

DISSERTATION

ESSAYS ON THE ROLE OF MICROFINANCE INSTITUTIONS IN FINANCIAL
DEEPENING, ECONOMIC GROWTH AND DEVELOPMENT

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Vange Mariet Ocasio

Department of Economics

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Doctoral Committee:

Advisor: Elissa Braunstein

Alexandra Bernasek
Ramaa Vasudevan
Robert G. Schwebach
Sherrill Shaffer

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ABSTRACT

ESSAYS ON THE ROLE OF MICROFINANCE INSTITUTIONS IN FINANCIAL DEEPENING, ECONOMIC GROWTH AND DEVELOPMENT

This dissertation is composed of three essays which examine how access to credit, namely micro credit, impacts economic outcomes at the household and village level in Bangladesh. The capability approach brought forward by Amartya Sen is applied to analyze economic development at the community level and to explore the complementarity between the provision of capability-enhancing services and the effectiveness of microfinance in terms of both removing credit constraints and improving economic outcomes for poor borrowers. In light of Sen's view of development, the Human Development Report defines development as a process of expanding opportunities so that each person can live a life of respect and value (UNDP, 2000, p. 2).¹ According to this definition, true development would include the improvement of economic outcomes as well as improvements in human conditions. The main objective of this dissertation is to explore how microfinance can contribute to economic development as measured by income growth and to analyze how investment in human capital (as measured by the provision of education, skill training, etc.) can augment economic growth at the community level.

Chapter 1 reviews the literature on microfinance including its history, its outreach and its impact on economic growth and development. In chapter 2, I use household level panel data from Bangladesh to estimate the economic impact of microfinance by tracing the marginal effect of microcredit on household income.

¹ United Nations Programme. www.undp.org .

² <http://www.accion.org/page.aspx?pid=265>. Accessed August 2011.

The findings suggest that the existence of banks and electricity in the village have a positive impact on household income as well as the ownership of land assets. In terms of microcredit borrowing, a main result in this study is that micro loans, especially those disbursed by the Grameen Bank, have a positive and statistically significant effect on household income. Unlike other studies (particularly, Khandker 2005), the findings in this study suggest that microcredit benefits all borrowers and not just female borrowers. The findings also suggest differential impacts by gender, education assets and labor assets.

In chapter 3, I investigate how Amartya Sen's capability approach can be applied to conceptualize and assess the effectiveness of micro loans when combined with capability-enhancing services. In this study, microcredit itself is viewed as a capability in the sense that it enables poor borrowers to start-up enterprises, build assets and remove credit constraints. Microfinance is also viewed as a complementary tool for enhancing economic development. Existing impact analysis focuses on marginal outcomes to assess the effectiveness of microcredit programs. In this context, the methodologies used in impact studies have resulted in findings that appear trivial in terms of the effects of microcredit on development and poverty reduction. In this paper, I explore the reasons why microfinance has not been as successful as we would hope in the case of Bangladesh.

Using household-level panel data from Bangladesh, I develop capability-enhancing policy variables and use interactions in a multiple linear regression (MLR) model to investigate whether the existence of services have any effect on the effectiveness of micro loans in increasing household income. Such services include, the provision of basic literacy services, skill training, etc..

The findings in this study suggest that when a set of capability-enhancing services are combined with microcredit, the marginal effect of microcredit on household income is positive and in some cases, more robust than when credit is issued without these services. The results suggest that the positive effect of microcredit can be larger in magnitude when credit is issued along with capability-enhancing services.

There are two preliminary conclusions in this study: (i) The implementation of capability-enhancing policies along with microcredit, augments the effectiveness of microfinance and, (ii) Given this positive association, from a policy perspective, in order to maximize the effectiveness of microcredit, the disbursement of micro loans should be accompanied by a capability set that would allow poor borrowers to thrive both economically and socially. In this context, giving poor borrowers access to credit along with capabilities or opportunity sets would result in greater efficiency in terms of maximizing the social and income return of micro loans. From a sustainable development standpoint, the effectiveness of microcredit in enhancing development would be greater when there is also simultaneous investment in human capital.

In chapter 4, I expand the dissertation with a study that attempts to measure some of the spillover effects of microfinance. I specifically estimate the effect of microfinance on both, village income and intra-village income inequality. The objective of the study is to examine the effects of microfinance beyond borrower welfare and to explore some of the possible general equilibrium effects of microfinance. In this study, I find that microfinance is positively associated with increases in income at the village level and it is also positively associated with increases in village income inequality. This result is counterintuitive because one would expect that if incomes increase at the village-level, income inequality would decrease and not increase.

However, this expectation implies that microcredit's return to income is the same for all borrowers. If this is not the case, for instance, if some borrowers are wealthier than others when they received the loan, then it is possible for microcredit to have differential income effects. In this context, if wealthier borrowers become wealthier as a result of access to micro credit, then it is possible for income inequality to widen even though incomes overall are also increasing. Higher educational achievement was found to be negatively associated with intra-village income inequality. From a policy standpoint, the findings in this study suggest that in order to offset the polarizing effect of microcredit, policymakers should look at initiatives that encourage investment in human capital.

This dissertation expands the dialogue about the effectiveness of microfinance and advocates for more investment in human capital as a way to augment the potential social and economic returns of microcredit. The results obtained through the many econometric estimations suggest that microcredit, while not a perfect poverty reduction tool, is an effective way to encourage economic growth.

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LIST OF ACRONYMS

Acronym

ASA	Association for Social Advancement
BIDS	Bangladesh Institute of Development Studies
BRAC	Bangladesh Rural Advancement Committee
BRI	Bank Rakyat Indonesia
FE	Fixed-effects
GDV	Gender-based violence
GSS	Gana Shahajyo Sangstha
HID	Human Development Index
IHDI	Inequality-adjusted HDI Index
LAC	Latin America and the Caribbean
LS	Two-stage Least Squares
MCP	Microcredit programs
MFIs	Microfinance Institutions
MLE	Maximum Likelihood Estimation
MLR	Multiple Linear Regression
MRA	Microcredit Regulatory Authority
NGOs	Non-governmental organizations
OLS	Ordinary Least Squares
PPAF	Pakistan Poverty Alleviation Fund
RD-12	Bangladesh Rural Development Board's RD-12 Program

RFM	Rural Financial Market
SHG	Self-help group model
UNDP	United Nations Development Programme
VBSP	Vietnam Bank for Social Policies

CHAPTER I

Brief History of Microfinance

1. Introduction

The microfinance movement has changed perceptions towards helping the poor in both, South Asia and Latin America. In many countries, microfinance has been used as a tool to increase financial depth in rural areas and it has typically targeted very low-income groups who would normally be excluded by conventional financial institutions (Weiss and Montgomery, 2004).

There is extensive literature on the range of institutional arrangements employed by different countries, the types of services microfinance institutions (MFIs) provide and the extent of outreach. However, there is agreement amongst the academic development community about the fact that we still know very little about the impact of microcredit (ibid). The overall consensus concerning the extent of what we currently know about microfinance was bluntly expressed in the following statement: “MFI field operations have far surpassed the research capacity to analyze them, so excitement about the use of microfinance for poverty alleviation is not backed up with sound facts derived from rigorous research. Given the current state of knowledge, it is difficult to allocate confidently public resources to microfinance development” (Zeller and Meyer, 2002).

The potential role financial institutions and intermediation play in economic growth and development has always been a topic I have found of interest during my graduate studies. According to the literature I have read on this topic, (i.e. King and Levine, 1993), there seems to be a positive relationship between the size of the financial sector and economic growth. Access to credit both for individuals and for businesses, even countries, has been positively associated with asset growth, investment and overall economic growth (See King and Levine, 1993abc, Ross, 1997 and 1998, Lucas, 1988 and Pagano, 1993). In this context, when I learned about microfinance, I immediately validated the idea of providing the very poor with access to credit, since access to credit has been linked to positive economic growth. In this sense, my dissertation work has been grounded on the following general question: If access to credit has been found to be effective in promoting economic growth and development, why would this not be the case for microfinance? If microfinance is a type of financial intermediation that eases credit constraints among the poor, then why shouldn't we expect the same positive impact we have seen in the case of macro-level financial intermediation?

There are many reasons why the impact of microcredit might not be expected to be the same as the impact that has been traced in the finance and growth literature. One of the major reasons is that the characteristics of the borrowing pool are much different for microfinance clients than for the clients of formal financial institutions. Such differences range from the collateral that is provided to the socio-economic background of these borrowers. In this context, rigorous impact analysis must be conducted to establish a strong linkage between microcredit and the potential benefits that it can bring about.

1.1 Microfinance: A Definition

Microfinance is a term used to describe the provision of financial services such as savings and insurance and issuing loans as low as \$100. These services and loans are typically offered to the poor and their families to assist them in the launching and development of small businesses as well as to help them engage in other productive activities. Many microfinance institutions (MFIs) adopt the social objective of helping the poor become more self-sufficient in order to improve the lives of family members, communities and whole societies (ACCION International)².

Microfinance used to be known as microcredit. Microcredit refers to the practice of issuing small loans without additional services. Today, since microcredit is offered along with a range of other services, the term microcredit has been replaced with the term microfinance (ibid). Throughout this dissertation, the terms microcredit and microfinance are used interchangeably to describe loans and services provided by MFIs.

The issue of microcredit became prevalent in the 1980s, although an early experiment of this lending scheme dates back 30 years ago in Brazil, Bangladesh and a few other countries (ibid). Microcredit came about from the need to provide the very poor access to credit without the collateral requirements typically imposed by the formal banking sector. In this context, microcredit has focused on clients whose alternative sources of credit have typically been in the informal sector where they are subject to violence and abuse by money-lenders.

² <http://www.accion.org/page.aspx?pid=265>. Accessed August 2011.

Microcredit is loaned to a micro entrepreneur by a bank or other institution and is often offered without requiring collateral from a group or an individual. Some of the main characteristics of the microcredit lending model includes the following (ibid):

Group lending: This type of lending scheme is also known as solidarity group lending or village banking and it is a self-monitoring mechanism that allows individuals to gain access to microcredit by securing collateral through group savings or guaranteeing a loan through a group repayment pledge. In this lending model, the incentive to repay is based upon peer pressure. If a group member defaults, the other group members make up the payment amount.

- **Individual lending:** This type of lending practice focuses on providing microcredit to one client at a time and does not require collateral or a guarantee for the loan.

Many microcredit loans are working capital loans used by the borrower to purchase additional inventory for their business, such as flour for the food entrepreneur or to acquire equipment. Over time, the issue of microcredit has expanded to the provision of other financial services not available to poor borrowers in the informal sector. Microfinance has attempted to meet the needs of poor borrowers by offering many services such as loans, savings, transfer services (remittances), insurance, education and skill training. Many financial institutions can provide these services, including non-governmental organizations (NGOs), cooperatives, credit unions, private commercial banks, non-bank financial institutions and some state-owned banks (ibid).

In many countries, microfinance programs lend predominately to poor women who are self-employed in the informal sector. In the Grameen Bank in Bangladesh, for instance, 97 percent of their seven million borrowers are women.³ One of the reasons for focusing on providing credit to women is that women are believed to be poorer and more credit constrained than men (see Burjorjee et al., 2002). In this context, microfinance has been used as a tool to provide access to financial services to women as well as a way to help them become entrepreneurs, empower them, induce higher levels of mobility and increase political participation (Hashemi et al. 1996).

1.2 Overview of Microfinance in Bangladesh and Other Countries

During the early 1980s and mid 1990s, there was an increase of semi-formal financial institutions focusing on poor women micro entrepreneurs with no collateral. To reach the poor, new lending schemes, widely known as microfinance, were developed by NGOs and banks with special charter such as the Grameen Bank in Bangladesh and the village banks of the Bank Rakyat Indonesia. In countries such as India, Indonesia, Sri Lanka and Vietnam, government-owned banks are key suppliers of microfinance services. Many of these banks are reliant on substantial subsidies for their operations. An exception is the Bank Rakyat Indonesia (BRI) where a unit desa system is used to ascertain financial sustainability. BRI focuses on the issue of loans to the “better off” poor as well as non-poor households (Morduch 1999). In Bangladesh, Cambodia, Nepal, Philippines, and Sri Lanka, NGOs are the predominant suppliers of microfinance services.

³ <http://www.grameen-info.org/bank/index.html>. Accessed May 2007.

There are more than 1,000 NGOs in Bangladesh who service more than 10 million households (Haque 2006). The largest NGOs in Bangladesh, are the Bangladesh Rural Advancement Committee (BRAC), the Association for Social Advancement (ASA), and Proshika. These NGOs account for 73% of the total outstanding loans (Thapa, 2007).

In Bangladesh, the Grameen Bank is the largest provider of microcredit among chartered banks. The Grameen Bank originated in 1976 when Professor Muhammad Yunus, Head of the Rural Economics Program at the University of Chittagong, executed an action research project to explore the idea of designing a credit delivery mechanism to provide banking services to the rural poor (Grameen Bank).⁵ The objectives of the Grameen Bank (named Grameen, which in the Bangla language means “rural” or “village”), include the following (ibid):

1. Provide banking facilities to the poor.
2. Prohibit the exploitation of the poor by money-lenders.
3. Create opportunities for self-employment for the unemployed in rural Bangladesh.
4. Enable the disadvantaged, particularly women from the poorest households, to be self-sufficient.
5. End the vicious circle of "low income, low saving & low investment", and create a virtuous circle of "low income, injection of credit, investment, more income, more savings, more investment, more income".

⁵ http://www.grameeninfo.org/index.php?option=com_content&task=view&id=19&Itemid=114. Accessed October 2012.

Yunus' action research project became successful in Jobra (a village adjacent to Chittagong University) and in some of the neighboring villages during 1976-1979. Over time, and with the sponsorship of the central bank of Bangladesh and the support of the nationalized commercial banks, the project's outreach was extended to the Tangail district in 1979. Given the success of the program in Tangail, the project was further extended to other areas in the country. In October 1983, the Grameen Bank Project was converted into a formal bank by government legislation. Currently, the Grameen Bank is owned by its members who are the rural poor. Member borrowers of the Bank own 90% of its shares, and the remaining 10%, is owned by the government of Bangladesh (ibid).

The Grameen Bank's lending model has been replicated worldwide, including China, India, Malaysia, Philippines, Sri Lanka, Thailand and Vietnam. The self-help group model (SHG) was designed by nongovernmental organizations (NGOs) (e.g. MYRADA) in India and is currently used by many MFIs and banks. This model is widely used in some parts of South East Asia, including Indonesia and Africa (Thapa, 2007).

Cooperatives are also major providers of microfinance in countries like India, Philippines, Sri Lanka, Thailand and Vietnam. In 1999, in Sri Lanka, there were 1,418 cooperative rural banks with 5.3 million deposit accounts and 1.23 million loans outstanding (Fernando, 2002, pp. 5-6). There were 8,400 thrift and credit cooperative societies that serviced 786,000 members (Thapa, 2007, p. 18).

1.3 Microfinance in Latin America and the Caribbean

Latin American MFIs have had tremendous success in expanding financial services to underserved groups. Since the late 1980s, microfinance clients have been growing to make Latin America one of the largest providers of microfinance in the world along with South East Asia. Through MFIs, financial services are currently available to nearly six million low income borrowing households in Latin America and the Caribbean (LAC) (Navajas and Tejerina, 2006).

Microfinance lending in LAC ranges in design and structure. There are non-regulated MFIs that focus lending predominately in less urbanized areas. NGOs continue to be the most significant source of non-regulated microfinance. On the other side of the regulation spectrum, in countries like Peru, Bolivia and Honduras, we find MFIs that are specialized nonbank charters. Such nonbank institutions are regulated financial institutions that are required to comply with the regulations put in place by the designated financial authority. The main difference between these institutions and a full service bank is typically lower capital requirements and a limited scope of services provided (Navajas and Tejerina, 2006).

In LAC, the provision of microfinance by commercial banks has become a common trend. For some banks like MiBanco in Peru and ProCredit in Ecuador, their primary line of business is microfinance. Other banks such as BanHcafe in Honduras, Banco Pichinca in Ecuador and Banco Santander in Chile are adopting microfinance as a new product (Westley, 2006). Table 1.1 shows some of the trends in microfinance and the extent of coverage over time. Apparent in Table 1 is the increase in the number of clients served by MFIs. By the year 2005, MFIs in LAC had nearly six million clients and an outstanding portfolio of over US\$5.4 billion.

According to Navajas and Tejerina (2006), the estimates in their study do not include the number of clients with access to remittances, deposits, payment services and other financial services.

The estimates are also not adjusted for borrowers with multiple loans at a given time.

Table 1.1: MFIs in Latin America and the Caribbean, 2005 and 2001

Type of Institution	Number of Institutions	Portfolio (US\$ Million)	Borrowers	Average Loan (US\$)
Data from 2005 (23 countries)				
Regulated MFIs	98	4,407	3,851	1,144
Downscale (Banks & Financieras) ^a	31	1,810	1,233,873	1,467
Greenfields ^b	30	1,005	738,671	1,361
Upgrades ^c	37	1,592	1,879,221	847
Non-regulated MFIs	238	1,030	2,100,951	490
All MFIs-2005	336	5,437	5,952,716	913
Data from 2001 (17 countries)				
Regulated MFIs	60	901	936,936	962
Downscale (Banks & Financieras) ^a	21	343	365,171	939
Upgrades ^c	39	558	571,765	976
Non-regulated MFIs	124	288	869,509	332
All MFIs-2001	184	1,189	1,806,45	659

^aDownscales: regulated financial institutions that added microcredit as a new line of business.

^bGreenfields: MFIs that started operating as regulated financial institutions since their inception.

^cUpgrades: NGOs that have transformed themselves into regulated financial institutions.

Source: Adapted from Table 1, Navajas and Tejerina, 2006, p. 4.

Another important trend is the fact that regulated MFIs have a significant market share in micro lending. In 2001 52 percent of microfinance clients were served by regulated MFIs and this percent increased to 65 percent by 2005. According to Navaja and Tejerina (2006, p. 5), the annual growth rate for the number of borrowers is 35 percent annually and 46 percent for the growth in portfolio.

Table 1.2 shows the magnitude of microfinance coverage in the LAC region. The countries are listed according to the number clients they have. Mexico ranks at the top and Peru, Columbia and Bolivia follow with well-established microfinance markets.

