-borrower to the insurance company. Consequently, this stage would require a well-developed insurance sector which, over time and space, can effectively pool any residual losses not covered by the IBRTP. The cost of transferring the basis risk, along with the transaction costs for underwriting, rating, and loss adjusting, would be loaded into the premium rate charged by the insurance company. In this stage, the MFI simply receives a fee from the insurance company for serving as a low-cost delivery mechanism.

New Technologies for Providing Loan-Linked Insurance

As the global donor and reinsurance communities collaborate more on how to transfer major weather risks out of low-income countries, the search continues for improved systems to measure extreme events in an objective and timely fashion. While most low-income countries do measure and record weather data in a fashion that is consistent with World Meteorological Organization (WMO) standards, many times gaps in available data and fiscal problems result in poor maintenance of weather stations. Improved technologies can mean significantly more activity in IBRTPs as

global partners gain assurance that low-cost technologies can be reliable and trusted to provide timely estimates of potential damage. Trust and reliable data are key to reinsurance market participation.

Remote sensing technologies hold great promise for facilitating the further development of IBRTPs. Remote sensing can be used to quantify anomalies associated with drought and flooding. These technologies are also being used to estimate crop yields around the globe. As further advances occur, these technologies can be used to develop effective and cost-efficient IBRTPs. More critically, they offer the opportunity to reduce basis risk by pinpointing geographic zones that are being impacted by extreme events.

Basist et al. (2001) describe how new Special Sensor Microwave Imager (SSM/I) technology can be used to monitor surface wetness. SSM/I technology is superior to infrared technologies because of its ability to penetrate cloud cover. Also, the images can be developed at night. The World Bank is investigating the potential for using SSM/I for assessing flooding events that negatively impact rice yields in Bangladesh and Southeast Asia. Reinsurers who sell IBRTPs have expressed a keen interest in this technology since it would provide a secure and reliable source of data on which to base IBRTPs.

Conclusion

This article shares thoughts on how to enhance microcredit and microfinance through linkages with IBRTPs. In low-income countries, limited access to savings, lending, and insurance institutions contributes to the existence of poverty traps. While significant progress has been made in offering microcredit in low-income countries, the progress has generally bypassed agricultural lending.

In rural areas of low-income countries, financial and insurance markets are limited by asymmetric information, high

transaction costs, and correlated loss exposure. IBRTPs offer hope for addressing these market limitations. IBRTPs transfer correlated risks, are not susceptible to asymmetric information problems, and have low transaction costs. However, purchasers of IBRTPs are exposed to basis risk whereby individuals can have a loss and not receive a payment.

Efforts to introduce IBRTPs into rural areas of low-income countries have faced two challenges. The first is finding low-cost delivery mechanisms. The second is attempting to address the basis risk inherent in IBRTPs. MFIs provide an existing, low-cost mechanism for delivering the benefits of IBRTPs to rural areas of low-income countries. Linkages to microfinance can also help mitigate the basis risk in IBRTPs.

Improved remote sensing technologies offer significant promise for developing secure and independent moisture-based IBRTPs (e.g., drought and flooding). These IBRTPs could be loss-adjusted in real time for the geographic areas that are most impacted. This would greatly reduce the transaction costs of offering IBRTPs in low-income countries for global reinsurers.

The three examples presented in this article demonstrate that these ideas have moved well beyond the conceptual stage. In India, the MFI, BASIX, has been selling rainfall insurance (a form of an IBRTP) to individual farmers as well as purchasing IBRTPs to reinsure the risk in their portfolio. In Mongolia, the World Bank pilot project, Index-Based Livestock Insurance, has caused lenders to think about linking this particular IBRTP to loans made to livestock herders. In Peru, MFIs are investigating IBRTPs based on ENSO 1+2 as a mechanism for transferring the risk of loan defaults associated with major flooding events.

The work in Peru has also stimulated efforts to develop a general model for linking IBRTPs to lending. This model is flexible enough to be applied in various low-income countries. It allows for tradeoffs to be made between basis risk

and transaction costs and provides a logical sequence for the development of agricultural insurance that addresses the classic problems of: (a) correlated losses, (b) high delivery costs, (c) high underwriting and monitoring costs, and (d) high loss adjustment costs. The model also provides a mechanism for using IBRTPs to transfer natural disaster risk out of the local community using existing MFI delivery mechanisms.

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A Dynamic Model of Individual and Group Lending in Developing Countries

Ani L. Katchova, Mario J. Miranda, and Claudio Gonzalez-Vega

Abstract

This paper examines the contract design problem of microfinance institutions seeking to maximize outreach to the poor while remaining financially sustainable. A dynamic model of group lending is developed that shows how optimal interest rates depend on information regarding moral hazard and adverse selection problems, correlated project risks, and strategic default. Relative to traditional static models, the results indicate a dynamic model better explains the current experience with individual and group lending in developing countries.

Key words: adverse selection, individual and joint liability contracts, microlending, moral hazard, strategic default

Poor households in developing countries have had limited access to formal financial services. Microfinance, where several types of microfinance organizations (MFOs) extend financial services to poor households while striving to remain financially sustainable, appears to be a solution to this challenge. The success of microfinance programs has been attributed to several innovations in lending technologies. Most of these innovations have resulted from trial and error, with the expectation that successful innovations would pass the test of time.

The most celebrated innovation in microfinance is group lending, where members of a borrowing group accept joint liability for the repayment of a loan. After group lending was implemented successfully by a few organizations, standardization and replication became a priority for many MFOs. Group lending has been adopted by many MFOs, including well-known organizations such as the Grameen Bank in Bangladesh and BancoSol in Bolivia. Other MFOs, including the BRI Unit Desa in Indonesia, Caja Los Andes in Bolivia, and Financiera Calpia in El Salvador, have also developed successful individual lending technologies.

Debate continues among academics and practitioners about the relative merits of individual and group lending technologies. In developing countries, dominance of one lending technology over the other appears to depend on circumstances unique to the specific country or region. These innovations, however, may not be able to overcome all existing economic and social obstacles. Addressing the financial market

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problems of the very poor requires a better understanding of the economic environment in which MFOs operate. This study develops models showing how lenders can optimally determine the interest rates they should charge based on information about the productivity and diligence characteristics of borrowers, their investment opportunities, degree of correlation among the returns for different borrowers, and levels of peer monitoring. In these models, the lender's objective is to extend loans to a large number of poor households (breadth of outreach), and especially to the very poor (depth of outreach), while remaining financially sustainable (Yaron, 1994).

An important determinant of lender sustainability is the ability of the lender to secure high repayment rates. While group lending is often associated with high repayment rates, forming a group will not always guarantee the repayment of the loan. Another mechanism for ensuring high repayment rates is to provide strong dynamic incentives such as the credible threats to cut the borrowers off from any future credit when loans are not repaid (Chowdhury, 2005; Morduch, 1999; Tedeschi, 2006; Wydick, 2001). When borrowers lack access to credit from other sources, this mechanism can overcome information and incentive problems in both individual and group lending.

Several papers have attempted to model borrowers' behavior under individual and group lending in an uncertain, but essentially static economic setting. These static models take into consideration moral hazard (Conning, 1999; Ghatak, 1999; Ghatak and Guinnane, 1999; Navajas, Conning, and Gonzalez-Vega, 2003), adverse selection (Ghatak and Guinnane, 1999; Navajas, Conning, and Gonzalez-Vega, 2003; Van Tassel, 1999), correlated returns of the borrowers' projects (Armendariz de Aghion, 1999), and strategic default where borrowers are able but unwilling to repay their loans (Armendariz de Aghion, 1999; Ghatak and Guinnane, 1999).

Static models, however, are unable to capture the dynamic incentives that are critical elements of individual and group lending contracts. In this study, we propose a dynamic model of individual and group lending which incorporates moral hazard, adverse selection, correlated risks, and strategic default. The static and dynamic models differ in a key respect. In the dynamic model, borrowers take into account the outcomes of their own and their peers' projects before they make strategic default decisions. Although static models provide useful insights concerning borrower-lender interactions, the dynamic models developed here are better able to capture the complex dynamic interactions that characterize repayment behavior.

In the following sections, we begin by developing a simple static model and then extend it to a dynamic model. Comparisons are then drawn regarding the predictions offered by both models.

The Static Model

Consider a loan contract between a borrower and a lender (individual liability contract) or between a group of borrowers and a lender (joint liability contract). Because modeling interactions among more than two borrowers in a group is complex (especially for the dynamic models considered later in this paper), we consider only the case of two borrowers obtaining a joint liability loan.

The loan is of size I and the principal plus interest due next period is RI , where $R = r + 1$. A borrower also needs to repay cRI for a defaulting partner, where $c = 0$ in the case of individual liability contracts, and $c = 1$ for joint liability contracts. It is assumed that repayment is an all-or-nothing decision; i.e., the borrower either repays all or nothing (Besley and Coate, 1995; Ghatak, 1999). The borrower uses the loan to invest in a one-period project. If the project is successful, it yields a random return (z_f) depending on the borrower's productivity type (z) and a constant production function parameter

(f). If the project fails, it yields zero returns. The productivity type z is assumed to be uniformly distributed for the pool of borrowers (Navajas, Conning, and Gonzalez-Vega, 2003).

Adverse selection occurs when the productivity type z is not observable by the lender, so that all borrowers are subject to the same interest rate. Since more productive borrowers cross-subsidize less productive borrowers paying the same interest rate, the equilibrium may have more individuals obtaining loans than would be the case under perfect information.

Moral hazard arises when borrowers are better off selecting a high level of effort, but they choose low effort because they also enjoy leisure benefits and face interest rates which are sub-optimally high. The cost of choosing low effort is also passed on to the lender as a lower probability of a successful outcome of the project (Conning, 1999). The borrower chooses a level of effort to exert once she obtains the loan. If the borrower exerts high effort (H), the project will be successful with probability P^H , and if the borrower exerts low effort (L), the project will be successful with probability P^L , where $P^H > P^L$. When the borrower exerts low effort, she enjoys additional leisure benefits Bl .

In the case of group lending, borrowers' project returns may also be correlated (Armendariz de Aghion, 1999). We define P^{HH} to be the conditional probability that the first borrower, who exerts high effort, is successful and has positive returns, given that the second borrower, who also exerts high effort, is successful. If borrowers' returns are positively correlated, then $P^{HH} > P^H$; if they are not correlated, then $P^{HH} = P^H$. When the first borrower's project is successful and the second borrower's project is unsuccessful, the first borrower has to repay the additional amount of $P^H(1 - P^{HH})$ for her partner. In all models, high-effort borrowers are not paired with low-effort borrowers because the members of the

group are assumed to monitor one another and enforce the same level of effort. Otherwise, borrowers would have an incentive to choose a low effort level for themselves and a high effort level for their partner, which would not be a sustainable equilibrium.

A borrower may be unable to repay her loan due to zero or insufficient project returns. However, a borrower's project may be successful but the borrower may be unwilling to repay her loan, which is defined as strategic default (Armendariz de Aghion, 1999). When a borrower defaults, then she is forfeiting the value of access to future credit V . We also assume a borrower is monitored with probability γ and incurs social sanctions W if she is caught in default. Social sanctions are especially effective in rural, less-mobile societies. A borrower may choose to repay her share and the share of her defaulting partner and gain the value of re-accessing future credit V , or to strategically default and keep her project returns, but incur social sanctions γW and gain the value of re-accessing future credit only if her partner repays both shares of the loan.

The Borrower's Problem

A potential borrower has five choices: (a) obtain the loan, exert high effort, and, if her project is successful, repay her share and the share of her defaulting partner (HN); (b) obtain the loan, exert high effort, and strategically default, if her project is successful (HD); (c) obtain the loan, exert low effort, and if her project is successful, repay her share and the share of her defaulting partner (LN); (d) obtain the loan, exert low effort, and strategically default, if her project is successful (LD); and (e) not apply for the loan and obtain the reservation utility (U). Figure 1 further illustrates these five choices in a static framework.

The borrower's problem is summarized by the following static optimization model:

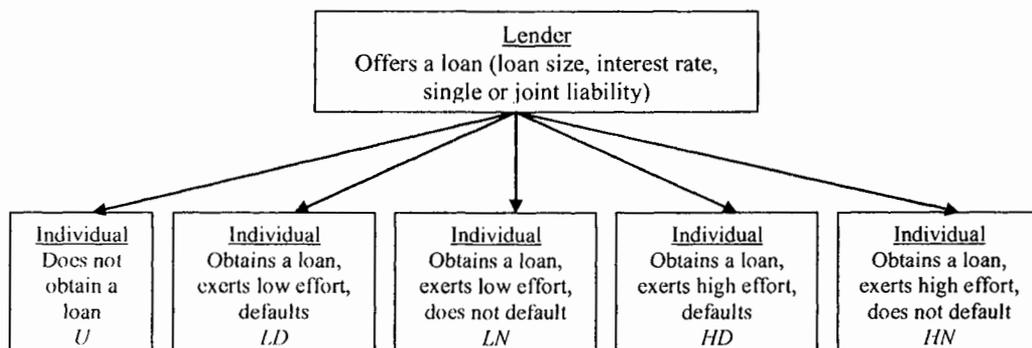


Figure 1. The Static Model Problem

$$(1) \max_{HN, LD, LN, ND, U} \left\{ P^H z f - P^H R I - P^H (1 - P^{HH}) \times c R I + P^H V, P^H z f - P^H \gamma W + P^H P^{HH} V, P^L z f - P^L R I + B I - P^L (1 - P^{LL}) c R I + P^L V, P^L z f + B I - P^L \gamma W + P^L P^{LL} V, U + V \right\}.$$

This model examines individual liability contracts ($c = 0$) or joint liability contracts ($c = 1$). It incorporates the adverse selection problem arising from the fact that the productivity type z is not observable by the lender. The model also incorporates the moral hazard problem through the borrower's choice of either a high or low effort level and the resulting probabilities of success (P^H and P^L). The model can be applied to the agricultural sector, where usually returns are positively correlated ($P^{HH} > P^H$) and to other sectors where returns are independent among borrowers ($P^{HH} = P^H$). Finally, the model includes the decision of strategic default when social sanctions W are imposed on a borrower who is monitored with probability γ .

The Lender's Problem

Because borrowers maximize their returns while obtaining loans, the lender's problem involves setting interest rates so that its operations are financially sustainable. The lender and the borrowers engage in the

following sequential game (Ghatak, 1999). First, the lender offers an individual or a joint liability contract, specifying loan size I , interest rate $r = R - 1$, and level of joint liability $c = 0$ or $c = 1$. Second, potential borrowers decide whether to obtain a loan and, if they do, they make their choices regarding their level of effort and possible strategic default. Finally, the projects are carried out and outcome-contingent transfers as specified in the contracts are met. The lender's objective is to choose an interest rate which maximizes the borrowers' residual returns (the project returns minus loan repayments), subject to the constraint that the lender's expected profit per loan is zero (Conning, 1999; Ghatak, 1999; Ghatak and Guinnane, 1999; Navajas, Conning, and Gonzalez-Vega, 2003).

Borrowers of different productivity type z choose whether to participate in the loan market and, if the loan is taken, they select different levels of effort and decide whether to strategically default. Let P^k be the probabilities of loans being repaid corresponding to the choices made by borrowers of type z , where

$$(2) P^k = \begin{cases} P^H & \text{if the borrower exerts high effort and does not default,} \\ P^L & \text{if the borrower exerts low effort and does not default,} \end{cases}$$

(continued ...)

(2) (continued ...)

- $P^H P^{HH}$ if the borrower exerts high effort and defaults but her partner repays for her,
- $P^L P^{LL}$ if the borrower exerts low effort and defaults but her partner repays for her,
- 0 if the borrower defaults or does not obtain a loan.

Suppose productivity type z in the population is uniformly distributed on the interval zero to one, with a distribution function $G(z) = \text{uniform}[0, 1]$. The optimization problem determines the choices made by borrowers of different type z regarding obtaining loans, exerting high or low effort, and defaulting strategically. Let z^k represent the breakpoints where borrowers of different type z change their choices. If a borrower of type z chooses not to obtain a loan, then $G(z) = 0$. The number of borrowers (β) as a proportion of the population is given by:

$$(3) \quad \beta = \sum_{k=1}^K (G(z^k) - G(z^{k-1})),$$

where $0 \leq \beta \leq 1$.

For each choice of participation, level of effort, and strategic default, there is a corresponding probability of repaying the loan P^k and a proportion of borrowers β^k having made the same choice:

$$\sum_{k=1}^K \beta^k \equiv \beta.$$

Assuming there are no partial loan collections and group members receive loans of equal size, the default rate for the lender is calculated as the probability that a borrower will be unwilling or unable to repay her loan $(1 - P^k)$, weighted by the proportion of borrowers β^k having made the same choice:

$$(4) \quad \text{default rate} = \frac{\sum_{k=1}^K (1 - P^k) \beta^k}{\beta}.$$

The lender obtains outside funding with interest rate ρ and has total handling costs

m , which are distributed among all borrowers. The number of borrowers is calculated as a proportion of the population β times the number of agents in the population b . The lender sets the lowest interest rate such that its operations are financially sustainable. In other words, the lender's expected profit per loan is set to zero:

$$(5) \quad \frac{\sum_{k=1}^K P^k \beta^k R I}{\beta} - (1 + \rho) I - \frac{m}{b \beta} = 0.$$

This equation represents the lender's profits as repayments on the loans minus the interest rate paid on loan funds and the average (per borrower) handling costs incurred by the lender. The first term is the repayment of loans received from the borrowers, weighted by their probability of success for the corresponding level of effort and by their default decision, added over the number of borrowers having made the same choice, as a proportion of the total number of borrowers. The second term is the lender's cost of obtaining outside financing at an interest rate ρ . The third term is the total handling costs for the lender divided by the number of borrowers. The lender sets an interest rate which maximizes borrowers' returns such that the lender's profits are zero.

The Dynamic Model

In the static model, the value derived by a borrower from being able to re-access future credit is assumed to be exogenous. The static model also assumes the borrower decides whether to repay or strategically default before she observes whether her project has been successful (Armendariz de Aghion, 1999). In this section, we develop a dynamic model, where the value of re-accessing future credit is assumed to be endogenous and where the borrower decides whether to repay or to strategically default after she observes whether her project has been successful.

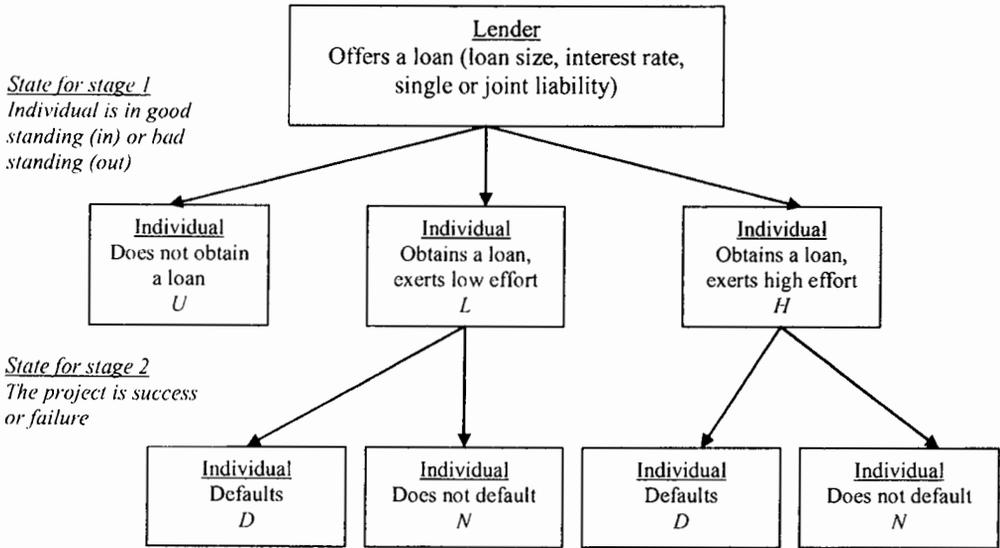


Figure 2. The Dynamic Model Problem

We consider a dynamic two-stage, two-person game. Because each action is state contingent in the dynamic game, building a model with more than two players significantly complicates the game and is beyond the scope of this study. Figure 2 illustrates the two stages of the game with the respective states and actions for each stage. The first stage is characterized by being in the state of *in* or *out* of the credit market and actions of not obtaining a loan or obtaining a loan and choosing a low or high effort level. The second stage is characterized by the state of project success or failure and actions of defaulting or not defaulting on the loan. The optimization problem is defined for the borrowers subject to the lender's zero profit condition.

The Borrower's Problem: Stage 1

In the first stage, the borrowers are either *in* (never defaulted on a loan before) or *out* (defaulted on a loan before). They choose whether to not obtain the loan *U*, obtain the loan and exert low effort *LL*, or obtain the loan and exert high effort *HH*. The first index refers to the first borrower and the second index refers to the second borrower. Only symmetric cases of *HH*

(high effort and high effort) or *LL* (low effort and low effort) are considered. To define the dynamic problem, states, actions, and transition probabilities are defined as follows:

<p>States:</p> <ul style="list-style-type: none"> ▸ <i>in</i> = never defaulted on a loan before ▸ <i>out</i> = defaulted on a loan before
<p>Actions:</p> <ul style="list-style-type: none"> ▸ <i>U</i> = do not obtain a loan, get a reservation utility ▸ <i>LL</i> = obtain a loan and exert low effort ▸ <i>HH</i> = obtain a loan and exert high effort
<p>Transition Probabilities:</p> <ul style="list-style-type: none"> ▸ $P^{HH}(ss)$ = probability of <i>ss</i> if <i>HH</i> ▸ $P^{HH}(sf)$ = probability of <i>sf</i> if <i>HH</i> ▸ $P^{HH}(fs)$ = probability of <i>fs</i> if <i>HH</i> ▸ $P^{HH}(ff)$ = probability of <i>ff</i> if <i>HH</i> ▸ $P^{LL}(ss)$ = probability of <i>ss</i> if <i>LL</i> ▸ $P^{LL}(sf)$ = probability of <i>sf</i> if <i>LL</i> ▸ $P^{LL}(fs)$ = probability of <i>fs</i> if <i>LL</i> ▸ $P^{LL}(ff)$ = probability of <i>ff</i> if <i>LL</i> ▸ = 1 for probability of <i>out</i> if <i>out</i> ▸ = 0 for probability of <i>in</i> if <i>out</i>

The probability $P^{HH}(ss)$ is the joint probability of the state *ss* (both the first and the second borrowers are successful) in the second stage, given that *HH* (both

the first and the second borrowers exert high effort) were chosen as actions in the first stage. Similar interpretations apply to the other probabilities. Given that the borrower is *out* this period, the probability of being *out* next period is 1, and the probability of being *in* next period is 0.

A Bellman's equation for stage 1 captures the tradeoffs between reservation utility and exerting high or low effort. The value of being in state *in* is the maximum value of either choosing the reservation utility and staying out of the loan market this period, or taking a loan, choosing a high or low effort level, and receiving the value of being in different states in stage 2 (*ss*, *sf*, *fs*, *ff*):

$$(6) \quad V(in) = \max_{HH, LL, U} \left\{ P^{HH}(ss)V(ss) + P^{HH}(sf)V(sf) + P^{HH}(fs)V(fs) + P^{HH}(ff)V(ff), P^{LL}(ss)V(ss) + P^{LL}(sf)V(sf) + P^{LL}(fs)V(fs) + P^{LL}(ff)V(ff), U + \delta V(in) \right\}.$$

The value of being in state *out* is the reservation utility and remaining in state *out* next period:

$$(7) \quad V(out) = U + \delta V(out).$$

The Borrower's Problem: Stage 2

In the second stage, the borrowers observe the outcomes of their projects (success or failure) and then decide whether to default. If at least one of the borrowers decides not to default and repay the loan, then the probability of them being *in* next period is 1. If both borrowers decide to default, then the probability of them being in state *out* next period is 1. States, actions, and transition probabilities are defined as follows:

<p>States:</p> <ul style="list-style-type: none"> ▸ <i>ss</i> = success and success ▸ <i>sf</i> = success and failure ▸ <i>fs</i> = failure and success ▸ <i>ff</i> = failure and failure
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<p>Actions:</p> <ul style="list-style-type: none"> ▸ <i>NN</i>, <i>ND</i>, <i>DN</i>, <i>DD</i> if <i>ss</i> ▸ <i>ND</i>, <i>DD</i> if <i>sf</i> ▸ <i>DN</i>, <i>DD</i> if <i>fs</i> ▸ <i>DD</i> if <i>ff</i>
<p>Transition Probabilities:</p> <ul style="list-style-type: none"> ▸ = 1 for probability of <i>in</i> if <i>NN</i>, <i>ND</i>, <i>DN</i> ▸ = 1 for probability of <i>out</i> if <i>DD</i> ▸ = 0 otherwise

Here *N* denotes not default, and *D* is default. Again, the first index refers to the state or action of the first borrower, and the second index refers to the state or action of the second borrower. Note that some actions are not applicable in some states. If the state is *f* (failure) for both borrowers, then the only possible action is *D* (default). Consequently, there are 16 possible combinations of actions, contingent on the states occurred.

A Bellman's equation for stage 2 captures the borrower's problem of balancing the immediate reward of defaulting against future rewards of being able to re-access the loan market. $V(ss)$ is the maximum attainable sum of current and expected future rewards, given the borrowers are currently in the state *ss* (success and success). If the borrowers are in state *ss*, they have four choices: both of them repay their shares, one of them repays both loans when the other strategically defaults, or both of them default and are removed from the loan market. The same arguments apply for the other states. The rest of the notation is the same as in the static model, where

$$(8) \quad V(ss) = \max_{NN, ND, DN, DD} \left\{ zf - RI + \delta V(in), \right. \\ \left. zf - R(1+c)I + \delta V(in), zf - \gamma W + \delta V(in), \right. \\ \left. zf - \gamma W + \delta V(out) \right\}.$$

$$(9) \quad V(sf) = \max_{ND, DD} \left\{ zf - R(1+c)I + \delta V(in), \right. \\ \left. zf - \gamma W + \delta V(out) \right\}.$$

$$(10) \quad V(fs) = \max_{DN, DD} \left\{ \delta V(in), \delta V(out) \right\}.$$

and

$$(11) \quad V(ff) = \delta V(out).$$

Note that in the dynamic model, the choice of whether to default depends on the success or failure of the borrowers, whereas, in the static model, the choice to default or not is made prior to the realization of the success or failure state.

Equations (8)–(11) are substituted into equation (6), so that $V(in)$ is a function of only $V(in)$ and $V(out)$. Equations (6) and (7) are functional equations for $V(in)$ and $V(out)$, and can be solved using a dynamic programming approach. Given a loan of size I , an interest rate $r = R - 1$ offered by the lender, and a level of joint liability c , the borrowers choose whether to take the loan, exert high or low effort, and whether to default based on the current state of being in or out in stage 1 and success or failure in stage 2.

The Lender's Problem

The analysis of the lender problem in the dynamic model is the same as in the static model, except for the probabilities associated with different choices. Let P^k be the probability corresponding to the choices made by borrowers of type z . Then, $P^k = P^k(ss) + P^k(sf) + P^k(fs) + P^k(ff)$; i.e.,

$$(12) \quad P^k(xx) =$$

$$\begin{cases} P^{HH}(xx) & \text{if the borrowers exert high effort and at least one does not default,} \\ P^{LL}(xx) & \text{if the borrowers exert low effort and at least one does not default,} \\ 0 & \text{if both borrowers default or do not take a loan,} \end{cases}$$

where xx is ss , sf , fs , or ff .

Similar to the static model case, the dynamic models are solved using a three-step procedure. First, the lender offers a loan contract of size I with interest rate $r = R - 1$, and a level of joint liability $c = 0$ or $c = 1$. Second, the borrowers

decide whether to obtain loans, the level of effort to exert, and whether to default strategically. Third, the lender takes into consideration the choices of the borrowers and calculates profits. The lender sets the interest rate such that its operations are financially sustainable.

Model Parameters

Table 1 shows the values for the parameters used in the static and the dynamic models. The values of the parameters are adopted from Navajas, Conning, and Gonzalez-Vega (2003), set using the *Microbanking Bulletin* providing industry benchmarks for microfinance organizations, or chosen by the authors. Borrowers generally obtain loans to purchase input supplies for agricultural, craft, or other entrepreneurial activities and repay their loans after the project proceeds are collected.

MFOs report very small average loan balances ranging between \$38 and \$1,016 (with \$100 or \$200 being usual average loan balances) and very short average loan terms of less than a year. Because of small loan sizes and low GNP per capita in the developing countries, the average loan size I is assumed to be \$100 and the outcome of the financed project fz is expected to range from \$0 to \$300 depending on the productivity type of the borrower.

The probability of project success is assumed to be $P^H = 0.9$ if high effort is exerted and $P^L = 0.6$ if low effort is exerted. Projects usually have high success rates because they are assumed to be well-established and performed on an ongoing basis in the community. In addition, a borrower enjoys \$100 in leisure benefits if she exerts low effort. If an individual does not borrow to invest in a project, then she is assumed to have a reservation utility of $-\$100$.

Because of lack of traditional collateral, group lending primarily relies on high monitoring and social sanctions among

Table 1. Microlending Parameters Used in Static and Dynamic Models

Variable	Parameter	Values in the Static Model	Values in the Dynamic Model	Source of Parameter Values ^a
Loan size	I	100	100	NCG, MBB
Interest rate	$r = R - 1$	endogenous	endogenous	
Joint liability component	c	0 or 1	0 or 1	
Group size	n	1 or 2	1 or 2	
Value of re-accessing market for future credit	V	300	endogenous	authors
Productivity type	z	[0, 1]	[0, 1]	NCG
Production constant	f	300	300	NCG
Reservation utility	U	-100	-100	authors
Leisure benefits	B	1	1	authors
Probability of success if high effort	P^H	0.9	0.9	NCG
Probability of success if low effort	P^L	0.6	0.6	NCG
Probability of success and success if high effort and high effort	P^{HH}	0.97	0.97	authors
Probability of success and success if low effort and low effort	P^{LL}	0.89	0.89	authors
Social sanctions	W	200	200	authors
Probability of monitoring	γ	0.9	0.9	authors
Population	b	100	100	NCG
Total handling costs for the lender	m	500	500	NCG, MBB
Lender's outside funding interest rate	ρ	0.1	0.1	NCG, MBB

^a Parameter values were adopted from Navajas, Conning, and Gonzalez-Vega (NCG, 2003), set using the *Microbanking Bulletin* (MBB), or chosen by the authors.

peer borrowers to enforce the repayment of the loans. These enforcement methods have proved very successful in rural, less-mobile societies. We assume that a borrower is monitored with a 90% probability by her peers and that the imputed value of social sanctions when a borrower is caught in strategic default is \$200. The value of re-accessing the market for future credit is set at \$300 in the case of the static model, and is determined endogenously for the dynamic model.

Finally, the lender is assumed to obtain external funds at a 10% interest rate from the international financial markets and incurs \$5 in handling costs per loan. Because the parameter values are chosen based on current microfinance industry trends, we expect that the results will

confirm the growing empirical evidence of high interest rates, high outreach, and financial sustainability of the MFOs.

Static Model Results

The optimization models involve maximizing the borrower's utility subject to the lender's zero profit condition. The models are solved using Matlab. Table 2 shows the interest rate required for lender's sustainability, the number of borrowers reached, the default rates, the borrowers' decisions of participating in the credit market, and their choices of effort levels.

Using the assumed parameter values, the lender must charge an interest rate of 61% on individual liability contracts, 37% on

Table 2. Static Model with Individual or Joint Liability Contracts

Results	Individual Liability Contracts	Joint Liability Contracts	
		Independent Returns	Correlated Returns
Interest rate	61%	37%	54%
Borrowers reached	90%	80%	87%
Default rate	28%	15%	25%
Productivity type and decision ^a	0.00–0.10 <i>U</i> 0.11–0.65 <i>LN</i> 0.66–1.00 <i>HN</i>	0.00–0.20 <i>U</i> 0.21–0.34 <i>LN</i> 0.35–1.00 <i>HN</i>	0.00–0.13 <i>U</i> 0.14–0.56 <i>LN</i> 0.57–1.00 <i>HN</i>

^a *U* = nonapplicant, *L* = low effort, *H* = high effort, *N* = not default, and *D* = default.

joint liability contracts with independent returns, and 54% on joint liability contracts with correlated returns to assure the lender's operations are sustainable. Therefore, the interest rate required for lender's sustainability is lower for group lending than for individual lending. The lender can offer lower interest rates on joint liability contracts because borrowers with failed projects may use their partners to repay the loan shares—an option which is not available under individual liability contracts. These results imply there is risk sharing between the lender and the repaying borrowers.

The results for group lending with correlated returns will always be between the results for the two extreme cases: group lending with independent returns and individual lending, which can be thought of as group lending with perfectly correlated returns. The interest rate that the lender must charge in group lending when returns among borrowers are independent is lower than when returns are correlated. The lender can offer lower interest rates when returns are independent because, when a borrower's project fails, the chance of failure for another borrower's project is lower for independent than for positively correlated project returns.

The finding that the interest rate in group lending may be lower than in individual lending does not necessarily mean all borrowers will be better off with group lending (Ghatak, 1999). In contrast to

individual credit, in group lending borrowers must balance the benefit of having someone else repay their loan share (the benefit of being partially insured against default) and the cost they may incur to repay the loan shares of other borrowers in case of their inability or unwillingness to repay loans (the cost of insuring other members against default). They will also incur peer monitoring costs, which are nonexistent in individual loans.

Under the parameters of the model, for low-productivity borrowers (with low project returns), the cost of insuring others is higher than the benefit of being insured plus the benefit of paying a lower interest rate. Therefore, some low-productivity agents will choose not to obtain joint liability loans, even if they would have obtained individual liability loans at higher interest rates.

Both the breadth and depth of outreach are lower in group lending, since low-productivity borrowers willing to participate in individual lending will not want to take group loans. The number of borrowers reached by the lender is highest in the case of individual lending (90% of the population), lower for group lending with correlated returns (87%), and lowest for group lending with independent returns (80%). Equivalently, 10% (3%) of the population are low-productivity borrowers who would obtain individual loans, but will not take group loans when their returns are independent (correlated). The reason for the lower outreach in group

lending is that some individuals who would have obtained individual loans choose not to obtain group loans because the benefits of being insured against default are lower than the cost of insuring others against default.

The default rates for the lender also depend on the type of contract offered. The default rates for the lender are 28% for individual liability contracts, 25% for joint liability contracts with correlated returns, and 15% for joint liability contracts with independent returns. Group lending has a positive effect on repayment rates, resulting from the possibility that a successful borrower may repay the loan of a defaulting partner. There is also a potentially negative effect which arises if the entire group defaults, when at least some members would have repaid if they were not burdened with the liability of other members (Besley and Coate, 1995). For group lending with two borrowers, as long as moral hazard is not increased by group lending, the positive effect dominates the negative effect, and repayment rates are higher for group lending compared to individual lending. This may not be the case when joint liability influences the possibility of strategic default.

The borrowers self-select into the following groups: (a) nonapplicants, for individuals with low levels of productivity; (b) borrowers who exert low effort and do not default, for individuals with medium levels of productivity; and (c) borrowers who exert high effort and do not default, for individuals with high levels of productivity. This is a standard incentive compatibility result, due to the assumption of different productivity types. Low-productivity individuals prefer to enjoy their reservation utility, medium-productivity individuals prefer to borrow but exert low effort and enjoy leisure benefits, and high-productivity individuals prefer to obtain a loan and exert high effort, because their returns are most sensitive to an increase in the effort level. Generally, the results associated with the borrowers' choices of participation and

exerted effort for the case of individual lending also extend to group lending.

Group lending may not only attract more productive borrowers than individual lending but, in small groups, it may also reduce moral hazard, due to increased monitoring. The proportion of the population who obtain loans and exert low effort is 55% in individual lending, 43% in group lending with correlated returns, and 14% in group lending with independent returns.

The crucial assumption behind these findings is that group lending does not destroy borrowers' incentives by leading them to low effort levels (moral hazard) and/or to a desire to free ride on other group members either in monitoring their peers or repaying their share of the loan (strategic default). This may no longer be the case if moral hazard and strategic default are present.

When moral hazard is present, then an increase in the probability of success of the project, when the borrower exerts high effort, tends to encourage diligence and this, in turn, leads to lower interest rates and lower default rates and to increased lender's outreach. For example, if the probability of success P^H increases from 0.9 to 1, the interest rate declines to 29% (16%), the default rate declines to 11% (0%), and the number of borrowers increases to 100% (95%) for individual lending (group lending). If the probability of success increases when the borrower exerts low effort, then it becomes more beneficial for borrowers to exert low effort because of the leisure benefits they would enjoy. In general, the effect of an increase in P^L on interest rates and default rates is ambiguous. The higher probability of success reduces default rates for borrowers exerting low effort, but more borrowers will shift from exerting high effort to exerting low effort.

High social sanctions are a key to preventing strategic default. For example, if the social sanctions decrease from \$200 (as is assumed here) to \$100,

or equivalently, if the monitoring probability decreases by one-half, all group members will default and the lender's operations will not be sustainable at any interest rate. Therefore, group lending operations can only be sustainable in communities with high social sanctions and high probabilities of peer monitoring (low transaction costs of monitoring). Moreover, if the social sanctions are sufficiently severe (as is the case here), group lending will yield higher repayment rates than individual lending (Besley and Coate, 1995).

Dynamic Model Results

The dynamic model developed in this study makes a realistic assumption that the value of future access to credit is endogenous. Borrowers have the option of defaulting and keeping their project returns but losing the value of being able to re-access the market for future credit. This value of future credit is found from the optimization problem to be an increasing function of the borrower's productivity type. In the static model, the value of future credit was assumed to be constant. Although the parameter values in the static and the dynamic models are the same, the results are different. This is due to the assumption concerning the value of future credit and the time when the decisions to default are made (before or after the realization of the success or failure states).

In a dynamic setting, the interest rate required for lender's sustainability in individual lending is 67% and the number of borrowers is 98% of the population (Table 3). The results of the dynamic model are somewhat similar to the results of the static model; however, a direct comparison is not possible, since this would require testing for the underlying assumptions of the models rather than comparing the results.

With the dynamic model, the interest rate required for lender's sustainability in group lending is 37% for borrowers with

independent returns and 55% for borrowers with correlated returns (Table 3). The interest rates under group lending are lower than the interest rates for individual lending because the lender can diversify risk across borrowers.

Given the values of the parameters, the number of borrowers is 100% of the population for group lending (Table 3). This result simply implies that if a lender opens operations in a new town or a village, everyone will form groups and obtain loans. However, these findings do not imply that all of the borrowers will repay their loans and remain borrowers in the future.

The results from the dynamic model are similar to those from the static model, where low-productivity individuals do not obtain loans and enjoy their reservation utility, medium-productivity individuals obtain loans and exert low effort, and high-productivity individuals obtain loans and exert high effort. In the dynamic model, the borrowers' decisions are state contingent. If a borrower's project is observed to be successful, the borrower does not default strategically and repays her loan. If a borrower's project fails, the borrower defaults because of inability but not because of unwillingness to repay the loan. These results represent a dynamic version of the static model results when borrowers do not default strategically.

The main difference between the static and dynamic model results is with respect to strategic default. In a static setting, a low-productivity borrower chooses not to obtain a loan and enjoys her reservation utility. In the dynamic model, however, a low-productivity individual will obtain a loan and invest it into a project while exerting low effort and enjoying leisure benefits. After the realization of her project, she will have the following state contingent strategy: repay if both her project and her partner's project are successful, and default strategically if her project is successful but her partner's project fails. From the optimization problem, it is determined that when a

Table 3. Dynamic Model with Individual or Joint Liability Contracts

Results	Individual Liability Contracts	Joint Liability Contracts	
		Independent Returns	Correlated Returns
Interest rate	67%	37%	55%
Borrowers reached	98%	100%	100%
Default rate	31%	16%	26%
Productivity type and decision ^a	0.00–0.02 <i>U</i>	0.00–0.20 <i>LL</i> $\left\{ \begin{array}{l} NN \text{ if } ss \\ DD \text{ if } sf \\ DN \text{ if } fs \\ DD \text{ if } ff \end{array} \right.$	0.00–0.29 <i>LL</i> $\left\{ \begin{array}{l} NN \text{ if } ss \\ DD \text{ if } sf \\ DN \text{ if } fs \\ DD \text{ if } ff \end{array} \right.$
	0.03–0.76 <i>L</i> $\left\{ \begin{array}{l} N \text{ if } s \\ D \text{ if } f \end{array} \right.$	0.21–0.68 <i>LL</i> $\left\{ \begin{array}{l} NN \text{ if } ss \\ ND \text{ if } sf \\ DN \text{ if } fs \\ DD \text{ if } ff \end{array} \right.$	0.30–0.72 <i>LL</i> $\left\{ \begin{array}{l} NN \text{ if } ss \\ ND \text{ if } sf \\ DN \text{ if } fs \\ DD \text{ if } ff \end{array} \right.$
	0.77–1.00 <i>H</i> $\left\{ \begin{array}{l} N \text{ if } s \\ D \text{ if } f \end{array} \right.$	0.69–1.00 <i>HH</i> $\left\{ \begin{array}{l} NN \text{ if } ss \\ ND \text{ if } sf \\ DN \text{ if } fs \\ DD \text{ if } ff \end{array} \right.$	0.73–1.00 <i>HH</i> $\left\{ \begin{array}{l} NN \text{ if } ss \\ ND \text{ if } sf \\ DN \text{ if } fs \\ DD \text{ if } ff \end{array} \right.$

^a *U* = nonapplicant, *L* = low effort, *H* = high effort, *N* = not default, *D* = default, *s* = success, and *f* = failure. The first index represents the choice for a borrower and the second index represents the choice for her partner in group lending.

borrower is of the low-productivity type, she does not value her future access to credit as much as a high-productivity borrower. The benefit of being insured against default in order to secure future access to credit less the cost of insuring her partner becomes less than her reservation utility, when she needs to repay two shares, and therefore she defaults.

The dynamic model, unlike the static model, can explain more reasonably the borrower's behavior regarding strategic default. In the static model, strategic default is a predetermined decision to always or never default under any circumstance. The dynamic model has a potential to explain that, when a borrower is burdened with default by her partner, she might choose to default even though she would have repaid the loan if her partner did not default. Therefore, the dynamic model can explain a situation when strategic default occurs in groups when adverse shocks affect some members of the group. The lender will be able to

continue operations on a sustainable basis even when strategic default is present, because the lender has already taken this effect into account when setting interest rates.

The results for the medium- and high-productivity borrowers are the same as in individual lending. Medium- and high-productivity borrowers take loans and exert low and high effort, respectively. They do not default strategically, because their value of future access to credit is higher than their reservation utility, even if they have to repay for defaulting partners. Overall, the results in the static and the dynamic models are similar, except for the case of low-productivity borrowers in group lending where strategic default is possible.

Conclusions

The analysis developed in this paper is an example of how a lender may determine interest rates based on information about

peer monitoring costs and social sanctions, correlation of business activities, investment opportunities, productivity, and diligence characteristics of borrowers. The analysis examines the static models developed in the literature where borrowers make choices of strategic default before their project realizations. We extend the literature by developing a dynamic model that allows for default decisions to be made conditional on borrowers' project outcomes.

The results show that, in a static framework, interest rates, default rates, and breadth and depth of outreach are lower in group lending than in individual lending. These findings hold as long as joint liability does not destroy borrowers' incentives and does not lead to moral hazard and strategic default. Enforcement of repayment in group lending crucially depends on peer monitoring and social sanctions; otherwise, borrowers strategically default and lenders' operations are not sustainable at any interest rate. The lower interest rates charged in group lending do not necessarily make joint liability contracts more attractive, since borrowers also incur the cost of monitoring and insuring their peers against default, while gaining the benefit of being insured against default. In fact, some low-productivity borrowers may become worse off under group lending and choose to drop out of the loan market altogether. If low productivity is a signal of poverty, breadth as well as depth of outreach decreases.

The results from the dynamic model suggest state-contingent default decisions allow borrowers to choose strategic default after observing their project realizations. The dynamic model can better explain real-world situations when a borrower's project may be successful but the borrower chooses to strategically default when her partner's project is unsuccessful. Nevertheless, the lender can continue operations even in this case if such a possibility has already been taken into account when setting interest rates.

The findings in this paper have important policy implications for lenders willing to extend financial services to poor producers without traditional collateral. The conventional wisdom that peer monitoring in group lending substitutes effectively for the lack of collateral may not always be valid. High repayment rates are ensured only when borrowers can impose severe social sanctions on defaulting peers and when the transaction costs of monitoring are low (the probability of monitoring is high).

Group lending is usually implemented as an effort to alleviate poverty by serving a large number of poor people (breadth of outreach) and especially the poorest of the poor (depth of outreach). Several microfinance organizations have successfully implemented individual and group lending practices in developing countries. Our models and findings are useful to lenders desiring to establish new lending operations or to extend their outreach to poor individuals in developing countries while remaining financially sustainable.

The findings from this study conform well to microfinance practices and facts. Even though microfinance organizations are operating in different countries and are quite diverse, similar trends emerge in microfinance practices. Microlending is generally characterized by very high interest rates, ranging from 20% for the Grameen Bank in Bangladesh to 72% for ADOPEM in the Dominican Republic (*Microbanking Bulletin*). Our results show interest rates between 37% and 67%, which seem reasonable when checked with observed data from developing countries.

Microlending may also be characterized by high default rates, with our models predicting 15%–28% of the borrowers will default. MFOs in developing countries report delinquency rates between 0% and 20% of the loan balance being overdue (*Microbanking Bulletin*). Caution should be used when comparing default and delinquency rates,

as there may be a large number of borrowers defaulting, but they may have smaller loan sizes than the rest of the borrowers.

Breadth and depth of outreach are harder to measure because we do not have information about the number of poor households (breadth of outreach) and especially very poor households (depth of outreach) living close to a particular MFO. However, some alternative statistics can be used to infer high outreach. The MFOs included in the *Microbanking Bulletin* serve as many as 1%–5% of the population in a country, which is an indication of high outreach. In addition, the average loan size as a proportion of the GNP per capita (ranging from 6% to 138%) is relatively high, which is also an indication of high outreach to poor households.

Finally, many of the MFOs are financially sustainable, with rates of financial self-sufficiency ranging between 38% and 137%, but often being close to 100%. Overall, our results fit well with the microlending data in developing countries. MFOs seeking to establish microlending operations in the developing countries may use our models to quantify the credit risks they face and determine appropriate interest rates for remaining financially sustainable.

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Making Loans to Make Friends: Explaining the Dismal Financial Performance of Financial Service Associations

Andrew G. Mude

Abstract

This paper investigates the ways in which microfinance provision can unravel and yield perverse outcomes that run counter to its stated objective. It presents a theoretical challenge to the Stiglitzian notion that large endowments of social capital induce inexpensive peer-monitoring efforts which render jointly-liable contracts efficient. Reliance on a specific set of assumed community characteristics that often do not adequately represent the incentive structure facing borrowers and lenders grossly overestimates the efficiency of informal finance institutions. In particular, by focusing on Financial Service Associations, a specific form of microfinance institution, the effectiveness of such institutions is found to be very sensitive to the behavioral motivations of both clientele and provider, as well as the social norms upon which such transactions take place.

Key words: contract enforcement, microfinance institutions, social capital

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It is now widely acknowledged that lack of access to credit is a major impediment to the alleviation of poverty. The poor, who may benefit from securing credit to invest in profitable self-employment or small enterprise projects, often times do not have the collateral needed to secure a loan from formal credit markets (Udry, 1990; Mosley, 1986). Without the requisite collateral, conventional individual-liability lending arrangements become unprofitable for formal banking institutions who face prohibitively high monitoring and information-gathering costs that encourage the twin problems of moral hazard and adverse selection. The resulting dynamic is well articulated in a burgeoning poverty-trap literature whereby structural features of the state of poverty (here their inability to secure productivity-enhancing loans) induce inertial forces that serve to lock the poor in a chronic state of poverty (Banerjee and Newman, 1993; Dercon, 1998; McPeak and Barrett, 2001; Lybbert et al., 2004; Barrett, 2005b).

To ease the credit constraints faced by the poor, there has been a surge of interest in a variety of microfinance institutions (MFIs) which have arisen as second-best solutions and can offer credit to customers with no collateral and still induce rates of relatively high repayment and allow for self-sufficiency. These MFIs largely share the common feature of requiring borrowers to form groups in which all borrowers are held jointly liable for one another's loans. As a joint-liability contract is likely to invite groups of acquaintances and close associates, such collective credit agreements alleviate the problems of informational asymmetry and costly

monitoring and can thereby support credit agreements that conventional banking practices cannot.

Economic theorists have focused a great deal of attention on understanding the mechanisms by which these MFIs thrive in environments where formal financial markets are thin or nonexistent. The literature has identified several theories explaining microfinance success [see Ghatak and Guinnane (1999) and Morduch (1999) for recent surveys]. Most of these explanations rely fundamentally on the existence of strong personal ties to community norms that sustain nonopportunistic behavior and transmit personal information across the community network.

Besley and Coate (1995) argue that the credible threat of social sanctions in such environments acts as a deterrent to renegeing on group loan agreements. Here, the high personal value placed on social capital acts as a viable substitute for asset collateral. In a similar vein, Stiglitz (1990) shows how jointly-liable contracts can induce peer monitoring efforts that both lower interest rates and increase repayment rates. As their interests are also at stake, group members have an incentive to punish partners who renege on their responsibilities, and in so doing limit the incidence of moral hazard. Group-lending contracts can also solve problems of adverse selection by offering contracts that encourage peer selection strategies for differentiating risky groups from safe groups (Ghatak, 1999).

Along with the theoretical advances highlighting the various ways in which joint-liability lending institutions outperform formal banking institutions, the programmatic success of the pioneer group-lender, Bangladesh's Grameen Bank, has catapulted microfinance delivery to the forefront of development practices. Over the three decades since its inception in 1976, the Grameen Bank has built up an impressive program offering collateral-free loans to groups of jointly liable poor villagers in rural Bangladesh,

with a primary focus on women. By 1994, the Bank was the largest micro-lender in Bangladesh, with a cumulative investment of over US\$1 billion disbursed over more than 2 million members, 94% of whom were women (Grameen Bank, 1994).

Riding this wave of success, the microfinance concept spread rapidly worldwide and was touted as a new paradigm of economic development. Microfinance programs enjoyed wide support among development practitioners, and donors have been more than willing to provide funds to extend the reach of such programs among marginal and vulnerable populations worldwide.

In 1997, a meeting of high-profile donors, development practitioners, and organizations produced a document hailing MFIs as the key element in fostering economic and social development in the 21st century, and began an initiative—the Microcredit Summit Campaign—to raise \$20 billion to support microfinance startup schemes for the following 10 years (Daley-Harris, 2005). By 2005, the sum of MFIs affiliated with the Microcredit Summit Campaign reported a clientele numbering close to 100 million persons, more than 70% of whom were classified among the poorest of the poor when their first loan was issued. The Campaign has been extended to 2015, and has set the goal of ensuring that 175 million of the world's poorest families (about 875 million individuals) have access to credit for entrepreneurial and other productive projects (Daley-Harris, 2005).

While we applaud this achievement and recognize the crucial role that access to credit can and does play in providing the poor with a pathway out of poverty, a history of unmet expectations and checkered success begs for caution. The success of MFIs is often defined by the following criteria: the number of borrowers served, the repayment rates, and the volume lent.

Outside of Bangladesh and Indonesia, however, MFIs have had limited success. Several studies have highlighted instances in which MFIs failed to meet their key objectives, or even had a negative impact on members (Osterloh, 2003; Zeller and Meyer, 2002; Kaboski and Townsend, 2000; Morduch, 1999; Rahman, 1999; Deschamps, 1989; Braverman and Guasch, 1984). In Kenya, for example, after 15 years of microfinance programs and over \$100 million in donor money spent, only about 70,000 individuals had been reached (Jazayeri, 2000). Furthermore, there are often no monitoring mechanisms to verify non-government organization (NGO) claims about outreach and impact.