Table 1.2: Microfinance in Latin America and the Caribbean (circa 2005)

Country	Number of MFIs	Portfolio (US\$ Millions)	Borrowers	Average Loan (US\$)
Mexico	39	471	1,217,920	387
Peru	67	1,516	1,174,361	1,291
Columbia	22	315	608,282	518
Bolivia	21	635	548,242	1,158
Nicaragua	21	261	399,614	652
Guatemala	24	273	363,286	753
Ecuador	20	322	327,065	985
Chile	5	663	297,995	2,223
Brazil	16	91	289,697	313
Dominican Republic	13	158	145,332	1,087
El Salvador	11	138	143,461	964
Honduras	14	80	143,118	560
Haiti	9	24	81,222	374
Paraguay	5	71	59,936	1,193
Costa Rica	19	341	45,607	7,469
Venezuela	5	37	44,969	816
Panama	6	16	28,103	552
Uruguay	3	10	7,155	1,422
Argentina	10	4	10,649	402
Jamaica	3	4	10,401	376
Guyana	1	2	4,184	413
Trinidad	1	3	1,733	1,500
Barbados	1	4	384	9,446
Total	336	5,437	5,952,716	913

Source: Adapted from Table 2, Navajas and Tejerina, 2006, p. 5.

An interesting aspect of the microfinance market in LAC is that the countries are different in the number of MFIs they have and the average loan size. Peru for instance, does not have as many borrowers as Mexico but it outranks Mexico in both the number of MFIs and the average size of the loans disbursed. Costa Rica does not rank at the top in the number of borrowers, but it does rank second to Barbados in the average size of the loans its MFIs provide.

1.4 Microfinance in South Asia

The number of MFIs serving the South Asian region varies from country to country. There are many factors that contribute to the extent of coverage of MFIs in the South Asian microfinance sector. Such factors include the modes of delivery mechanism by which credit is disbursed, the extent of competition and institutional frameworks as well as the historical context of the country. Some countries have a very mature market and low barriers to entry and this has contributed to the significant growth of MFIs in these countries (Alamgir, 2009). As illustrated in Table 1.3, Bangladesh is a good example of a market where microfinance has penetrated to a significant extent. Currently, there are 518 NGO-MFIs registered with the recently established Microcredit Regulatory Authority (MRA) and there are a number of unregulated MFIs throughout the country.⁶

Table 1.3: Number of MFI Branches by South Asian Countries

Country	Number of Branches	Number of Branches per 100 Sq Km Land Area	Average Annual Growth between 2006 and 2008 ^a
Afghanistan	283	0.43	6%
Bangladesh	14,441	110.94	5%
Nepal	590	4.13	12%
Pakistan	1,281	1.88	12%
Sri Lanka	1,465	22.67	1%

Source: Microfinance Institute, *Overview Report* 2010. See MRA at www.mra.gov.bd. Accessed on January 2011.

⁶ See MRA at www.mra.gov.bd. Accessed on January 2011.

Although Bangladesh and Sri Lanka have a more mature microfinance sector in terms of coverage, all of the South Asian countries have experienced growth in their respective microfinance sector. According to the data presented in Table 1.3, Nepal and Pakistan have experienced the largest growth from 2006 to 2008. In Table 1.4 we can see the extent of microfinance coverage in South Asia in terms of the number of borrowers each country had as of 2007. Sri Lanka and Bangladesh are by far the largest hosts of microfinance schemes. An interesting number to look at is the growth rate in coverage from 2006-2007. Pakistan and Afghanistan display a tremendous growth in microfinance over this period. In the case of Pakistan a significant driver in the increase of microfinance has been the effort of the Pakistan Poverty Alleviation Fund (PPAF) to alleviate poverty. In addition, the government of Pakistan established the Khushali Bank to provide financial services to the underserved population. In Afghanistan, the country has adopted microfinance as a tool to alleviate poverty and to facilitate the process of democratization in the country (Alamgir, 2010).

Table 1.4: Number of Borrowers per thousand poor people by countries in South Asia and growth in 2007

Country	Borrowers per 1000 people	Growth (% change over 2006-2007)
Afghanistan	28.1	55.2
Bangladesh	305.9	15.1
India	33.9	18.4
Nepal	33.4	23.5
Pakistan	26.6	51.3
Sri Lanka	365.8	3.4

Source: Microfinance Institute, *Overview Report* 2010. See MRA at www.mra.gov.bd. Accessed on January 2011.

1.5 Sources of Poverty in Bangladesh

Bangladesh is a predominately rural economy although urbanization has been taking place at a fast pace. According to current estimates, agricultural activities have been declining as a percentage share of GDP. In 1989, agricultural activities accounted for 30.4% of GDP and by 2009 agriculture as a percentage of GDP had declined to 18.7%. Industry during this same period climbed from 21.1% of GDP to 28.7 percent in 2009. Industrial activities are now becoming more important in the Bangladeshi economy. Most of the industrial activities are in the services sector rather than in the manufacturing sector (World Bank, 2011).⁷ In terms of economic growth, Bangladesh has achieved stable economic growth (as measured by GDP) in the past three years of about 5.4% annually.

Currently, the World Bank estimates that Bangladesh's economy will continue to grow at a 5.4% per year but some constraints to this growth are noted. Some of these constraints includes lack of a quality education, rapid urbanization, weak governance and inadequate infrastructure, especially power and ports (ibid)

The incidence of poverty in Bangladesh is relatively high, particularly in the rural areas (Rahman and Hossain, 1995). Although poverty has declined in recent years , about 40 percent of the population (likely higher in rural areas) live below the national poverty line (World Bank 2011)⁸.

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<http://www.worldbank.org.bd/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/BANGLADESHEXTN/0,,contentMDK:23209442~menuPK:295765~pagePK:2865066~piPK:2865079~theSitePK:295760,00.html>. Accessed August 2011.

⁸<http://www.worldbank.org.bd/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/BANGLADESHEXTN/0,,contentMDK:23209442~menuPK:295765~pagePK:2865066~piPK:2865079~theSitePK:295760,00.html>. Accessed August 2011.

Historically, poverty in Bangladesh has been associated with increasing landlessness, high unemployment, low literacy and high pollution growth (Khandker, 1998). Bangladesh has also been characterized as a high population growth country. Currently, population is a 162.2 million and the population growth is 1.5% annually.

Even though more than 90 percent of cultivable land in Bangladesh is used for food-grain production, the growth rate of food is substantially low (about 4 percent) which means that the country's supply of food does not meet its demand. Malnutrition is prevalent among the poor, particularly among women and children (ibid). Child malnutrition is (% of children under 5) 41percent compared to 28 percent for low income countries. The literacy rate (% of population age 15+) for Bangladesh is 55 percent compared to 61% in South Asia and 66% in low income countries (World Bank 2011)⁹.

Given Bangladesh's historical and current constraints in terms of large population growth, sluggish agricultural production and lack of adequate education and infrastructure, the prospects of continued economic growth are in question. In the meantime, providing the rural poor with access to credit seems like a viable strategy to reduce poverty. This supply-based approach is centered on the idea that there is a strong demand for inputs such as credit and schooling and that individuals and households with access to such inputs can improve their well-being through increases in production, consumption and investment (Khandker, 1998).

⁹<http://www.worldbank.org.bd/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/BANGLADESHEXTN/0,,contentMDK:22977793~pagePK:141137~piPK:141127~theSitePK:295760,0.html>. Accessed August 2011.

1.6 Impact of Microfinance in Bangladesh and Around the World

Measuring the impact of microfinance has been a popular objective among researchers interested in exploring the issues surrounding the topic of poverty. Many of these studies are cited throughout this dissertation but to set the stage for the analysis to follow, I will mention a few impact studies that have been influential in igniting recent and future research.

One of the early and widely cited studies of the impact of microfinance on poverty is Hume and Mosley (1996). In this study a control group approach was employed to evaluate programs in different countries, including the Grameen Bank in Bangladesh and the Bank of Rakyat Indonesia. The authors found that the incomes of poor borrowers increased ranging from 10-12% in Indonesia to about 30% in Bangladesh.

Another study of a couple of major microcredit programs in Bangladesh revealed that 5 percent of participating households were removed from poverty annually as a result of receiving microcredit. This study also suggests that loans taken out by women add 18 Taka to consumption (Khandker 1998). A similar study of Bangladesh programs suggests that participation in a microcredit programs, particularly in the Grameen credit program, has an increasing effect on schooling by girls when women are the loan recipients (Pitt and Khandker, 1998). Other studies such as that of Duong and Izumida (2002) find that participation in microcredit programs is influenced by the lack of credit facilities and by the ownership of assets. The findings in this study also suggest a positive correlation between credit and output.

In a more recent study, Amin et al. (2003), the findings suggest that members are typically poorer than nonmembers and that programs are more successful in reaching the poor but not as successful in reaching the vulnerable. Another study of MFIs in Indonesia found a significant correlation between consumption and health among borrowing households (Gertler et. al., 2003). A similar study concerning the correlation between microfinance borrowing and health suggests that microcredit given to women is positively correlated with height-for-age and arm circumference of boys and girls in the household (Pitt et. al., 2003).

The aforementioned studies document the impact of microfinance in South Asia and establish an overall positive correlation between access to microcredit, poverty reduction and positive social outcomes. The impact literature on Latin American microcredit programs suggests a similar outcome. In a study of credit programs in Bolivia such as BancoSol, ProMujer, PRODEM and SARTAWA, the findings suggest that microcredit is associated with larger increases in income for borrowers as compared with nonborrowers (Mosely, 2001). Another similar result was obtained in a study of Ecuador's Banco Solidario program and Bolivia's Caja de los Andes program. The findings suggest that being a client of an MFI is associated with increasing incomes (Benegas et al, 2002). In a study of Peru's Mibanco, the findings suggest that the microenterprises of participants have substantial increases in net income, assets and employment relative to those microenterprises that do not participate in a credit program (Dunn and Arbucle, 2001a, 2001b). A prevalent finding in the literature is that access to microfinance benefits poor borrowers and contributes to poverty alleviation.

CHAPTER II

The Economic Impact of Microcredit on Poor Households: A Study of Flagship Programs in Bangladesh

1. Introduction

Critics of microfinance argue that micro loans are just “micro-Band-Aids” because they fail to generate benefits substantial enough to alleviate poverty in the countries where microcredit programs have been implemented. Bangladesh and Bolivia are examples of such countries.¹⁰ On a macroeconomic level and looking at aggregate data, it is hard to dispute claims that microfinance has not indeed succeeded in alleviating poverty. Looking at recent studies on the household and village-level effects of microfinance, however, tells quite a different story.

Using household level panel data from Bangladesh, this paper estimates the economic impact of microfinance by tracing the marginal effect of microcredit on household-level income. The motivation and research question in this study is driven by a simple question: If increases in income contribute to poverty reduction, are micro loans important in income generation and thus poverty alleviation? This paper contributes to the current literature on microfinance in two ways: (i) to my knowledge, the impact of microcredit on household income has not been measured using both periods in this dataset, (ii) the results obtained in this study contradict previous findings that suggest that microfinance in Bangladesh benefits only women.

¹⁰ Alexander Cockburn, “*The Myth of Micro Loans*”, The Nation, October 19, 2006.

In fact, in a recent study, Khandker 2005 found that access to microcredit contributes to poverty reduction, especially for women while in the case of men, microfinance had no statistical significance in augmenting household consumption. In this study, microfinance loans given to both female and male borrowers have a positive and statistically significant impact on household income.

Lastly, this study contributes to the literature in that it captures differential impacts by loan source, gender, education assets and labor assets. Additionally, the loans obtained from money-lenders in the informal market are included in the analysis to see how these loans affect borrowing households. This paper is organized as follows: section 1.1 presents a rationale for using household income rather than household expenditure as a dependent variable to measure household economic outcome, section 1.2 describes the extent of microfinance outreach in Bangladesh, section 2 presents the empirical literature, section 3 presents the model and estimation strategy, section 4 describes the data, and sections 5 and 6 summarize the results and provide the main conclusions.

As described in chapter 1, in Bangladesh, as well as in other countries, microfinance programs are often targeted towards the poor and women who are self-employed in the informal sector. Microfinance involves small-scale credit and savings transactions that allow small businesses to obtain start-up capital with little or no collateral in place. Microcredit programs also provide education and working skills to women and the poor in order to improve production capabilities and decision-making. A number of microfinance institutions (MFIs) and non-governmental organizations (NGOs) lend predominately to women. For instance, about 97 percent of Grameen Bank's seven million borrowers are women.¹¹

¹¹ <http://www.grameen-info.org/bank/index.html>, as of May 2007.

Other major microfinance programs such as FINCA and ACCION also lend predominately to women.¹² One of the reasons MFIs and NGOs have shifted micro-lending toward women is that women are believed to be poorer than men on average (see Burjorjee et al., 2002). Women also tend to own little assets compared to their male counterparts and this makes them unable to provide the collateral required by most formal lenders. In this context, women are believed to be more credit-constrained (Khandker, 1998).

In the case of Bangladesh, microcredit is targeted toward poor rural women because rural women in particular, tend to be isolated and deprived and even though they greatly contribute to rural economic activity, their work is marginalized and ignored (see Schuler & Hashemi, 1995 and Abdullah & Zeidenstein, 1982). Additionally, given Bangladesh's system of 'purdah,' "a system for the seclusion of women" (Khan, 1988, p. 33), women, particularly in rural Bangladesh, have typically been prevented from getting an education, they do not own land or borrow from the formal sector without their husband and they are socially conditioned to view themselves as inferior to their male counterparts (Papa, Auwal, & Singhal, 1995). This Muslim doctrine of 'purdah' requires Bangladeshi women to veil themselves in public and they are prevented from visiting towns away from their homes. In this context, women are kept out of the paid labor force (Auwal, 1996). Furthermore, if a poor household cannot afford food, the expectation is that the women should forgo food and starve, resulting in a higher mortality rate for women than for men (Shehabuddin, 1992).

¹²http://www.villagebanking.org/site/c.erKPI2PCloE/b.2604299/k.FFD9/What_is_Microfinance_What_is_Village_Banking.htm and <http://www.accion.org/Page.aspx?pid=492> (accessed October 7, 2009)

1.1 Use of Income vs. Consumption to Measure Poverty

The issue of whether the specification of the model employed in this study should use household consumption rather than income as a dependent variable has been noted during seminar and conference presentations. This issue is a valid one, particularly if we are trying to determine changes in the poverty rate for the population sample (in this case, the effect of microfinance on poverty).

The use of income as a measure of poverty is commonly used by governments and researches both in the United States and other countries. Consumption expenditure is another commonly used measure of poverty and currently, this is the measure recommended by many researchers. The argument in favor of using consumption expenditure rather than income is that income will tend to overstate poverty rates because there are many sources of income that are not included in the income measure and as such this could impose a downward bias on the measure of well-being. Other sources of income that are not included in the income measure are access to credit, tax credits, remittances and many other sources of income that would allow an individual or family to smooth consumption and thus increase or keep constant the standard of living (Meyer and Sullivan, 2011). Another argument against using income as a measure of poverty is that income is less stable than consumption and thus a less reliable measure of poverty.

The research question pursued in this study is not about how microfinance impacts the poverty rate among the population sample but rather whether microcredit is associated with increases in household and village income. The impact of microfinance on poverty in this study is a more indirect question.

The assumption here is that if microfinance is associated with increases in income, then this result is favorable in terms of a positive step towards reducing poverty. Income was used as a dependent variable in this study in order to estimate the marginal return of microcredit to household and village income. In other words, the research inquiry is focused on the role of microcredit on income generation. I wanted to look at the factors that contribute to increases in household and village income and what proportion of income can be empirically explained by these factors (i.e. land ownership, education, microcredit, etc.).

The empirical relationship between household consumption expenditure and microfinance was examined by Khandker (2005). The aim of this study was not to replicate the aforementioned study but rather, to provide robustness (or lack thereof) for previous findings in terms of microcredit's ability to affect household and village economic outcomes.

1.2 Microfinance in Bangladesh

Bangladesh has been a significant player in the microfinance movement and microcredit programs are some of the most successful initiatives in the world. The number of MFIs, financial nongovernmental organizations (NGOs) and banks serving the poor has increased over the past two decades as well as the number of program participants. This is certainly the case in rural Bangladesh where the number of borrowers totaled 24.3 million in 2005 (see Table 2.1).

Table 2.1: Coverage of Microcredit Programs in Bangladesh

(As of December, 2005)		
Organization	No. of Borrowers (in millions)	Outstanding Loan (in billions Taka)
NGO-MFIs	14.9	54.5
Grameen Bank	4.9	28
Government Program	2	7.7
Sub Total	21.8	90.2
Nationalized Commercial Banks	2.3	32.8
Private Banks	0.2	1.1
Sub Total	2.5	33.9
Grand Total	24.3	124.1

Source: Maps on Micro credit Coverage in Upazilas of Bangladesh, PKSf (2006)

The member-based Microfinance Institutions are a rapidly growing segment of the Rural Financial Market (RFM) in Bangladesh. Microcredit programs (MCP) in Bangladesh are sponsored by various formal financial institutions, specifically, nationalized commercial banks and specialized banks, as well as government organizations and semi-formal financial institutions (nearly 1000 NGO-MFIs).¹³ The Grameen Bank is one of the largest providers of micro loans in Bangladesh today.

2. Empirical Literature

The Grameen Bank's view that credit is a human right and that the poor are indeed credit worthy, has encouraged group-based lending models in over 70 countries around the world (Auwal, 1996). Many countries such as Kenya, the Philippines, Ethiopia, and Malaysia have adopted the Grameen Bank's peer lending model and have experienced a great deal of success (Kamaluddin, 1993). Latin American countries have also welcomed microfinance schemes as a poverty alleviation tool.

¹³ Palli Karma-Sahayak Foundation, http://www.pksfbd.org/index.php?option=com_mapping&Itemid=284. Accessed March 2007.

A combined research project of the Bangladesh Institute of Development Studies (BIDS) and the World Bank, find significant evidence that the programs help the poor in smoothing consumption and enable microenterprises to accumulate capital. The findings also substantiate the claim that microfinance programs promote investment in human capital (i.e. schooling) and raise awareness about family planning (i.e. use of contraceptives) among poor families (Khandker 1998) .

In a similar study on the impact of microfinance in Bangladesh, Pitt and Khandker (1998) estimated the impact of program participation by gender in each of the three group-based credit programs studied.¹⁴ The study's aim was to trace the effects of access to credit on women's and men's labor supply, boys' and girls' schooling, expenditure, and assets. Using a quasi-experimental survey design, they found that participation in the credit programs, measured by cumulative borrowing, is a strong determinant of labor supply, schooling, household expenditure and asset building. Interestingly, their findings also show that credit provided to women was more likely to influence the aforementioned behaviors than credit provided to men.

In a more recent study, Khandker (2005) examined the effects of microfinance on poverty reduction at both the participant and village levels using panel data from Bangladesh. Here the 1991/92 BIDS-World Bank survey data was expanded with a follow-up survey in 1998/99. The results of this study show that access to microfinance helps reduce poverty at the household-level, especially for female participants.

¹⁴ The three credit programs studied were the Grameen Bank, the Bangladesh Rural Advancement Committee, and the Bangladesh Rural Development Board's RD-12 program.

In terms of the effects on the local economy, the study concluded that microfinance has a positive impact at the village-level because it raises per capita household consumption for both participants and nonparticipants in the villages where the programs operate. Other studies also report positive impacts of microfinance in Bangladesh (e.g. Hashemi, Schuler, and Riley 1996; Schuler and Hashemi 1994).