The problem is further aggravated by eager donors who do not impose stringent conditions on the funds they give out and do not worry much about future sustainability or consequences (Gaspard and Platteau, 2005; Morduch, 1999). In many areas, opening an NGO, MFI, or otherwise has become a business whereby savvy entrepreneurs take advantage of the overzealous donor interest in such programs to enrich themselves (Mosse, 2001; Harrison, 2002; Jazayeri, 2000). The relative ease of attracting donor funds has generated an artificial demand for MFIs which are too often haphazardly implemented and marketed. The result has been an alarming increase in micro-indebtedness by unsuspecting members with the consequence of a rise of social tensions that threaten to erode the selfsame social capital on which these programs base their success (Rahman, 1999).

This paper seeks to investigate the ways in which microfinance provision, an idea with great potential, can unravel and yield perverse outcomes which are counterproductive to its stated objectives. The specific focus is on Financial Service Associations (FSAs), a particular and novel form of MFI whose structure was actually designed to mitigate some of the problems befalling the customary MFI. Despite the solid logic and grand claims of FSA promise, Osterloh (2003) documents a

dismal reality of poorly performing FSAs in Kenya. Building on Osterloh, a model is constructed to explain the failure of these FSAs. It is argued that the set of assumed community and individual characteristics, upon which the success of FSAs crucially depend, do not adequately represent the environment and behavioral motivations of the clientele.

The remainder of the paper is organized as follows. The following section contains a brief description of the concept and structure of FSAs and describes more specifically the role played by FSAs in Kenya. Next, a simple model is developed to explain why FSAs have had little success in Kenya. Conclusions are offered in the final section.

Financial Service Associations

Concept and Operation

FSAs differ significantly from traditional MFIs in that they do not rely on outside sources of funding to finance credit provision. Rather, in the FSA model, equity capital for loans is generated by selling shares to community members. The total value of the shares sold generates the loan fund, redistributable among members via credit. The purchase of a share confers membership.¹ Shares are priced low enough to allow for community-wide participation, but benefits are increasing in shares held to reward investment in the bank. For example, credit limits are set at four times the value of a member's shares.

Being locally owned, financed, and managed, FSAs were designed to assure sustainability and exploit the informational advantages common to traditional

¹ FSAs resemble early models of credit unions in that they were also informal organizations in which members pooled money among themselves to create a loaning fund accessible only to members (Clark, 1943). Over time, lessons learned through failure or sub-par performance culminated in formal organizational structures governing credit unions (Black and Dugger, 1981).

communities. Moreover, FSAs were to encourage the development of local management and entrepreneurial capacity by inducing incentives for efficient monitoring of FSA accounts and for capitalizing on the opportunity of accessible investment loans (Jazayeri, 2000). Since the FSA model emerged through a pilot project in South Africa in 1994, FSAs have proliferated across the African continent. By the year 2000, over 160 FSAs were functioning in eight different countries (Benin, Congo, Gabon, Guinea, Kenya, Mauritania, South Africa, and Uganda). In total, they had made over \$2.5 million in loan disbursements and had a combined membership of over 50,000 (Jazayeri, 2000).

The Kenyan Experience

Evidence from the FSA experience in Kenya, however, paints a somber picture. In a detailed analysis of 10 FSAs serving various regions across Kenya, Osterloh (2003) reports repayment rates are well below those required for financial sustainability. Loan repayment data from 894 of the 976 total loans issued by the sample FSAs show that 315 (35%) of the loans were found to be in arrears. Defined as loans with principal past due, the amount in arrears represented 24% of the total value of loans issued and 64% of total share capital. Furthermore, while FSA bylaws require late principal to be penalized by a 15% premium on the interest rate, Osterloh found that none of the sample FSAs reliably and consistently imposed the penalties. Moreover, a majority of unpaid loans are those taken out by wealthy members. Indeed, the 20 largest loans in default represented 14% of the total share value of all 10 FSAs. As loan amounts are capped at a multiple of the shares one owns in the FSA, each of the 20 loans was too large to have been provided to any but the wealthiest members of the FSAs. In essence, this means poorer members are subsidizing nonperforming loans to the rich and the FSA in effect acts as an implicit regressive tax vehicle redistributing the meager wealth of the poor to the rich!

This perverse consequence of an otherwise promising initiative may be due to an inadequate and incomplete characterization of the motivations of individual behavior in traditional communities. The low asymmetries of information enjoyed by traditional communities is frequently cited as endowing such communities with the social infrastructure upon which they can pursue economic transactions despite the absence of formal enabling institutions. Unfortunately, less attention is given to those features of social embeddedness, such as the politics of patronage and power, which are equally common to traditional communities and serve to undermine the productive potential of social cohesion (Barrett, 2003, 2005a; Gaspart and Platteau, 2005; Platteau and Abraham, 2002).

The experience of FSAs in Kenya serves as a good case study to reveal some of the "imperfections" of tight-knit communities that limit their ability to sustain and induce economically beneficial and social welfare-enhancing behavior. In environments often targeted by MFIs, the high degree of socialization also gives rise to a culture of patronage and favoritism. Empowered by a leadership role in a local FSA, for example, an individual may be compelled to use loan provision and monitoring decisions to buy influence and secure goodwill among friends and neighbors. In fact, once perceived to be in a position of privilege, turning one's back on requests for assistance could invite retribution from one's network of associates (Platteau, 2000; Platteau and Abraham, 2002). The result is a tendency to offer credit to individuals who are not likely to meet repayment conditions and a weakened resolve to impose ex post sanctions to punish defaulters. As Osterloh (2003) points out, in Kenya, the Credit Committee formed specifically to use local information on loan applicants to screen out ex ante credit risks in one FSA (North Horr) turned down only eight of 340 loan applications. This may also explain why none of the FSAs studied by Osterloh charged penalties on late repayments of principal.

The structure and design of FSAs make them particularly vulnerable to the influences of patronage and favor-peddling. The FSA is typically managed by a Board of Directors (BoD) democratically elected by the shareholders. The BoD is then in charge of managing all FSA resources, making loan decisions, keeping the accounts, and so on. Because they preside over the equity capital generated by all members' savings, any losses the FSA incurs do not directly affect the BoD, but rather are spread out in a general devaluation of all members' share values. Thus, if the disutility from rejecting a loan application *ex ante* and enforcing penalties *ex post* (which the BoD bears personally) is greater than the consequent loss in share value (which is borne by the entire membership), the BoD can rationally (self-interestedly) choose to offer loans that underperform.

It is important to note that FSA funds are drawn exclusively from the community, and thus any losses incurred by offering loans to unproductive members and failing to punish defaulters is absorbed by the entire membership in the form of eroding share values. This has serious implications for poverty alleviation efforts, especially if (as Osterloh shows) a vast majority of principal in arrears is held by wealthy members who default on loans.

In what follows, a simple model of FSA style micro-lending is developed to explain the dismal performance of the FSAs in Kenya and to highlight the organizational features found to limit their effectiveness. Where credit providers can invite social retribution for denying loans to friends and neighbors, the resulting nonmaterial incentive to offer loans to individuals who are uncreditworthy in expectation results in the provision of nonperforming loans.

This effect becomes more pronounced when we invoke the organizational structure of the FSA, whereby credit committees bear the full social cost of screening applicants, but only share in a fraction of the financial benefit. Arguing that the costs of rejecting wealthy

applicants are higher, it is shown that credit committees relax their screening and enforcement functions in proportion to the applicant's wealth. By extension, we highlight the resulting dynamic wherein the deteriorating share value of poorer members subsidizes nonperforming loans to the wealthy.

The Model

The framework is a two-period, principal-agent model with a single risk-neutral principal and multiple risk-neutral agents.² The principal, who makes lending decisions, denotes the FSA management. While in practice the management is comprised of a board of several persons, abstracting to a single individual does not alter the main results. The agents are FSA members. Each member is endowed with a productivity parameter α with support $(0, 1]$. Defining α as the probability of a successful outcome in pursuing an investment project, all members are assumed to have the option of investing in a project θ that yields $\bar{\theta} > 0$ with probability α , and $\underline{\theta} = 0$ with probability $(1 - \alpha)$. The lender, by virtue of the rich information structure present in traditional communities, is able to costlessly establish each borrower's productivity parameter α .

The projects require a fixed cost of K which members can only finance by obtaining a loan from the FSA. Because members are not required to offer collateral to obtain credit, the loans are of limited liability in nature—i.e., if they realize a project outcome of $\underline{\theta}$, they cannot repay their loans and must default. Following the convention in the literature, we allow for such "liquidity-constraint" defaults and seek only to investigate the incidence and

²We borrow the general structure of our model from de Aghion (1999). However, where de Aghion analyzes a joint-liability contract agreement between a conventional bank and two jointly-labile associates, we extend the model to highlight the specific structure of the FSA wherein an elected board makes the screening and monitoring decisions on behalf of the entire membership.

determinants of “strategic” defaults whereby borrowers have a high project realization $\bar{\theta}$, and are therefore able to repay their loans, but do not.

Base Case: No Moral Hazard

To begin, assume that all members (henceforth borrowers) are completely honest and will not default for strategic reasons. Assume also that the principal (henceforth the lender) is the sole provider of microcredit loans and he seeks to maximize his expected net profit.³ This implies the lender will only offer loans if

$$(1) \quad \alpha K(1 + R) - (1 - \alpha)K \geq 0,$$

where R is the net interest rate which we take to be given.⁴ For ease of presentation, denote $r = 1 + R$, where r is the gross interest rate. Solving equation (1) for α , we obtain

$$(2) \quad \alpha \geq \frac{1}{1 + r}.$$

Let $\alpha^*(r)$ equate equation (2). Then, for all borrowers with $\alpha \geq \alpha^*$, the lender will offer the loan. For all $\alpha \geq \alpha^*$, assume $\bar{\theta}$ is such that $\alpha\bar{\theta} > Kr$. This assures the expected net present value of undertaking the project is positive for all members who are offered loans (otherwise a risk-neutral member would not request a loan), and they can in fact repay their loans conditional on realizing $\bar{\theta}$ (else the lender would not offer the loan).

³To fix ideas, we first model the unrealistic scenario in which borrowers voluntarily repay their loans without coercion. We will later build up the model, subsequently introducing the specific organizational features of FSAs, as well as more realistic assumptions on the behavioral motivations of both borrowers and lenders.

⁴We hold the interest rate r to be exogenous in order to highlight the central decision-making features over which local FSA management has control: the screening of applicants and the sanctioning of defaulters. Interest rates are often set independently by implementing NGOs.

Self-Interested FSA Members

Now, suppose instead that borrowers are self-interested and, even upon realizing $\bar{\theta}$, will only repay their loan if the personal benefits of repaying outweigh those of reneging. In addition, to introduce a key feature of the FSA structure, recall that FSA rules only allow members who have shareholdings in the association to take out loans, with the maximum loan being a multiple of a member’s share value. Denote $1/\varphi$ as the multiple of share holdings which sets the upper bound of the loan amount a member can obtain; $K\varphi$ is thus the share value needed to support the loan amount K .⁵

It is assumed that if a borrower reneges, she forfeits any shares held in the FSA. According to FSA bylaws, a borrower who reneges does indeed forfeit such shares. However, as Osterloh (2003) documents, FSA credit committees rarely penalized members who defaulted on their loan payments. The model developed here explains this reluctance to penalize defaulting members. Note, if shares were not forfeited, default would occur at a higher rate. That the FSA is nonetheless plagued by unsustainable rates of default despite the assumption of forfeiting merely strengthens the results.

In addition, it is assumed that failure to repay one’s loans conditional on realizing $\bar{\theta}$ is punishable by the imposition of social sanctions, S . The lender, who will impose

⁵Recall, according to FSA bylaws, the purchase of at least one share is required for membership. Share prices are arbitrarily set but often low enough to be affordable to a majority of community members. Recall also that individual credit limits are set at a multiple of each member’s share value. However, for simplicity, we assume that all members have the same value of shares in the FSA and that K is the maximum amount they can borrow; i.e., all members have $K\varphi$ worth of shares in the FSA. While in reality wealthier members are likely to own more shares and take bigger loans, this simplification only strengthens our result that screening and monitoring functions are increasingly ineffective in members’ wealth: If wealthier members were to take larger loans and default, poorer members would only experience a faster deterioration in the share value.

the sanctions on any strategic defaulter, must first be able to ascertain a borrower's project realization. This is modeled by introducing a monitoring technology whereby the lender undertakes to monitor the borrower's activities with the aim of uncovering the borrower's project realization. We assume a perfect monitoring technology. A lender who decides to monitor borrowers will always accurately determine project realizations. Denote γ as the probability that the lender will monitor the borrower. Should a borrower decide to default strategically, the lender will discover the deceit and punish the borrower to the tune of S .⁶ The borrower has information on γ .⁷ Monitoring, however, takes effort and is not costless to the lender. A linear cost of monitoring is assumed and c is denoted as the marginal cost of γ .⁸

The timing of the model is as follows. First, lenders observe α and decide whether to extend the loan. If they do decide to extend the loan, they then make their monitoring decision which the borrower observes. In the next period, project returns are realized and borrowers receiving positive realizations decide whether to repay the loan or to default. Strategic defaulters who were monitored are then sanctioned. This problem is modeled as a two-stage game and solved for the sub-game perfect Nash equilibrium through backward induction.

In the second stage, a borrower, having realized $\bar{\theta}$, will then only repay if:

$$(3) \quad \bar{\theta} - Kr + K\phi \geq \bar{\theta} - \gamma S.$$

⁶ In communities with a high degree of socialization, where members place a high value on their social standing and relationships, social sanctions can involve the exclusion of deviant members from valuable community networks or the costly tarnishing of their reputations.

⁷ This assumption turns on the existence of low asymmetries of information present in tightly-knit traditional communities.

⁸ Cost of monitoring can also be interpreted as a reluctance to impose sanctions on a member of one's own community since, for example, it may result in tensions that could damage valuable relationships.

Recall that r is defined as the gross rate of interest. As such, the left-hand side of equation (3) denotes the borrower's wealth should she decide to repay the loan: the investment return $\bar{\theta}$, plus the value of the retained shares $K\phi$, less the repaid principal and interest on the loan Kr . On the right-hand side is the borrower's expected wealth should she decide to default: the investment return $\bar{\theta}$, less the expected money metric value of social sanctions, γS .⁹

In order to assure repayment, a lender must therefore set γ such that

$$(4) \quad \gamma \geq \frac{K(r - \phi)}{S}.$$

Let $\gamma^*(K, r, M, S)$ solve equation (4) with equality.¹⁰ Knowing this, in the first stage, the lender chooses γ , whereby

$$(5) \quad \alpha Kr - c\gamma - (1 - \alpha)K \geq 0.$$

Since the marginal cost of sanction is increasing to the lender, he will set γ equal to γ^* or zero. Given the present structure, $\gamma = 0$ implies the lender has offered a loan but chooses not to impose sanctions against defaulters. With no threat of sanctions, the only losses to a borrower who reneges are her shares in the FSA, valued at $K\phi$, that would necessarily be forfeited. Since $Kr > K\phi$, if $\gamma = 0$, a borrower will strategically default and the lender will incur a loss of K per loan.¹¹ Clearly, a lender will set $\gamma = \gamma^*$ on all loans offered, and not offer any loans to

⁹ Because $K\phi < Kr$, the collateralized value of shares $K\phi$ that will be forfeited due to default is not sufficient to cover the losses.

¹⁰ Since $\gamma \in (0, 1]$, we assume $S > K(r - \phi)$. Indeed, all informal credit enforcement methods that rely on the credible threat of sanctions require them to be powerful enough to act as a deterrent to contract default. Consequently, the vast majority of the literature analyzing informal contract enforcement is set in rural traditional communities where the relatively high degree of social embeddedness justifies the use of sanctions as a powerful enforcement device.

¹¹ Recall that as the gross interest rate, $r > 1$, and as the borrowing fraction, $\phi < 1$.

borrowers who are expected to renege.¹² Solving equation (5) for α , we obtain:

$$(6) \quad \alpha \geq \frac{1}{1+r} + \frac{c\gamma^*}{K(r+1)}.$$

Let α^y solve equation (6) with equality; α^y then represents the threshold probability of success below which a lender will not lend to a prospective borrower. It is easy to see that $\alpha^y > \alpha^*$. Therefore, the space of borrowers whose productivity parameter falls between $[\alpha^*, \alpha^y]$, who were eligible for loans when default was not an option, are no longer considered creditworthy. This represents a decline in aggregate social welfare as all borrowers with $\alpha \geq \alpha^*$ have a positive net present value of project investment (see Figure 1 presented in the following section). Where borrowers are opportunistic, α^y is nonetheless the second-best optimal productivity threshold.

Community Norms and Personal Incentives Supporting Assistance

We continue to extend the model by incorporating a particularly important decision-making determinant that has so far been left out of models of informal microfinance lending. The same tight-knit traditional ties that allow lenders to rely on the credible threat of social sanctions should a borrower default may also limit their ability to make decisions solely on the basis of the expected profitability of loans. A well-known feature of traditional societies is their strong egalitarian tendency (Platteau, 2000). Redistributive norms may consequently develop and persist to maintain equality and limit the emergence of class, or to keep members from accumulating wealth which would enable them to evade their obligation to community insurance or consumption-smoothing pools (Fafchamps, 1992; Platteau, 2000). As such, a lender who has the capacity to assist a borrower in

the form of offering credit might invite scorn from the community if he refuses to extend a loan.

Beyond the compulsion of egalitarian norms, a lender might have a personal incentive to oblige certain, often more powerful, members of the community. Special favors to powerful individuals may return positive dividends in the future or may serve to solidify patron-client relationships that are common in more traditional communities.

This mechanism is modeled by further endowing each borrower with wealth w that is known to the lender, where borrowers' wealth can be interpreted as a metaphor for the "power" they wield in the society and therefore their expected value as a friend. A cost δw is then imposed on the lender for refusing to extend loans. The parameter δ captures the generalized norm of assistance that compels the lender to assist any member of the community. Consequently, a lender will now offer loans if the following condition holds:

$$(7) \quad \alpha Kr - c\gamma^* - (1 - \alpha)K \geq -\delta w.$$

Solving equation (7) for α , we obtain:

$$(8) \quad \alpha \geq \frac{1}{r+1} + \frac{c\gamma^* - \delta w}{K(r+1)}.$$

Let $\alpha^{\delta w}$ solve equation (8) with equality. Note that

$$\frac{\partial(\alpha^{\delta w})}{\partial(\delta)} < 0 \quad \text{and} \quad \frac{\partial(\alpha^{\delta w})}{\partial(w)} < 0.$$

This implies $\alpha^{\delta w} \leq \alpha^y$, signifying the lender now offers credit to borrowers whose expected financial return on the loan is negative. Moreover, it now becomes possible for a lender to offer a loan to some clients but fail to monitor them with positive probability. This will occur if the disutility of refusing to grant a member a loan, δw , is greater than the value of a lost loan, K . In other words, if the expected return on a loan that requires positive monitoring effort (and thus a sufficient and credible threat of sanctions conditional on

¹²In what follows, it is assumed $c\gamma^* < K$. If not, monitoring loans would cost more than the loan value itself and the FSA, or any other credit scheme, would not rationally exist.

default) is less than the cost of the loan, but a lender is still compelled by the logic of social norms and his own personal incentives to offer the loan, he is better off not incurring the cost of monitoring and instead writing off the loan. As we know, all non-monitored borrowers will subsequently default sanction-free.

More formally, we know a loan will be granted to all applicants with wealth w satisfying $\delta w \geq K$. Let $\bar{w} = K/\delta$ denote the minimum wealth threshold for which securing a loan is guaranteed. Recall the decision-making process a lender faces. First, the lender decides whether to offer the loan. Conditional on offering a loan, he then decides whether to monitor the loan, i.e., whether to set $\gamma = 0$ or $\gamma = \gamma^*$. Thus far, all members offered loans were monitored with probability γ^* . With the introduction of δw , however, a subset of members with $w \geq \bar{w}$ will not be monitored; they will essentially be given free loans, or grants.

To determine who receives free loans, note that once a loan is offered, the lender will lose K if he fails to monitor the loan, and can expect $\alpha Kr - c\gamma^* - (1 - \alpha)K$ if the loan is monitored. Thus, for all α satisfying

$$(9) \quad \alpha Kr - c\gamma^* - (1 - \alpha)K < -K,$$

the expected return on a monitored loan is less than the value of a lost loan, and giving a free loan is the dominant strategy for the lender. Let α^{-k} solve equation (9) with equality. It is easy to see that

$$\alpha^{-k} = \frac{c\gamma^*}{K(r + 1)}.$$

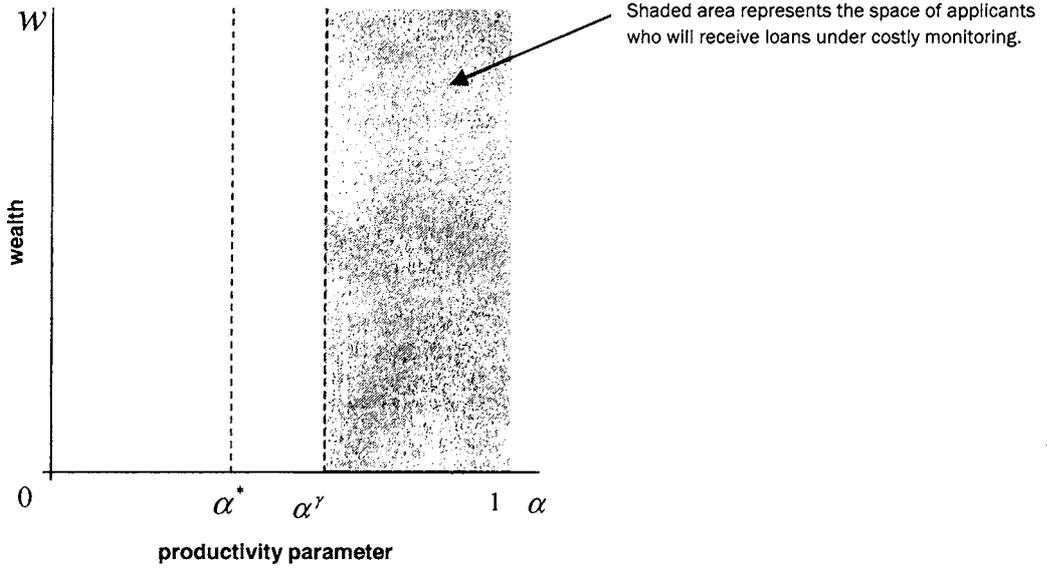
Consequently, all members with a wealth productivity parameter such that $w \geq \bar{w}$ and $\alpha < \alpha^{-k}$ will be given free loans.¹³

¹³Note, this implies that at wealth level greater than \bar{w} , applicants are implicitly punished for having productivity greater than α^{-k} . This is essentially a construct of the model, arising from the fact that lenders invite retribution for screening out applicants but not for monitoring them. As such, since members with $\alpha > \alpha^{-k}$ have expected profits (or losses) greater

Graphical representations may provide greater clarity. In Figure 1, we first graph the second-best productivity threshold (α') against the first-best (α^*). Note that productivity thresholds are independent of borrower wealth in both instances. The shaded area represents the space of members whose loan applications will be accepted and will subsequently be monitored with probability γ^* . In expectation, all these loans yield weakly positive profits to the lender. Insofar as it represents lost opportunities for accessing credit, the space between α^* and α' represents the aggregate loss of welfare due to costly monitoring in the face of self-interested borrowers. This space (α') increases as the disutility of monitoring (c) increases, or the personal cost of social sanctions (S) decreases.

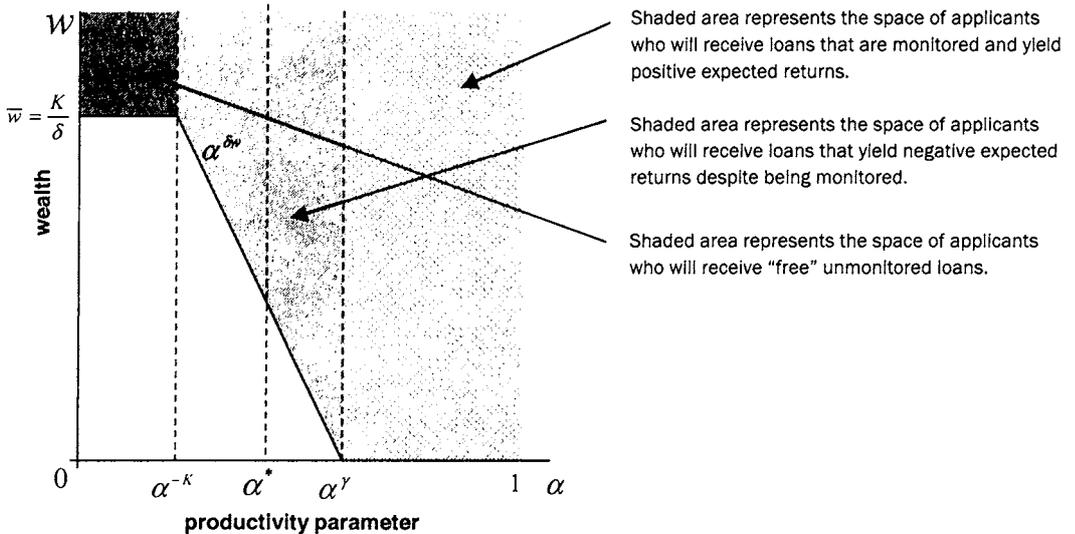
Figure 2 depicts the effect of incorporating nonmaterial considerations on the part of the lender, arising from community norms and personal incentives that support the provision of loss-making loans. We draw in the productivity threshold $\alpha^{\delta w}$ which results when these considerations are factored into the lender's loaning decisions. Because $\alpha^{\delta w}$ is downward sloping in w , greater leniency is indicated in loan provision to the wealthy. We also draw in \bar{w} , the wealth above which loan provision is guaranteed. It can be easily verified that $\alpha^{\delta w}$ crosses \bar{w} at α^{-k} by substituting \bar{w} for w in $\alpha^{\delta w}$ and performing a simple algebraic manipulation. Up to $w = \bar{w}$, all loan applicants falling to the right of $\alpha^{\delta w}$ will be granted loans and monitored. Above \bar{w} , applicants falling to the right of α^{-k} are monitored. The subset of these that lie in the lightly shaded area will yield financial losses to the lender in expectation. Those falling in the dark shaded area are given free, unmonitored loans.

than the cost of a free loan, they are monitored. From the viewpoint of the FSA, however, any loan given to a member with $\alpha < \alpha'$ is loss-making, with losses moving inversely with α until the lower threshold for losses on a single loan, K , is reached at α^{-k} .