The robustness of the results in the studies discussed above still remains an issue because impact studies are sensitive to the method applied. It is in this light that this paper undertakes a slightly different approach to estimating the impact of microfinance in Bangladesh. Using the same dataset and focusing on the same programs as Khandker (2005), instead of using per capita consumption expenditure as the dependent variable, I use per capita household income to estimate the marginal impact of micro loans in Bangladesh. There are compelling reasons why I have chosen to use per capita household income instead of per capita household consumption expenditure. Since the three microcredit programs require households to save a portion of their loans, using consumption expenditure as the dependent variable might understate impact. Another reason is that given that results are sensitive to the method used, using a different dependent variable than in the previous studies can serve as a robustness check and can provide further support for previous findings. According to the results obtained in this study, the method employed here does provide support for earlier evidence and differential impacts are revealed.

3. Theoretical Model and Estimation Strategy

In assessing the effectiveness of any development program or service, one issue that arises with impact evaluation is the biases that could come from endogenous participation in such programs. In the impact analysis literature, the typical sources of correlation are referred to as program placement bias and household selection bias (Pitt, Rosenzweig, & Gibbons, 1993; Ravallion, 1999). If there is a systematic geographical bias in the way the program targets the population, a program placement bias is created. This is certainly the case in Bangladesh where poor households are specifically targeted and happen to live in areas where the incidence of poverty is more prevalent. A household selection bias would also occur if participation in the program is correlated with unobserved individual characteristics. In this study, the concern is the potential bias on the credit estimate created by the correlation between unobserved heterogeneity and micro loans.

A major challenge facing development programs, particularly microcredit programs, is that policy conclusions are difficult to reach because the results of impact studies are sensitive to the empirical method used to estimate program effects. In this context, the employment alternative methods to estimate program impacts and determine whether microfinance benefits participants and their communities is necessary.

I begin with an income equation that relates income y_t in year t to the household's asset endowment and characteristics X , the amount of loan received M , and a random error ε :

$$y_{ijt} = \beta_1 X_{ijt} + \beta_2 M_{ijt}^F + \beta_3 M_{ij(t-1)}^F + \beta_4 M_{ijt}^M + \beta_5 M_{ij(t-1)}^M + \varepsilon_{ijt} \quad (1)$$

Where y_{ijt} is household per capita income in village j , which is assumed to depend on household characteristics and current and past borrowing. X is a vector of household assets and characteristics. M^F and M^M respectively are vectors of current and past microcredit received by female and male borrowers from different programs. Parameters β_2 , β_3 , β_4 , and β_5 measure the effects of current and past credit (stock) for loans given to female and male borrowers by each of the microcredit programs. Loans are separated by gender because since credit markets are imperfect and labor markets are different for men and women, the impact of microfinance borrowing is expected to differ by gender.

According to equation (1), the marginal return to income in any given time period is the combined returns from past credit and current credit. The model assumes that even if current credit is zero, for instance, the household did not borrow in period $T=2$, past credit can still have an effect on income. Specifying the model in this way allows for differential impacts on borrowing over time.¹⁵

The above equation, if estimated in this standard way, however, would suffer from the biases discussed earlier since it is likely that exogenous factors will also affect household and village level income. To the extent these factors cause the error term in (1) to be correlated across all periods for a particular household or village, cross-section estimates that do not account for this correlation will not be efficient. If the omitted variables are correlated with household income, then estimating equation (1) with methods such as cross-section will in fact yield biased results (see Mundlak, 1978 and Hsiao, 1986). To eliminate the potential biases discussed above, the income equation is expanded to capture household and village level unobserved heterogeneity.

¹⁵ A similar specification was used by Khandker (2005).

The income equation is rewritten:

$$y_{ijt} = \beta_1 X_{ijt} + \beta_2 M_{ijt}^F + \beta_3 M_{ij(t-1)}^F + \beta_4 M_{ijt}^M + \beta_5 M_{ij(t-1)}^M \quad (2)$$

$$+ \phi_{ij} + \mu_j + \varepsilon_{ijt}$$

Where ϕ_{ij} is the household unobserved effect, which include household characteristics such as managerial ability, land quality and external factors such as local conditions or the presence of other government programs. μ_j is the village unobserved effect and the error term ε_{ijt} is potentially serially correlated with X and M. Since the household fixed effect method also controls for any village-level endogeneity, the income equation is simplified by combining the unobserved effects into τ .

The simplified version of equation (2) can be expressed as follows:

$$y_{ijt} = \beta_1 X_{ijt} + \beta_2 M_{ijt}^F + \beta_3 M_{ij(t-1)}^F + \beta_4 M_{ijt}^M + \beta_5 M_{ij(t-1)}^M + \tau_{ij} + \varepsilon_{ijt} \quad (3)$$

To control for the aforementioned biases, the income equation is estimated using panel data for 1991/1992 and 1998/1999 where the same households are included for both periods. The above equation has also been estimated using the first differencing method but since T=2, both first differencing and the within estimators yield identical results. As mentioned previously, the first issue that arises is the homogeneity of household effects.

Here, the null hypothesis of homogeneity is that ϕ_{ij} and μ_j are constant for all i . If this is not the case, cross-sectional estimators such as pooled OLS are inconsistent and may yield biased coefficient estimates. To help us determine which model yields the most consistent estimates, we employ a Hausman test (see Hausman, 1978 and Hsiao, 1986). According to the results of this test, the null hypothesis of homogeneity, which says that ϕ_{ij} and μ_j are constant for all i , must be rejected. Therefore, this analysis relies on the fixed-effect (FE) estimator to analyze the marginal impact of borrowing on household level income.

4. The Data

This study relies on the 1991/92 and the 1998/99 surveys conducted by the Bangladesh Institute of Development Studies (BIDS) and the World Bank. The surveys covered 1,798 households drawn from 87 villages in 29 thanas.¹⁷ The 1991/92 survey was conducted during Bangladesh's three cropping seasons: round 1 which took place during *Aman* rice (November-February), round 2 during *Boro* rice (March-June), and lastly, round 3 during *Aus* rice (July-October). The 1998/99 survey was collected only once during this period (Pitt and Khandker, 1998 and Khandker, 2005).

The purpose of this survey was to collect the data for analyzing three major credit programs. Those programs were the Grameen Bank, the Bangladesh Rural Advancement Committee (BRAC), and the Rural Development-12 program of the Bangladesh Rural Development Board (RD-12).

¹⁷ A thana is an administrative unit that is smaller than a district and consists of a number of villages. In Bangladesh, you have "Divisions" and under those divisions you have "Zilas". Thanas are under the umbrella of zilas.

Villages where these programs operated were surveyed as well as non-program villages where no micro lending or any similar lending activities took place. Target households and non-target households were surveyed. Target households are those who meet the program eligibility criteria, which is to own less than or equal to half of an acre of land. Non-target households are those who do not meet the landholding criteria. Non-target households were surveyed in both program villages and non-program villages (ibid).

Out of the 29 thanas covered, 24 were program thanas (8 from each of the three programs) and 5 were non-program thanas. The thanas included in the survey were selected from 391 rural thanas out of 460 thanas. Three villages in each program thana were randomly selected from a group of program villages where a program had been in operation for at least three years. Three villages in each of the non-program thanas were also randomly selected. These villages were drawn from the village census of the Government of Bangladesh. In terms of the village survey design, villages with fewer than 51 number of households and villages with more than 600 households, were excluded (ibid).

The households surveyed in 1991/92 were revisited in 1998/99. This time, however, the households were interviewed in one round, rather than in three. Among the 1,769 households surveyed in 1991/92, 113 could not be interviewed in 1998/99 and only 1,656 households were available for the re-survey. Included in the re-survey were new households from previous villages and newly included villages. Also three non-target households were randomly selected from each of the previous 87 villages. Also included, are three new thanas that were randomly selected from the southern and southeastern regions that were seriously affected by cyclone in 1991/92. These thanas were excluded in the first round survey.

From the new thanas, three villages were also drawn randomly, adding an additional 9 villages. In the new villages, 20 households were drawn from target and non-target households. In total, 2,599 households were surveyed in 1998/99.¹⁸

The distribution of households by program membership is presented in Table 2. Out of all the households surveyed in 1991/92, 11.6 percent were BRAC members, 8.5 percent were Grameen Bank members and 6.2 percent were RD-12 members. In the 1998/99 survey, the number of Grameen Bank borrowers increased to 14.3 percent; the number of BRAC borrowers actually decreased to 9.3 percent and RD-12 project borrowers also decreased to 3.6 percent. An interesting trend we see in the 1998/99 survey is the increasing presence of other NGOs, with 11.1 percent of participating members.

As we can note from Table 2.2, participation in rural Bangladesh has increased from 26.3 percent in 1991/92 to 45.7 percent in 1998/99. The number of eligible non-participants decreased from 40.3 percent to 25.6 percent and non-target households also decreased from 33.4 percent to 28.8 percent (*ibid*). Participation in microfinance programs is more prevalent among individuals who have very little land or no land at all. In the 1991/92 survey, the participation rate among the landless is 56 percent and this rate increased to 59 percent in the 1998/99 survey (see Table 2.3).

¹⁸ Details of these surveys were provided by Pitt and Khandker, 1998, Khandker, 2005 and by the published documents for this data (see World Bank).

Table 2.2: Distribution of Households by Program Membership

Program Membership	1991/92	1998/99
Grameen Bank members	8.5%	14.3%
BRAC members	11.6%	9.3%
BRDB RD-12 members**	6.2%	3.6%
Other NGO members	0%	11.1%
Multiple program members	0%	7.4%
Target non-participants	40.3%	25.6%
Non-target households	33.4%	28.8%
No. of observations	1,769	2,599

**Other NGOs: ASA, PROSHIKA, GSS, Youth Development and other small NGOs.

Source: Author's calculation from the 1991/92 and 1998/99 surveys. A similar table is presented in Khandker (2003).

Table 2.3: Household Participation in Micro-credit Programs

Landholding (decimals)	1991/92 Survey		1998/99 Survey	
	Participation rate in each landholding group (%)	Distribution of participants by landholding group (%)	Participation rate in each landholding group (%)	Distribution of participants by landholding group (%)
0	56.4	8.3	58.8	10.9
.1-.20	33.1	53.8	58.0	49.8
.21-.50	29.5	15.3	48.3	14.5
.51-1.00	24.3	9.4	43.7	11.3
1.01-2.50	16.0	10.3	35.0	10.6
2.51+	7.1	2.9	12.0	2.9
All households	26.0	100.0	45.6	100.0
Observations	1,769	894	2,599	1,630

Source: Author's calculation from the 1991/92 and 1998/99 surveys. A similar table is presented in Khandker (2003).

To better control for unobserved heterogeneity in the sample, this paper relies on panel data to estimate the marginal impact of microcredit on household income. Once the sample is restricted to households that were interviewed in both periods to form a panel, we are left with 1,656 households for each survey. In terms of the households that split into multiple households, they were combined with the original households to form a single household. In terms of the biases or problems that this may cause, previous studies have conducted statistical tests to see if merging the data was appropriate and the tests indicate that combining the data does not significantly alter the results obtained by keeping the households separate (see Khandker and Pitt 2002). Table 2.4 in Appendix I presents summary statistics for relevant variables such as per capita income, and the various microcredit variables. As can be observed in this table, the mean for the 1991/92 variables for $t-1$ is zero. By assumption, there was no borrowing before 1991/92 because data is only available starting in 1991/92. In this case $M_{ij(t-1)}$ in the 1992 survey = 0. The same assumption was made in Khandker (2005).

5. Results

The results from the household FE estimation of equation (3), are presented in Table 2.5 in Appendix I. They show that as expected, the coefficients for labor assets (i.e. number adults in household), land assets (i.e. avg. household landholding) and infrastructure (i.e. bank present in village and electricity) are positive and statistically significant. As one would expect, the obvious implication here in terms of policy is that the state of development of a village in terms of infrastructure plays a significant role in income generation. The accumulation of assets by household is also important in terms of generating income and lifting households out of poverty.

In terms of microcredit borrowing, the results suggest that the benefits of microcredit extend to both male and female borrowers. In previous studies, however, the benefits of microcredit borrowing accrued disproportionately to women rather than men (see Pitt and Khandker (1998) and Khandker (2005)). Based on the fixed-effect estimation, a 10 percent increase in the current stock of female borrowing from the Grameen Bank, increases per capita income by .7 percent. The same increase in male borrowing from the Grameen Bank, increases per capita income by .9 percent (slightly higher than for female borrowers).

Most of the coefficients for the credit variables for other NGOs are significant positive and of substantial magnitude. For instance, a 10 percent increase in past credit given to women by other NGOs, increase household income by 1.34 percent. Similarly, a 10 percent increase in past credit given to men by other NGOs, increase household income by 1.75 percent. This result suggests that there are other sources of microfinance that are effective in targeting and disbursing loans to the poor.

The coefficients for the credit variables for other sources of microfinance are not what we would expect and warrant some analysis here. As an exercise, micro loans obtained from other sources such as money-lenders (i.e. employers, neighbors, shopkeepers, etc.) were included in this study. An interesting finding is that the credit coefficients for male and female borrowing from this source are statistically significant in a puzzling way. The findings show that a 10 percent increase in the current stock of credit given to men by other sources increase household income by .6 percent. Credit given to women by other sources in both periods has a significant negative impact on income of .7 percent and 1.15 percent respectively.

The estimates of the credit variables for other sources of microcredit borrowing would be puzzling under normal credit market conditions. In such market, one would expect that an increase in borrowing would augment the income of borrowers. In Bangladesh, however, credit markets are not perfect and most poor households are denied access to credit. Women, in particular, are excluded from the credit market, especially credit outside of formal microcredit programs. In this context, according to previous studies, it is the case that when women borrow (particularly in rural areas) in the informal sector (relatives, informal moneylenders, etc.), they do so under distress and are often exploited by their moneylenders (Yunus, 1994a, pp, 3-4). In this case, it would make sense that borrowing from other sources outside of NGOs and microfinance programs would impact household income positively when the borrower is a male and adversely when the borrower is a female. The fixed-effects estimates are used to calculate the marginal returns to credit for male and female borrowers (Table 2.6).²⁰ At the mean, an additional Tk 100 of cumulative borrowing from Grameen by women during 1998/99 increased household yearly income by almost Tk 6. The most significant impact observed is the effect of women borrowing from other NGOs. An additional Tk 100 in women's stock of credit from other NGOs during 1991/92 increases the household's total income by Tk 200.

In terms of the marginal return to microfinance for women borrowing from other sources, as previously discussed, credit from these sources has a reductive effect on household yearly income of Tk 36 for 1991/92 and Tk 50 for 1998/99. The marginal returns to borrowing for male borrowers who obtain credit from other NGOs is also substantial (see Table 2.6).

²⁰ Note: Because the estimation equations are in log-log (elasticity) form, marginal returns are calculated using the formula:

$$\frac{dY}{dX} = \beta \left(\frac{\bar{Y}}{\bar{X}} \right)$$

An additional Tk 100 in men's stock of credit from other NGOs during 1991/92 increases the household's total income by Tk 168 and by Tk 179 during 1998/99. In terms of borrowing from other sources of microfinance (i.e. money-lenders), this borrowing source seems to benefit men and not women.

Table 2.6: Marginal Returns to Microfinance Loans (taka per 100 taka in borrowing)

Gender and Period	Household Total Yearly Income
<i>Women's Borrowing</i>	
Returns from Grameen Loans in 1991/92	-.31
Returns from Grameen Loans in 1998/99	5.78***
Returns from NGO Loans in 1991/92	200.36***
Returns from NGO Loans in 1998/99	6.37
Returns from Other Loans in 1991/92	-35.9**
Returns from Other Loans in 1998/99	-50.03**
<i>Men's Borrowing</i>	
Returns from Grameen Loans in 1991/92	4.9
Returns from Grameen Loans in 1998/99	32.18**
Returns from NGO Loans in 1991/92	168.2***
Returns from NGO Loans in 1998/99	179.3***
Returns from Other Loans in 1991/92	.97**
Returns from Other Loans in 1998/99	7.1***

*t-statistic is significant at the 10 percent level of better

**t-statistic is significant at the 5 percent level or better

***t-statistic is significant at the 1 percent or better

Source: Author's calculations based on 1991/92 and 1998/99 household surveys in Bangladesh.

When the sample is restricted by land assets and by education assets (presented in Table 2.7 in Appendix I), it is apparent that microfinance benefits households who are resource poor (i.e. own $\leq .50$ acres of land) and households that are less educated (i.e. < 4 yrs of schooling). The results in Table 2.7, suggest that the policies employed by the Grameen Bank and other microfinance programs are effective in terms of their impact on the targeted population.

Most of the coefficients for the resource wealthy households are not statistically significant which suggests that these households do not benefit from microcredit as much as those households who lack assets, collateral and access to credit. In this context, the results suggest that microcredit benefits the resource poor households.

There are a few items in Table 2.7, Appendix I, that are worth highlighting. The coefficient for the 1991/92 BRAC loans disbursed to women in households that have low education assets is negative significant suggesting that loans from this source given to this subgroup have an adverse effect on household income. The same is observed for BRAC loans given to men with higher educational achievement. RD-12 loans given to men with low land and education assets also have a negative significant coefficient. These results are puzzling since we would expect credit to be positively associated with income, but as discussed previously, in the presence of imperfect credit markets and limited investment and market opportunities, it is possible for access to credit not to have the impact we would expect.²¹ In terms of the marginal returns to credit for selected groups (see Table 2.8), we can observe the largest returns in Taka terms for men and women who obtained credit from NGOs.

The results from Table 2.8 suggest that at the mean, an additional Tk 100 of cumulative borrowing from NGOs increased household yearly income for women borrowers in the period 1991/92 who had $\leq .50$ acres of land by Tk 210.02, by Tk 188.4 for borrowers with < 4.5 years of education and by Tk 195.9 for borrowers with < 4 adults in the households. Similar results are observed for male borrowers.

²¹ In future versions of this research, further exploration of the data will be employed to see if these issues are caused by problems in the data.

The largest marginal return in Table 2.8 is observed for male borrowers who borrowed from NGOs in the period 1991/92 and who had labor assets > 4. The results suggest that an additional Tk 100 in men's stock of credit from other NGOs during period 1991/92 increases household's total income by Tk 430.6.