Notes: α^* = first-best borrowing productivity threshold;
 α^γ = borrowing productivity threshold under costly monitoring.

Figure 1. Loans Offered Under Costly Monitoring



Notes: $\alpha^{\delta w}$ = borrowing productivity threshold under norms and patronage concerns;
 \bar{w} = wealth threshold above which any loans granted are unmonitored;
 α^{-K} = productivity level below which any loans provided are unmonitored.

Figure 2. Effect of Assistance Norms and Patronage Incentives on Loans Offered

To briefly summarize, we have thus far shown that where social norms give lenders a personal incentive to grant powerful members special privileges ($\delta\omega > 0$), they are likely to provide loans to uncreditworthy but relatively wealthy borrowers, i.e., individuals who in expectation represent negative profits to the lender. These individuals will nonetheless be monitored with probability γ^* and punished by sanctions should they attempt to default conditional on a positive realization. However, where these nonmaterial incentives are particularly strong (when $Kr < \delta\omega$), lenders may extend free credit. That is, they will provide loans to borrowers with no intention of monitoring and full expectation of default. These borrowers, who we assume know the value of γ , will thus all renege on their debt repayment commitment.

Although such a policy affects all members by way of the generalized norm (δ), the wealthier members of society (those to whom personal favors are likely to generate positive externalities) fare better. The wealthier one is, the greater the likelihood of being extended a free loan. While this is a crucial result, its consequence is most potent in the FSA setting, to which we now turn.

Modeling the FSA

The model is now extended to better capture the structure of the FSA. Previously, we modeled a lender who was compelled by certain social norms to provide nonperforming loans. One may rightfully dismiss such a situation as unrealistic. Indeed, why should any person present himself as a lender in an environment in which he is set up to suffer losses? In an FSA, however, the "lender" is not an individual using his own resources as equity. Rather, the "lender" is simply an elected shareholder who makes decisions on behalf of all members.

Essentially, then, modeling the decision-making process of an FSA requires one main alteration to the previous model. The

lender's (FSA manager's) decision function must be modified to account for the fact that he now oversees total FSA profit but only receives indirect benefits in the form of increasing share values which are spread over all shareholders. Of significance, however, as the FSA manager, the lender still bears the full brunt of the costs associated with rejecting loan applicants ($\delta\omega$), and monitoring ($c\gamma^*$).

Let N be the number of FSA members. Assume all members hold a similar number of shares, and thus profits are equally distributed among them. The FSA manager will now offer loans and subsequently monitor loans and enforce sanctions to all members endowed with productivity parameter α such that

$$(10) \quad \frac{\alpha Kr}{N} - c\gamma^* - \frac{(1 - \alpha)K}{N} \geq -\delta\omega.$$

Solving equation (10) for α , we have

$$(11) \quad \alpha \geq \frac{1}{1 + r} + \frac{(c\gamma^* - \delta\omega)N}{K(1 + r)}.$$

Let $\alpha^{\delta\omega N}$ solve equation (11) with equality. The lender will therefore offer loans in the general case to only those members with $\alpha \geq \alpha^{\delta\omega N}$. Note that for $N = 1$, $\alpha^{\delta\omega N} = \alpha^{\delta\omega}$.

We ask first how increasing the size of the FSA impacts on the lender's decision making. Differentiating $\alpha^{\delta\omega N}$ by N , we obtain:

$$(12) \quad \frac{\partial(\alpha^{\delta\omega N})}{\partial(N)} = \frac{c\gamma^* - \delta\omega}{K(1 + r)}.$$

When $c\gamma^* > \delta\omega$, it is evident that $\alpha^{\delta\omega N}$ is increasing in N .¹⁴ Specifically, as the size of the FSA increases, the lender will increase the probability of success required by borrowers and thus reduce the number of loans he will offer. The intuition of this is fairly simple. While

¹⁴The expected cost of monitoring ($c\gamma^*$) will be larger than the nonmaterial incentive for offering loans ($\delta\omega$) when threat of social sanctions (S) is a relatively weak deterrent of deviant behavior, when the generalized norm of assistance (δ) is sufficiently low, and/or when the wealth of the borrower is significant.

financial benefits are now diffuse, the nonmaterial costs are personalized and fully absorbed by the lender. The lender must therefore increase the probability of success among his customers in order to minimize FSA losses. Holding δ constant, note that increases in ω indicate the quantity expressed in equation (12) gets smaller. As such, even though the space of members unable to attract loans grows due to increasing N , the space varies inversely with wealth.

When wealth increases such that $c\gamma^* < \delta\omega$, then $\alpha^{\delta\omega N}$ becomes decreasing in N and the lender okays more loan applications, despite knowing this increases the number of borrowing members generating expected losses. So long as the cost of rejecting a loan applicant ($\delta\omega$) is greater than the expected financial loss from the loan, the imperative to assure that the FSA is profitable is dominated by the disutility of denying credit to wealthy members.

A lender will also be tempted to give out more free loans as the FSA grows in membership. In this case, lenders will lose K/N , their personal claim to the loan, if a borrower defaults. As such, all loan applicants with wealth satisfying $\delta\omega > K/N$ will receive loans. To find the subset of those who will get free loans, let $\bar{\omega}^N = K/\delta N$. Applying the same method as in the previous section, substitute $\bar{\omega}^N$ for ω in $\alpha^{\delta\omega N}$ and simplify. The result is

$$(13) \quad \alpha^{-KN} = \frac{c\gamma^*N}{K(r+1)},$$

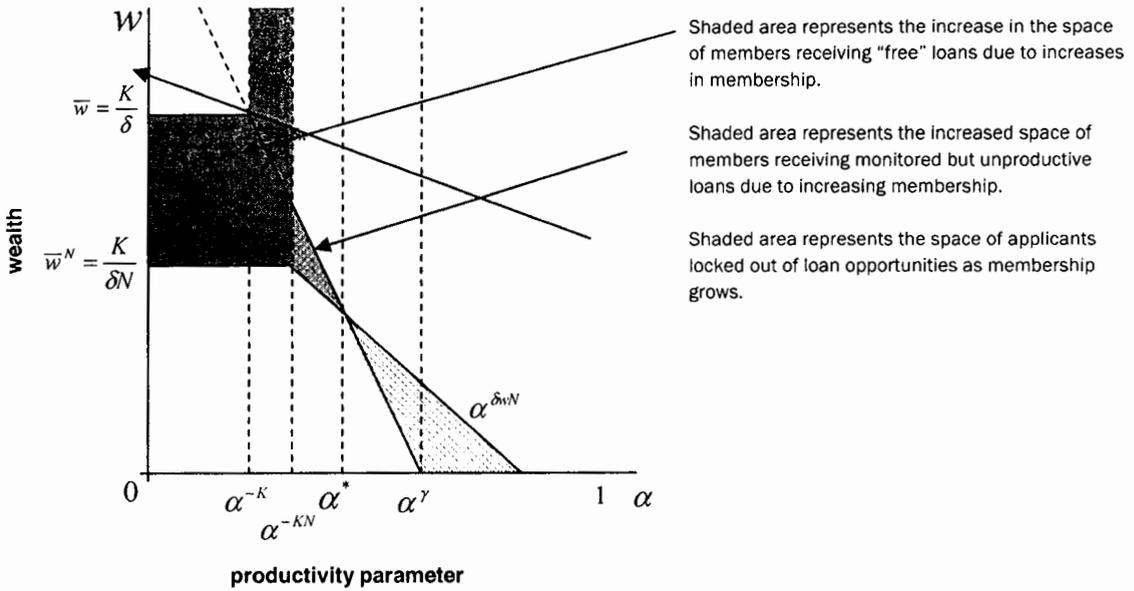
the productivity level below which the expected return on a monitored loan is less than the value of a free loan. Any member with wealth $\omega \geq \bar{\omega}^N$ and productivity parameter $\alpha < \alpha^{KN}$ will receive free loans. It is clear that $\bar{\omega}^N \leq \bar{\omega}$ and $\alpha^{KN} > \alpha^K$, with the difference, in both cases, growing in N .

Figure 3 highlights the consequences of increasing FSA membership. We highlight the space of members affected by increasing N . The light shaded area

represents those who are locked out of loan opportunities as membership grows. Not only are the poorer members more adversely affected, but many who would be financially profitable to the FSA at large (those with $\alpha > \alpha^*$) are not offered loans. In contrast, more members among the wealthy, whose loans constitute expected financial losses to the FSA, become eligible for loans. The space of these members who receive monitored loans is given by the medium-shaded area, while the increase in members receiving free loans is given by the dark-shaded area.

To summarize, as the FSA gets larger in size, it becomes increasingly inefficient as an informal credit device, becomes more unsustainable, and, most importantly, disadvantages the poor in favor of the rich. This is particularly noteworthy given that the logic of FSAs requires a large membership. In order to be able to provide loans, FSAs need to raise a significant amount of equity capital, and, if most of their membership are poor, this can only be done by signing on a large number of members. Because FSA members all own shares in the institution, if the wealthier members are screened in a less stringent manner, allowing them to default in greater numbers, poorer members disproportionately bear the brunt of decreases in share value, effectively subsidizing the wealthy with the eroding value of their share capital.

In essence, FSAs become an implicit regressive tax vehicle, redistributing wealth from the poor to the rich due to the social costs inherent to denying loans to one's friends and neighbors and the fact that such costs typically increase with the power and wealth of the prospective borrower. This effect is magnified by the externality central to FSA lending decisions, wherein credit committee members personally incur the social costs of rejecting loan applicants but bear only a fraction of the costs of extending loans likely to prove unprofitable.



Note: Parameters with added *N* as superscripts show direction of change in productivity and wealth borrowing and monitoring thresholds due to increases in FSA membership.

Figure 3. Effect of Increasing FSA Membership on Loans Offered

Conclusion

Unlike canonical models that paint an overly optimistic picture of the potential of MFIs to thrive in traditional communities by exclusively highlighting their informational advantages, we introduce the common features of patronage and favor-peddling into our model to explain the dismal financial performance of FSAs. Where individuals known to be in positions of privilege will invite costly retribution from friends and neighbors if they neglect to share the benefits, or could provide favors which may yield future dividends, the advantages of low information asymmetries are likely to be dampened. The irony is that the same high degree of socialization which confers informational advantages on traditional societies also breeds incentives for patronage and favor-peddling.

This study shows that where a culture of patronage exists, the consequent nonmaterial incentive additionally faced by credit providers causes them to relax their screening and enforcement intensity to the financial detriment of the organizations

they serve. As the social costs of rejecting wealthy applicants are likely to be higher, the wealthy are particularly favored and may even be allowed to default without fear of sanction. This dynamic is invoked to explain the dismal financial performance of FSAs in Kenya, as documented by Osterloh (2003).

By requiring credit committee members to bear the full burden of the social costs of screening applicants and sanctioning defaulters while financial benefits are spread out evenly across the membership, the structure of FSAs renders them particularly vulnerable to the provision of underperforming loans in the name of patronage. In an analytical analog of Osterloh's empirical evidence, we find that credit committees are induced to offer nonperforming loans to the wealthy which are indirectly paid by the eroding share value of the poor. As FSAs are targeted mainly toward poor communities, the fact that the poor might be induced to place their meager savings into a scheme that ends up swallowing their wealth would be unfortunate.

This evidence calls for a critical reevaluation of FSA design, as well as mechanisms of microfinance provision more generally. Furthermore, it cautions that a failed microfinance delivery mechanism is not simply a suboptimal outcome but could quite easily result in perverse consequences which leave the intended beneficiaries worse off than they initially were. Because the effectiveness of these institutions is highly contingent on the social context in which they operate, and because their failure has repercussions for poor and vulnerable members, the design of microfinance delivery mechanisms requires a detailed and nuanced understanding of the specific context in which they are to be implemented. It must be remembered that while the bonds of friendship can facilitate the provision of informal loans, the converse is often times true: offering cheap or free loans can secure friendship.

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Savings and Asset Allocation of Households in Uganda

Barnabas Kiiza and Glenn D. Pederson

Abstract

The Government of Uganda has put in place the Plan for the Modernization of Agriculture as part of its poverty reduction program. That program incorporates the improvement of households' access to formal financial services as one of its main components. To examine the program, this study uses primary data to determine the savings and portfolio allocation behavior of households with and without access to formal financial services. Findings reveal no significant difference between both types of households in the marginal propensity to save out of long-run income. The precautionary demand for liquidity and the desire to avoid risk are important factors shown to influence portfolio allocation decisions by households.

Key words: household savings, portfolio allocation, Uganda

The Plan for the Modernization of Agriculture (PMA) is a development program implemented by the Government of Uganda. The program has been established to improve the welfare of households who rely on agriculture for their livelihood (Ministry of Finance, Planning, and Economic Development, 2000). One of the key components of the PMA is the improvement of rural households' access to formal credit and savings services, which involves making formal credit available to households for enterprise growth and the mobilization of their financial savings.

This approach is consistent with the development finance literature, which suggests that one of the economic conditions necessary for growth and development is the existence of well-functioning financial markets (Zeller et al., 1994). Uganda, like many developing countries, has imperfect rural financial markets for both credit and savings. Thus, for the PMA to achieve its long-term goals, there needs to be an improvement in the financial infrastructure including better access for rural households to formal credit and savings services. The scope of this study is limited to establishing how access to these services affects household savings behavior.

Urban and rural households in Uganda have the capacity to save in the form of real and financial assets. Accordingly, this study attempts to examine the savings and portfolio allocation behavior of a sample of households in Uganda. This focus is based on the fact that increased savings mobilization is expected to confer additional welfare benefits, since households with access to formal savings

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and higher amounts of real assets have a greater capacity to absorb and pool idiosyncratic risks across periods. Additionally, real and financial savings are expected to reduce food insecurity among these vulnerable households (Eswaran and Kotwal, 1990; Alderman and Paxson, 1992).

Previous studies strongly suggest that a household's ability to achieve food security and economic growth may be impeded by the absence of complete and accessible formal financial markets (Dercon, 1996; Zeller et al., 1997). Because formal insurance markets and social security services are incomplete or totally nonexistent, many rural and urban households also engage in self-insurance schemes (von Braun, 1991). One of the ways in which households in Uganda respond to these risks, including food insecurity, is by holding traditional precautionary savings in the form of relatively liquid assets. These assets include cash, livestock, consumer durables, and stocks of commodities. While these precautionary savings act as a buffer against income risk, they pose additional problems of theft, disease, and pests. For example, cash is divisible and highly liquid, but it has the drawbacks of yielding little or no return and may be lost.

The objective of this analysis is to evaluate how access to formal financial services induces households to adjust the level of the traditional precautionary assets. The study also seeks to identify the relationship between access to formal financial services, the marginal propensity to save out of income, and the observed portfolio allocation decisions of households.

The Model

As indicated in the objectives reported above, there are two separate but related economic outcomes to credit and savings access. First, access to formal financial services leads to an increase in savings, and second, access will lead to differential responses in asset allocation and liquidity preferences. This section presents two

models, the first designed to establish the relationship between households, access, and savings, and the second to establish the relationship between households, access, and liquidity preferences.

Savings Function

It is assumed that measured consumption (C_t) and measured income (Y_t) are each composed of a permanent (long-run) component (C_t^P and Y_t^P , respectively) and a transitory component (C_t^T and Y_t^T , respectively), and these components are additive (El-Mokadem, 1973). Specifically,

$$(1) \quad C_t = C_t^P + C_t^T,$$

$$(2) \quad Y_t = Y_t^P + Y_t^T.$$

Components are assumed to be stochastically independent, $\text{corr}(Y_t^P, Y_t^T) = \text{corr}(C_t^P, C_t^T) = 0$. Permanent (long-run) income is assumed to be systematically related to permanent consumption such that

$$(3) \quad C_t^P = \alpha_0 + \alpha_1 Y_t^P + u_{1t},$$

where u_{1t} is a stochastic term with $E[u_{1t}] = 0$ and $E[u_{1t}u_{1t}'] = \sigma^2 \mathbf{I}$, t indicates time, and α_0 and α_1 are parameters. In addition, transitory consumption C_t^T is assumed to be a linear, homogeneous function of transitory income up to a stochastic component (u_{2t}):

$$(4) \quad C_t^T = \alpha_2 Y_t^T + u_{2t},$$

where $E[u_{2t}] = 0$.

Most transitory income is assumed to be saved for future consumption. However, some may be used to finance transitory consumption, since not all of the latter is financed by savings alone due to the low degree of liquidity of most real assets (e.g., real estate) and the existence of household borrowing constraints. From (1)–(4) we obtain measured savings:

$$(5) \quad S_t = \beta_0 + \beta_1 Y_t^P + \beta_2 Y_t^T + u_{3t},$$

where the parameters β_1 and β_2 are the marginal propensities to save out of long-run (permanent) and transitory income, respectively. Following Sandmo (1969, 1970), Cass and Stiglitz (1972), Levhari (1972), Gersovitz (1989), and Kimball (1990a, b), we impose the conditions that $0 \leq \beta_1 \leq 1$, $0 \leq \beta_2 \leq 1$, and $\beta_1 < \beta_2$. This approach is also supported by empirical studies.

Expanding (5), we obtain:

$$(6) \quad S_t = \beta_0 + \beta_1 Y_t^P + \beta_2 Y_t^T + \beta_3 D + \beta_4 D Y_t^P + \mathbf{X}'\boldsymbol{\beta} + u_t \quad (t = 2002, 2003),$$

where D designates a dummy variable that takes a value of 1 if the household has access to formal financial services, and 0 otherwise. D acts both as an intercept shifter (increasing savings) and a slope shifter (increasing the marginal propensity to save out of permanent income). \mathbf{X} is a vector of household-specific variables, and $\boldsymbol{\beta}$ is a vector of parameters.

Variations of (6) can be estimated, but it is the magnitude and statistical significance of β_4 which is of interest in this study. The coefficient β_4 measures the incremental change in the marginal propensity to save from an increase in permanent income. It is distinct from β_3 (which indicates whether savings change in absolute value) by attributing utility or a change in behavior toward savings. Equation (6) is estimated using weighted least squares for both the urban and rural households to account for heteroskedasticity across the household data.

Portfolio Allocation Function

We specify the precautionary asset share demand function of the i th household for the j th asset following Feldstein (1976), Hochguertel (1997), and Chakraborty and Kazarosian (1999) as:

$$(7) \quad \frac{A_{ij}}{W_i} = \alpha_0 + \alpha_1 D_1 + \alpha_2 D_2 + \alpha_3 Y_i^P + \alpha_4 (Y_i^P)^2 + \alpha_5 Y_i^T + \mathbf{X}'\boldsymbol{\alpha} + \varepsilon_i,$$

where A_{ij} is the value of the j th precautionary asset held, and A_{ij}/W_i is its share in total household net worth (W_i); D_1 is a dummy variable equal to 1 if the household has access to formal financial services by holding deposits or taking credit at a financial institution (= 0 otherwise); D_2 is a dummy variable equal to 1 if the household head changed major occupations at least once within five years (= 0 if no occupation change), to capture employment or income uncertainty; Y_i^P is permanent income and $(Y_i^P)^2$ is permanent income squared, which is used to account for household life-cycle effects; Y_i^T is transitory income; \mathbf{X} is a vector of household-specific variables and $\boldsymbol{\alpha}$ a vector of the parameters. The household variables include characteristics of the survey respondent: sex, age, education, occupation, location, and work experience. Long-run (permanent) income is proxied by the predicted values from an earnings function to address the endogeneity problem associated with using actual measured income as an explanatory variable in both (6) and (7).

Data

The survey was conducted in 2003, but households were also asked to provide information for the year 2002. In the survey, a household is defined as the basic economic unit which includes all persons who are related by blood, marriage, or adoption, and who normally take meals in one house or compound. Except for newborns, a person must have stayed with the household for at least six months during the period of study to be considered a member of the household.

Purposive selection of the districts was done following the location of microfinance institution (MFI) programs run by Pride Uganda, Centenary Rural Development Bank, and Uganda Finance Trust. Sample selection was conducted in two stages. The first stage was purposive selection of the respondents from each of these institutions. This procedure was then followed by randomly selecting

respondents from first-stage samples. For households without access to formal financial services, selection was random at all levels.

The primary data collected included several household characteristics (e.g., income, age, loans taken, work experience, etc.). This was accomplished using a structured questionnaire administered through direct interviews of 340 respondents in the districts of Mbarara, Rakai, Masaka, Jinja, Mukono, and Luwero. The questionnaire was designed to capture disaggregated information to ensure a more reliable data set.

Household Access

The development finance literature offers various conceptual approaches to access, as it relates to credit. Access may be defined by the presence of barriers such as high transactions costs that are borne by the potential credit applicants. Alternatively, it may be defined by the observed participation (or nonparticipation) of an individual or household.

In this study a combination of concepts is applied to define *access of households to financial services* (credit and savings). Households reporting savings accounts, demand deposits, or checking accounts are classified as having access to a formal financial institution. All those households that had tried but failed to acquire one of these types of accounts due to conditions imposed by the banks or MFIs (e.g., minimum initial deposits, maximum amounts withdrawn in a week, minimum balances to be held, length of maturity before withdrawal can occur, high service fees on checking accounts) are assumed to have *no access to financial services* (hereafter denoted as “without access” or “no access”).

Households that had never attempted to open an account, but were fully aware of the existence of these services, are assumed to have no access. This classification is perhaps debatable, since

the household may have decided not to acquire a savings account, even though it may not have been denied such an account if it had applied for one. In this case, the determination of no access is equated to not participating. All households that had no knowledge of these financial services due to illiteracy are assumed to have no access.

The same classification approach is applied to determine access to credit facilities. Households that had tried but failed to obtain credit have no access. The households that had never tried to acquire a loan but were well informed about the existence of credit services are classified as having no access. Here again, the “no access” classification is a modification of the concept, since the decision to not access credit may be due to household preferences (the desire not to borrow) and not a consequence of limitations being imposed on the household by the financial institution or the condition of the infrastructure. As in the case of savings, the notion of credit access is equated to household participation. Finally, households with no knowledge of the existence of credit services are assumed to have no access.

Household Measured Income

Total disposable income of a household includes both labor and capital incomes, measured as receipts of the household in relation to a production activity. Agricultural income is taken as the difference between gross agricultural receipts from the different activities and total operating expenses on all the activities. Income generated from crafts or businesses is measured as net business profit or loss.

Net profit is obtained by subtracting the sum of total operating expenses, business debts paid, and cash or goods withdrawn from the business for home consumption from gross receipts. Wages are calculated for the head of the household as the product of the wage rate and the total

period employed. Salaries are recorded as the monthly basic pay received by the head of the household. Data on rental income from property owned and interest income received from financial assets are also recorded.

Long-Run (Permanent) Income

Long-run (permanent) income of a household is proxied by the predicted values obtained from estimating modified earnings functions for rural and urban households using ordinary least squares (see Mincer, 1974; Musgrove, 1979; Bhalla, 1980; Paxson, 1992; Kitza and Pederson, 2001). The measured income of the i th individual in period t is given by:

$$(8) \quad Y_t^P = \mathbf{x}_t^P \mathbf{b} + e_t^P,$$

where \mathbf{x}_t^P is a vector of household-specific variables (e.g., wealth, gender, level of education, type of occupation, location, work experience, or age of the household head) and \mathbf{b} is a vector of parameters.

A distinction is made between the error (e^P) component and transitory income. Transitory income is not regarded as the error term in (8); rather, it is obtained separately.¹ Transitory income includes infrequently received or unanticipated income that accrues to the household. Long-run (permanent) income is defined as expected income for a given year. The unobserved component of permanent income (as distinguished from transitory income) is the residual which is obtained by estimating (8). This residual is unexplained income. Moreover, an

analysis of the residual indicates it is not significantly correlated with the measure of transitory income. In this study, we use the terms "long-run" and "permanent" income interchangeably.

Transitory Income

Transitory income is defined as unanticipated income that accrues to the head of the household. Households are asked about their major and minor occupations in terms of steady or reliable income and transient jobs and the related earnings. The major income activity and associated earnings are distinguished from the transitory income source *ex ante*. Transitory income in this case includes income from lump-sum allowances for civil duties, such as organizing elections, and income earned as a participant in privately or publicly funded short-term development or research projects.

Measured Household Savings

This study adopts the capital account method for measuring total household savings—i.e., changes both in physical and financial assets minus changes in liabilities adjusted for net capital losses and capital transfers. The assumption is that savings will show up as changes in the value of liabilities, capital transfers, and assets.² Thus, in the accounting period, measured household saving is expressed as

$$S = [\Delta P_A + \Delta F_A] - [\Delta L + C_l + C_g],$$

where ΔP_A is the change in physical assets (acquisitions minus liquidations), ΔF_A is the change in financial assets (increases minus decreases), ΔL is the change in liabilities (increases in borrowing minus increases in lending), C_l is the net inflow of capital transfers, and C_g is the capital loss or damage.

²To simplify the analysis, depreciation of physical assets is not included in the measure of household savings.

¹Musgrove (1979) states that permanent income can be known only with an error that is conceptually different from transitory income. The fraction of permanent income which is unexplained [i.e., e_t^P in equation (8)] is consumed exactly like the explained part and it has an error component only for the researcher, since the consumer knows what his/her permanent income is. Unexplained income (e_t^P) is just as much a part of permanent income as the explained portion. The explained part of household income is proxied by using the predicted values from the estimate of (8).

Precautionary Assets

Kimball (1990a) defines precautionary assets as the difference between the assets a household would hold under conditions of certainty and the amount it would hold when uncertainty is present.³ Engen and Gruber (2001) and Hrung (2000) have considered a measure of liquid wealth (savings and checking accounts, bonds, stocks, and short-term debts) as liquid precautionary savings.

In this study precautionary assets are defined as: *risky-liquid* [agricultural commodity stocks, livestock, household durables, cash deposits at Rotating Savings and Credit Associations (ROSCAs), and cash kept at home] if they are prone to diseases, theft, and death; *safe-liquid* (bank/MFI savings deposits); and *safe-illiquid* (real estate). Calculated mean asset holdings and asset proportions of the households are reported in Table 1.

The mean asset holdings of households with access are higher than those without access to formal financial services, except for farm equipment and agricultural stock. However, households without access have a higher share of *risky-liquid* precautionary assets than those with access. Each precautionary asset share is equal to the ratio of the *j*th precautionary asset (*risky-liquid*, *safe-liquid*, and *safe-illiquid*) divided by household net worth.⁴ Net worth is calculated as total wealth of the household from financial and real assets minus liabilities held in 2002–03.

³ Carroll and Samwick (1995) define precautionary assets as any asset that can be used to cover expenses due to unforeseen circumstances, such as bad draws in earnings.

⁴ The classification of precautionary assets into safe versus risky is based on the relative covariant risk exposure to loss (such as death due to diseases, theft, nonrepayment of informal loans) and liquidity (versus illiquidity) based on the ease of liquidation of the asset in the event the household is faced with a negative income shock.

Income Uncertainty

Income uncertainty can be measured in a number of ways. Previous studies have used either the variability in household income (Carroll, 1994; Carroll and Samwick, 1997, 1998) or the variability in household expenditures (Kuehlwein, 1991; Dynan, 1993) as proxy variables for uncertainty. However, as Guiso, Jappelli, and Terlizzese (1996) and Guiso, Jappelli, and Pistaferri (1998) have pointed out, variability measures may be poor indicators of uncertainty because they may contain large controllable elements.

We use proxy variables for income uncertainty by various methods. Uncertainty is measured by the probability of either job loss or job stability (following Carroll, Dynan, and Krane, 1999). Such a measure allows for comparison with the results of Guiso, Jappelli, and Terlizzese (1992) and Lusardi (1997, 1998, 2000), who use job loss or job stability to measure income uncertainty with a dummy variable specification (indicating if the household head had changed major occupations).

Results

Access and Savings Behavior

Weighted least squares equations are estimated for variants of the savings function as indicated in equation (6), and results are reported in Table 2. Mbarara, Masaka, Luwero, Rakai, and Mukono are district dummy variables used to capture region-specific effects. Accessibility to formal financial services is captured by the intercept dummy variable, *D* as shown in equation (6) but now denoted "Access" in Table 2. It is significant for rural households only. This finding is not surprising, since the mean level of savings held by rural households with access to financial services is higher than that of those without access. This is confirmed by the independent *t*-tests for mean differences, with equal variances assumed for both types of households.

Table 1. The Asset Structure of Households

Mean Holdings (in 000s Ugandan shillings)	Households With Access (N = 235)	Households Without Access (N = 103)	t-Value
1. Buildings	7,442.5	2,944.3	2.516
2. Land	3,978.4	2,019.4	2.673
3. Livestock	1,153.5	414.2	3.738
4. Farm Equipment	15.7	18.6	-0.407
5. Household Durables	2,165.4	550.1	2.806
6. Formal Savings ^a	874.0	—	—
7. Informal Savings	369.0	195.4	2.670
8. Business Stock	3,144.4	744.1	4.869
9. Agricultural Stocks	37.1	59.2	-1.152
Precautionary Asset Shares:			
▸ Risky-Liquid (3, 4, 5, 7, 8, 9)	0.458	0.538	-3.127
▸ Safe-Liquid (6)	0.068	—	—
▸ Safe-Illiquid (1, 2)	0.474	0.462	0.443

Source: Sample survey data, rural and urban households.

^a Formal savings excludes forced deposits that are MFI/bank loan-related.

Table 2. Estimated Household Savings Functions

Variable	Rural Households (N = 276)		Urban Households (N = 318)	
	Coefficient	t-Value	Coefficient	t-Value
Constant	7.86E+05	2.063	-3.04E+04	-0.063
Access	8.07E+05***	3.796	3.10E+04	0.077
Long-Run Income	0.166	1.522	0.253***	3.567
Long-Run Income * Access	-0.170	-1.321	0.025	0.283
Unexplained Income	-0.09**	-1.963	0.033	1.565
Transitory Income	0.950*	1.711	—	—
Family Size	-3.89E+05***	-4.046	-8.61E+04	-1.001
Family Size Squared	2.14E+04***	3.156	4.16E+03	0.596
Mbarara	4.22E+05	1.225	4.94E+04	0.135
Masaka	2.10E+05	0.585	-1.55E+06***	-3.905
Rakai	1.88E+05	0.679	2.44E+04	0.067
Mukono	4.70E+05*	1.821	-1.55E+05	-0.425
Luwero	-2.44E+05	-0.882	-2.00E+04	-0.044
Adjusted R ²	0.126		0.149	
Standard Error	1,431.1		0.5	
F-Statistic	4.3		6.1	

Note: Single, double, and triple asterisks (*) denote statistical significance at the 10%, 5%, and 1% levels, respectively.

For urban households, the mean level of savings held by households with access is not significantly different from the savings level of those without access. As indicated above, savings in our study reflect net changes in assets, liabilities, and capital transfers. In addition, the contribution of financial assets to total savings is greater for rural households than it is for urban households.

As shown by the results presented in Table 2, the estimated marginal propensity to save out of permanent (long-run) income [β_1 in equation (6)] for urban households is 0.253. The permanent income variable is not significant for rural households but has the correct sign. The effect of access on the marginal propensity to save out of permanent income is examined through the coefficient on the interaction term between permanent income and the access dummy variable. This *Access * Income* variable ($D * Y_t^p$) is used to obtain the coefficient β_4 in equation (6). The marginal propensity to save out of permanent income does not significantly differ between households with access and those without access to formal financial services for urban households. This result may be explained by the fact that a very large fraction of the savings is accounted for by real assets. Therefore, the marginal propensity to save may not differ very much between those with access and those without access. Consequently, simple access, per se, to formal financial services does not necessarily increase the marginal propensity to save among the households in our sample. The estimated marginal propensity to save out of transitory income for rural households is 0.95. Due to the lack of significance and wrong coefficient sign, the transitory income variable is dropped from the urban household savings equation and the equation is reestimated without it.

Following the life-cycle theory, the results also show that initially family size depresses the level of household savings. However, as the household ages, there is more accumulation of savings later in life.

Smith and Ward (1980) obtain a similar result, concluding young children depress savings for young families, especially where the mothers are working. In older families, especially where the mother does not work outside the home, Smith and Ward find that children in fact increase savings of the household. Finally, we employ district dummy variables in the savings equations to capture the effects of regional differences which would otherwise be assumed away.

Access and Asset Allocation

A two-tailed, generalized Tobit model is used to determine the effects of access to formal financial services and income uncertainty on household asset allocation under the assumption of heteroskedastic error terms. The results are reported in Tables 3 and 4. District dummy variables are employed again to test for region-specific effects. The estimated coefficient on the *Access* variable [denoted as D_1 in equation (7)] is not significant in either the rural or urban households (as shown in Tables 3 and 4). A plausible explanation could be that household asset allocation is mainly influenced by other factors, such as income uncertainty, rather than whether a household has or does not have simple access to financial services.

Permanent (long-run) income is significant in the asset share equations for both rural and urban households, indicating it is a major factor in determining household asset allocation. For both rural and urban households in the sample, the traditional risky-liquid assets (livestock, durables, cash kept at home, etc.) may be taken as "inferior assets," while real estate and bank deposits are "normal assets"—i.e., when permanent income increases, the fraction of risky-liquid assets in the total portfolio declines. This relationship is captured by the coefficient α_3 in equation (7) for the share of the j th precautionary asset held. However, when permanent income increases, the proportions of safe-illiquid assets (real estate) and safe-liquid assets (bank deposits) increase for both

Table 3. Asset Share Equations for Rural Households (N = 272)

Variable	Safe-Illiquid Assets		Safe-Liquid Assets		Risky-Liquid Assets	
	Coefficient	t-Value	Coefficient	t-Value	Coefficient	t-Value
Constant	0.602	6.73	-0.410	-5.07	0.400	4.69
Access	0.006	0.16	—	—	0.029	0.82
Long-Run Income	4.84E-08***	3.80	3.20E-08***	2.52	-4.78E-08***	-3.95
Long-Run Income Squared	-1.49E-15***	-2.34	-1.71E-15***	-2.57	1.63E-15***	2.69
Unexplained Income	-4.11E-09*	-1.90	1.35E-09	0.31	1.63E-09	0.79
Transitory Income	-5.01E-08	-0.76	2.25E-08	0.51	3.59E-08	0.58
Income Uncertainty	-0.025	-0.68	0.114***	3.20	0.0002	0.01
Income Sources	0.09***	2.61	-0.059*	-1.83	-0.076***	-2.34
Family Size	-0.031**	-2.24	0.021	1.57	0.023*	1.72
Family Size Squared	0.002**	2.16	-0.001	-1.39	-0.001*	-1.67
School Fees	-3.63E-08***	-2.56	7.16E-08***	4.47	2.05E-08	1.52
Luwero	-0.154***	-2.72	0.094*	1.87	0.128***	2.38
Mbarara	0.019	0.34	-0.090	-1.38	-0.009	-0.17
Rakai	-0.209***	-3.78	0.183***	4.17	0.160***	3.03
Masaka	0.003	0.06	-0.175**	-2.10	-0.001	-0.02
Mukono	-0.101*	-1.86	0.112***	2.58	0.073	1.42
Likelihood Ratio χ^2	85.3		97.22		67.9	
Standard Error	0.235		0.122		0.225	
Pseudo-R ²	0.370		0.576		0.385	
Censored at 0	36		219		0	
Censored at 1	0		0		26	

Note: Single, double, and triple asterisks (*) denote statistical significance at the 10%, 5%, and 1% levels, respectively.

rural and urban households (as observed in Tables 3 and 4). The findings are important since they show that as permanent incomes rise, households tend to shift away from holding traditional risky-liquid precautionary assets (livestock, durables, cash kept at home, etc.) in favor of safer ones (real estate and bank deposits). This is especially true for the rural households' sample.

An *Income Sources* variable is included in the regression equation to capture the effect of having a decreased probability of being liquidity-constrained and having less uncertainty about income flows. This variable is measured by the number of reported income sources of the household. A higher number of income sources implies a lower probability that a household will be liquidity-constrained and a lower degree of income uncertainty.

Therefore, if the number of income sources is higher, the expected probability of the household to be liquidity-constrained is lower, and its expected likelihood to hold a larger share of illiquid assets is higher (reducing the share of the liquid assets in the portfolio). It also implies a lower degree of income flow uncertainty. This is shown by the positive signs on the illiquid asset coefficients and the negative signs on the liquid asset coefficients (as shown in both Tables 3 and 4). Chakraborty and Kazarosian (1999) and Hochguertel (1997) report similar results.

The *Income Uncertainty* variable is proxied by the probability of either job loss or job stability (following Carroll, Dynan, and Krane, 1999). Theory suggests that an increase in income uncertainty leads to increasing shares of the safe and/or liquid assets in a household portfolio.

Table 4. Asset Share Equations for Urban Households (N = 330)

Variable	Safe-Illiquid Assets		Safe-Liquid Assets		Risky-Liquid Assets	
	Coefficient	t-Value	Coefficient	t-Value	Coefficient	t-Value
Constant	0.011	0.100	0.011	0.22	0.600	6.62
Access	-0.049	-1.02	—	—	-0.019	-0.53
Long-Run Income	5.66E-08***	7.11	2.53E-11	0.01	-3.11E-08***	-5.74
Long-Run Income Squared	-1.26E-15***	-6.18	2.71E-17	0.31	7.09E-16***	5.92
Unexplained Income	-2.47E-09*	-1.89	-3.84E-10	-0.54	2.06E-09***	3.16
Transitory Income	3.25E-09	0.520	-4.04E-09	-0.51	-1.52E-09	-0.39
Income Uncertainty	-0.104***	-3.39	-0.049***	-2.82	0.096***	4.02
Income Sources	0.111***	2.62	-0.002	-0.12	-0.064**	-2.02
Family Size	0.001	0.06	-0.013	-1.51	0.018	1.40
Family Size Squared	-0.00E-04	-0.11	0.001	1.14	-0.001	-1.46
School Fees	2.20E-08	1.33	1.07E-08	1.45	-4.36E-09	-0.43
Luwero	0.022	0.31	-0.126***	-3.30	0.031	0.58
Mbarara	0.063	0.90	0.038	1.28	-0.106*	-1.95
Rakat	0.106	1.53	-0.087***	-2.52	-0.013	-0.23
Masaka	0.22***	3.33	-0.034	-1.10	-0.149***	-2.80
Mukono	0.042	0.60	0.031	1.05	-0.011	-0.20
Likelihood Ratio χ^2		107.5		58.2		79.8
Standard Error		0.344		0.125		0.255
Pseudo-R ²		0.255		0.645		0.332
Censored at 0		64		212		1
Censored at 1		265		105		19

Note: Single, double, and triple asterisks (*) denote statistical significance at the 10%, 5%, and 1% levels, respectively.

For urban households (Table 4), the results reveal that an increase in income uncertainty leads to a reduction of the share of both safe-illiquid and safe-liquid assets but an increase in the share of risky-liquid assets. This is interpreted to mean the precautionary demand for liquidity outweighs the desire to avoid exposure to risk. These results are generally consistent with Kimball's (1991) exposition, which shows precautionary demand for liquidity and temperance are major factors affecting portfolio allocation decisions of households. However, for rural households (Table 3), an increase in income uncertainty leads to an increase in the share of only safe-liquid assets (bank deposits).

The *Family Size* variable has a negative and significant influence on the shares of safe-illiquid assets held by rural

households, and has a positive and significant effect on risky-liquid assets (Table 3). It could be argued that initially family size depresses the share of safe-illiquid assets but increases the share of risky-liquid ones. As the household ages, there is a shift toward more accumulation of safe-illiquid assets (real estate) and a reduction in the holdings of the risky-liquid ones later in life. Interestingly, the results are not significant for urban households (as shown in Table 4).

The *Family Size* variable has the same effect on asset allocation as the *School Fees* variable, which is included in the analysis since it is large relative to income for many rural households. This tuition expenditure has a positive and significant influence on the shares of bank or microfinance savings deposits (safe-liquid assets) held by rural households.

The corresponding effect is negative on the shares of illiquid assets held, possibly because school fees are paid through the banks and the desire for liquidity increases with the prospects of higher tuition expenses. Once again, the results are not significant for urban households, as reported in Table 4. School dues represent a larger fraction of rural household incomes than they do for their urban counterparts, perhaps explaining the weaker liquidity effect for urban households.

Conclusion

This study uses data collected through a survey in 2003 and recall (2002) to determine the savings and portfolio allocation behavior of Ugandan households with and without access to formal financial services. The findings show that the marginal propensity to save out of long-run income for households with access to formal financial services is not significantly different from the propensity of households without access. This implies there is no significant difference in the capacity to save between the two types of households as the levels of permanent income change. One possible explanation is that the bulk of savings is held in the form of traditional real assets, such as real estate, livestock, and domestic durables. Thus, we should not expect to find significantly different savings behavior among those with and those without access to formal financial services.

Simple access to formal financial services does not in itself necessarily lead to an increase in savings or the marginal propensity to save among the households in our sample. This finding contradicts conventional wisdom which suggests it is more plausible for households with access to formal credit and/or savings services to possess better financial discipline and foresight. In other words, participation in formal financial markets should theoretically instill better financial management principles among these households than their counterparts.

One would expect households with access to be associated with higher marginal propensities to save.

Therefore, the PMA's mobilization of financial savings will take more effort than mere simple access. Success involves access to institutions with appropriate credit and savings instruments and good incentives. Moreover, it can also be argued that households with access are bound to benefit from formal credit through the supply of capital which facilitates the expansion of income and real productive assets of the households. This in turn contributes to increased household savings that may be tapped using appropriate instruments with incentives to reduce risk exposure, as is discussed below.

In addition, the findings of this study indicate that simple access to formal financial services, per se, does not significantly influence asset allocation. Instead, the results suggest that income and income uncertainty are the key variables influencing asset allocation among rural and urban households. An increase in permanent income leads to increased holdings of safe-illiquid and safe-liquid assets by the households and a decrease in risky-liquid assets generally. Thus, the desire to avoid exposure to risk outweighs the precautionary demand for liquidity in this case. However, the converse is true with an increase in income uncertainty (decrease in holdings of illiquid assets but an increase in liquid assets).

It is therefore evident that the demand for liquidity and the desire to avoid risk are the major factors influencing portfolio allocation decisions by households, but not simple access to formal credit and savings services. It is also evident that as household incomes rise, there is a general shift from holding traditional risky-liquid assets to safe-liquid (deposits) ones, especially for rural households.

This behavior can be exploited by mobilization of savings through improved

access to enterprise-transforming credit in the PMA's program. The benefit of access to this credit in the long run is asset growth and productivity, which also implies increased mobilization of financial assets in the PMA's program through higher household incomes.

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Introducing Inventory Credit into Nigerien Agriculture: Improving Technology Diffusion

Felix G. Baquedano and John H. Sanders

Abstract

A critical component of agriculture in developing countries is increasing soil fertility in response to depleted soils and declining crop yields. An inventory credit program was introduced in western Niger to generate savings for farmers' groups to facilitate the purchase of inorganic fertilizers. This program is compared with a more traditional inventory credit program, which provides credit at harvest but lets farmers sell their grain in the post-harvest period after grain prices have recovered. The evaluation of the two programs for their impacts on farmers' incomes and farm-level technology adoption is undertaken with a linear programming model. The decision-making framework of this model comes from interviews of farmers in a number of African countries. Farmers are found to be risk averse, but exhibit a different type of decision making than the usual expected income-income variability tradeoff.

Key words: fertilizer, inventory credit, Niger, risk aversion

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In order to meet farmers' cash flow and liquidity requirements at harvest when prices collapse¹ and to encourage higher use of inputs, non-government organizations (NGOs) in Sub-Saharan Africa have developed a financing mechanism based on inventory credit. Present inventory credit programs in Niger purchase the grain at harvest prices and capture the gains from seasonal price increases for the farmers' groups. Then these farmers' groups buy fertilizer with a quantity discount and make it available to the village farmers at the discounted prices.

This study evaluates the benefits of this program and compares it with an inventory credit program in which farmers directly receive the income gains from the increased seasonal prices. Moreover, we consider the potential effects of reduced interest costs from lending by a regional or local institution that could charge a lower loan default risk premium from better knowledge of its farmer clients.

The remainder of the paper proceeds as follows. First, to evaluate the present program and two proposed changes to it, we present the farmer decision-making mechanism based upon our fieldwork. Next, this decision-making framework is incorporated into a linear programming model based upon a utility function representing lexicographic preferences.

¹ There are three price problems faced by farmers in developing countries: the harvest-price collapse, the good-season price collapse, and the public sector-induced price collapse. Inventory credit programs respond to the harvest-period price collapse.

A section is then devoted to a description of the present and potential inventory credit program and production technologies available. Following the introduction of the formal model, current program benefits are analyzed and compared to a revised program with and without reduced interest costs. The final section highlights some policy implications and offers conclusions about development policy directions.

Farmer Decision Making

In empirical studies in Sub-Saharan Africa, farmers state two primary objectives, and there is an implicit third objective: (a) a harvest income goal; (b) a subsistence consumption objective for the staple crop, millet in this case; and (c) income maximization once the above objectives are attained.

Relative to the first objective, the harvest income goal, farmers need money at harvest to pay for their purchased and family labor,² finance out-migration of family members after the crop season, pay school fees, taxes, health costs, and finance weddings and other ceremonies. The financial obligations pressuring farmers to obtain income at harvest time are so pervasive that most developing countries experience staple price collapses at harvest time. To encourage farmers to benefit from the price recovery six to eight months after harvest, an inventory credit program needs to provide credit at harvest.³

The second farmer objective is to put aside sufficient quantities of the main staple to assure subsistence consumption during the year. Many modelers in developing

countries have placed this as the first constraint. In contrast, a series of empirical studies (Rain, 1999; Abdoulaye, 2002; Baquedano, 2005; Uaiene, 2005) have shown farmers consistently rank the household income goal above the acquiring and storage of subsistence consumption needs until the next harvest. This priority ranking is most obvious in bad rainfall years when many farmers are unable to set aside sufficient subsistence consumption. They rely on the market or private/public assistance to obtain sufficient staples later in the year.⁴ Nevertheless, farmers will still first attempt to meet their harvest income goal.

Farmers' third (implicit) objective is to maximize income after these first two objectives have been achieved. This is the standard income-maximization objective, but satisfying the two above objectives first makes the farmer risk averse. Although continuity of the objective function is violated, this is how farmers explain their decision making.

Farmers can produce their own subsistence crop and/or purchase it. Farmers do not know what the purchase price and availability of their subsistence staple will be in purchase periods later in the year. Hence, they often show a preference for producing more than what would be economically optimal given the expected prices six to eight months after harvest. Rather than producing up to the expected price, we would expect farmers to produce their subsistence crop up to the price they foresee in an adverse rainfall year. This food availability in bad years is a primary risk to which farmers feel the need to respond. Later in this paper, we test this hypothesis with farm-level observations.

² Family labor is compensated by purchasing clothing, giving grain for other family members (besides the household head) to sell, and financing for the younger male members of the household to go to the capital or the coast to find employment until the next agricultural season.

³ Estimates of the opportunity costs (difference between prices at harvest and six months later) for obtaining the harvest income goal will be discussed later.

⁴ Rain (1999) argues that farmers' willingness to sell their grain in bad years despite its scarcity is enabled by their reliance on complex social ties with family members working in other regions. These ties are a type of social insurance policy in which family members are counted on to provide money and/or food primarily in bad rainfall years. In disaster years, not included in the farm-level modeling, the public sector and NGOs step in to provide aid.

Inventory Credit in Niger

A traditional inventory credit program provides loans guaranteed by grain stocks to farmers to meet their harvest income requirements. The farmer is able to sell the grain later in the year and then repay storage and interest costs (Coutler and Onumah, 2002; Coutler, 2002). In this study, we examine two programs: (a) the program currently implemented in Niger to generate savings for farmers' groups to purchase inorganic fertilizer for the next crop season, and (b) a more conventional inventory credit program in which the farmer benefits by receiving higher grain prices and credit at harvest.

This study uses village-level data from the village of Karabedji in the Fakara region of Niger. A map showing our study area is presented in Figure 1. As previous fieldwork conducted by Abdoulaye (2002) utilized data from this village, collected in the 1999–2000 production season, we re-collected data from farmers in this same location to characterize the 2002–2003 production season. Karabedji is considered to be representative of the millet-cowpea zone (the Sahelo-Sudanian zone in Figure 1) for Niger. This Sahelo-Sudanian zone is the principal zone of agricultural production in Niger. One distinction of the Fakara region's Karabedji village is that it has been used by international agricultural research centers [ICRISAT and the International Center for Soil Fertility and Agricultural Development (IFDC)] over nearly three decades for regional trials; hence there has been more exposure to new technologies than in most other regions.

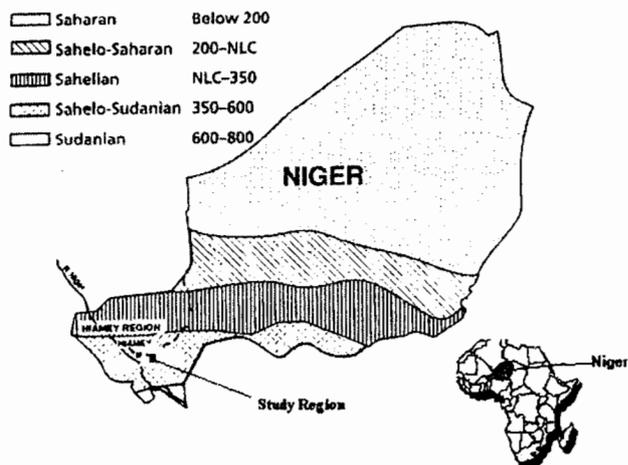
The Food and Agriculture Organization's (FAO's) Inventory Credit program, begun in the Fakara region of Western Niger in 1998, has as its principal objective the increased use of fertilizer. This program operates through farmers' organizations. These organizations take over the middleman role of buying the grain at harvest and then selling it later after the price recovery. With the profits generated from the sale of the grain later in the year,

after deducting interest and storage cost, the producers' organization purchases fertilizer at a discounted price by buying in quantity. The fertilizer is then sold at the discounted price. In this manner, the farmers' organization creates a revolving fund for obtaining bulk purchases of fertilizer. Farmers benefit from the low-priced fertilizer in the next production season and from the technical recommendations associated with the fertilizer and improved seeds.

The more traditional inventory credit program permits farmers to sell their grain six to eight months after the harvest and then repay the storage agency, such as the farmers' organization, for the costs of storage and interest. The program provides credit at harvest time based upon some percentage of the harvest-time grain price. The organization holds the grain until the farmer repays the loan plus interest and storage costs. This allows farmers to capture the price variation for their staple crop between harvest and later in the year. The potential millet price increase, which farmers can receive from a modified program in Niger, fluctuates between 2% and 38% six months after harvest, as observed over the last five production seasons (2000–2001 through 2004–2005; Figure 2).