Table 2.8: Marginal Returns to Microfinance Loans Based on the Household Fixed-Effects Estimates for Selected Groups (taka per 100 taka in borrowing)

Gender and Period	Household Total Yearly Income (Land Assets ≤ .50 acres) (Taka)	Household Total Yearly Income (Education Assets ≤ 4.5 years) (Taka)	Household Total Yearly Income (Labor Assets < adults) (Taka)	Household Total Yearly Income (Labor Assets > 4 adults) (Taka)
<i>Women's Borrowing</i>				
Returns from Grameen Loans in 1991/92	.23 6.12***	.22 5.7**	.3 5.1**	2.2 21.6***
Returns from Grameen Loans in 1998/99	210.02*** 3.13	188.4*** 8.4	195.9** 1.74	151.01 .21
Returns from NGO Loans in 1991/92	-40.5** -50.04	25.2 -36.9	19.4 31.79	83.5 163.4
Returns from NGO Loans in 1998/99				
Returns from Other Loan Sources in 1991/92	6.27* 34.65*	3.13 31.5*	3.1 29.01*	7.3 23.9
Returns from Other Loan Sources in 1998/99	175.9** 139.9*	214.3** 176.3**	118.2 123.5	430.6** 504.4
<i>Men's Borrowing</i>	.63 6.51**	.60 5.1*	.73 9.4***	.52 2.3
Returns from Grameen Loans in 1991/92				
Returns from Grameen Loans in 1998/99				
Returns from NGO Loans in 1991/92				
Returns from NGO Loans in 1998/99				
Returns from Other Loan Sources in 1991/92				
Returns from Other Loan Sources in 1998/99				

*t-statistic is significant at the 10 percent level of better

**t-statistic is significant at the 5 percent level or better

***t-statistic is significant at the 1 percent or better

Source: Author's calculations based on 1991/92 and 1998/99 household surveys in Bangladesh.

Looking at the marginal returns presented in Tables 2.6 and 2.8 allows us to see a more tangible measure of the impact of microcredit that is suggested by the estimates. Some of the marginal returns are small and others are quite significant. However, it is evident by the results obtained here that microfinance does have the potential to make a significant contribution to income generation, poverty reduction and to overall economic prosperity for poor borrowers.

6. Conclusion

The findings in this study have important policy implications for microcredit development programs. One implication is that if microcredit plays an important role in increasing household income, microcredit programs would be more effective if efforts were aimed at maximizing the social and income returns from micro credit since the ultimate goal is to increase human capital and raise the income of targeted households. The findings in this study suggest that targeting the poor is an effective rural development policy in terms of poverty reduction and thus future goals of development programs should include expanding the outreach of microcredit programs. The results presented here also suggest that there are differential impacts based on gender, socioeconomic factors and microfinance programs. Incorporating these differential impacts in program evaluation methods could improve the effectiveness of microfinance schemes so as to allow policymakers to implement policies that would ultimately result in significant poverty reduction.

Another important policy implication stemming from this study is that given the geographical, political and cultural settings of Bangladesh, something needs to be done to complement credit with investment opportunities in working capital, technology and equal opportunity for women in formal sectors. The findings in this study suggest that given the small magnitude of impact, provision of credit alone will not create significant economic growth at the household and village level. Microfinance programs are increasing their efforts to compliment credit with other services such as financial and entrepreneurship education but these efforts will be ineffective if there are barriers that prevent borrowers, specifically women, from maximizing the returns to their loans. In this context, microcredit programs should also engage in the kind of advocacy that would help create an entrepreneurial environment that is inclusive and nurturing for all borrowers.

CHAPTER III

Complementarity Between Microcredit and Capability-Enhancing Services: The Case of Microfinance Institutions in Bangladesh

“... social opportunities of education and health care, which may require public action, complement individual opportunities of economic and political participation and also help to foster our own initiatives in overcoming our respective deprivations. If the point of departure of the approach lies in the identification of freedom as the main objective of development, the reach of the policy analysis lies in establishing the empirical linkages that make the viewpoint of freedom coherent and cogent as the guiding perspective of the process of the development.”

____Amartya Sen (1999, p. 13)

1. Introduction

Microfinance has proven to be an effective development strategy for poverty reduction, but like many other development tools, it has faced a number of challenges. One of the challenges has been the inability of microfinance institutions (MFIs) and non-governmental organizations (NGOs) to reach the people that need access to credit the most. Although outreach has increased over the years, microfinance has insufficiently reached the poorest strata of society (Morduch and Haley 2002). Studies have shown that unless there is a specific and appropriate design of a targeting tool, it is likely that the microfinance program will fail to reach the poorest of people (ibid). In this context, it is likely that the poor would either be missed or that they will exclude themselves because they do not believe they could benefit from the program (Navajas et al 2000).

Another major challenge facing microfinance and the issue of focus in this chapter is the fact that the poor, particularly in Bangladesh, form the vast majority of the people without access to health care, education and a favorable economic environment. In particular, access to basic human assets (i.e. education, health care and nutrition) is important because when these assets are insufficient it can slow income growth and limit the effectiveness of microfinance in lifting the poor out of poverty. For this reason, it has been argued that the poor, particularly those facing great social and economic deprivation, may not be good candidates for micro loans. According to Morduch and Haley (2002), the general consensus about microfinance is that since entrepreneurial skills and ability are required to run a successful microenterprise, not all borrowers are equally able to take on debt. Furthermore, it is argued that the sick, the destitute, etc., many whom are among microfinance borrowers, should be given direct financial assistance rather than micro loans (ibid). While the aforementioned arguments are valid, the position taken in this dissertation and the dominant view and evidence in the literature is that the poor can greatly benefit from receiving loans.

As mentioned earlier in previous chapters and as evidenced in chapter 2, there is strong evidence that microcredit is positively correlated with increases in income, education, entrepreneurship, asset building and consumption expenditure (see Hashemi, Schuler, and Riley 1996; Schuler and Hashemi 1994; Khandker 1998; and Khandker 2005). Although studies have suggested that microfinance has had a positive impact on poverty reduction, critics of microcredit, as noted previously, argue that micro loans are just “micro-Band-Aids” because they have failed to generate substantial economic development in the countries where they operate.²²

²² Alexander Cockburn, “The Myth of Micro Loans”, *The Nation*, October 19, 2006.

On a macroeconomic level, it is hard to dispute this claim and one of the reasons for this, as it is argued in this chapter, is that in the absence of an opportunity set that would complement microfinance, namely the existence of basic human assets, investment opportunities, equal opportunity, etc., the impact of microfinance is likely to remain small in scale and poverty reduction would be minimal.

The explicit expectation of many microfinance programs is that access to credit will significantly reduce poverty, empower women and improve the living conditions of poor borrowers. The underlying issue with this expectation is that the roles that social conditions and/or what Sen (1999) called “substantive” and “instrumental” freedoms play in development are ignored. According to Sen, development requires the removal of the major barriers that cause “unfreedoms” such as tyranny, poor economic opportunities, systematic social deprivation, neglect of public facilities, as well as oppression (Sen 1999, p. 3). According to this view, if microcredit is associated with improvements in incomes and expenditures, but individual freedoms and abilities are not enhanced, substantial development has not been realized. In this context, development goes beyond the usual macroeconomic indicators of development.

In light of Sen’s capability framework, a different approach to measuring the effectiveness of microcredit is undertaken in this study. In previous studies, for instance, my own study in chapter 2, household level panel data from Bangladesh was used to estimate the economic impact of microfinance by tracing the marginal effect of microcredit on household-level income. The findings suggested that the existence of banks and electricity in the village is positively correlated with increases in household income.

A positive correlation was also found between income and the ownership of land assets. In this context, the results confirm that the existence of adequate public facilities, one of Sen's defined capabilities, contributes to economic development in terms of the positive influence infrastructure seems to have on income generation.

A main result in the study conducted in chapter 2 is that micro loans, especially those disbursed by the Grameen bank, have a positive and statistically significant effect on household income and this effect is observed for all borrowers from the poorest households. The findings also suggest differential impacts by gender, education assets and labor assets. The extent of the impact measured in the aforementioned study, however, is limited in scope since it tells us little about whether the increase in household income improves the lives of borrowers in terms of their living conditions, their freedoms and what they are able to do as people.

Given data limitations, the objective in this study is not to measure how freedoms or capabilities are enhanced by microcredit but rather how the provision of capability-enhancing services and microcredit enhance economic development as measured by income. Household panel data from Bangladesh is used to measure the empirical relationship between the capability-enhancing services provided by three microfinance programs in Bangladesh and per capita income. The three programs of interest are the Grameen Bank, the Bangladesh Rural Advancement Committee (BRAC) and Rural Development-12 (RD-12) program.

The organization of the study is as follows: section 2 describes Sen's capability approach to development, section 3 reviews some of the capability constraints in Bangladesh and section 4 reviews the relationship between capabilities and poverty reduction in Bangladesh.

Section 5 outlines the theoretical background, section 6 outlines the first empirical model used, section 7 presents the second empirical model used, section 8 describes the data, and section 9 discusses the results from the first model. Section 10 outlines the results from the second model and section 11 concludes the study.

2. Sen's Capability Approach

Amartya Sen is an Indian economist who received the 1998 Nobel Prize in Economic Sciences for his work on welfare economics and social choice theory, and for his focus on finding solutions to the problems associated with poverty. Sen is known for his work on the causes of famine and for his instrumental role in the development of solutions for mitigating the effects of shortages of food. Sen's most influential book, *Development as Freedom*, was published in 1999 and since then, it has been cited by many scholars, particularly, in the field of development economics. Sen's unique view about what should be the main goal of development is centered on a bottom-up approach to economic and human development. His "capability" approach is based on the idea that people should be able to live the life they choose and value and should have the "capability" and/or "freedom" to do so in the absence of socially imposed deprivations. In this context, for instance, an example of a capability would be freedom from hunger. Sen would argue that access to food is a basic human right and would enable people (make them capable of) to become nourished and productive members of society.

According to Sen, the expansion of freedom should be both the primary end and the principal means of development. Furthermore, he believes that development should aim to remove the kinds of “unfreedoms” that prevent people from having choices and opportunities to exercise their reasoned agency. In this context, Sen contends that true development is that which removes substantial unfreedoms (Sen, 1999, p. xii).

Sen argues that social opportunities of education and health care complement individual opportunities of economic and political involvement as well as the chances of overcoming deprivation. In this sense, the process of development should aim at providing these social opportunities as a point of departure (Sen, 1999, p. xii). Sen contends that freedom is central to the process of development for the following reasons (Sen, 1999, p. 4):

- (1) *The evaluative reason*: assessment of progress has to be done primarily in terms of whether the freedoms that people have are enhanced;
- (2) *The effectiveness reason*: achievement of development is thoroughly dependent on the free agency of the people.

The above arguments are especially relevant to the use of microfinance as a tool for development. As previously argued in chapter 2, the provision of social and economic opportunities to borrowers would complement access to credit by allowing poor borrowers to fully utilize the funds in a manner that would be efficient and beneficial to income growth and the emergence of small enterprises.

In this context, microfinance providers should look at whether or not the freedoms that would complement microfinance are in place in order to fully assess the potential benefits microfinance can bring about. The lack of freedoms on the other hand, should be viewed on the part of the MFI or NGO as an opportunity to play a larger role in the process of development, namely to act as an advocate for the provision of such freedoms.

2.1 Institutions and Instrumental Freedoms

Sen identifies two broad categories of freedoms. The first group comprises the substantive freedoms. Included in this category are elementary capabilities such as being able to avoid deprivations like starvation, undernourishment, escapable morbidity, premature mortality and the freedoms that are related to being literate and numerate and having freedom of the press and speech (Sen, 1999, 36). The other freedoms are placed in the instrumental freedoms category. There are five distinct types of freedoms in the instrumental freedom category that are comprised of rights and opportunities that help advance the general capability of an individual. These freedoms, Sen argues, are not only the primary ends of development but they are in essence its principal means. In this context, the instrumental role of freedom is related to the way different types of rights, opportunities and entitlements contribute to the expansion of overall human freedom and thereby promote development (Sen, 1999, p. 10, 37) Table 3.1 lists and describes these freedoms.

Table 3.1: Instrumental Freedoms

Freedoms	Description
1) Political Freedoms (including civil rights)	-Freedom to determine what should govern and on what principles. Freedom of political expression and right to vote.
2) Economic Facilities	-Opportunities to utilize economic resources for the purpose of consumption, production or exchange. Fair income distribution.
3) Social Opportunities	-Societal arrangements for education, health care, etc. which influence the individual substantive freedom to live better.
4) Transparency Guarantees	-The freedom to deal with one another under guarantees of disclosure, trust and lucidity.
5) Protective Security	-The provision of a social safety net for preventing death and starvation. Includes fixed institutional arrangements such as unemployment benefits and statutory income supplements to the indigent and famine relief and other assistance for the destitute.

Source: Sen, 1999, p. 10, 37

2.2 Capabilities, Interconnections, and Microfinance

One of the missing links in the microfinance literature appears to be the connection or complementarities that capability-enhancing services have or can have on the overall impact of microfinance. Many scholars who conduct impact studies treat microfinance programs as if they were removed or operated independently from local cultures and economic and political environments. The fact of the matter is that this is never the case. Every country and/or village in which microfinance programs operate is attached to its embedded institutions and cultures and as such, the impact of microfinance will be affected by the dynamics inherent in those institutions and cultures. In this context, the goals to alleviate poverty and encourage entrepreneurship can be dampened if the social and economic environment is not conducive to the attainment of such goals.

A main argument pursued in this dissertation is that the provision of the substantive and instrumental freedoms brought to light by Sen, are relevant to the success of microfinance programs in alleviating poverty. To put this in context, imagine giving a loan to someone who is critically ill and without access to health care. It would be very difficult for this borrower to both repay the loan and turn the funds into a productive activity. In the aforementioned scenario, access to health care would be interconnected to microcredit in that healthy borrowers can engage in productive activities and thereby repay the loan and maximize the return (social and economic) of the funds borrowed.

3. Capability Constraints in Bangladesh

In Bangladesh, as well as in other countries, microfinance programs are typically targeted towards the poor and women who are self-employed in the informal sector. Microfinance involves small-scale credit and savings transactions that allow small businesses to obtain start-up capital with little or no collateral in place. Microcredit programs also provide education and working skills to women and the poor in order to improve production capabilities and decision-making.

A number of microfinance institutions (MFIs) and non-governmental organizations (NGOs) lend predominately to women. For instance, about 97 percent of Grameen Bank's seven million borrowers are women.²³ Other major microfinance programs such as FINCA and ACCION also lend predominately to women.²⁴

²³ <http://www.grameen-info.org/bank/index.html>, as of May 2007.

²⁴ http://www.villagebanking.org/site/c.erKPI2PCIoE/b.2604299/k.FFD9/What_is_Microfinance_What_is_Village_Banking.htm and <http://www.accion.org/Page.aspx?pid=492> (accessed October 7, 2009)

One of the reasons MFIs and NGOs have shifted micro-lending toward women is that women are believed to be poorer than men on average (see Burjorjee et al., 2002). Women also tend to own little assets compared to their male counterparts and this makes them unable to provide the collateral required by most formal lenders. In this context, women are believed to be more credit-constrained (Khandker, 1998).

In the case of rural Bangladesh, microcredit is targeted toward poor rural women because women tend to be isolated and deprived and even though they greatly contribute to rural economic activity, their work is marginalized and ignored (see Schuler & Hashemi, 1995 and Abdullah & Zeidenstein, 1982). Additionally, given Bangladesh's system of 'purdah,' "a system for the seclusion of women" (Khan, 1988, p. 33), many rural women are not encouraged to be educated, they do not own land or borrow from the formal sector without their husband and they are socially conditioned to view themselves as inferior to their male counterparts (Papa, Auwal, & Singhal, 1995). This strict Muslim doctrine of 'purdah' requires Bangladeshi women to veil themselves in public and they are prevented from visiting towns away from their homes. In this context, women are kept out of the paid labor force (Auwal, 1996). Furthermore, if a poor household is unable to afford food, the expectation is that the women should forgo food and starve, resulting in a higher mortality rate for women than for men (Shehabuddin, 1992).

Critics of microcredit question the appropriateness of micro loans as a tool for alleviating poverty because, as noted earlier, not every borrower is a good candidate for microcredit in terms of the requirement that the loans be used for productive activities. In this sense, if local economic conditions, opportunities and "freedoms" are scarce, the extent of poverty reduction will depend on local circumstances.

It is argued that poverty is likely to be caused by low economic growth, high population growth, inequality in the distribution of resources, unemployment and low productivity among the poor. Given the aforementioned poverty-inducing factors, poverty reduction would require investing in human and physical capital in order to increase worker productivity (Khadker, 1998). In the case of many developing countries, in this particular case, Bangladesh, poverty is caused to an extent by the lack of investment in both, human and physical assets.

Despite the documented impact microfinance has had on poverty alleviation and the considerable progress Bangladesh made as a country in reducing poverty during the 1980s and the 1990s (Sen, 2003), the country is still among the poorest countries and 40% of the population still lives below the national poverty line (World Bank).²⁵ To give an example of the type of economic and social environment in which MFIs and NGOs currently operate in Bangladesh, we can examine the most recent Human Development Report for Bangladesh. The Human Development Index (HDI) measures the average achievements in a country in three basic measures of human development. Those measures are a long and healthy life, access to knowledge and a reasonable standard of living. Similarly to Amartya Sen, The United Nations Development Programme (UNDP) defines human development as a process of expanding people's opportunity set, improving their well-being and the existence of social and political freedoms. This concept of human development makes a distinction between two aspects of human development: (1) the development of human capabilities and (2) the freedom to enjoy these capabilities for work or for leisure (see <http://hdr.undp.org> for more details). Table 3.2 below outlines the key distinctions between traditional approaches of development as compared to the human development approach employed by the UNDP.

²⁵ <http://data.worldbank.org/country/bangladesh>. Accessed July 2011.

Table 3.2: UNDP Human Development Approach vs. Other Development Approaches

Development Approaches	UNDP Human Development Approach
-Economic growth: economic growth is in itself a means and not an end of development.	-Use other measures of economic growth because high GDP Growth does not translate to progress in human development. Global experience shows that high growth does not always translate into human development.
-Theories of human capital formation and human resource development: view human beings as means to increased income and wealth. Concerned with human beings as inputs to increasing production.	-Human development denotes both the process of widening people's choices and improving their well-being. The concept of human development is a holistic on putting people at the centre of all aspects of the development process.
-Human welfare approach: looks as human beings as beneficiaries in the development process.	-Looks at human beings as participants in the development process.
-Basic needs approach: concentrates on the bundle of goods and services that deprived population groups need such as food, shelter, clothing, health care and water.	-Focus is not so much on the provision of basic goods and services but rather their implications on human choices.

Source: UNDP²⁶

The HDI currently places Bangladesh in the “low human development” category and ranks it 129 in human development out of 169 countries. The country profile for Bangladesh is presented in Table 3.3. This data brings to light some of the unfortunate realities facing Bangladesh today. Some basic human asset deprivations include the lack of access to health care, education and equal opportunity for women. The life expectancy at birth is 66.9 years and the adult literacy rate is 56.5 percent. These numbers are very low compared to neighboring countries such as India and Pakistan.

²⁶ <http://hdr.undp.org/en/statistics/indices/>. Accessed August 2011.