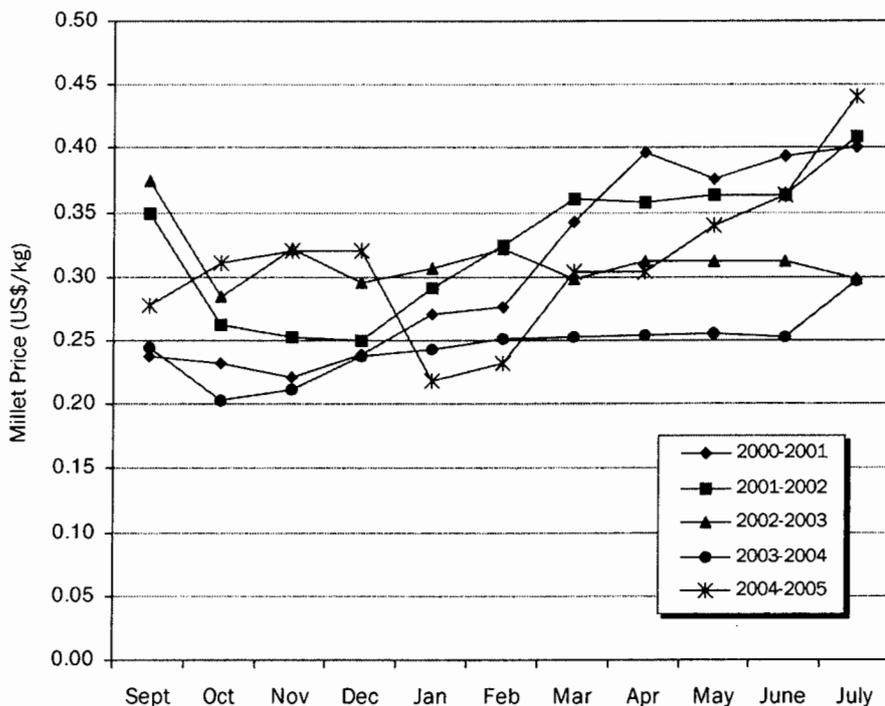
Empirical Model

In the representative household, preferences are ordered lexicographically, responding to the hierarchal ordering in which farmers in Niger satisfy their objectives in this risky environment with substantial price and weather risk (see also Abdoulaye and Sanders, 2006). Diagrammatically, this is illustrated in Figure 3. The three components of the African farm households' utility function (the harvest income requirement, subsistence consumption, and maximization of expected income) can be divided into three noncontinuous segments. Up to income level (D), the farmer attempts to achieve his harvest income goal by maximizing his utility



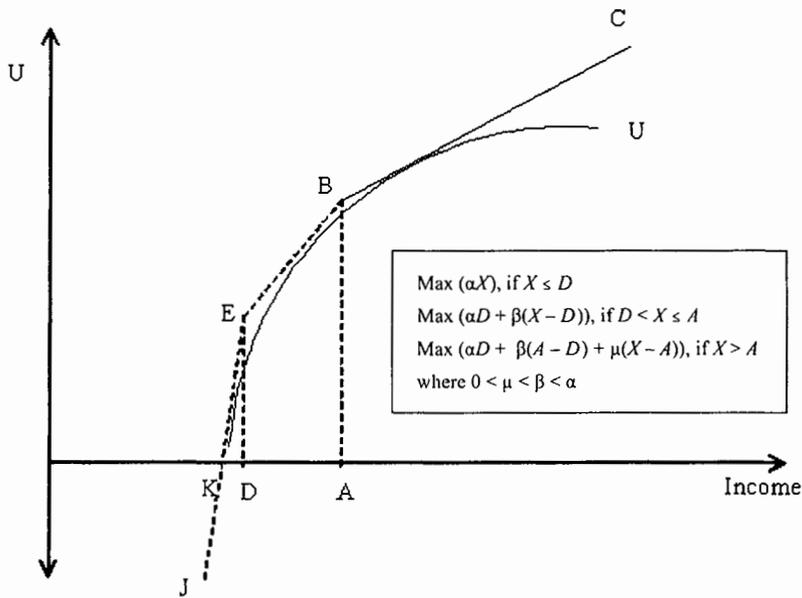
Source: Adapted from Sanders, Shapiro, and Ramaswamy (1996).

Figure 1. Map of West Africa Divided by Agro-climatic Zones



Source: Authors' calculations from SIMA (2003).

Figure 2. Variation of Millet Prices in Real Terms Between Harvest (September) and Other Points of the Year for Five Production Seasons in Niger (base year = 2003)



Source: Yigezu (2005).

Figure 3. The Lexicographic Utility Problem in African Households

function along (JKE). Once income level (D) has been attained, the farmer tries to put aside (DA), the money value of his millet consumption goal, until reaching (A). His utility function in this region is maximized along (EB). Once at (A), the farmer then maximizes expected income along (BC) (see also Yigezu, 2005).

The model considers four states of nature with respect to rainfall: bad, normal, good, and very good. A fifth state of nature—a very bad year or major drought year—is excluded from the model. The probabilities of the first four states of nature are the only ones relevant to farmer decision making as there is nothing that can be done at the farm level to avoid the disaster of a drought. Moreover, the public sector and NGOs intervene when a major drought occurs. So the probabilities⁵ of

these first four states of nature sum to one (Table 1).

Technology Packages Available to the Household

There are three traditional technology packages in the model and four proposed or new packages (Table 2). The technological packages (TPs) involve three crops: millet, cowpeas, and peanuts. Millet and cowpeas are the focus here as these are the main subsistence crops and there are substantial technology backlogs available to be introduced in the production of these two crops. The first TP, no fertilizer use, is for millet alone, while the other two traditional TPs are

must equal one. In spite of the availability of price information for the past 14 years, the price distribution was defined using only the last five years, because this more recent period reflects a structural shift in government policy to intervene less. Donors have been pressuring the Nigerien government not to drive grain prices down in bad and normal years, and there has been more response to this pressure in the last five years.

⁵The probability of a state of nature to occur was estimated using rainfall data from 1931–2004. A disaster or very bad year occurred approximately once a decade (as in 1984, 1992, and 2004). This type of year is excluded from the calculation of probabilities. The probabilities of the four other states of nature then

Table 1. Probability of Observing a State of Nature and a Type of Year and Distribution of Prices at Harvest and Six Months Later in a State of Nature

State of Nature	Probability of a State of Nature (%)	Distribution of Prices at Harvest (US\$/kg)	Distribution of Prices Six Months Later (US\$/kg)
Bad	25	0.26	0.37
Normal	42	0.23	0.31
Good	17	0.20	0.25
Very Good	16	0.17	0.19

Sources: Authors' calculations from Abdoulaye (2002); Système Nigérienne de la Météorologie; and Système D'Information sur les Marchés Agricoles (SIMA).

Note: Farmers face five states of nature: very bad year (probability = 9%), bad year (probability = 23%), normal year (probability = 38%), good year (probability = 15%), and very good year (probability = 15%). But the first state (very bad) does not enter the model given that there is very little farmers can do in this state. Therefore, the effective probabilities faced by farmers are: bad 25%, normal 42%, good 17%, and very good 16%.

Table 2. Expected Yields of Current and Potential Production Systems in Four States of Nature

Technology Packages ^a	States of Nature							
	Bad		Normal		Good		Very Good	
	Millet	Cowpeas	Millet	Cowpeas	Millet	Cowpeas	Millet	Cowpeas
Traditional:	— (Yield, kg/ha) —							
1 No Fertilizer (millet in monoculture)	208		279		351		387	
2 Micro Dosage (3 kg/ha of NPK)	216	24	270	100	323	175	350	210
3 Moderate Dosage (25 kg/ha of NPK)	302	26	402	111	482	196	522	239
New Technologies:								
4 Improved Moderate Dosage (60 kg/ha of NPK)	175	162	433	236	691	310	949	385
5 Improved Moderate Dosage (50 kg/ha of SSP)	191	167	440	268	689	369	938	470
6 4 + New Cultivars	131	165	519	307	863	468	1,233	673
7 5 + New Cultivars	144	200	528	348	862	552	1,220	820

Source: ICRISAT/IFDC in Abdoulaye (2002).

Note: Farmers face five states of nature: very bad year (probability = 9%), bad year (probability = 23%), normal year (probability = 38%), good year (probability = 15%), and very good year (probability = 15%). But the first state (very bad) does not enter the model given that there is very little farmers can do in this state. Therefore, the effective probabilities faced by farmers are: bad 25%, normal 42%, good 17%, and very good 16%.

^a Definitions of fertilizers: NPK = Nitrogen, Phosphorous, and Potassium; SSP = Super Simple Phosphate.

millet intercropped with cowpeas. The yields reported for the TPs in the model come from the on-farm trials in the Fakara region, carried out by ICRISAT/IFDC since the 1980s (Abdoulaye, 2002). The data capture the yields for the different states of nature of the most common production systems as well as new technological packages developed in the ICRISAT/IFDC project over almost a decade.⁶

As shown in Table 2, the new TPs include increased dosages of fertilizer with improved application methods and new cultivars. The most common practice in the region is to mix very small quantities of fertilizer with the seed at sowing time and to put them together with some manure in the planting hole. The new technologies include increasing fertilization with side dressing with and without new cultivars.

The new TPs have a millet yield advantage over traditional technologies ranging from 55% to 89% (Table 2). With regard to cowpeas, the yield advantage ranges between 136% and 248% in comparison to traditional practices.

Model Representation

The objective function in the model, as stated in equation (1), maximizes the expected value of adjusted post-harvest income, subject to the farmers' objectives of first meeting their harvest income goal and then fulfilling their staple consumption objective. The model requires that the income goal [equation (2)] be met through sales of crops in every state of nature at harvest prices in that particular state. The harvest income goal in each state of nature was estimated from farm-household interviews and from

⁶The ICRISAT/IFDC data used for production coefficients were consistent with averages obtained from the farm interviews in Karabedji for the two production seasons of 1999–2000 and 2002–2003. For details on the yield data, see Abdoulaye (2002) and Baquedano (2005).

estimates in the literature.⁷ The consumption requirement [equation (3)] can be met from consumption of stored grain or purchases from the market. The consumption requirement⁸ of 2,000 kg/annum/household of millet was taken from government estimates.

$$(1) \quad \text{Max } E[I] = \sum_s \theta_s I_s$$

s.t.:

$$(2) \quad \sum_i S_{1is} P_{1is} \geq HI_s,$$

$$(3) \quad C_{is} + B_{is} \geq Cr.$$

Only after these harvest income and subsistence consumption objectives have been met does the household maximize income. By incorporating the farmers' main objectives under different states of nature, the model responds to the farmers' risky environment in the way farmers explain their own behavior. This approach has been followed previously by Vitale and Sanders (2005) in Mali; Abdoulaye and Sanders (2006) in Niger; Uaiene (2005) in Mozambique; and Yigezu (2005) in Ethiopia.

Equation (4) defines how grain from own production in the household can either be consumed, sold at harvest, or sold six months later:

$$(4) \quad Q_{is} = C_{is} + S_{1is} + S_{2is}.$$

Equation (5) is maximized in the objective function and is defined as "adjusted net income" from grain sales six months after harvest and income from other activities:

⁷The harvest income goal was estimated from various sources, as follows: bad rainfall year, US\$99 (Abdoulaye, 2002); normal rainfall year, US\$200 (Hopkins and Reardon, 1993); good rainfall year, US\$280 (Baquedano, 2005); and very good rainfall year, US\$364 (Rain, 1999). All values were adjusted for inflation to 2003 values using the GDP deflator (IFS 2003 = 100).

⁸The consumption requirement has been adjusted to take into account the differences in consumption between adults and infants as well as males and females.

$$(5) \quad I_s = \sum_i S_{2is} P_{2is} + \sum_k R t_{ks} Z_k + RM_s \\ - \sum_i S_{2is} St_i - \sum_j \left(\sum_n a_{nj} X_n \right) P_j \\ - \lambda \sum_i PP_s B_{is} - \sum_L HL_L W_L - Cf_s.$$

Relevant costs for grain storage, production inputs, labor, and financing have been deducted to obtain the net value. Note that the income maximization in equation (5)—after assuring the two priority objectives of harvest income and subsistence consumption—also enables the farmer to buy the part of his subsistence requirement not achieved by his own production. Additional consumption greater than that produced by the farmer is bought with his income earned and with transfers from his family.⁹

Equation (6) returns the income definition in equation (5) to a more standard income definition by adding back the value of food purchases multiplied by λ (to be explained below) and subtracting the value of remittances:

$$(6) \quad I_s^* = I_s + \lambda \sum_i PP_s B_{is} - RM_s.$$

Equation (7) defines total expected household income, which is the sum of income in equation (6), sales at harvest, and the value of own consumption:

$$(7) \quad \sum_s \theta_s \left(I_s^* + \sum_i S_{1is} P_{1is} + \sum_i C_{is} PC \right) = TI.$$

As stated previously, the household can choose to meet its consumption requirement from own production or through purchases from the market. What balances the tradeoff between consumption from own production and purchases from the market in the model is

the own food production premium lambda (λ) in equation (5). The parameter λ enables an increased shadow price of production of millet above the expected price six months after harvest to compensate for the desire of farmers to assure much of their own grain for consumption and to reduce their dependence on the market for millet (Abdoulaye and Sanders, 2006). When $\lambda = 1$, the farmer produces millet until the value of his marginal product is equal to the expected purchase price of millet six months later. However, farmers state that they want to assure sufficient grain in a bad year when prices are substantially higher (Abdoulaye and Sanders, 2006). Hence, farmers base their price expectation for later in the year on a bad year. In that regard, λ allows the on-farm production cost to increase, thereby assuring more of own production for bad rainfall conditions.

At a lambda value of one in our model, farmers relied on the market for their consumption of millet at a substantially higher rate than the observed market purchases of farmers. After calibrating the model to observed farmer behavior of millet production and purchases for different states of nature, a value of 1.78 best represented observed farmer behavior.¹⁰ At this higher level of lambda, the farmer produces millet at a cost 78% higher than the expected purchase price six months later for millet. This translates into an expected price of 377 FCFA/kg¹¹ for millet in bad years. This is high, but consumer prices often reach 250 FCFA/kg in poor rainfall years, and in the summer of 2005 the price for millet surpassed 300 FCFA/kg. Farmers are apparently willing to produce millet even up to a shadow price higher than they would pay in bad rainfall years.

⁹There is evidence that households rely heavily on remittances in bad years to meet their subsistence goal (Rain, 1999). To reflect these empirically observed additional funds forthcoming for grain purchases in bad years, remittances were added into the model. Remittances for a bad year were valued at US\$89 (Abdoulaye, 2002), and adjusted for inflation to 2003 values using the GDP deflator (IFS 2003 = 100).

¹⁰The own food premium in our model quantifies how much a farmer is willing to pay to avoid relying on the market for his subsistence consumption by increasing the marginal value product of his own production of the staple, millet.

¹¹The International Monetary Fund (IMF) exchange rate for Nigerian FCFA is 572.43 FCFA = US\$1 (2003 base year).

Equation (8) defines production as the area planted under the technologies available in the model times their respective yields:

$$(8) \quad Q_{is} = \sum_n Y_{ins} X_n.$$

Equations (9) and (10) define land and labor constraints, respectively:

$$(9) \quad \sum_n X_n \leq Ld,$$

$$(10) \quad \sum_n X_n LR_{Ln} + \sum_k Z_k LR_{Lk} \leq HSL_L + HL_L.$$

Capital is exogenous in the model, and drives the model results since the new technologies raise the capital requirements. The capital available to the household in the model is the sum of investments incurred by the household in agricultural and nonagricultural activities observed in the 2002–2003 season.¹² The total initial capital available to the household in the model for all activities is US\$264 (excluding the remittances in bad years). The model is solved using linear programming, and a detailed description of all variables is given in Table 3.

The Effects of Inventory Credit in Niger

The current inventory credit (CIC) program in the Farkara region of western Niger does not result in the farmer receiving a higher seasonal price. Rather, the profits generated through grain sales six months later are reinvested in purchasing fertilizer at a discounted price, which is sold at that price back in the village. The savings to farmers from the lower-priced fertilizer in the current program are between 6% and 15%, depending upon the type of fertilizer (Table 4).

¹²This capital is internally generated by cashing in the farmers' own assets, as there is no outside source of capital except informal money lenders at high interest rates. Households own various assets that they can and do cash in on the market—including grain stocks, small animals (i.e., chickens), and even larger animals (sheep and goats). These capital levels in the model reflect observed investment levels of farmers from selling off these assets.

To determine the benefits of the CIC program on the household's adoption of new technologies and income, those farmers receiving and not receiving the fertilizer price discount for fertilizer are compared. Farmers who live in a village where a CIC program is established (or in close proximity) have access to new technologies and other institutional support promoted by the program to implement these new technologies. Farmers without access to the program do not have the institutional and logistical support that the program provides. Hence, their access to or knowledge of new technologies is limited.

In our model, we distinguish between program farmers who have access to new technologies with a lower price for fertilizer, and nonprogram farmers, who use only their traditional technologies. For both program and nonprogram farmers, the price they receive for their millet is the harvest price.¹³

According to model results, the current inventory credit program in Niger does increase fertilizer usage and provides higher incomes for program farmers over nonprogram farmers, but the gains are small.¹⁴ Program farmers' expected household income is US\$88 (8%) higher than for nonprogram farmers (Table 5). These model results are based upon technical coefficients at the median level for samples of Karabedji farmers in the Farkara region.

¹³In Niger in remote villages, it is common for farmers to sell to merchants who do not even give them the harvest market price as paid in regional markets for their crops. Farmers take this price because they do not have information on prices or they have no other alternatives for selling their grain.

¹⁴When relaxing the assumption that only members of the current inventory credit program have access to new technologies and allowing nonmembers access to all technologies, only marginal differences in income were found between the two groups. Household income increases by only US\$5 (0.45%) from the effect of reduced fertilizer cost alone. Use of fertilizer for both groups, if they had equal information, was then identical. The price-saving effect alone was then very small, as can be appreciated by the minimal changes in income.

Table 3. Definition of Notational Subscripts, Variables, and Parameters in the Empirical Model

Item	Definition
Subscripts:	
I	Crops available for production (millet, cowpeas, peanuts)
S	State of nature (bad, normal, good, very good)
K	Nonagricultural activity
N	Technology package
J	Input
L	Labor
Variables:	
I_s	Adjusted post-harvest income in state s
I_s^*	Post-harvest income in state s plus the value of food purchase adjusted by its opportunity cost minus remittances and cost of financing
Q_{is}	Production of crop i in state s
C_i	Consumption of crop i in state s
B_{is}	Purchase of crop i in state s
S_{1is}	Sales of crop i in period 1 (harvest) in state s
S_{2is}	Sales of crop i in period 2 (six months after harvest) in state s
Z_k	Quantity of nonagricultural activities k undertaken
St_i	Storage cost of crop i
a_{nj}	Use of input j by production technology n
X_n	Area planted of production technology n
HL_L	Amount of labor hired in labor period L
Parameters:	
θ_s	Probability of state s to occur
Cr	Millet minimum consumption requirement
P_{1is}	Price of crop i in period 1 in state s
HI_s	Immediate post-harvest income requirement in state s
P_{2is}	Price of crop i in period 2 in state s
Rt_{ks}	Return to nonagricultural activity k in state s
RM_s	Remittances in state s
P_j	Price of input j
λ	Own food production premium
PP_s	Post-harvest consumer price in state s
W_L	Wage rate of labor in labor period L
Cf_s	Interest cost of financing
TI	Total household income
Y_{ins}	Yield of crop i under production technology n in state s
PC	Weighted average of consumption price of millet
Ld	Amount of land available
LR_{Ln}	Labor requirement in labor period L by technology package n
LR_{Lk}	Labor requirement in labor period L by activity k
Lab_L	Adult equivalent male labor available in labor period L
$Flab_L$	Adult equivalent female labor available in labor period L

Table 4. Farm Gate Prices of Fertilizers Available in the Model

Fertilizer ^a	Current Program Price (US\$/kg)	National Price (US\$/kg)
NPK	0.40	0.47
DAP	0.44	0.47
SSP	0.44	0.47

Sources: SIMA (2003) and authors' calculations from survey data.

^a Definitions of Fertilizers: NPK = Nitrogen, Phosphorous, and Potassium; DAP = Diammonium Phosphate; and SSP = Super Simple Phosphate.

Table 5. Comparison of Household Income in Four States of Nature Between a Farmer in the CIC Program Using New Technologies and a Farmer Not in the Program Under Traditional Technologies

State of Nature	No Program, Traditional Technologies (US\$)	CIC Program, New Technologies (US\$)	Change (%)
Bad	791	760	-4
Normal	1,124	1,197	6
Good	1,253	1,395	11
Very Good	1,316	1,569	19
Expected	1,093	1,181	8

Source: Authors' model results.

Note: Marginal value for capital for farmers in the CIC program is 20%. Farmers not in the program also have a 20% marginal value for capital.

The higher incomes for farmers in the CIC program result from: (a) increased production due to higher fertilizer use, (b) the ability of farmers to capture the price increase by selling some production later in the year from their own storage, and (c) a savings in fertilizer cost (the direct program effect). Program farmers, according to modeling results, have an expected increase in production of 984 kg over nonprogram farmers. The production effect¹⁵ accounts for US\$73 (83%) of the

difference in household income between nonprogram and program farmers.

Farmers in the CIC program have expected sales of millet six months after harvest that are 764 kg higher than those of nonprogram farmers (Figure 4). This price effect is much smaller than the production effect—i.e., the expected price difference between harvest and six months later is only US\$0.08/kg. The increased income from selling six months later for program farmers over nonprogram farmers is US\$15. The increase in sales six months later contributes only 17% of the total difference in incomes between program and nonprogram farmers.

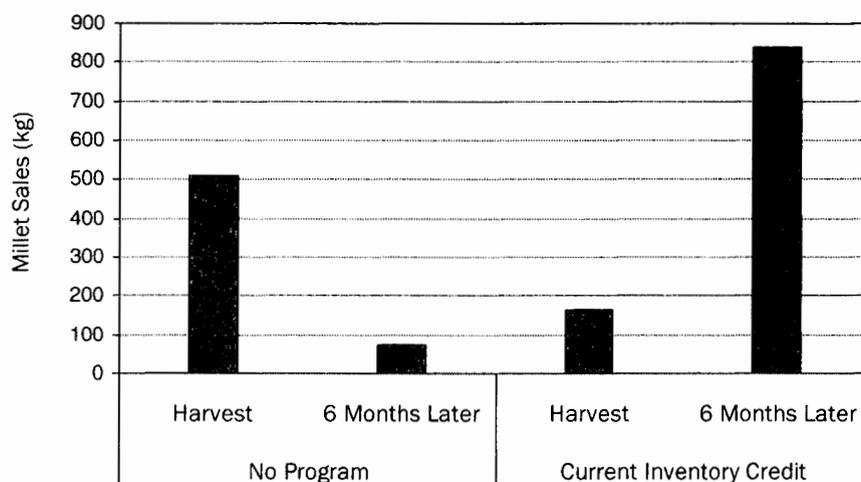
Improving Farmers' Incentives Under Inventory Credit

In this section, the effect on fertilizer use and incomes of enabling farmers to capture a higher price for millet instead of a lower price for fertilizer will be evaluated. In contrast to the CIC program described above, this program has not been implemented in Niger. The higher price for millet by selling later and taking advantage of the seasonal price increase for the farmer is the operating concept of most inventory credit programs.

The improved inventory credit (IIC) program is compared to the current inventory credit (CIC) program where farmers' only incentives are lower-priced fertilizer and greater technology information. Farmers in the IIC program pay the national price for fertilizer, and it

allow them to store and sell later at a higher price. The production effect is the residual of total effects, and is calculated as $1 - \text{Price Effect}$. The price effect is calculated as $(P_6 - P_{11}) \cdot \Delta Q_6 - I - S$, where P_6 is millet price six months after harvest, P_{11} is harvest millet price, and ΔQ_6 is the difference in sales six months after harvest between nonprogram farmers and program farmers. We calculate the production effect as a residual of the price effect, because the former captures simultaneously the changes of cowpea and millet production given their intercropped production system. The price effect is unambiguous as it only comes from the change in sales of millet six months later.

¹⁵ There are two effects from inventory credit: (a) a production effect, due to the access to more fertilizer and/or new varieties, and (b) a price effect given that farmers might generate sufficient surplus which would



Source: Authors' model results.

Figure 4. Distribution of Expected Millet Sales Between Farmers Under No Program and the Current Inventory Credit (CIC) Program

Table 6. Millet Prices at Harvest and Six Months Later in Real Terms in Four States of Nature

State of Nature	Price at Harvest (US\$/kg)	Price Six Months Later (US\$/kg)
Bad	0.26	0.37
Normal	0.23	0.31
Good	0.20	0.25
Very Good	0.17	0.19

Sources: Authors' calculations from SIMA (2003).

Note: A complete listing of all prices can be found in Baquedano (2005).

is assumed that the value of the loan received to meet the farmer's harvest income is equal to the full harvest value of the grain deposited as collateral.¹⁶

The price advantage to storage under the IIC program is the price difference between the harvest price and the price for millet

¹⁶ Providing farmers with 100% of the value of their grain stored in loans is the practice in the inventory credit programs in Niger. Later in the analysis, this assumption is relaxed and the amount given as a loan to farmers varies from 70% to 95% of the harvest value of their grain deposited in the program as a loan.

six months later. This price difference times the quantities sold later net of the cost of storage and financing is the return to the later sale. Farmers' seasonal price gains from storage depend upon the state of nature faced by farmers. The highest price gains to storage for farmers are in bad and normal years (Table 6). In bad years (poor rainfall), prices increase US\$0.11/kg (42%), while in normal years they increase US\$0.08/kg (35%).

The returns to storage must be sufficient to cover interest and storage cost.¹⁷ The model indicates that farmers under the improved inventory credit (IIC) program use more fertilizer than those in the current inventory credit (CIC) program

¹⁷ Under the IIC program, farmers finance their harvest income goal at the current real monthly interest rate of 2.58%. The inventory credit program in Niger allows only millet and peanuts as collateral for financing. Therefore, these are the only crops allowed in the model to be stored under the inventory credit program. Any sales of cowpeas six months later must cover payment of the farmer's own cost of storage of US\$0.15/kg (as estimated from interviews), and farmers risk losing up to 50% of the stored cowpeas due to insect infestation (FAO, 2004).