Table 3.3: Country Profile of Human Development Indicators—Bangladesh

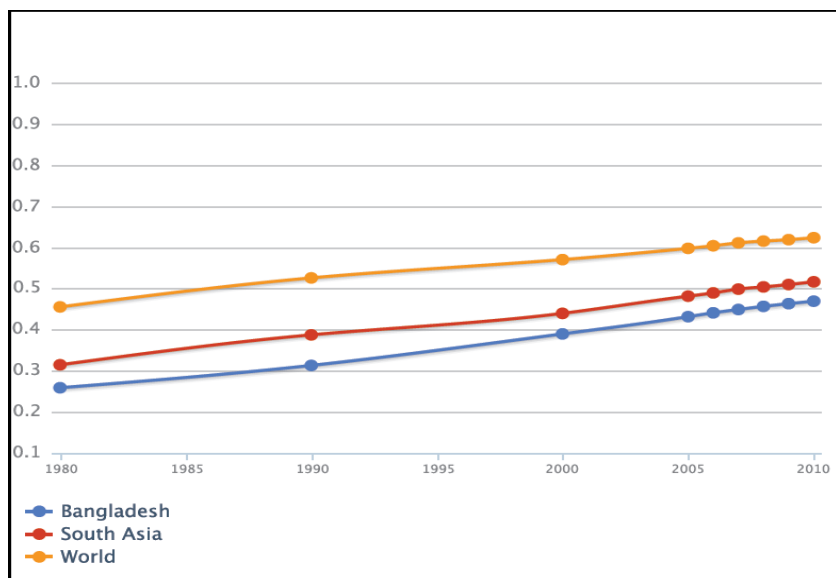
Health		Life expectancy at birth (years) 66.9
Indicator	Value	
Prevalence of undernourishment in total population (% of population)	26	
Expenditure on health, public (% of GDP)	1.1	
Under-five mortality (per 1,000 live births)	54	
Life expectancy at birth (years)	66.9	
Education		Mean years of schooling (of adults) (years) 4.8
Indicator	Value	
Adult literacy rate (both sexes) (% aged 15 and above)	56.5	
Combined gross enrolment ratio in education (both sexes) (%)	52.1	
Expenditure on education (% of GDP) (%)	2.4	
Mean years of schooling (of adults) (years)	4.8	
Income		GNI per capita (2008 PPP US\$) LN 7.4
Indicator	Value	
GDP per capita (2008 PPP US\$)	1,458	
GNI per capita (2008 PPP US\$) LN	7.4	
Household final consumption expenditure per capita PPP (constant 2005 international \$)	788	
Inequality		Inequality-adjusted HDI value 0.331
Indicator	Value	
Income Gini coefficient	31	
Inequality-adjusted education index	0.219	
Inequality-adjusted income index	0.299	
Inequality-adjusted HDI value	0.331	
Poverty		Multidimensional poverty index (k greater than or equal to 3) 0.291
Indicator	Value	
Multidimensional poverty index (k greater than or equal to 3)	0.291	
Intensity of deprivation	50.4	
MPI: Headcount (k greater than or equal to 3), population in poverty (% of population)	57.8	
Population living below \$1.25 PPP per day (%)	49.64	
Gender		Gender Inequality Index, value 0.734
Indicator	Value	
Maternal mortality ratio (deaths of women per 100,000 live births)	570	
Population with at least secondary education, female/male ratio	0.784	
Adolescent fertility rate (women aged 15-19 years) (births per 1,000 women aged 15-19)	71.6	
Gender Inequality Index, value	0.734	
Shares in parliament, female-male ratio	0.198	
Maternal mortality ratio (new estimates) (deaths of women per 100,000 live births)	340	
Gender Inequality Index (updated)	0.712	

Source: Human Development Report 2011

The gender inequality index reflects women's disadvantage in three areas: reproductive health, empowerment and the labor market. The index ranges from 0, which means that men and women fare equally and 1, which means women fare very poorly in all three dimensions. The gender inequality index value for Bangladesh is 0.734 which indicates a high degree of disadvantage for women.

Another important index is the Inequality-adjusted HDI Index (IHDI). This index captures the loss in potential human development that is due to inequality. The IHDI equals the HDI when there is no inequality and is less than the HDI as inequality rises. In this context, the HDI is viewed as a measure of potential human development and IHDI represents actual human development. The 2011 HDI is 0.469 and the IHDI for Bangladesh is 0.331. The loss in potential human development due to inequality in Bangladesh is .138 (computed by $0.469 - 0.331$).

One of the main arguments pursued in this chapter and throughout this dissertation is that in order for microfinance institution to make a significant dent on poverty reduction, the enabling conditions necessary for human and economic prosperity must be in place. In the case of Bangladesh, the degree of existing deprivation must be considered and addressed as a point of departure in the development process by development initiatives. According to the HDI while Bangladesh has displayed an upward trend in human development, it still ranks at the bottom compared to South Asia and the world as a whole (see Figure 3.1, Bangladesh is represented by the lowest plot).



Source: Human Development Report 2011

Figure 3.1: Human Development Index: Trends 1980-present

4. Capabilities and Economic Development in Bangladesh

There are many documented cases that support the idea that expansion of capabilities is positively correlated to economic growth and development. One of the most comprehensive studies pertaining to the issue of poverty and the linkages between poverty and capabilities in Bangladesh is found in Sen (2003). In this study, the author uses a panel dataset on 379 rural households in Bangladesh to compare the reasons why some households escape poverty and why others do not. According to Sen (2003) a missing link in the Bangladesh literature is related to the inadequacy of two types of disadvantages: “social” and “geographical”. The social disadvantage category is composed of specific groups of the chronic poor who are part of social formations among different caste, class, ethnicity and religion. The geographical disadvantage pertains to residents of different areas where social and economic opportunities may or may not exist (ibid).

In terms of the main causes of poverty in Bangladesh, the literature points to the factors listed in Table 3.4 (see Hossain and Sen 1992; Hossain, Sen, and Rahman, 2000; BIDS 2001 for a discussion of these factors) as major contributors to poverty.²⁷ Given these poverty-inducing factors, the typical policies that are recommended in the literature are those that emphasize food production, nonfarm sector development, access to credit and human development in the areas of education, health and nutrition (ibid). In addition to these policies there is strong consensus that any successful policy “menu” must include measures that enhances “... voice, promote empowerment, and raise the institutional capability of the poor and socially disadvantaged groups” (Sen, 2003).

Table 3.4: Factors Linked to Poverty in Bangladesh

1.	Being in a female-headed household
2.	Limited access to transport
3.	Limited power and other infrastructure
4.	Living in a remote area
5.	Unfavorable agricultural environment
6.	Having little agricultural and other assets
7.	Illiteracy
8.	Wage labor

To identify those who escape poverty, Sen (2003) compares the assets and occupational/income structure of the chronically poor to those of the households who escape poverty and those who were never poor. The results of the author’s computations are replicated in Table 3.5.

²⁷ Bangladesh Institute of Development Studies. <http://bids.org.bd/bids-bd/activities/governance.htm>. Accessed July 2008.

Some of the characteristics about the chronically poor observed in this table is the fact that this group holds the lowest position with respect to all asset categories such as the number of earners, average years of schooling of earners, average land owned, access to credit market and ownership of nonland fixed assets. In terms of the reasons why some of these households could not escape poverty or fell deeper into poverty, these very same characteristics or lack of opportunities contributed to their descend into poverty.

In terms of the households that ascended or escaped poverty, Sen (2003) observes that the existence of “capability” and or “opportunity” sets was the prime driver of high income growth. The data in Table 3.5 accentuates the fact that those households who escape poverty tend to accumulate human, physical and financial assets. According to the data, ascending households tend to focus on nonagricultural activities and engage in trade, migration (remittance) and other nonagricultural labor.

Sen (2003) identifies a few factors that were instrumental in allowing households to escape poverty that are relevant to the topic and analysis undertaken in this dissertation. One of the factors identified is considerable increases in human assets among the ascending households. The author points out that part of the difference in human assets between the descending household and the ascending households can be attributed to a high degree of inequality in the distribution of human assets (ibid).

Table 3.5: Asset base and income by dynamic group in rural Bangladesh, 1987-2000

Variables	Chronic poor		Ascending household		Descending households		Never poor	
	1987-88 2000		1987-88 2000		1987-88 2000		1987-88 2000	
<i>Labor force</i>								
Family size	5.66	6.05	6.50		4.88	6.97	5.94	6.3
Number of earners	1.54	1.77	6.40		1.75	1.87		9
No. of agricultural workers	1.19	1.10	1.70		1.30	1.22	1.75	
No. of nonagricultural workers	0.35	0.67	2.31		0.45	0.65	2.18	
			1.05				1.12	
<i>Natural assets</i>			1.01				0.84	
Owned land (ha)	0.27	0.24	0.65		0.60	0.47	0.63	
Cultivated land (ha)	0.27	0.21	1.30		0.78	0.31	1.34	
Rice area (ha)	0.35	0.29			1.01	0.37		
MV rice cultivate area (ha)	0.10	0.18			0.31	0.24		
			0.42				1.23	
<i>Human assets</i>			0.74				1.29	
Average years of schooling of all earners	3.16	5.90	0.38		4.08	7.45	1.06	
			0.54				0.75	
			0.46				1.51	
<i>Financial assets (\$)</i>	13	31	0.78		15	12	1.01	
Amount of institutional loan taken	27	10	0.19		31	4	0.57	
Amount of noninstitutional loan taken	40	41	0.57		46	16	0.70	
Total amount of loan taken								
<i>Physical assets (\$)</i>	98	131	5.18		163	174	8.09	
Total nonland fixed assets	77	101	12.60		154	99	15.98	
Agricultural assets	20	30			9	75		
Nonagricultural assets								
			17	45			13	108
			28	17			89	42
			45	62			102	151
			137	658			323	1242
			123	213			298	268
			14	445			25	974

Source: Adapted from Sen, 2003.

According to Sen (2003), another contributor to poverty reduction was changes in financial assets. The author attributes this increase in financial assets to greater access of the rural poor households to institutional sources of credit between the two periods due to the growth of microfinance institutions (MFIs) in these communities. In this respect, the author notes that the households that climbed out of poverty had greater access to financial services than those who remained poor and that those who were never poor had a greater advantage since they had access to both institutional and noninstitutional financial resources (ibid). Table 3.6 outlines the reasons the households in the Sen (2003) study reported to be the main contributors to their economic prosperity and ultimately their escape from poverty.

Table 3.6: Reasons of “improvement in economic well-being over the last decade” as-perceived by respondents in rural Bangladesh (percentage of multiple responses)

Reasons of improvement	Dynamic poverty groups					
	Ascending households			All groups		
	Cases	%	Rank	Cases	%	Rank
Structural	98	73.1	I	297	74.4	I
Increase in natural assets	10	7.5	4	42	10.5	4
Increase in human assets	35	26.1	2	93	23.3	2
Increase in financial assets	6	4.5	6	27	6.8	6
Increase in physical assets	37	27.6	1	101	25.3	1
Increase in social assets	6	4.5	6	14	3.5	8
Favorable market conditions	4	3.0	7	20	5.0	7
Life cycle	32	23.9	II	89	22.3	II
Increase in labor force	16	11.9	3	40	10.0	5
Positive change in household demography	16	6.0	5	49	12.2	3
Crisis	4	3.0	III	13	3.3	III
Positive shocks (“good luck”)	4	3.0	7	13	3.3	9
Total cases	134	100	—	399	100	—

Source: Adapted Sen 2003.

The two most important factors identified as the main drivers of poverty reduction were improvement in physical assets and the acquisition of human capital. One of the main conclusions that can be reached from the Sen (2003) study is that there are many routes to poverty reduction. Another conclusion is that the process of economic development is multidimensional in the sense that in most cases one policy alone, it being access to credit or the provision of cash transfers, etc., will not yield economic development of a significant magnitude.

5. Microcredit and Channels of Impact

The majority of recent studies that use survey data to examine the impact of microcredit have focused on the effect access to credit has on the traditional measures of economic development such as income and household expenditure (See Hulme and Mosely 1996, Khandker 1998, Chen and Snodgrass 2001, Park and Ren 2001, Mosely 2001, Duong and Izumida 2002, Banegas et al 2002, Dunn and Arbuckle 2001a, 2001b and Khandker 2005). The channel of microcredit impact of this type is represented by diagram (a) in Figure 3.2 and is in fact the type of analysis found in chapter 2 of this dissertation. Upon further review of the literature, few studies were found where the correlation between microcredit and capabilities is explored. The direct impact of microfinance on instrumental freedoms or capabilities can be modeled in a way consistent with diagram (b) where the focus is on how microfinance enhances or fails to enhance capabilities (Figure 3.2).

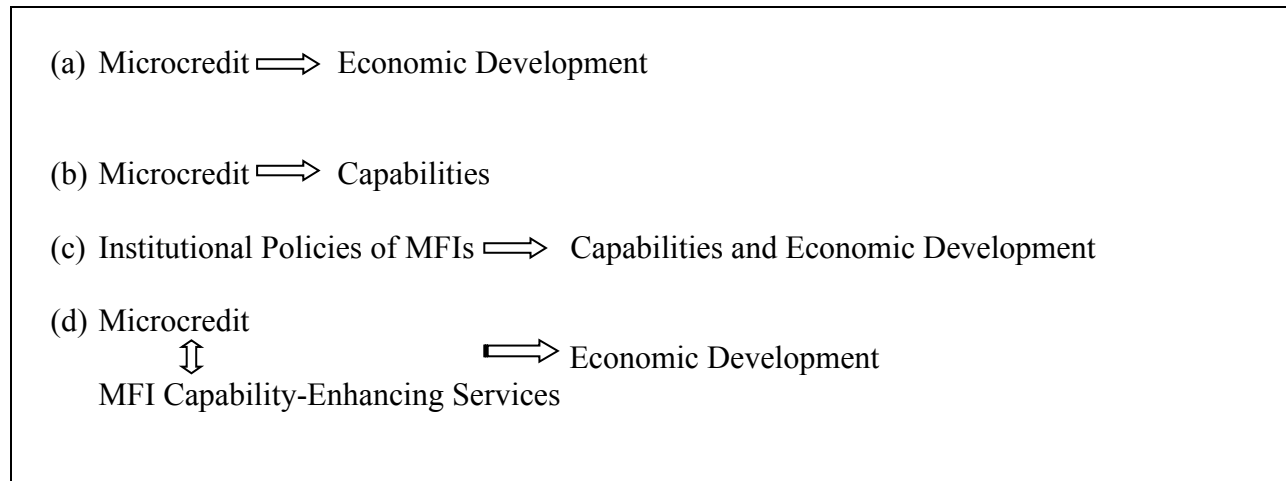


Figure 3.2: Microcredit and Channels of Impact

A study that falls within the (b) channel of impact is that of Pitt and Khandker (1998) where they examined the relationship between microcredit and labor supply and schooling by girls (both which would fall in the realm of the capabilities defined by Amartya Sen). Their findings suggest that microcredit has a positive impact on women's labor supply and that participation in the Grameen Bank credit program has a positive impact on schooling by girls. Another study linking the relationship between capabilities and microcredit is that of Gertler et. al. (2003). In this study, the results suggest a significant positive correlation between microfinance, household consumption and health.

To my knowledge, there are very scarce studies that measure the relationship between the services provided by the MFI, credit and social and economic outcomes (impact channel (d) in Figure 3.2). Such institutional policies or services include the provision of education and skill training and the requirement that all borrowers obtain these services before they are eligible for a loan from the MFI or NGO.

Other institutional policies include an explicit pledge by the borrowers to denounce cultural norms that are oppressive and counterproductive in terms of a borrower's ability to labor in freedom and become productive (See Section 8.1). These institutional policies are expected to enable the borrower to become productive and to prosper as individuals and to achieve economic prosperity. In this context, the policies or services provided by the microfinance institution are referred to here as capability-enhancing policies or services. In the context of Amartya Sen's capability framework, these policies and services are expected to have the effect of alleviating or removing "unfreedoms" and allowing individuals to reach their potential and as such, they fall within the realm of the capability space that Sen describes.

I was able to find one study that considers how financial intermediation provided by MFIs and their institutional policies impacts social and economic development. Kaboski and Townsend (2005) studied the correlation between the institutional policies of selected MFIs and social and economic outcomes. Their paper used variation in policies and institutional characteristics to evaluate the impacts of microfinance institutions at the village-level in rural Thailand. They used a two-staged LS and MLE test of microfinance impact on asset growth, level of consumption/input use, probability of being a business owner, probability of being a rice farmer, and probability of borrowing from a money lender. They found that institutions with good policies (such as providing services to borrowers) can promote asset growth, consumption smoothing, occupational mobility and can decrease moneylender reliance.

The Kaboski and Townsend (2005) study examined impact of the type illustrated in diagram (c) in Figure 3.2. They used household and village-level data to explore the impact of financial intermediation in the "unbanked" sector in rural Thailand.

One of the limitations in this study is the lack of microcredit data at both the institutional-level and at the household-level. For example, the authors were unable to obtain data on loan amounts and so the aim of their study focuses on how the policies of the MFI and the prevalence of MFIs in rural areas impacts asset growth, entrepreneurship, occupational mobility and many other aspects of household prosperity.

This study expands on the type of analysis found in Kaboski and Townsend (2005) and contributes to the existing literature on microfinance and financial intermediation in the following ways: (i) I examine whether the capability-enhancing services provided by the three MFIs in this study improve the effectiveness of microcredit in promoting economic development, (ii) I explore the differential impacts of these capability-enhancing policies by gender and by institution, and (iii) I explore impact channel (d) in Figure 3.2, which is the inherent association and/or complementarities between microcredit and the provision of capability-enhancing services.

5.1 Impact of Microcredit and Capability-Enhancing Services on Household Income

The few rigorous studies that evaluate the impacts of microfinance institutions (see Pitt and Khandker 1998, Morduch 1998, Coleman 1999, Raviez 2000, Aportela 1998 and Khandker 2005) have produced mixed results rendering it necessary to explore the impact of microcredit at a deeper level. This is one of the objectives of this study. To my knowledge, besides the Kaboski and Townsend (2005) study, no other study explores the link between the policies employed by the MFI and program outcomes.

The connection between the roles capabilities play on the effectiveness of microcredit in fueling development is also a missing link in the literature. In this chapter, I explore the empirical association between the services provided by the Grameen Bank, BRAC and RD-12 and household outcomes and also attempt to trace the association or complementarities between microcredit and these policies.

Similarly to Kaboski and Townsend (2005), I begin with exploring whether good policies and/or services, such as those that are expected to enhance the defined capabilities or freedoms described by Amartya Sen, have any effect on income growth. To do this, I use the same model I used in chapter 2 and include dummy variables representing the various services provided to borrowing households by the Grameen Bank, BRAC and RD-12. The provision of these services is referred to in this study as capability-enhancing services. These services are expected to enhance human capabilities because they are the typical factors that are linked to human development and economic growth.

Table 3.7 below lists the services offered by the three microcredit programs explored in this study. As can be noted, most of these services are in the category of education and health care which fall in the realm of the basic human assets defined by the UNDP and the freedoms described by Sen (1999). The fact that not every household receives these services becomes apparent from the numbers displayed in table 3.7. In this context, it is not known from the data whether there are fees associated with these services and why some households are excluded from receiving these services.

Table 3.7: Capability-Enhancing Services

<u>Services Offered by the MFI</u>	Grameen % of Households Receiving Services		BRAC % of Households Receiving Services		RD-12 % of Households Receiving Services	
	1991/92	1998/99	1991/92	1998/99	1991/92	1998/99
Primary Healthcare	64%	58%	51%	56%	30%	42%
Basic Literacy	63%	62%	48%	52%	36%	38%
Marketing Training	28%	9%	7%	6%	16%	4%
Skill Training	12%	67%	25%	54%	62%	47%
Other Services	7%	2.5%	36%	9%	31%	4%

Source: Author's calculations from the 1991/92 1998/99 surveys

From looking at the table presented above we can see that for some MFIs less than half of the households in the sample reported receiving each service. A hypothesis to be tested in this study is whether the provision of these services or the implementation of these capability-enhancing policies is important in generating economic prosperity (as measured by income) for the household. If these services in fact matter, then from a policy perspective, it would be beneficial for MFIs to increase the provision of these services in order to both augment the effectiveness of microcredit in alleviating poverty and speed up the process of economic development.

6. Empirical Model I: Policy Impact on Household Outcome

In assessing the effectiveness of any development program or service, one issue that instantly arises with impact evaluation is the biases that could come from endogenous participation in such programs. In the impact analysis literature, the typical sources of correlation are referred to as program placement bias and household selection bias (Pitt, Rosenzweig, & Gibbons, 1993; Ravallion, 1999).

If there is a systematic geographical bias in the way the program targets the population, a program placement bias is created. This is certainly the case in Bangladesh where poor households are specifically targeted and happen to live in areas where the incidence of poverty is more prevalent. A household selection bias would also occur if participation in the program is correlated with unobserved individual characteristics. In this study, the concern is the potential bias on the credit estimate created by the correlation between unobserved heterogeneity and micro loans.

A major challenge facing development programs, particularly microcredit programs, is that policy conclusions are difficult because the results of impact studies are sensitive to the empirical method used to estimate program effects. In this context, there are compelling reasons to employ alternative methods to estimate program impacts and determine whether microfinance benefits participants and their communities. Similarly to chapter 2, I begin with an income equation that relates income y_t in year t to the household's asset endowment and characteristics X , the amount of loan received M , and a random error ε :

$$y_{ijt} = \beta_1 X_{ijt} + \beta_2 M_{ijt}^F + \beta_3 M_{ij(t-1)}^F + \beta_4 M_{ijt}^M + \beta_5 M_{ij(t-1)}^M + \beta_6 Z + \varepsilon_{ijt} \quad (1)$$

where y_{ijt} is household per capita income in village j , which is assumed to depend on household characteristics and current and past borrowing. X is a vector of household assets and characteristics. M^F and M^M respectively are vectors of current and past microcredit received by female and male borrowers from different programs. Parameters β_2 , β_3 , β_4 and β_5 measure the effects of current and past credit (stock) for loans given to female and male borrowers by each of the microcredit programs.

Loans are separated by gender because since credit markets are imperfect and labor markets are different for men and women, the impact of microfinance borrowing is expected to differ by gender. Also since many of the group-based programs are separated by female only or male only groups, separating these effects seems appropriate. The term $\beta_6 Z$ is a vector of various capability-enhancing services provided by each MFI and the parameter β_6 captures the effect these services have on the household's ability to generate income. Z is a dichotomous variable that equals one when the household receives the service and zero when it does not.

According to equation (1), the marginal return to income in any given time period is the combined returns from past credit and current credit. The model assumes that even if current credit is zero, for instance, the household did not borrow in period $T = 2$, past credit can still have an effect on income. Structuring the model in this way allows for differential impacts on borrowing over time.²⁸

The above equation, if estimated in this standard way, however, would suffer from the biases discussed earlier since it is likely that exogenous factors will also affect household and village level income. To the extent these factors cause the error term in (1) to be correlated across all periods for a particular household or village, cross-section estimates that do not account for this correlation will not be efficient. If the omitted variables are correlated with household income, then estimating equation (1) with methods such as cross-section will in fact yield biased results (see Mundlak, 1978 and Hsiao, 1986).

²⁸ A similar specification was used by Khandker (2005).

To eliminate the potential biases discussed above, the income equation is expanded to capture household and village level unobserved heterogeneity.

The income equation is rewritten:

$$y_{ijt} = \beta_1 X_{ijt} + \beta_2 M_{ijt}^F + \beta_3 M_{ij(t-1)}^F + \beta_4 M_{ijt}^M + \beta_5 M_{ij(t-1)}^M + \beta_6 Z + \varphi_{ij} + \mu_j + \varepsilon_{ijt} \quad (2)$$

where φ_{ij} is the household unobserved effect, which include household characteristics such as managerial ability, land quality and external factors such as local conditions or the presence of other government programs. μ_j is the village unobserved effect and the error term ε_{ijt} is potentially serially correlated with X and M .

To estimate the above equation, a household fixed-effect (FE) estimator is used. Since the household fixed effect method also controls for any village-level endogeneity, the income equation is simplified by combining the unobserved effects into τ . The simplified version of equation (2) can be expressed as follows:

$$y_{ijt} = \beta_1 X_{ijt} + \beta_2 M_{ijt}^F + \beta_3 M_{ij(t-1)}^F + \beta_4 M_{ijt}^M + \beta_5 M_{ij(t-1)}^M + \beta_6 Z + \tau_{ij} + \varepsilon_{ijt} \quad (3)$$

7. Empirical Model II: Analysis of Associations Between Microcredit and Capability-Enhancing Services

To account for the correlation between access to credit and the provision of capability-enhancing services on economic development, interactions in a multiple linear regression (MLR) model are used. Interactions in a multiple regression, a technique that was initially employed by Pearson 1908, is applied to account for the variance in an interval dependent variable, comprised of linear combinations of interval, dichotomous, or dummy explanatory variables (North Carolina State University)²⁹. The aim here is to measure effects in a way that captures the institutional design of the MFI and to see whether microcredit along with the provision of capability-enhancing services have an effect on income generation at the household level. The magnitude of this effect is also compared with the impact of microcredit in the absence of services that are conducive to enhancing “freedoms”.

To measure the effect of microcredit when capability-enhancing services are in place, the regression model in equation (3) is expanded to include interaction terms. According to Greene (2003, p. 123-124), a model relating, for instance, household income, Y , to microcredit M and capability-enhancing services Z can be specified as follows:

$$Y = \beta_1 + \beta_2 M + \beta_3 Z + \beta_4 MZ + \varepsilon \quad (4)$$

²⁹ http://search.ncsu.edu/?cx=015938034614832269431%3Av_-81jqd7vq&cof=FORID%3A11&q=multiple+regression&search-submit.x=0&search-submit.y=0. Accessed July 2011.

In this model, unlike the specification in equation (3), we can trace the effect of capability-enhancing services when they exist (ie. $Z=1$). The net marginal effect on household income Y is measured by the following:

$$\frac{\partial E[Y|M,Z]}{\partial M} = \beta_2 + \beta_4 Z \quad (5)$$

The above expression implies that the marginal effect of microcredit, M , on household income is increased when capability-enhancing policies are in place (i.e. $Z = 1$), assuming β_4 is positive. In the spirit of this method of measuring the effectiveness of microfinance programs, the relationship between input (credit) and outcome (household income) is expected to vary depending on the institutional context (existence of capability-enhancing services). In other words, the impact of microcredit on household income will depend on the economic and social environment in which the borrower lives as well as the policies implemented by the MFI. In this sense, the hypothesis to be tested here is whether an increase in Y (income) is associated with M (micro loans) when condition Z (existence of capability-enhancing services) is met.

For the purpose of measuring the effect of the capability-enhancing services provided by the MFIs selected in this study, the multiple regression model is specified in the following manner: It is assumed that Y and M are continuous variables and Z is a dichotomous variable that equals one when the required condition is met, and zero if it is not.

The following equation is used to represent this model:

$$y = \beta_0 + \beta_1 M + \beta_2 Z + \beta_3 MZ + \varepsilon \quad (6)$$

Equation (6) above represents the conditional hypothesis previously discussed. In the absence of capability-enhancing policies (i.e. $Z=0$), this equation reduces to the following:

$$y = \beta_0 + \beta_1 M + \varepsilon \quad (7)$$

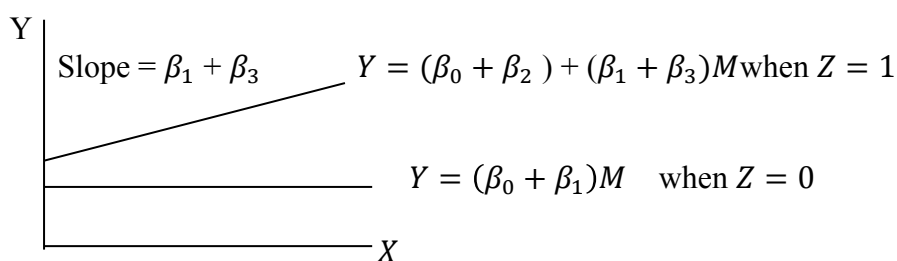
The coefficient β_1 in Eq. (7) represents the effect of a one-unit change in M on Y when condition Z is absent ($\partial Y/\partial M$ given $Z=0$ is β_1). When condition $Z=1$ and/or capability-enhancing policies are present, Eq. (7) can be simplified as follows:

$$y = (\beta_0 + \beta_2) + (\beta_1 + \beta_3)M + \varepsilon \quad (8)$$

The above equation represents the effect of a one-unit change in M on Y when $Z=1$ which is $\beta_1 + \beta_3$ ($\partial Y/\partial M$ given $Z=1$). Given that the hypothesis here is that Y is increasing in M only if Z is present, inherently, our result should be such that $\beta_1=0$ and $\beta_1 + \beta_3$ should be positive (Bramber, Clark and Golder ,2005). According to Bramber, Clark and Golder (2005) a conditional hypothesis is one where the relationship between a set of variables depends on the value of one or many other variables.

Such hypothesis can be expressed as follows: H_1 : An increase Y is associated with an increase in M when condition Z is met, but not when condition Z is absent. This hypothesis is represented in Figure 3 below:

Figure 3: Graphical illustration of an interaction model consistent with hypothesis H_1



Source: Adapted from Brambor, Clark and Golder (2005)

The hypotheses described above are prevalent in the fields of comparative politics and epidemiology where studies focus on the relevance of context or “context conditionality” (see Brambor, Clark and Golder, 2005, Wright 1976, Friedrich 1982, Aiken and West 1991). In such studies, causation can never be proven and instead the goal is to trace associations or correlations between a specific outcome and the factors that may influence that outcome. Given the often economic, socially and politically unfavorable environments in which microfinance schemes operate, the employment of methods that account for social and institutional context may shed some light on the factors that influence the process of development.

A challenge that arises with a multiplicative interaction term model is that interpreting the results can be tricky because the size of the coefficients represent conditional marginal effects rather than average effects. This feature of the model is what allows this model to capture the meaning behind a conditional hypothesis because the model can only shed light on associations between the independent variables and the dependent variable. Specifying the model this way enables the effect of the independent variable M on the dependent variable Y depend on an additional variable such as Z . This model specification cannot be interpreted to mean that M has an average effect on Y as it can be concluded in the linear-additive regression model.

As previously mentioned and as represented in Eq.(4), the Z coefficient exclusively captures the effect of Z on Y when $M=0$. In this context, it would be incorrect to conclude that a positive and significant coefficient on M or Z translates into an increase in Y . The estimates can only shed light on the fact that M is associated with a increase/decrease in Y when condition Z is absent. It will also tell us the association of M with an increase/decrease in Y when condition Z is present (Bramber, Clark and Golder ,2005).

7.1 Interactions in a Multiple Linear Regression Model: Significance Testing and Interpretation of Results

In the additive regression model M has a constant effect on Y , whereas the interaction model asserts that the effect of a change in M on Y will be influenced by the value of the conditioning variable Z . In this sense, regression results will only display model parameters and goodness of fit.

These attributes are of interest in the linear-additive model but in the case of a multiple regression model, what is of interest is the combination of coefficients such as $(\beta_1 + \beta_3 Z)$ (see equation 6) in terms of predicting associations between the variables. One example Bramber, Clark and Golder (2005) provide in their paper is the case where Z represents government size. From looking at the regression output, we would know the effect of M when government size is zero. However, since there would be no observation where government size is zero, logically we would see that the coefficient on M tells us nothing about the effect of M (if M were to measure government size) on Y . In this sense, from the typical results table, there is no way of knowing if M has a significant effect on Y when $Z = 0$ (Bramber, Clark and Golder, 2005).

In terms of the magnitude and significance of the coefficient on the interaction term, the analyst cannot determine whether M has a meaningful conditional effect on Y from the regression output. The reason for this is that, as previously mentioned, marginal impact of M on Y results from $(\beta_1 + \beta_3 Z)$ and not the parameters on β_1 and $\beta_3 Z$ independently (Bramber, Clark and Golder, 2005). In this context, the statistical significance of the variables can be ignored in the case of interaction terms due to the following reasons: (i) t-tests are not used for dummy (or dichotomous) variables although many statistical packages output them, and (ii) the t-test is a test specifically of the unique variance an independent variable accounts for and not of shared variance which we find in the interaction term (North Carolina State University).³⁰

³⁰ http://search.ncsu.edu/?cx=015938034614832269431%3Av_-81jqd7vq&cof=FORID%3A11&q=multiple+regression&search-submit.x=0&search-submit.y=0. Accessed July 2011.

Table 3.8 provides an example of the types of conclusions we may be able to draw from the regression results using interactions in a multiple regression model. Here, we are interested in the relationship between M and Y when $Z = 0$, the correlation between M and Z when $Z = 1$ and the total marginal effect on Y which is captured by $\beta_1 + \beta_3 Z$.

Table 3.8: Interpreting Interactions in a Linear Multiple Regression Model

When $Z = 0$ $M = \beta_1$ Sign of β_1 :	When $Z = 1$ Interaction Effect= $\beta_3 Z$ Sign of $\beta_3 Z$:	Interpretation
(+)	(+)	$+\beta_1$ = Credit has a positive effect on household income in the absence of the service $+\beta_3 Z$ = The positive effect of credit on household income increases as the service increases $(+\beta_1 + \beta_3 Z)$ = The total marginal effect of credit and the service on household income is positive
(+)	(-)	$+\beta_1$ = Credit has a positive effect on household income in the absence of the service. $-\beta_3 Z$ = The increasing effect of credit on household income declines as the service increases. $(+\beta_1 - \beta_3 Z)$ = The total marginal effect of credit and the service on household income can be positive or negative depending on the size of the coefficients.
(-)	(+)	$-\beta_1$ = Credit has a reductive effect on household income in the absence of the service. $+\beta_3 Z$ = The reductive effect of credit on household income declines as the service increases. $(-\beta_1 + \beta_3 Z)$ = The total marginal effect of credit and the service on household income can be positive or negative depending on the size of the coefficients.
(-)	(-)	$-\beta_1$ = Credit has a negative effect on household income in the absence of the service. $-\beta_3 Z$ = The negative effect of credit on household income increases as the service increases. $(-\beta_1 - \beta_3 Z)$ = The total marginal effect of credit and the service on household income is negative.

M=microcredit, Z=capability-enhancing services and MZ=Interaction

Looking at the association between microcredit and income when the policy or service is in place and when it is not in place can shed some light on the possible dynamics that influence the effectiveness of microcredit in poverty reduction. Given the differential impacts we have seen in previous results, from a policy perspective it makes sense to probe further into the factors that may be driving these results. In exploring these issues, an important question that arises is why the credit from some programs are associated with increases in household income and others are not. While it is difficult to know for certain from this exercise, one of the objectives of this dissertation is to initiate and encourage this type of analysis in future impact studies.

To explore possible associations between the policies of the three microfinance programs, similarly to equation (3), I begin with an income equation that relates income y_t in year t to the household's asset endowment and characteristics X , the amount of loan received M , the services provided by the MFIs Z and a random error ε . When interaction terms are added to account for the association between credit and the policies of the MFI, equation (3) becomes:

$$y_{ijt} = \beta_1 X_{ijt} + \beta_2 M_{ijt}^F + \beta_3 M_{ij(t-1)}^F + \beta_4 M_{ijt}^M + \beta_5 M_{ij(t-1)}^M + \beta_6 Z + \beta_7 M_{ijt}^F Z + \beta_8 M_{ij(t-1)}^F Z + \beta_9 M_{ijt}^M Z + \beta_{10} M_{ij(t-1)}^M Z + \tau_{ij} + \varepsilon_{ijt} \quad (9)$$

As before, y_{ijt} is household per capita income in village j , which is assumed to depend on household characteristics and current and past borrowing. X is a vector of household assets and characteristics. M^F and M^M respectively are vectors of current and past microcredit received by female and male borrowers from different programs. Parameters β_2 , β_3 , β_4 and β_5 measure the effects of current and past credit (stock) for loans given to female and male borrowers by each of the microcredit programs in the absence of capability-enhancing services (i.e. $Z=0$).

The term $\beta_6 Z$ is a vector of the various capability-enhancing policies implemented by each MFI and parameter β_6 captures the association between these policies and household income. Parameters β_7 , β_8 , β_9 , and β_{10} capture the relationship between credit, services and household income when $Z=1$. Similarly to the first set of equations found in section 6, a household fixed effect method is employed to account for unobserved household heterogeneity.

8. The Data

As in chapter 2, this study relies on the 1991/92 and the 1998/99 surveys conducted by the Bangladesh Institute of Development Studies (BIDS) and the World Bank. The surveys covered 1,798 households drawn from 87 villages in 29 thanas (Pitt and Khandker, 1998) and Khandker, 2005).³¹ The 1991/92 survey was conducted on three cropping seasons: round 1 during *Aman* rice (November-February), round 2 during *Boro* rice (March-June), and round 3 during *Aus* rice (July-October). The 1998/99 survey was collected only once during this period (ibid).

The purpose of this survey was to analyze three major credit programs: Grameen Bank, Bangladesh Rural Advancement Committee, and the Rural Development-12 program of the Bangladesh Rural Development Board. Villages where these programs operated were surveyed as well as non-program villages where no micro lending or any similar lending activities took place (ibid). Target households and non-target households were surveyed.

³¹ A thana is an administrative unit that is smaller than a district and consists of a number of villages. In Bangladesh, you have “Divisions” and under those divisions you have “Zilas”. Thanas are under the umbrella of zilas.