Table 7. Land Allocation to Technologies Between the Current Inventory Credit (CIC) and Improved Inventory Credit (ICC) Programs

Technology Packages	CIC Program	IIC Program, 2.6% Real Monthly Interest
Traditional:	— (hectares) —	
1 No Fertilizer	3	2
2 Micro Dosage (3 kg/ha of NPK)		
3 Moderate Dosage (25 kg/ha of NPK)		
New Technologies:		
4 Improved Moderate Dosage (60 kg/ha of NPK)		
5 Improved Moderate Dosage (50 kg/ha of SSP)		
6 4 + New Cultivars		
7 5 + New Cultivars	3	4
Expected Household Income (US\$)	\$1,181	\$1,275

Source: Authors' model results.

Note: Definitions of Fertilizers: NPK = Nitrogen, Phosphorous, and Potassium; and SSP = Super Simple Phosphate.

(Table 7). Area fertilized under a new technology, which intercropped millet with cowpeas and uses 50 kg/ha of side-dressed SSP, increases by 1 ha (33%) in moving from the CIC program to the IIC program.

The income advantage for farmers under the IIC program over the CIC program is a result of: (a) higher overall total sales due to increased production, and (b) greater sales six months later at a higher price. Farmers under the IIC program have an expected household income that is US\$94 (8%) greater than their counterparts in the CIC program (Table 8).

As observed from Table 8, the income advantage is larger in every state of nature for farmers under the IIC program than for farmers under the CIC program except in a bad one. In a bad state of nature, the yield effects are small; hence, income

Table 8. Comparison of Household Income in Four States of Nature Between a Farmer in the Current Inventory Credit (CIC) Program and a Farmer Under the Improved Inventory Credit (IIC) Program

State of Nature	CIC Program, New Technologies (US\$)	IIC Program, 2.6% Real Monthly Interest (US\$)	Change (%)
Bad	760	732	-4
Normal	1,197	1,337	12
Good	1,395	1,504	8
Very Good	1,569	1,717	9
Expected	1,181	1,275	8

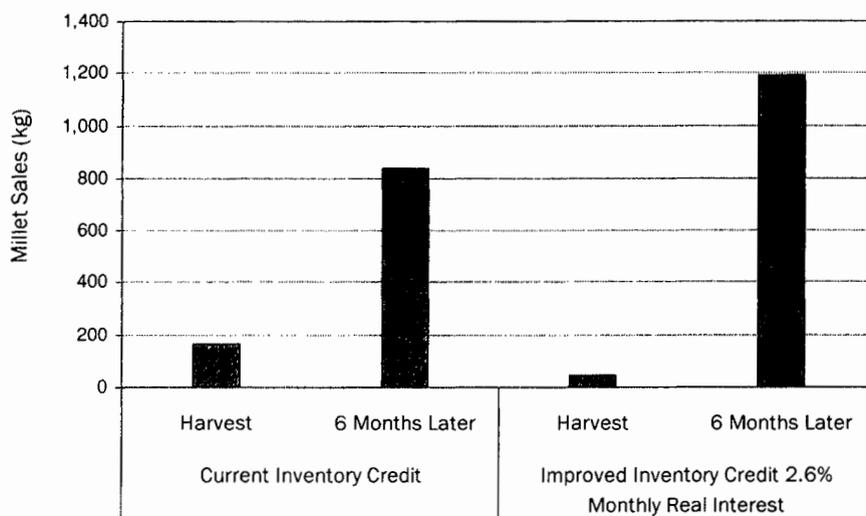
Source: Authors' model results.

Note: Marginal value for capital for farmers in the CIC program is 20%. Farmers in the IIC program have a 16% marginal value for capital.

differences between program and nonprogram farmers are low. This result is not surprising given that improved cultivars are less drought tolerant than traditional varieties and can't take advantage of higher dosages of fertilizer when faced with low water availability. Fortunately for farmers, the bad rainfall years with poor yields are the years in which the seasonal price change is the largest.¹⁸

Crop production increases by 570 kg for farmers in the IIC over those in the CIC, accounting for US\$77 (82%) of the change in income between farmers in these two programs. This income gain comes from increasing fertilizer expenditures by US\$33. Expected sales six months later at the higher seasonal price for farmers under the IIC program increase 352 kg over those for CIC program farmers (Figure 5), accounting for US\$17 (18%) of the income increase between farmers in the IIC and CIC programs.

¹⁸ But this also implies farmers need to have sufficiently high yields to put aside some of their harvest to sell later.



Source: Authors' model results.

Figure 5. Distribution of Expected Millet Sales Between Farmers Under the Current Inventory Credit (CIC) Program and an Improved Inventory Credit (IIC) Program

Effects of a Lower Cost of Financing

As reported in Table 9, farmers face a 36% annual nominal interest rate under the current inventory credit program. Taking out the average inflation rate over the past 13 years of 5% (IFS/IMF), and assuming a 10% long-term return to investments,¹⁹ implies that farmers in Niger are charged a 21% loan default risk premium.

In an inventory credit program, such as the CIC, the producers' organization should be able to reduce the riskiness of the credit by knowing its members and utilizing group pressure to encourage repayment (Jain, 1996). Given the very low default rates for microfinance programs in other developing nations (Year of Microcredit, 2005), a risk

¹⁹The return of a low-risk alternative, such as a U.S. Treasury bond, averages 5% to 6%. Assuming a return double that average in a high-risk environment such as Niger seems reasonable. Lowenberg-DeBoer, Abdoulaye, and Kabore (1994) have found even higher rates of return for Nigerien village-level investments.

Table 9. Observed and Suggested Cost of Financing in Nominal Terms

Description	Suggested Rate (%)	Program Rate (%)
Rate of Return	10	10
Inflation	5	5
Risk of Default	5	21
Annual Rate	20	36
Monthly Rate	1.67	3

Source: Authors' calculations from survey data.

premium of 5% seems reasonable for Niger.²⁰ This adjustment of the risk premium results in a nominal annual interest rate of 20%. In real terms, the change in the interest rate would be from 31% to 15%, or 1.25% monthly assuming the continuation of 5% annual inflation.

²⁰The similarity of the macroeconomic environment described in the studies of microcredit in various countries reviewed by the authors is the justification for the 5% loan default risk for Niger. Clearly, there is a need for empirical studies to establish a range of loan default risk for Niger. Such an objective would be useful for a future study but is beyond the scope of this work.

The model is rerun at this 1.25% monthly real interest rate, varying the percentage of the inventory holdings given as a loan. The analysis in the previous section assumed that farmers receive 100% of the value of their stored millet as a loan. The credit given in most inventory credit programs is 50% to 100% of the value of the stored crop (FAO, 2000). By varying the amount of the harvest value of stored crop received as a loan, we evaluate the effects of restricting credit on farmers' participation in inventory credit. The analysis in this section concentrates on two effects: (a) how farmer participation changes when the interest rate is lowered and the amount the farmer can borrow varies, and (b) the effect on farmers' incomes and technology use from the lower interest rates.

Farmer participation in the program is measured by the amount borrowed by the farmer. More borrowing from the program is indicative of more millet being stored under inventory credit. The model results provide evidence that the incentive for farmers to participate in the inventory credit program increases substantially as the cost of credit is lowered. When the cost of credit is lowered from 2.58% to 1.25% monthly, the expected amount of borrowing increases by US\$77 (98%) (Table 10). At the lower interest rate farmers would borrow at 70% of the harvest value of their grain, whereas at the higher interest rate they only utilize program credits at 75% of the harvest value and above.

When looking at the changes in income, these are positive but small effects. They result from only an interest cost savings since production practices are not affected by the reduced interest rates. Under the higher interest rate, income increased by US\$94 (8%) when switching from the CIC to an IIC program (Table 11). When the interest rate is lowered from 2.58% to 1.25%, income increases by US\$129 (11%) when switching from the CIC to an IIC. Hence, the net effect in household income from lowering the interest rate in the new

inventory credit program is an additional US\$35 (3%).

When credit is reduced to 95% of the harvest value of stored grain, at the higher interest rate, income increases by US\$44 (4%) when changing from the CIC to the IIC program (Table 11). When the interest rate is lowered, income increases by US\$119 (10%) when shifting from the CIC to the IIC program. This implies a net effect of a lower interest rate on income of US\$75 (6%) when credit is reduced to 95%. Restricting credit to 90% of the harvest value of the stored grain increases income by US\$40 (3%) from the CIC to the IIC program. When the interest rate is lowered at the reduced level of credit of 90%, income increases by US\$109 (9%) from the CIC to the IIC program. This results in a net effect from the change in the interest rate of US\$69 (6%) when credit is restricted to 90%. The increase in income continues to favor the IIC at the lower interest rate over the higher interest rate program up until valuation of grain given as a loan is 80%. When credit is reduced to 75% or less of the harvest value of stored grain, the income differences between the two programs (IIC with a higher interest rate and IIC with a lower interest rate) practically disappear.

The modeling results of varying the interest rate and the amount of credit received as a loan suggest that not only does participation increase at a lower rate of lending, but farmers can also obtain reasonable increases in income. At the higher interest rate, the gains in income quickly decrease as the amount given as a loan is lowered (Table 11). No significant production effects were found when varying the interest rate and the loan amount, as the production plans did not vary. The effects on income result from the savings in interest cost from reducing the risk of loan default.

Conclusions

In the current inventory credit program, where farmers do not capture the higher crop prices later in the season but instead

Table 10. Expected Level of Borrowing of Harvest-Value Income Under the Improved Inventory Credit (IIC) Program Under Three Costs of Capital and Five Valuations of Grain Stored

Monthly Interest Rate	Value of Grain Stored						
	100%	95%	90%	85%	80%	75%	70%
	— US\$ —						
2.58	78	64	64	64	64	64	0
1.25	156	156	156	156	156	132	132
Change in Borrowing: US\$/ (Percent)	77 (98%)	91 (142%)	91 (142%)	91 (142%)	91 (142%)	68 (106%)	—

Source: Authors' model results.

Table 11. Changes in Expected Household Income from the Current Inventory Credit (CIC) Program in Niger to an Improved Inventory Credit (IIC) Program Under Two Costs of Capital and Three Valuations of Grain Stored

Description	Value of Grain Stored						
	100%	95%	90%	85%	80%	75%	70%
	— US\$ / (Percent) —						
IIC (2.58% monthly rate)	94 (8%)	44 (4%)	40 (3%)	35 (3%)	31 (3%)	27 (2%)	24 (< 2%)
IIC (1.25% monthly rate)	129 (11%)	119 (10%)	109 (9%)	99 (8%)	89 (8%)	35 (3%)	27 (2%)
Expected Net Change: US\$/ (Percent)	35 (3%)	75 (6%)	69 (6%)	64 (5%)	58 (5%)	8 (1%)	3 (< 1%)

Source: Authors' model results.

receive a lower price for fertilizer in the next season, program participant farmers increase their incomes and fertilizer use. The current inventory credit program in Niger clearly is an improvement over no program. Nevertheless, currently farmers' contributions to the program average 1.1 bags of millet, which represents less than 4% of their total production in the 2002–2003 production season. There is an increasing number of participating farmers but minimal increase in participating farmers' contributions. This is consistent with the low returns found in the modeling, and brings into question the sustainability of the current program and its effectiveness to further increase fertilizer use.

The modifications to inventory credit indicate that the income benefits are greater when farmers are allowed to retain the profits from the later sales of their millet staple. The use of fertilizer also increases substantially when comparing the current inventory credit program to a program where the farmers' organization retains the profits. According to the model results, improving inventory credit by redistributing back to farmers the net returns to storage provides a larger economic incentive to use more fertilizer than lowering input prices.

The improved inventory credit program has the potential to offer its greatest benefit to farmers in bad years when seasonal price increases are highest between harvest and

later in the year. However, the technology data and the modeling results indicate that the response of new technologies in bad rainfall years is small under inventory credit. Farmers' ability to take advantage of the bad-year price increase depends upon their ability to increase yields in these years. So, in the future, there needs to be more emphasis on improved technology for these low rainfall years, such as water harvesting technologies (see Sanders, Shapiro, and Ramaswamy, 1996).

In spite of large changes in interest rates, the additional income effects are small. The gains here are in the costs of storage in better rainfall years, as there is little surplus to sell in adverse rainfall years. The benefits to storage are less in good rainfall years because there is much less price increase. Clearly, the main constraint to inventory credit programs is increasing yields in bad rainfall years when the seasonal price increases are substantial.

Another market improvement is to respond to the between-year price collapse in good rainfall years by selling to higher value markets. The animal feed market or food processing markets are important responses to the between-season price collapse (Vitale and Sanders, 2005; Ouendeba, Abdoulaye, and Sanders, 2003). This market expansion will become more important as incomes increase and as the price differences within years are reduced, since more farmers will be obtaining inventory credit.

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Agricultural Production Credit Clubs in Armenia: Facilitating Investment Through Market Linkages, Social Capital, and Microcredit

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Abstract

Armenia's 1991 privatization and land redistribution process handed ownership and control of agricultural production to over 300,000 inexperienced, financially distressed, subsistence farmers operating extremely small fragmented plots, and the processing sector to similarly distressed managers. As seen elsewhere across Eastern Europe, the result was chaotic turmoil characterized by pervasive delayed payments, massive disinvestment, and rapid output declines. However, unlike elsewhere, Armenia could not rely upon the entry of FDI to correct channel incentives and revitalize its agricultural and rural financial markets. Instead, an alternative exogenous stimulus was required. This study analyzes the instrumental case of how a quasi-public third party, the USDA Market Assistance Program and Agricultural Production Credit Clubs, successfully imitated FDI-induced incentive structures through market linkages, social capital, and microcredit to establish economically sustainable marketing channels. The findings provide important insights into the design of market-linked microcredit programs.

Key words: Armenia, credit clubs, social capital

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The growth of Armenian agriculture over the past decade and a half has been severely constrained by access to financial resources. The 1991 privatization and land redistribution process placed Armenia's productive arable land resources in the hands of the Armenian people. This solved the ensuing food security problem, but it also threw the agricultural sector into chaotic turmoil. The agricultural production base was now controlled by over 300,000 inexperienced, financially distressed, subsistence farmers operating extremely small and fragmented plots. As "new" farmers, they possessed neither the banking relationships nor business history to access formal credit markets. Additionally, the transition process had eroded away any wealth they previously possessed. Consequently, the production system rapidly descended into a low-input subsistence production system.

Similarly, the agricultural processing sector found itself under severe financial distress. Processors were therefore unable to extend trade credit to farmers; instead, they actually borrowed from farmers through extreme payment delays, worsening farmers' already perilous cash-flow situation. Thus policy makers were faced with the challenge of how to inject the agricultural sector with the sufficient financial resources in an incentive-compatible manner to kick start production and rural financial markets.

Interestingly, although there are many theoretical solutions provided in the literature (Swinnen and Gow, 1999), the only empirically successful solution

observed in Central and Eastern Europe (CEE) for revitalizing the agricultural sector and supporting rural financial markets has been the entry of foreign direct investment (FDI) induced vertical coordination and trade credit (Gow and Swinnen, 1998, 2001; Gow, Streeter, and Swinnen, 2000; Foster, 1999; Dries and Swinnen, 2004). By entering markets with sufficient reputation, financial resources, technical knowledge, market access, and a sufficiently long-term perspective to ensure credible self-enforcing contractual relationships, these foreign firms have been able to provide an incentive structure for overcoming the numerous market failures that previously plagued the sector (Gow and Swinnen, 1998; Walkenhorst, 2000; Gow and Swinnen, 2001; Dries and Swinnen, 2004; Dries, Reardon, and Swinnen, 2004).

Unlike other CEE countries, Armenia has not been able to rely on FDI to quickly restore an economically viable and sustainable market structure. With its small domestic consumption base, both in terms of population and purchasing power, Armenia provided an unsuitable foreign investment arena for multinational food companies. Instead, the Armenian agricultural sector required an alternative external stimulus; this came from the U.S. government through a U.S. State Department financed and USDA implemented overseas development aid project—the USDA Market Assistance Program (MAP).

In this study we analyze the instrumental case of the USDA MAP Agricultural Production Credit Club program and how its establishment has facilitated rural financial market access for selected groups of Armenian producers. Although the program is small in size and scale, it serves as an important instrumental case of an innovative and economically sustainable microcredit program for possible replication elsewhere.

The remainder of the paper is structured as follows. First, the agricultural transition process in Armenia is described.

Next, the role of FDI is reviewed and discussed as the observable solution for correcting various market failures in many CEE countries. This leads to an extensive analysis and evaluation of the USDA MAP and its Agricultural Production Credit Club (APCC) program as an instrumental microcredit and business development model (in the absence of FDI) for facilitating rural financial market access for agricultural producers. Finally, the impact of the APCCs as a driver of innovation and change within Armenian agriculture is evaluated and discussed.

Impact of Transition on Agriculture

Armenia has arguably faced one of the most difficult economic and social transitions of all the former Soviet Republics (World Bank, 2002a). The country initially suffered a severe economic contraction around the time of independence that led to widespread poverty and financial distress (Gomart, 2002).

Three key events drove this economic decline: (a) a 1988 earthquake that devastated the north and closed Armenia's main electricity source, (b) continued political unrest and armed conflicts with Azerbaijan that resulted in economic blockades and closed the borders with Azerbaijan to the east and with Turkey to the west, and (c) the independence from the Soviet Union and the ensuing price and trade liberalization and privatization process that caused the collapse of traditional marketing channels.

The combined impact was a 60% decline in GDP between 1991 and 1993, and widespread poverty, financial distress, and significant emigration (Dudwick, 2002; Gomart, 2002). By 1993, over 75% of the population was living on less than US\$1 per day (Gomart, 2002). Since then, Armenia has achieved modest economic growth coupled with low inflation; however, GDP still remains only at about 80% of 1990 levels. Overall living

conditions have improved, although not all households or regions have benefited equally, and inequality continues to rise.

Across the economy, agriculture has been the sole sector where output exceeds its corresponding 1990 levels (Sardaryan, 2002) and has been an important factor determining GDP growth (World Bank, 2002b). The blockade, privatization, and breakdown of the agrifood complex, coupled with poor government policies, have all adversely affected agriculture, but the impact was less severe than that seen in other sectors. Agricultural output fell only 17.5% from 1988 to 1993 (Sardaryan, 2002; World Bank, 2002b). Since then, the crop sectors have seen a dramatic recovery, whereas the livestock sector continues to struggle.

There were several reasons for this differential recovery. Immediately following independence in 1991, and facing a looming food security crisis, the Armenian government implemented a rapid egalitarian land redistribution scheme in combination with the concurrent privatization of the livestock, input, and processing sectors; liberalization of prices; and removal of subsidies. The aim was to stimulate agricultural production. Instead, the process created an agricultural production sector characterized by inexperienced, financially constrained, subsistence farmers; highly fragmented land parcels; increasing input costs; lower output prices; extreme payment delays; and severe credit shortages. The result was bedlam as farmers and firms attempted to readjust.

Facing severe distress and food shortages, farmers rapidly adopted subsistence farming practices to alleviate their immediate food security concerns (Dudwick, 2002; Gomart, 2002). Excess livestock were liquidated to access scarce capital resources and farmers shifted their limited resources to subsistence production of storable and tradable arable crops.¹ The

result was a 50% reduction in livestock numbers along with an initial fall and slow recovery in crop output, as yields dropped, although acreage remained effectively unchanged. However, over time, as farmers' experience and production practices improved, so did crop yields and output (Gomart, 2002).

Similarly, capital and factor input shortages forced many processing firms to initially close or severely reduce production. Once privatization began and electricity was fully restored, firms continued to struggle. Their traditional business practices were no longer appropriate. Armenia's newly gained independence gave rise to broken business relationships, constrained trade and market access, pervasive financial distress, limited capital, and a nonexistent legal enforcement system. New business practices had to be established. Emigration and reduced consumer spending power had also severely contracted domestic demand. So, not only did firms face increasing competition from imported products and distressed local firms, but they also faced a rapidly shrinking domestic market.

The impact was total chaos, with financial distress and contractual breach pervasive throughout the system from farmers to retailers. Investment decisions became driven by a survival mentality, characterized by extremely high discount rates and very short payback period requirements. Commercial relationships, contracts, and trust were of little value or significance due to financial distress and limited legal recourse. The result was a completely broken agricultural sector requiring an entirely new business model and infusion of capital, knowledge, and technology.

Foreign Direct Investment as the Observed Solution

Across CEE, similar agricultural collapses had been observed during transition. No country was immune; the only differences were the extent of the individual collapses

¹ Fertilizer use, for example, dropped by over 60%.

in terms of both length and depth. Some CEE countries, like Hungary and the Czech Republic, faced a very swift decline followed quickly by a rapid ascent, whereas others, such as Russia, have faced extremely long, drawn out declines with no bottom in sight (Swinnen, 2000).

All of the declines, however, have the following characteristics in common: the breakdown of the traditional marketing channels and business relationships due to privatization and market liberalization; extreme and pervasive financial distress across all channel members; limited personal savings and financial resources; ineffective legal enforcement systems; extreme payment delays; and a massive shift to barter and cash exchange transactions, as firms had limited to no trust or confidence in business partners or financial exchange transactions (Gow and Swinnen, 1998, 2001; Swinnen and Gow, 1999).

Within this dysfunctional business environment of high information asymmetry and weak enforcement, borrowers lacked the ability to signal their creditworthiness or stake suitable bonds for collateral. Lenders similarly faced screening, monitoring, and enforcement problems. Thus the agricultural sector found itself in a financially constrained suboptimal equilibrium unable to break the poverty trap (Swinnen and Gow, 1999). To minimize exposure, farmers rapidly shifted production from high-asset specificity products, such as milk, toward low-asset specificity products traded in cash markets, such as watermelons, or highly storable products, such as wheat and potatoes (Gow and Swinnen, 1998). The result was a massive decline in agricultural output across the CEE countries.

The entrance of FDI has been critical in correcting marketing channel incentives, priming rural financial markets, and catalyzing economic growth. Through providing credible, transparent, and enforceable vertical contract relationships, in combination with the necessary

financial, technological, and human resources, foreign firms have been able to offer private solutions that assist farmers in escaping the poverty trap (Gow and Swinnen, 1998, 2001; Gow, Streeter, and Swinnen, 2000; World Bank, 2002c). However, with its small domestic consumption base, both in terms of population and purchasing power, Armenia provides an unsuitable foreign investment opportunity for multinational food companies. Consequently, an alternative stimulus was required: the USDA Market Assistance Program.

The USDA Market Assistance Program²

In 1992, Armenia requested U.S. government assistance in facilitating agricultural transition. The USDA initially provided a traditional technology-push, extension-driven project; however, after three years, it became apparent that this project was not meeting industry needs. So, in 1996, the USDA redesigned the project to a market-pull approach with the establishment of the USDA Marketing Assistance Project (MAP).³ With this change, the program's focus evolved from "What can we produce?" to "What does the market demand and how can we profitably meet this demand?"

The Market Assistance Project mission statement perhaps best articulates this change:

MAP will assist farmers and agribusinesses in production, marketing, and exporting food and related products to increase incomes, create jobs, and raise the standard of living for Armenians working in the agro-processing sector. This assistance will come in the form of timely

²The U.S. government assistance has been managed by the USDA Cooperative State Research, Education, and Extension Service (CSREES) Office of International Programs.

³The USDA MAP project was recently completed, with its responsibilities and services being transferred to a specifically established NGO, the Center for Agribusiness and Rural Development (CARD). See www.usda.am and www.card.am for additional details.

technical, financial, and marketing support to farmers and farmer groups, agribusinesses, as well as education, extension services, and applied research (USDA MAP, 2003).

To achieve its goals, USDA MAP used an integrated, market-driven approach to business development delivered through permanent Armenian staff and visiting international technical specialists. These individuals assist business clients to: (a) identify potential market demand and develop appropriate marketing channels through marketing assistance, (b) develop new products and processes through technical assistance, and (c) access and mobilize the necessary finance resources. In this way, the USDA MAP operates in a similar catalytic manner as FDI.

Since its inception, MAP has worked with more than 65 different processing firms, who employ more than 2,600 full-time staff and 1,100 seasonal staff and purchase raw materials from 18,000 farmers. At the farm level, MAP has facilitated the establishment of 33 farmer marketing associations⁴ in dairy, goats, and fruit and vegetables, the establishment of 48 production credit clubs which provide short-term finance for farmer groups, and provided technical assistance on numerous production and marketing issues.

Problem Identification

After the 1996 restructuring, USDA MAP realized it needed to concurrently address both the primary production and processing-level problems, as a general lack of high-quality raw materials was constraining its agribusiness and food processing clients. This problem resulted from farmers' limited access to credit and their inability to enforce payment for any goods sold. The banking sector viewed agriculture as a high-risk sector and was

only willing to provide loans at exorbitantly high interest rates and collateral requirements.

Land reform had provided farmers a productive resource, but one with little collateral value, as delayed payments meant its economic rents were effectively zero. Similarly, up- and downstream firms were financially distressed and capital constrained, hence unable to provide trade credit or vendor finance. Instead, many processors actually borrowed capital from farmers through delayed payments for delivered product.⁵ These factors effectively excluded farmers from capital markets. Consequently, a different approach or delivery system was required to inject capital into the system and correct incentives.

Agricultural Production Credit Clubs

Recognizing that microcredit programs provided a solution, Bill Miller, a USDA MAP director, decided to restructure and expand a highly targeted, pilot microcredit program into the Agricultural Production Credit Club (APCC) program with the aim of assisting financially distressed small-scale farmers gain access to small production credit loans.⁶ The key component of the program was linking a self-selected group of farmers from within the same community and productive activity to a USDA MAP collaborating agribusiness enterprise.

⁵ See Gow and Swinnen (1998) and Swinnen and Gow (1999) for an extensive discussion on the pervasiveness of hold-up problems in the form of delayed payments in transition agriculture and their adverse impact on agricultural output.