Target households are those who meet the program eligibility criteria, which is to own less than or equal to half of an acre of land. Non-target households are those who do not meet the landholding criteria. Non-target households were surveyed in both program villages and non-program villages (ibid).

Out of the 29 thanas covered, 24 were program thanas (8 from each of the three programs) and 5 were non-program thanas. The thanas included in the survey were selected from 391 rural thanas out of 460 thanas. Three villages in each program thana were randomly selected from a group of program villages where a program had been in operation for at least three years. Three villages in each of the non-program thanas were also randomly selected. These villages were drawn from the village census of the Government of Bangladesh. In terms of the village survey design, villages with fewer than 51 number of households and villages with more than 600 households, were excluded (ibid).

The households surveyed in 1991/92 were revisited in 1998/99. This time, however, the households were interviewed in one round, rather than in three. Among the 1,769 households surveyed in 1991/92, 113 could not be interviewed in 1998/99 and only 1,656 households were available for the re-survey. Included in the re-survey were new households from previous villages and newly included villages. Also three non-target households were randomly selected from each of the previous 87 villages (ibid). Also included, are three new thanas that were randomly selected from the southern and southeastern regions that were seriously affected by cyclone in 1991/92. These thanas were excluded in the first round survey.

From the new thanas, three villages were also drawn randomly, adding an additional 9 villages. In the new villages, 20 households were drawn from target and non-target households. In total, 2,599 households were surveyed in 1998/99.³²

In terms of the distribution of households by program participation is out of all the households surveyed in 1991/92, 11.6 percent were BRAC members, 8.5 percent were Grameen Bank members and 6.2 percent were RD-12 members. In the 1998/99 survey, the number of Grameen Bank borrowers increased to 14.3 percent; the number of BRAC borrowers actually decreased to 9.3 percent and RD-12 project borrowers also decreased to 3.2 percent. The interesting trend that is observed in the 1998/99 survey is the increasing presence of other NGOs, with 11.1 percent of participating members. In this context, program participation in rural Bangladesh has increased from 26.3 percent in 1991/92 to 45.6 percent in 1998/99. The number of eligible non-participants decreased from 40.3 percent to 25.6 percent and non-target households also decreased from 33.1 percent to 28.8 percent.

Participation in microfinance programs is more prevalent among individuals who have very little land or no land at all. In the 1991/92 survey, the participation rate among the landless is 56 percent and this rate increased to 59 percent in the 1998/99. Only 33.9 percent of those who own land up to .50 acres are program participants in the 1992/91 survey. The participation rate for this group increased to 56.1 percent in the re-survey. Also observed is the fact that multiple program memberships are higher among landed households as compared to landless and land-poor households.³³

³² Details of these surveys were provided by Pitt and Khandker (1998), Khandker (2005) and in the data documents published by the World Bank/BIDS.

³³ Land-poor refers to someone owning ½ acre or less of land. Landed refers to someone who owns over ½ acre of land.

To better control for unobserved heterogeneity in the sample, this paper relies on panel data to estimate the marginal impact of microcredit on household income. Once the sample is restricted to households that were interviewed in both periods to form a panel, we are left with 1,656 households for each survey. We are also left with approximately 87 villages. In terms of the households that split into multiple households, they were combined with the original households to form a single household. In terms of the biases or problems that this may cause, previous studies have conducted statistical tests to see if merging the data was appropriate and the tests indicate that combining the data does not significantly alter the results obtained by keeping the households separate (see Khandker and Pitt 2002). Table 3.9 in Appendix II presents summary statistics for the relevant income, credit and policy variables used in this chapter.

8.1 Institutional Design of Selected MFIs in Bangladesh

Tables 3.10-3.12 below outline the main features of the Grameen Bank, BRAC and RD-12 program. The institutional design of the MFI, namely its policies are of interest in this study because these policies can have implications for impact and the process of development as a whole. While similar, these MFIs have some important differences pertaining to group features, membership criteria and social development policies.

Table 3.10: Program Features of the Grameen Bank

Membership Criteria	Maximum landholding of half an acre of land. Only one member allowed per household
Group Features	Five members from a group. Five to eight groups constitute a center. Separate groups for men and women. Separate centers for men and women. Weekly meetings of groups.
Savings Mobilization	Tk 1 per week 5 percent of each loan (nonrefundable) goes to group fund. 0.5 percent of each loan used for group insurance. Option to buy shares worth Tk 100 per member.
Credit Delivery Mechanism	No collateral but group liability. 50-week installment of loan. Interest at the end of loan cycle. 20 percent interest rate for general loan, 8 percent for housing loan. Maximum loan Tk 10,000.
Social Development	Training duration 1530 days. Review of code of conduct at center meetings. Minimum skills-based training.

Source: Khandker and Khalily 1996; Khandker, Khalily, and Khan 1995; Khan and Khalily 1995

Table 3.11: Program Features of BRAC

Membership Criteria	Maximum landholding of half an acre of land; at least one household member must work for wages. One household member allowed per household. Since 1992 one member allowed per household.
Group Features	3,040 members form village organizations. Village organizations are divided into solidarity groups of 57 members. Separate groups for men and women. Each men's group has a counterpart women's group. Weekly meetings of solidarity groups.
Savings Mobilization	Tk 2 per week. 4 percent of each loan (nonrefundable) goes to group insurance. 1 percent of each loan used for group insurance.
Credit Delivery Mechanism	No collateral but group liability. 50-week installment of loan. Interest at the end of the loan cycle. 20 percent interest for production loans. Maximum loan Tk 10,000
Social Development	Training duration 36 months. Review of code of conduct at village organization meetings. Substantial skills-based training.

Source: Khandker and Khalily 1996; Khandker, Khalily, and Khan 1995; Khan and Khalily 1995

Table 3.12: Program Features of RD-12

Membership Criteria	<ul style="list-style-type: none"> • Maximum landholding of half an acre of land; at least one household member must work for wages. • More than one member allowed per household.
Group Features	<ul style="list-style-type: none"> • 1,535 members form primary cooperatives. • Primary cooperatives are divided into solidarity groups of 45 members. • Separate cooperatives for men and women. • Separate groups for men and women. • Weekly meetings of cooperative.
Savings Mobilization	<ul style="list-style-type: none"> • Tk 2 per week. • 5 percent of each loan goes to group fund. • Mandatory purchase of cooperative share of Tk 10 per member per year.
Credit Delivery Mechanism	No collateral but primary cooperative liability. 50-week installment of loan. Interest at the end of loan cycle. 16 percent interest rate for production loans. Maximum loan Tk 10,000
Social Development	Training duration 36 months. Review of code of conduct at primary cooperative meetings. Substantial skill-based training

Source: Khandker and Khalily 1996; Khandker, Khalily, and Khan 1995; Khan and Khalily 1995

The institutional design of the Grameen Bank differs from BRAC and RD-12 in that the member groups are significantly smaller. Grameen groups are composed of five members while BRAC groups have 57 members. RD-12 groups have 45 members. The differences in group feature may be important in terms of impact and social capital formation. It is possible that Grameen's smaller group may be more effective in developing solidarity and relationships and this could be associated with the economic success of the group. On the other hand, a larger group may be beneficial in creating larger networks and enabling borrowers to pool more resources together for productive purposes. Another distinct institutional design of the Grameen Bank is that the time devoted to social development or training is much longer than the other two programs.

Grameen's training lasts 1,530 days while the training for BRAC and RD-12 programs last 36 months. This education policy may account for differences in the magnitude of the impact of these three programs.

Another interesting difference between the institutional designs of these MFIs is that some do not allow multiple members of the household to borrow at the same time but others do. The RD-12 program, for instance, allows more than one household member to borrow at the same time. Also, the Grameen Bank is the only program that does not require that at least one household member work for wages. Tables 3.13-3.15 below outline the codes of conduct for each of the MFIs. In general, the codes of conduct of the three MFIs are very similar. They all encourage a healthy lifestyle, the cultivation of fruit, vegetables and other foods, good hygienic practices, respect for one another, respect for women, family planning and the rejection of dowries.

Table 3.13: Codes of Conduct for Members of Microcredit Programs-Grameen Bank

Grameen Bank's 16 Decisions
<ol style="list-style-type: none"> 1. The four principles of the Grameen Bank discipline, unity, courage and hard work-we will follow and advance in all walks of our lives. 2. We will bring prosperity to our families. 3. We will not live in dilapidated houses. We will repair our houses and work toward constructing new houses. 4. We will grow vegetables all year round. We will eat plenty of them and sell the surplus. 5. During the plantation season, we will plant as many seedlings as possible. 6. We will plan to keep our families small. We will minimize our expenditures. We will look after our health. 7. We will educate our children and ensure that we can pay for their education. 8. We will always keep our children and the environment clean. 9. We will build and use pit-latrines. 10. We will drink tube well water. If not available, we will boil water or treat it with alum. 11. We will not take any dowry in our son's wedding, neither will we give any dowry in our daughters' wedding. We will keep the center free from the curse of dowry. We will not practice child marriage. 12. We will not inflict injustice on anyone, nor will we allow anyone to do so. 13. For higher incomes we will collectively undertake bigger investments 14. We will always be ready to help each other. If anyone is having difficulty, we will help him. 15. If we learn of nay breach in discipline in any center, we will help to restore discipline. 16. We will introduce physical exercise in our centers. We will take part in all social activities collectively.

Source: Khandker and Khalily 1996; Khandker, Khalily, and Khan 1995; Khan and Khalily 1995

Table 3.14: Code of Conduct for Members of Microcredit Programs: BRAC

BRAC's 17 Promises	
	<ol style="list-style-type: none"> 1. We will not engage in malpractice or injustice. 2. We will work hard and bring prosperity to our family. 3. We will send our children to school. 4. We will adopt family planning and keep our family size small. 5. We will try to be clean and keep our house tidy. 6. We will always drink pure water. 7. We will not keep our food uncovered and will wash our hand and face before we take our meal. 8. We will construct latrines and will not leave our stool where it does not belong. 9. We will cultivate vegetables and trees in and around our house. 10. We will try to help each other under all circumstances. 11. We will fight against polygamy and injustices to our wives and all women. 12. We will be loyal to the organization and abide by its rules and regulations. 13. We will not sign anything without having a good understanding of what it means (we will look carefully before we act). 14. We will attend weekly meetings regularly and on time. 15. We will always abide by the decisions of the weekly group meetings. 16. We will regularly deposit our weekly savings. 17. If we receive a loan we will repay it.

Source: Khandker and Khalily 1996; Khandker, Khalily, and Khan 1995; Khan and Khalily 1995

Table 3.15: Code of Conduct for Members of Microfinance Programs: RD-12

RD-12's 21 Oaths	
	<ol style="list-style-type: none"> 1. We will remain united. 2. We will be sincere and sympathetic toward all. 3. We will follow the principles of the cooperatives. 4. We will strive for development through work and sincerity. 5. We will educate ourselves and send our children to school. 6. We will adopt family planning methods. 7. We will drink boiled water and use hygienic toilets. 8. We will fight against polygamy and the abuse of women. 9. We will save a part of our income and deposit it with the society. 10. We will take loans from the society and strive to increase our incomes 11. We will not ask for aid from anybody. 12. We will not run after relief. 13. We will not be lazy. 14. We will not remain illiterate. 15. We will not sign paper without reading it. 16. We will not give or take any dowry. 17. We will not have very large families. 18. We will not break the rules and discipline of the cooperative societies 19. We will not delay repayments of loan installments. 20. We will not listen to bad advice from mischievous persons. 21. We will not allow our organizations to be damaged in any way.

Source: Khandker and Khalily 1996; Khandker, Khalily, and Khan 1995; Khan and Khalily 1995

9. Results: Impact by Type of Institution and by Policy

The results from the household FE estimation of equation (3) (presented in Table 3.16 for the Grameen Bank) are consistent with the results from the regressions in chapter 2. The results show that as expected, the coefficients for labor assets (i.e. number of adults in household), and infrastructure (i.e. electricity present in village) are positive and statistically significant. These results are consistent with Amartya Sen's contention that the provision of adequate economic facilities such as banks and good infrastructure are instrumental in the process of development (Sen, 1999, p. 10, 37).

According to the results presented in Table 3.16, microcredit borrowing from Grameen, similarly to the results obtained in chapter 2, benefits both male and female and borrowers in the household. Previous studies using this data-set (outside of this dissertation) found that the benefits of microcredit borrowing accrued disproportionately to women rather than men (see Pitt and Khandker (1998) and Khandker (2005). Based on the fixed-effect estimation of the impact of Grameen credit, a 10 percent increase in the period 1998/99 stock of female borrowing from the Grameen Bank, increases per capita income by about .5 percent for women and .8 percent for men (see regression 2).

The coefficients for the policy variables are not statistically significant across all programs, and policy effects differ from program to program (see Tables 3.16-3.18). For the Grameen bank, primary health care, basic literacy and skill training services have a statistically significant effect on household income. Marketing training and other services are not typically emphasized with the issue of Grameen credit and a reduction of these two services can be traced over the two period (see Table 3.7). In this context, it makes sense that these two policy variables do not have a statistically significant effect on household outcome.

Table 3.16: Household Fixed-Effects Estimates of the Impact of Grameen Credit and Capability-Enhancing Services on Household Income

VARIABLES	(1) lnincome Primary Health Care	(2) lnincome Basic Literacy	(3) lnincome Marketing Training	(4) lnincome Skill Training	(5) lnincome Other Services
Number of adults in Household (15-59yrs.)	0.183** (0.0710)	0.202*** (0.0696)	0.193*** (0.0694)	0.187*** (0.0690)	0.197*** (0.0691)
Avg. years of education of household adults	0.0487 (0.0462)	0.0417 (0.0457)	0.0401 (0.0460)	0.0457 (0.0450)	0.0386 (0.0458)
Bank in village (dummy)	0.176 (0.165)	0.164 (0.165)	0.201 (0.173)	0.158 (0.168)	0.193 (0.164)
Electricity in village (dummy)	0.398** (0.192)	0.433** (0.207)	0.329* (0.193)	0.291 (0.192)	0.327* (0.191)
Log of women's loans from Grameen, (t)	0.0457 (0.0341)	0.0568* (0.0335)	0.0623* (0.0339)	0.0504 (0.0331)	0.0628* (0.0344)
Log of women's loans from Grameen, (t-1)	0.0234 (0.0461)	0.0172 (0.0464)	0.00943 (0.0454)	-0.0110 (0.0440)	0.00859 (0.0462)
Log of men's loans from Grameen, (t)	0.0730* (0.0391)	0.0820** (0.0394)	0.0910** (0.0399)	0.0609 (0.0400)	0.0933** (0.0403)
Log of men's loans from Grameen, (t-1)	0.0883* (0.0529)	0.0840 (0.0536)	0.0800 (0.0530)	0.0444 (0.0514)	0.0803 (0.0537)
Primary Health Care (dummy)	0.438*** (0.161)				
Basic Literacy (dummy)		0.297* (0.154)			
Marketing Training (dummy)			0.0989 (0.141)		
Skill Training (dummy)				0.575*** (0.161)	
Other Services (dummy)					-0.168 (0.206)
Observations	878	878	878	878	878
Number of hhcode	439	439	439	439	439
F-statistics	18.70	19.36	18.38	19.72	18.62
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000

*t-statistic is significant at the 10 percent level of better

**t-statistic is significant at the 5 percent level of better

***t-statistic is significant at the 1 percent or better

Note: Robust standard errors are in parentheses. Regressions also controlled for the following: sex, age, education, year dummy, village level infrastructure and price variables to account for the impact of time-varying changes in local economic conditions.

Source: Author's computations based on 1991/92 and 1998/99 household surveys in Bangladesh.

In terms of the effect of BRAC loans on household income, consistent with earlier results, only the men benefit from this credit (See Table 3.17). The coefficients for the loans disbursed to women by BRAC are not statistically significant. The results suggest that a 10 percent increase in the period 1998/99 stock of male borrowing from BRAC, increases per capita income by 1.6 percent. Loans disbursed to men in the earlier period (t-1) also had a positive and statistically significant effect on household per capital income. In this period, a 10 percent increase in the stock of male borrowing from BRAC, increases per capita income by 1.7 percent (see Table 3.17).

As discussed previously, the institutional design of each of the MFIs in this study is different in some aspects and this can have an impact on household outcomes. According to the results, credit has differential effects in terms of gender and the distinct institutional design of the MFIs may play a role in the impact of credit. BRAC for instance, has larger solidarity groups as compared to Grameen. BRAC has solidarity groups of 57 members compared to Grameen groups of five members. It is possible, that group size matters in terms of the impact credit will have on household outcomes. Another distinct feature of BRAC is that membership requires that at least one household member work for wages. This feature can serve as collateral for borrowing and as such, borrowers from this institution will have to provide collateral as a condition for borrowing. The requirement of wage labor can potentially reduce the time for entrepreneurship and as such, the return of credit to the household may not be large enough to contribute to poverty reduction (income) in a significant way. Finally, BRAC contributes significantly less time for social development than Grameen does.

Table 3.17: Household Fixed-Effects Estimates of the Impact of BRAC Credit and Capability-Enhancing Services on Household Income

VARIABLES	(1) lnincome Primary Health Care	(2) lnincome Basic Literacy	(3) lnincome Marketing Training	(4) lnincome Skill Training	(5) lnincome Other Services
Number of adults in Household (15-59yrs.)	0.252** (0.105)	0.260** (0.106)	0.254** (0.107)	0.262** (0.105)	0.259** (0.105)
Avg. years of education of household adults	-0.000297 (0.0596)	-0.00348 (0.0598)	-0.00181 (0.0598)	-0.00252 (0.0599)	-0.00268 (0.0599)
Bank in village (dummy)	-0.535 (0.433)	-0.500 (0.428)	-0.506 (0.431)	-0.496 (0.425)	-0.488 (0.425)
Electricity in village (dummy)	0.699** (0.275)	0.693** (0.277)	0.685** (0.278)	0.697** (0.277)	0.690** (0.276)
Log of women's loans from BRAC, (t)	-0.00792 (0.0389)	-0.00911 (0.0391)	-0.0107 (0.0394)	-0.00775 (0.0392)	-0.00667 (0.0396)
Log of women's loans from BRAC, (t-1)	0.0325 (0.0679)	0.0148 (0.0670)	0.0152 (0.0653)	0.0173 (0.0650)	0.0151 (0.0649)
Log of men's loans from BRAC, (t)	0.155** (0.0689)	0.165** (0.0704)	0.165** (0.0694)	0.165** (0.0708)	0.161** (0.0708)
Log of men's loans from BRAC, (t-1)	0.174** (0.0739)	0.175** (0.0750)	0.175** (0.0743)	0.175** (0.0755)	0.168** (0.0771)
Primary Health Care (dummy)	0.198 (0.198)				
Basic Literacy (dummy)		-0.0366 (0.184)			
Marketing Training (dummy)			0.163 (0.306)		
Skill Training (dummy)				-0.0383 (0.188)	
Other Services (dummy)					-0.108 (0.262)
Observations	668	668	668	668	668
Number of hhcode	338	338	338	338	338
F-statistics	8.69	8.59	8.69	8.70	8.55
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000

*t-statistic is significant at the 10 percent level of better, **t-statistic is significant at the 5 percent level of better,

***t-statistic is significant at the 1 percent or better

Note: Robust standard errors are in parentheses.