⁶ The Women in Rural Development microcredit program had been launched in 1998 by the UDSA MAP to assist women in starting small businesses. Under this program, three credit clubs had been established that made available working capital loans of up to US\$300 to women for purchase of inputs, services, and labor to be used in agricultural processing related activities. The loans had to be repaid within 12 months.

⁴ These units are called "associations" as apposed to "cooperatives" in an attempt to dissociate them from the Soviet-era cooperative farms and the stigma still associated with these earlier farms.

The goal was to establish an economically sustainable, mutually beneficial, and self-enforcing relationship between the two groups based upon a timely payment and cash-flow stream from processors to producers, a secure supply of high-quality inputs for processors, and a self-enforcing and self-monitoring structure. The basic premise was actually so simple that no one really believed it would be successful. Yet it has been. The following sections highlight the critical components of the APCC program.

Securing a Profitable Market and Cash Flow

The key guiding principle underlying the success of the credit clubs was that *all production credit clubs had to be directly aligned to a viable and profitable processor*. This strategy acknowledges that a successful loan decision is directly determined by the borrower's ability to produce sufficient cash flow to repay the loan and that a necessary condition for success is a viable and profitable downstream market. To ensure this, the USDA MAP required that APCCs be linked directly to a USDA MAP-assisted processing plant or cooperative.

As part of their assistance package to agribusinesses and processors, USDA MAP program managers explained the APCC program and how it could facilitate their procurement process. If positively agreeable, the processors could then recommend a specific group of farmers or farm leader for the USDA MAP staff to approach about the APCC program.

Establishing Collective Interest and Identifying the Business Leader

Once a farmers' group had been identified, initial exploratory meetings would present the APCC project concept, goals, and requirements. Discussions would only progress if a suitable business leader could be identified who possessed sufficient entrepreneurial vision and social capital to lead a homogeneous group of potential

club members through the establishment process. Then, conditional on a business leader being identified and a positive group response to the proposal's requirements, further meetings would be conducted to establish the club, elect officers, and begin business plan writing seminars.

Club Structure

At the outset, the potential club members determined their own membership eligibility requirements. Ten to 15 club members were viewed as the optimal group size to ensure cooperation, enforcement, and establish sufficient social capital within the club. Only after two years could new members be admitted; an initial bonding period was seen as essential for institutionalizing the rules and ensuring the development of appropriate group dynamics.

The program is designed as a continuous revolving credit program with the goal of repayment, and hence initiation of a new cycle within one year or less. The USDA provided each club an initial credit line. The credit line was neither a grant nor a loan, but was instead an equity investment that established the APCC's initial capital base from which it could initiate lending activities. The USDA did not require any return on capital nor did it agree to leave its equity capital in the APCC in perpetuity. However, the USDA did stipulate the right to remove its equity investment at any time if the APCC sustained losses to its principal or if the club failed to grow its equity base.

The APCC and USDA MAP have first claim against any farm profit generated from production activities. Only after all previous loan allocations have been repaid and the USDA has received full payment for its equity investment can the club initiate a new credit cycle.

Loans

The loans were initially set at a maximum of US\$1,000, interest-free. Club members were, however, required to pay a membership fee during each loan

allocation cycle based upon a fixed percentage of the individual loan amount allocations. Although each club determines its own membership fee, until now this fee has been unanimously set at 15% of the total loan amount allocated each cycle. The membership fee in effect became a self-determined interest payment to the club for use of funds.

The loans were designed to provide farmers working capital for the purchase of inputs, supplies, and services for use in the production process—not for investment in fixed assets or buildings. Leasing of equipment was encouraged if such equipment was necessary to implement a business plan. Family members could not be hired using loan funds; instead, they had to be paid from production profits.

Credit Review and Allocation Process

All loan activities were initiated, decided upon, and enforced collectively by the club members. A business plan was required to accompany each loan application to support the loan review process. USDA MAP staff provided technical assistance to each club on business plan development, credit scoring, loan analysis, and club activities. All club members served on the loan application review committee and decided upon allocations. This procedure provided a highly effective screening mechanism to protect against bad loans, as club members had the best knowledge of one another's resources and capabilities.

Once the loan applications were approved by a satisfactory vote of the club members,⁷ USDA MAP credit specialists and the director would review and sign off. The USDA would then transfer funds into an APCC account at a local bank. Next, program managers visited the credit club to

initiate dispersal of funds to the respective credit club members. One month after allocation, program managers would return to visit and monitor the recipients' activities and investments to ensure consistency with the proposed business plan.

Since the program's initiation, the USDA has implemented various process improvements to standardize and streamline the loan application process and increase formality, efficiency, transparency, and auditability. Clubs now submit one comprehensive and integrated business plan and loan application. A formal loan committee reviews and approves all loans. If approved, legally binding agreements are signed with the club president and individual members. Clubs now distribute the funds.

This approach has offered program managers additional time to visit club members, monitor their activities, and develop training materials. The whole process has positively impacted farmers' attitudes toward credit and strengthened their banking relationships, while not affecting loan recovery rates.

Repayment and Capital Accumulation

Each farmer repays the credit club via installments over a set time period. The principal component of each installment is deposited back into the "USDA Credit Line" account, while the 15% membership fee is split with 10% deposited into the "Refundable Fund" of the credit club and 5% deposited into the "Risk Reserve Fund" of the credit club.

The Refundable Fund is a club-managed equity account that builds with each completed loan cycle. The Risk Reserve Fund is a farmer-specific savings fund that at the end of the cycle farmers can either access for personal use or retain as a savings investment in the credit club. Over time, the capital accumulation within both accounts will provide the capital base required to ensure self-sufficiency, thereby removing the need for USDA initial equity

⁷ Each club determined what it recognized as a satisfactory vote; however, the USDA suggested that unanimous approval would be appropriate during the initial establishment of the clubs. Clubs could change this requirement at a later date if deemed appropriate.

investment. Upon membership withdrawal or club termination, club members have the right to receive all of their membership payments conditional upon the club having no outstanding debt obligations.

Joint Monitoring and Risk Bearing

There are no collateral requirements; however, implicit self-enforcement mechanisms operate. First, clubs are not allowed any principal losses. Otherwise, USDA MAP can withdraw its equity investment. Specifically, this means club members are jointly and severally liable for one another's repayment, thereby ensuring self-monitoring and enforcement. Second, any member who recommends new members is liable for any delinquencies they may incur, as well as possible expulsion from future allocations. Third, the savings component through the Risk Reserve Fund imposes a mutual liability upon all members for repayment. Finally, the "Law of Credit Clubs" states that the property of delinquent borrowers becomes the property of the credit club upon loan default.

Credit Clubs as Drivers of Institutional Innovation

The APCC program has been responsible for various institutional innovations, discussed in detail in the sections below.

Legal Status

At the time of the program's expansion, the Armenian legal system did not recognize "Credit Clubs" as legal entities, causing many difficulties in enforcing financial contacts. In April 2002, after a complex process, USDA MAP facilitated the enactment of the "Law of Credit Clubs." The law defines and regulates the legal status of credit clubs as volunteer organizations created for mutual financial assistance of individual members conducting agricultural activities, governs their activities, and determines acceptable sources on funds. Although the law still

requires considerable improvement, its importance cannot be underestimated, as credit clubs can now be registered and operate on an equivalent basis as all other legal entities. By 2005, all APCCs had successfully registered as non-profit cooperatives.

Union of Credit Clubs

The law's enactment also provided the impetus behind the formation of a lobby group, the Union of Credit Clubs, to collectively influence Armenian agricultural policy—something that had previously been unavailable to small farmers. Since its formation, the Union has established an important mechanism for accessing and influencing policy makers.

Credit Club Forum

An annual Union of Credit Clubs forum has been initiated to give APCC members and interested parties an opportunity to discuss critical issues, transfer best practices, introduce new ideas, concepts, and processes, and lobby government. For example, the first forum addressed the shortcomings and possible reform of the legal framework for credit clubs. Various parliament members and government officials were invited to ensure that they understood the problems. As a result of the forum, a consultant was hired to write a set of by-laws and accompanying guidebook for the operation of credit clubs. Since then, these by-laws have been adopted by all of the credit clubs, thereby mitigating many of the legislation's weaknesses.

Leadership Training Programs

The presence of good leadership is recognized as a key component in the success of any credit club. Program managers estimate that leadership accounts for 60% of a club's success. Consequently, the USDA has collaborated with an NGO to develop, implement, and deliver a series of leadership and teamwork

skills training programs for credit club presidents, management, and members. They have also introduced an accounting training module for farmers on daily financial and business record keeping, cash flow analysis, and basic tax management. The programs have been institutionalized in local NGOs to ensure continuity and sustainability.

Impact and Farmer Responses

Since 1998, 50 APCCs with a total of 962 members have been established in 10 different commodity areas and across all 10 regions of Armenia (Table 1 and Figure 1). Over this time period, the APCC program has successfully completed 200 credit cycles. Currently, there are 20 additional farmer groups who have submitted requests for the establishment of new credit clubs. The USDA MAP began with an allocation of US\$100,000 to support the initial credit clubs and loan allocation over the first few years. Since the program's origin, the total loan portfolio has grown to about US\$1,700,000, of which \$1,200,000 is USDA-allocated funds and \$500,000 is credit clubs' investments drawn from their own Refundable and Risk Reserve Funds (Figure 2).

Breaking the Dependency Culture

The credit clubs have had a huge positive impact on assisting members develop a culture of self-determination, instead of dependency. The Soviet system and initial post-Soviet AID-supported system fostered a dependency culture in many rural regions that has been extremely difficult to break. By providing individuals the opportunity to jointly determine their future and assisting them in taking the first step, the APCCs and farmer members have broken this dependency culture.

As one APCC president noted: "If you look at the villages with a credit club and if you rank the farmers based on their well-being—first would be APCC farmers, then there would be farmers in the co-op if

there is one, then the rest of the farmers." Many farmers now realize the positive impact of APCC membership on their income earnings potential and wealth accumulation, which has risen to a level where it is now greater than that of their urban friends and families (the average Armenian household income is approximately \$350 per annum). Farmers clearly recognize that they have benefited from access to capital and no one wants to regress to the past. So instead of waiting for someone else to act, there is now a collective desire among farmers to self-determine and control their own future.

Institutionalized Savings and Capital Accumulation

After their 2nd credit cycle, all clubs are required to allocate a proportion of membership fees into their Refundable Fund and Risk Reserve Fund which act in a similar manner to a private equity investment and savings account, respectively. This retained capital then directly supports future lending activities, thereby providing appropriate screening and monitoring incentives for farmer members as their personal capital is at risk.

Interestingly, farmers have preferred to invest all of their membership fees toward building APCC capital, rather than removing their Risk Reserve Funds. For credit-constrained farmers, this is a win-win situation; they simultaneously increase their personal savings (as these retained funds can be removed at a later date), while also increasing the size of the pool of available credit lines with each cycle. This process has generated approximately US\$575,389 in investment savings through the refundable funds. The average amount of funds generated per club is US\$11,282, but ranges from US\$123 to US\$45,934 depending on the number of farmers, the year of establishment, number of cycles, and the activity of the club. As shown in the far right-hand column of Table 1, this is the equivalent of US\$597 savings per farmer member, or almost twice the average annual income for an Armenian household.

Table 1. Summary Data for Agricultural Production Credit Clubs in Armenia

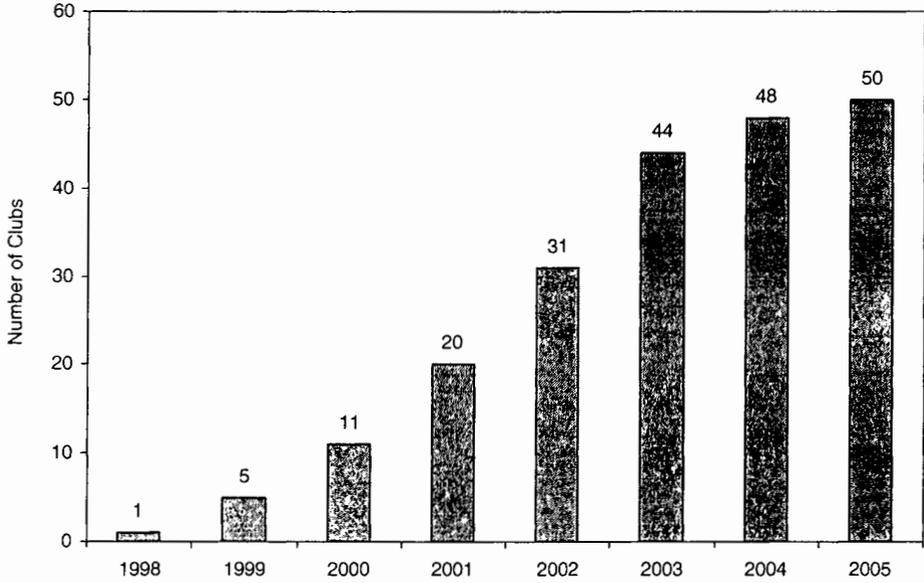
Credit Club	Region	Activity	Date of Establishment
1 Gyumri CC	Shirak	canned fruits	Nov. 1998
2 Kurtan CC	Lori	potatoes	Feb. 1999
3 Stepanavan CC	Lori	milk	Feb. 1999
4 Areni CC	Vayots Dzor	grapes	Apr. 1999
5 Vosketap CC	Ararat	tomatoes	Nov. 1999
6 Narek 1 CC	Lori	wheat/potatoes	Mar. 2000
7 Vartablur CC	Lori	potatoes	Mar. 2000
8 Nairi CC	Armavir	tomatoes	Mar. 2000
9 Dashtakar CC	Ararat	tomatoes	Apr. 2000
10 Lejan CC	Lori	milk	Jul. 2000
11 Voske Hask CC	Shirak	wheat/potatoes	Nov. 2000
12 Akhurian CC	Shirak	wheat/potatoes	Mar. 2001
13 Akunk CC	Shirak	wheat/potatoes	Mar. 2001
14 Pushkino CC	Lori	milk	Mar. 2001
15 Vardenis CC	Gegharkunik	milk	Apr. 2001
16 Vahan CC	Gegharkunik	milk	Apr. 2001
17 Oshakan CC	Aragatsotn	dried fruits	May 2001
18 Hrazdan CC	Kotayk	milk	Sep. 2001
19 Tsakhhahovit CC	Aragatsotn	milk	Nov. 2001
20 Brnakot CC	Syunik	wheat/hogs	Nov. 2001
21 Sistan CC	Syunik	milk	Nov. 2001
22 Kurtan 2 CC	Lori	potatoes	Jan. 2002
23 Shirak CC	Shirak	milk	Apr. 2002
24 Ashotsk CC	Shirak	milk	Apr. 2002
25 Ijevan CC	Tavush	grapes	Apr. 2002
26 Ginekar CC	Vayots Dzor	grapes	May 2002
27 Voskevaz CC	Vayots Dzor	grapes	May 2002
28 Aregak CC	Vayots Dzor	grapes	Jun. 2002
29 Aigevan CC	Armavir	fruits	Jul. 2002
30 Arevik CC	Armavir	fruits	Jul. 2002
31 Lejan 2 CC	Lori	milk	Nov. 2002
32 Lejan 3 CC	Lori	milk	Nov. 2002
33 Golden Goat	Vayots Dzor	goat milk	Jan. 2003
34 Dalar Shiver	Lori	forage/milk	Mar. 2003
35 Ashotsk 2 CC	Shirak	milk	Apr. 2003
36 Zangakatun CC	Ararat	fruits	Apr. 2003
37 Vardashat CC	Ararat	fruits	Apr. 2003
38 Vardenis 2 CC	Gegharkunik	milk	Apr. 2003
39 Oshakan 2 CC	Aragatsotn	dried fruits	Jun. 2003
40 Tashir CC	Lori	milk	Aug. 2003
41 Shirak 2 CC	Shirak	milk	Aug. 2003
42 Aigabats CC	Shirak	wheat/potatoes	Aug. 2003
43 Tavush CC	Tavush	wheat	Sep. 2003
44 Maisyan	Armavir	milk	Oct. 2003
45 Areni 2 CC	Vayots Dzor	grapes	Nov. 2003
46 Selim	Vayots Dzor	goat milk	Feb. 2004
47 Jrahovit CC	Ararat	potatoes/vegetables	Mar. 2004
48 Artik CC	Shirak	wheat/potatoes	Mar. 2004
49 Khachik	Vayots Dzor	goat milk	Feb. 2005
50 Galto	Aragatsotn	sheep milk	Feb. 2005
51 Gandzakar	Tavush	wheat/hogs	Feb. 2005

Totals:

Sources: USDA Market Assistance Program (MAP), Center for Agribusiness and Rural Development (CARD), and authors' calculations.

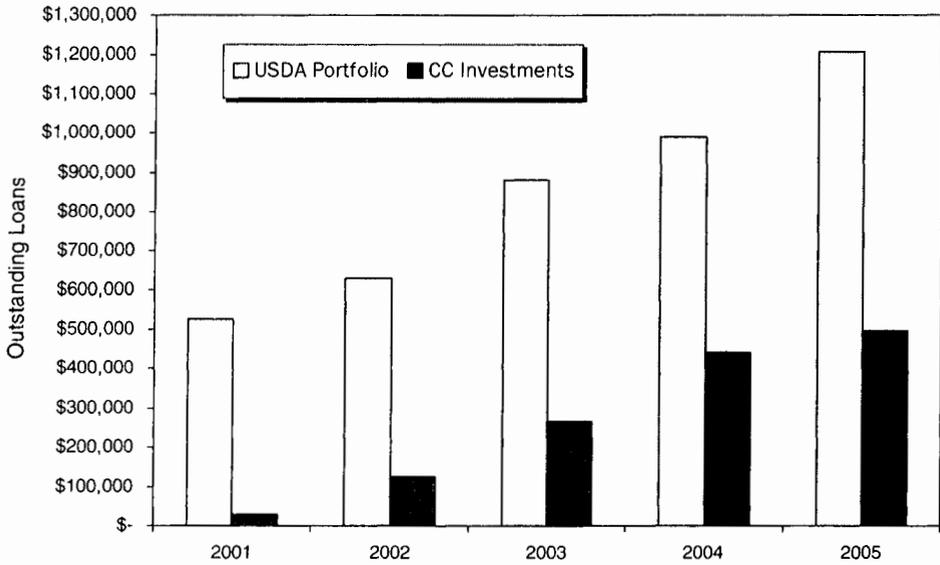
Table 1. Extended

	Number of Current Members	Number of Cycles	Loan Amount of 1st Cycle (US\$)	Loan Amount Current Cycle (US\$)	Amount in Refundable Fund (US\$)	Average Effective Savings per Member (US\$)
1	18	8	3,000	10,470	7,000	389
2	27	6	12,200	84,165	34,383	1,273
3	32	7	9,860	57,860	30,308	947
4	20	7	16,060	24,063	7,555	378
5	13	7	13,835	49,825	19,849	1,527
6	19	5	16,730	23,890	6,000	316
7	22	5	16,100	60,220	26,668	1,212
8	18	7	8,782	59,843	20,964	1,165
9	10	7	9,490	21,820	11,378	1,138
10	30	4	19,395	51,085	19,160	639
11	16	7	13,770	55,800	24,596	1,537
12	23	6	21,356	70,500	25,116	1,092
13	20	6	20,300	70,000	24,347	1,217
14	31	5	10,428	85,255	32,331	1,043
15	19	5	10,600	47,000	20,178	1,062
16	12	5	11,455	25,055	9,985	832
17	16	4	13,100	31,815	10,495	656
18	28	5	24,600	61,267	12,743	455
19	30	5	20,990	73,125	21,007	700
20	10	5	7,019	29,500	8,129	813
21	12	5	16,600	29,400	9,669	806
22	18	3	10,730	33,300	7,831	435
23	17	4	11,595	20,626	5,020	295
24	20	5	11,883	24,455	9,875	494
25	11	4	3,612	10,755	123	11
26	18	2	10,470	13,405	3,546	197
27	11	4	9,335	6,207	245	22
28	15	5	9,650	18,955	6,743	450
29	22	5	8,367	41,749	10,266	467
30	27	5	12,493	59,540	16,163	599
31	23	3	10,925	18,130	6,418	279
32	24	3	8,600	15,340	5,331	222
33	19	4	14,800	21,867	5,623	296
34	14	3	13,894	27,290	9,047	646
35	16	4	13,450	24,545	6,363	398
36	15	2	4,780	12,400	2,577	172
37	15	2	7,980	13,200	3,282	219
38	26	4	14,400	41,800	10,640	409
39	16	1	11,779	11,779	1,890	118
40	25	3	22,730	38,195	6,800	272
41	13	3	9,050	17,890	2,547	196
42	13	3	7,580	19,955	3,532	272
43	18	3	8,772	19,922	3,000	167
44	21	3	14,525	24,787	3,318	158
45	21	6	11,350	18,356	45,934	2,187
46	20	3	14,340	28,500	4,888	244
47	12	3	9,777	15,352	3,288	274
48	11	3	10,316	17,900	3,114	283
49	19	2	14,975	23,849	2,274	120
50	20	2	12,800	20,000	1,983	99
51	17	2	11,475	21,765	1,869	110
	963			1,703,772	575,390	597



Source: Center for Agribusiness and Rural Development (CARD).

Figure 1. Number of Credit Clubs



Source: Center for Agribusiness and Rural Development (CARD).

Figure 2. Total Outstanding Loans (USDA and Credit Club)

These savings range up to over US\$2,100 per person.

Early Repayment and Graduation to Formal Markets

Initially it was necessary for program managers to ensure farmer members made their loan repayments on time. This often involved physically visiting farmers to remind them their installments were due. Over time, these visits have become superfluous as farmers have gained economic strength. Instead, farmers are now calling program managers to inform them that they have successfully completed their loan repayments, often ahead of schedule, and they want to initiate a new cycle. Additionally, some farmers have graduated to the formal banking system with an established formal credit history and recognition of appropriate financial repayment practices. Without the club, this graduation to formal markets would have been unlikely.

Collaborative Culture

Previously, farmers rarely trusted each other and were wary of the notion of working together. The APCC mutual liability requirement has served to force members to come together. Over successive credit cycles, this independent culture has broken down. There are now numerous stories of club members collaborating to repay other members' loans in default so that a new credit cycle can be initiated, and then negotiating private settlements with the specific member. This new collaborative culture for identifying and implementing solutions will be important as these farmers attempt to collectively pursue new market activities.

Expansion into New Activities

Access to business training and capital has catalyzed an entrepreneurial mindset within many clubs and villages, leading to the initiation of various new entrepreneurial activities. Once individuals start observing

their peers attempting a new entrepreneurial activity, they begin initiating their own. This has led to the relaxation of industry linkage rules and introduction of a 70:30 rule where at least 70% of the loan must be used on the primary activity and up to 30% on an alternative activity. This second activity may be the same for all members (if they so decide) or different for each member.

Conclusions

Although the APCC program is small in scale, it does provide an instrumental case and set of lessons illustrating how outside donor agencies can successfully replicate the impact of FDI in facilitating subsistence farmers' access to rural financial markets. The critical takeaway is the importance of the direct market linkages to a profitable downstream firm, as without these linkages it would be impossible to ensure farmers a reliable cash-flow stream—and it is this factor upon which all investment and lending decisions are based.

Elsewhere in Central and Eastern Europe, FDI has been the critical catalyst in correcting farmers' production incentives. As foreign firms have entered these markets, they have been forced to provide farmers a reliable and profitable cash-flow stream to ensure a steady stream of high-quality inputs. Within this case, USDA MAP has been able to achieve a similar response and impact to FDI by linking the APCCs to a USDA MAP-supported agribusiness. These linkages help in facilitating the timely payment for delivered product, thereby solving the farmers' cash-flow problems and correcting their investment incentives. Thus an appropriately designed market linkage is important in providing an economically sustainable business model against which to profitably lend.

Although USDA MAP staff never become involved in enforcing any of the contract

payments or product flows between parties (and they should not), they have been able to successfully promote the screening and match-making process. Key to this process is getting the processors to pre-identify a farm leader or group of farmers with whom they are interested in working, and then separately facilitating establishment of a self-selected club of homogeneous farmers involved in a common activity around that farm-business leader.

This allows USDA MAP to advance the establishment of a self-enforcing, monitoring, and risk-bearing club structure focused on one economically sustainable activity and reliable cash-flow stream. As part of this process, farmers are required to make an equity investment in the club. This not only imposes a self-enforcing structure on the club members, but also encourages a culture of self-determination and investment within the club membership, thereby breaking down the previous dependency culture.

Additionally, by requiring APCCs to focus on one common activity until the group has built sufficient social capital and economic stability, the clubs have reduced information asymmetry and eased joint monitoring, enforcement, and solution provision should problems arise. Once sufficient social capital and wealth are established to weather any unexpected economic shocks, the rules are relaxed to allow members to pursue new entrepreneurial activities, thereby spurring new economic growth within these rural villages and communities.

Finally, by leveraging APCCs' social capital base and facilitating their collaborative networking via the Union of Credit Clubs annual forum, the USDA MAP has been able to successfully provide impoverished farmers with a viable mechanism to directly influence government policy making and achieve a larger social impact for Armenian agriculture beyond just growing their private wealth.

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To encourage the publication of peer-reviewed research, Myers Endowment funds will be used to support two awards starting with the Spring 2006 issue of **Agricultural Finance Review**. The prizes will include a monetary award as well as a certificate. Selected by the editors and on nomination by subscribers to *AFR*, the two awards will be for:

- *Overall Best Journal Article*, and
- *Best Journal Article Authored by a Student*.

All articles are eligible for an award, including invited papers and papers submitted for special issues. There are no specific criteria for determining what constitutes a “best” journal article except that it will be known to be best once read. The student award must have the student as senior author, must have been written principally by the student, and must contain thesis, dissertation, or any other research originated by the student either independently or under the advisement of a faculty. The two awards are mutually exclusive, meaning that if the student award is also the best journal article, only the best journal article award will be given. The winners of the award will be announced annually in the Spring issue of **Agricultural Finance Review**.

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Calum G. Turvey
W.I. Myers Professor of Agricultural Finance
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