Source: Author's computations based on 1991/92 and 1998/99 household surveys in Bangladesh.

In terms of social development services, the duration of training is 36 month for BRAC compared to 51 months in the Grameen program. Since women in Bangladesh generally have less access to education than men, it is possible that the length of training makes a difference in terms of the impact credit has household outcomes.

For the BRAC program, none of the policy variables are statistically significant despite their increase of most of these services over the two periods. This result seems counterintuitive but as previously noted, the institutional design and credit delivery of the MFI can play an important role in the magnitude of overall program impact. This fact, can contribute to the differential impacts we observe here.

In terms of the RD-12 program, consistent with the earlier results in chapter 2, the coefficients of the credit variables for this program were not statistically significant (see Tables 18). The institutional design of the RD-12 program is that of a cooperative that requires members to both contribute five percent of each loan to a group fund and mandatory purchase of cooperative shares. Similarly to BRAC, this MFI requires that one household member work for wage labor and large solidarity groups. It is possible that for very poor borrowers both the requirement of wage labor and the purchase of shares may not be adequate. Both requirements can impose burdens that may not be conducive to income generation at the household level. In this context, the larger retention of the borrowed funds by the institution while it increases savings, it reduces the amount of funds the borrower can invest in productive activities.

In the case of the RD-12 program, basic literacy services, skill training and other services have a positive and statistically significant effect on household outcome (see Table 3.18). While none of the credit variables in the regression for RD-12 were statistically significant, the results suggest that capability-enhancing policies play an important role in income generation. This result highlights the possibility of complementarities between access to credit and access to services. The insignificant result for marketing training could be due to the small percentage of households that receive this service in the sample.

Table 3.18: Household Fixed-Effects Estimates of the Impact of RD-12 Credit and Capability-Enhancing Services on Household Income

VARIABLES	(1) lnincome Primary Health Care	(2) lnincome Basic Literacy	(3) lnincome Marketing Training	(4) lnincome Skill Training	(5) lnincome Other Services
Number of adults in Household (15-59yrs.)	0.170** (0.0835)	0.165** (0.0833)	0.189** (0.0843)	0.139 (0.0861)	0.170** (0.0802)
Avg. years of education of household adults	0.0425 (0.0541)	0.0488 (0.0551)	0.0420 (0.0555)	0.0590 (0.0541)	0.0470 (0.0538)
Bank in village (dummy)	0.583* (0.314)	0.533* (0.315)	0.551* (0.314)	0.659** (0.315)	0.643** (0.317)
Electricity in village (dummy)	0.445** (0.207)	0.451** (0.206)	0.463** (0.210)	0.558*** (0.213)	0.473** (0.199)
Log of women's loans from RD-12, (t)	-0.0140 (0.0367)	0.00368 (0.0382)	-0.0208 (0.0361)	-0.0177 (0.0350)	-0.0225 (0.0351)
Log of women's loans from RD-12, (t-1)	-0.0399 (0.0506)	-0.0191 (0.0526)	-0.0462 (0.0501)	-0.0342 (0.0499)	-0.0590 (0.0498)
Log of men's loans from RD- 12, (t)	-0.0349 (0.0357)	-0.0240 (0.0347)	-0.0327 (0.0350)	-0.0381 (0.0344)	-0.0489 (0.0349)
Log of men's loans from RD- 12, (t-1)	-0.0587 (0.0465)	-0.0368 (0.0483)	-0.0650 (0.0467)	-0.0414 (0.0475)	-0.0647 (0.0459)
Primary Health Care (dummy)	0.0363 (0.173)				
Basic Literacy (dummy)		0.247* (0.143)			
Marketing Training (dummy)			-0.289 (0.270)		
Skill Training (dummy)				0.427** (0.176)	
Other Services (dummy)					0.624*** (0.216)
Observations	577	577	577	577	577
Number of hhcode	289	289	289	289	289
F-statistics	9.27	9.41	9.15	10.26	10.13
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000

*t-statistic is significant at the 10 percent level of better

**t-statistic is significant at the 5 percent level of better

***t-statistic is significant at the 1 percent or better

Note: Robust standard errors are in parentheses. Regressions also include the following: sex, age, education, year dummy, village level infrastructure and price variables to account for the impact of time-varying changes in local economic conditions.

Source: Author's computations based on 1991/92 and 1998/99 household surveys in Bangladesh.

The results obtained for policy effects in all of the regressions for all of the three programs suggest that for the most part, policies that are instrumental in expanding the capability set and/or the social and economic prosperity of an individual play an important role in economic development. In the case of using microcredit as a tool to reduce poverty, this study suggests that both access to credit and the provision of capability-enhancing services are positively associated with poverty reduction at the household-level. The findings in this study suggest that Grameen credit is associated with a positive impact on household economic outcomes and that Grameen loans are more effective in alleviating poverty than the credit disbursed by similar programs such as BRAC and RD-12. This result and implication is not new in the literature. Other impact studies on these same programs obtained similar results (see Pitt and Khandker, 1998 and Khandker, 2005).

A reason for the observed contrast in program impacts could stem from the fact that each program, while similar in institutional design, is different with respect to group features, membership criteria and social development policies (see tables 3.10-3.15). These differences can influence program impacts and make some programs more effective than others. In terms of the effect or correlation between the services provided by all three programs, the results suggest a positive correlation between many of the services and income growth at the household-level.³⁴

So far, the results in this study suggest that independently of one another, microcredit and MFI services are positively associated with increases in income. In the next section, I would like to conduct an experiment to see if the simultaneous provision of credit and capability-enhancing services, have any effect on the economic outcome of the household.

³⁴ Dummies for each policy variable were estimated separately to avoid multicollinearity and other issues that may arise with using dummy variables and having too many independent variables.

The objective here is to explore whether there are any complementarities or interconnections between microcredit and the provision of services. Looking into this interaction would help policymakers implement effective credit delivery methods .

10. Results: Analysis of the Effect of Microcredit and Capability-Enhancing Services

The regression model in equation (9) was estimated separately for each of the microcredit programs. Similarly to the results presented in the previous section, the credit coefficients for BRAC are only statistically significant for the stock of credit disbursed to male borrowers but not to female borrowers. The credit coefficients for the RD-12 program were not statistically significant. One feature of the MLR model is that even though the coefficient of the relevant variables are not statistically significant on their own, once subjected to a set of conditions, this variable may gain statistical significance. This feature highlights the conditional hypothesis concept presented in Section 7. In other words, the coefficient for microcredit, M , may be statistically insignificant when the condition $Z=0$ or namely, when capability-enhancing services are absent. However, the effect of microcredit on household income Y may become statistically significant when $Z=1$ or when the policies or services are in place. Another possible outcome which is observed in the results, is that the coefficient for microcredit, M is statistically significant on its own ($Z=0$) but becomes larger when $Z=1$.

In the spirit of the MLR model and to remain consistent with the language of Bramber, Clark and Golder (2005), I will limit my interpretation of the results to a discussion about the empirical associations between the variables and the marginal effects on the dependent variable.

The results from the regressions are presented in the tables that follow.³⁵ Table 3.19 outlines the empirical associations between credit and the provision of primary health care services by the Grameen Bank. According to the results, microcredit disbursed to women in the period 1998/99 when combined with primary health care services is positively associated with increases in household income. The results further suggest that the positive effect of credit is magnified when primary health care services are provided. In this context, a 10 percent increase in the stock of female borrowing increase household income by .8 percent when the borrower receives primary health care services, but when primary health care services are not provided, the effect is statistically insignificant. Here, credit and primary health care services are complementary and this policy augments the return of credit to household income.

The result outlined above, is similar for male borrowing in the period 1991/92. In this instance, the provision of primary health care services significantly augments the effectiveness of credit to increase income. Here, a 10 percent increase in the stock of Grameen credit given to men and the provision of health services increases income by .10 percent. The results imply that both men and women from the Grameen program benefit from primary health care services.

Table 3.20 shows that in the case of the provision of basic literacy, none of the coefficients are statistically significant although the coefficient for this dummy variable was positive and statistically significant for equation (9) where it was regressed on household income (see Table 3.16). One of the caveats to this model is that the use of dummy variables may omit important information. Given the limited information provided, these variables are not perfect proxies for what we are trying to measure.

³⁵ You can find the full regression output for all regressions in Appendix II.

Table 3.19: Marginal Effect of Credit and Health Care on Household Income

Grameen Bank	Primary Health
Variable	(X) (Z) Interaction Term
Log of women's loans from Grameen, (t)	0.0609 0.0767**
	(0.0436) (0.0387)
Log of women's loans from Grameen, (t-1)	-0.0389 -0.0308
	(0.0540) (0.0523)
Log of men's loans from Grameen, (t)	0.0007 -0.0297
	(0.0518) (0.0606)
Log of men's loans from Grameen, (t-1)	0.1120 0.0978*
	(0.0703) (0.0554)

Source: Author's estimations in Table 34 in chapter Appendix

Note: Robust standard errors are in parentheses.

Table 3.20: Marginal Effect of Credit and Basic Literacy on Household Income

Grameen Bank	Basic Literacy
Variable	(X) (Z) Interaction Term
Log of women's loans from Grameen, (t)	0.0275 0.0469
	(0.0471) (0.0355)
Log of women's loans from Grameen, (t-1)	-0.0254 0.0493
	(0.0525) (0.0494)
Log of men's loans from Grameen, (t)	0.0541 0.0875
	(0.0551) (0.0610)
Log of men's loans from Grameen, (t-1)	0.0043 0.0383
	(0.0789) (0.0618)

Source: Author's estimations in Table 34 in chapter Appendix

Note: Robust standard errors are in parentheses.

The result for the effect of marketing training is an interesting one (see Table 3.21). In the simple fixed effects estimates of the impact of Grameen credit on household income in Table 3.16, the coefficient on the policy variable for marketing training was not statistically significant. When the variable is interacted with credit, however, the effect is positive for loans given to men and women by Grameen. The magnitude of the effects of credit in the absence of marketing training is smaller than when credit and marketing training are provided simultaneously. Credit alone provided to women is associated with a .6 percent increase in income while the combination of the two variables yields a marginal effect of 1.36 percent. The effect of credit and marketing training is similar to that of women for the men.

Table 3.21: Marginal Effect of Credit and Marketing Training on Household Income

Grameen Bank	(X)	Marketing Training (Z) Interaction Term
Variable		
Log of women's loans from Grameen, (t)	0.0621* (0.0343)	0.136** (0.0546)
Log of women's loans from Grameen, (t-1)	-0.0204 (0.0460)	-0.0262 (0.0549)
Log of men's loans from Grameen, (t)	0.0803** (0.0395)	0.0599 (0.0626)
Log of men's loans from Grameen, (t-1)	0.0990* (0.0564)	0.101* (0.0575)

Source: Author's estimations in Table 34 in chapter Appendix

Note: Robust standard errors are in parentheses.

According to the results in Table 3.22, skill training is a service and or policy that seems to complement credit in a positive way but the results are not statistically significant. Similar to previous results, loans given to women borrowers by the Grameen Bank are associated with increases in household income independent of skill training, although the training interaction term is positively correlated with income but not statistically significant. A 10 percent increase in the stock of current credit given to women by the Grameen bank, increase household income by .8 percent.

Table 3.22: Marginal Effect of Credit and Skill Training on Household Income

Grameen Bank Variable	Skill Training	
	(X)	(Z) Interaction Term
Log of women's loans from Grameen, (t)	0.0860* (0.0519)	0.0475 (0.0436)
Log of women's loans from Grameen, (t-1)	-0.0141 (0.0479)	-0.0554 (0.0459)
Log of men's loans from Grameen, (t)	0.0991 (0.0711)	0.0377 (0.0618)
Log of men's loans from Grameen, (t-1)	0.0509 (0.0749)	-0.0563 (0.0674)

Source: Author's estimations in Table 34 in chapter Appendix

Note: Robust standard errors are in parentheses.

The effect of providing “other services” is somewhat puzzling. From looking at Table 3.7 presented previously, one trend to observe in the two periods is that all of the three MFI significantly reduced the provision of other services. As noted earlier, one caveat of using dummy variables to represent services is that we are bound to omit important information. In terms of the services in this category, it is possible that the three MFIs shifted their services to more specific services like skill training for example. In this case, it is possible that the provision of some general services is reduced in order to release resources for the provision of more specific services like education and job related training.

An interesting result is observed for the interaction effect of Grameen credit and other services (see Table 3.23). For credit disbursed to women in the earlier period, the provision of other services augmented the effectiveness of past loans in increasing income. Without these services, the effect of credit on household income is statistically insignificant. However, when this credit is complemented with other services, the increase in income becomes 1.4 percent and this interaction effect is statistically significant. Loans disbursed in period 1998/99 alone are associated with an increase in household income in the absence of other services.

The results for the provision of services by BRAC are interesting in terms of the differential effects observed by gender (see Tables 3.24-3.28). Worth recalling is the fact that in the simple regression (see Table 3.17) the coefficients for the credit variable for the men were positive and statistically significant across different specifications of the model. Furthermore, the variables for BRAC credit issued to men in both periods have the largest coefficients and account for the greatest marginal impact (i.e. 1.8 percent) on household income in terms of the provision of just credit.

Table 3.23: Marginal Effect of Credit and Other Services on Household Income

Variable	Grameen Bank	Other Services (Z) Interaction Term
	(X)	
Log of women's loans from Grameen, (t)	0.0581* (0.0350)	-0.0598 (0.0645)
Log of women's loans from Grameen, (t-1)	0.0294 (0.0484)	0.141** (0.0684)
Log of men's loans from Grameen, (t)	0.0974** (0.0407)	0.0000 0.0000
Log of men's loans from Grameen, (t-1)	0.0882 (0.0558)	0.0112 (0.0816)

Source: Author's estimations in Table 34 in chapter Appendix

Note: Robust standard errors are in parentheses.

Table 3.24: Marginal Effect of Credit and Primary Health Care on Household Income

Variable	BRAC	Primary Health (Z) Interaction Term
	(X)	
Log of women's loans from BRAC, (t)	-0.0310 (0.0504)	-0.0276 (0.0559)
Log of women's loans from BRAC, (t-1)	0.0553 (0.0851)	-0.0102 (0.0604)
Log of men's loans from BRAC, (t)	0.1400 (0.1010)	0.0485 (0.0834)
Log of men's loans from BRAC, (t-1)	0.1470 (0.1040)	-0.0473 (0.0865)

Source: Author's estimations in Table 35 in chapter Appendix

Note: Robust standard errors are in parentheses.

None of the service variables for the BRAC program are statistically significant in the simple regression (see Table 3.17). An important policy that can be driving these results in favor of male borrowers is the requirement that at least one member of the household works for wages in order to receive credit. If the wage-earner happens to also be the borrower, the increase in funds (i.e. wage income plus borrowed funds) would be greater and thus can allow the borrower to have access to a greater flow of money that can quickly be invested. This flow of funds may not be available to female borrowers if they are not the wage-earner in the household.

Table 3.25: Marginal Effect of Credit and Basic Literacy on Household Income

Variable	BRAC	Basic Literacy
	(X)	(Z) Interaction Term
Log of women's loans from BRAC, (t)	-0.0042 (0.0483)	-0.0276 (0.0559)
Log of women's loans from BRAC, (t-1)	0.0348 (0.0827)	-0.0102 (0.0604)
Log of men's loans from BRAC, (t)	0.208** (0.0983)	0.0485 (0.0834)
Log of men's loans from BRAC, (t-1)	0.166* (0.0951)	-0.0473 (0.0865)

Source: Author's estimations in Table 35 in chapter Appendix

Note: Robust standard errors are in parentheses.

In Tables 3.26 and 3.28, some of the interaction terms for services like marketing training and other services are statistically significant and augment the effectiveness of credit in increasing household income. In Table 3.26 we see that the effect of current BRAC loans given to women borrowers is statistically insignificant but when the loans are combined with marketing training, the coefficient becomes positive significant.

This interaction yields one of the strongest results in terms of magnitude. When BRAC loans given to women borrowers are combined with marketing training, a 10 percent increase in credit from BRAC results in a 2.3 percent increase in household income. A similar result is obtained for male borrowers where without marketing training, a 10 percent increase in current credit from BRAC results in a 1.7 percent increase in household income but when this credit is complemented with marketing training, the magnitude of the impact increases to 2.5 percent. Similarly, the result is obtained for male borrowers in Table 3.28 when other services are combined with credit. The negative coefficient for past BRAC loans given to men is puzzling but as noted earlier, this could be attributed to the ambiguity inherent in this variable.

Table 26: Marginal Effect of Credit and Marketing Training on Household Income

BRAC	(X)	Marketing Training (Z) Interaction Term
Variable		
Log of women's loans from BRAC, (t)	-0.0122 (0.0405)	0.230** (0.0890)
Log of women's loans from BRAC, (t-1)	-0.0013 (0.0660)	-0.0291 (0.0946)
Log of men's loans from BRAC, (t)	0.173** (0.0693)	0.250*** (0.0941)
Log of men's loans from BRAC, (t-1)	0.191** (0.0758)	0.1410 (0.2350)

Source: Author's estimations in Table 35 in chapter Appendix

Note: Robust standard errors are in parentheses.

Table 3.27: Marginal Effect of Credit and Skill Training on Household Income

Variable	BRAC	Skill Training
	(X)	(Z) Interaction Term
Log of women's loans from BRAC, (t)	-0.0228 (0.0484)	-0.0131 (0.0532)
Log of women's loans from BRAC, (t-1)	0.0129 (0.0714)	0.0283 (0.0483)
Log of men's loans from BRAC, (t)	0.173* (0.1050)	0.1020 (0.0846)
Log of men's loans from BRAC, (t-1)	0.1180 (0.1090)	-0.0397 (0.0807)

Source: Author's estimations in Table 35 in chapter Appendix

Note: Robust standard errors are in parentheses.

Table 3.28: Marginal Effect of Credit and Other Services on Household Income

Variable	BRAC	Other Services
	(X)	(Z) Interaction Term
Log of women's loans from BRAC, (t)	-0.0197 (0.0414)	0.0143 (0.0701)
Log of women's loans from BRAC, (t-1)	-0.0185 (0.0694)	-0.0549 (0.0806)
Log of men's loans from BRAC, (t)	0.133* (0.0753)	0.146** (0.0655)
Log of men's loans from BRAC, (t-1)	0.0524 (0.1030)	-0.158* (0.0833)

Source: Author's estimations in Table 35 in chapter Appendix

Note: Robust standard errors are in parentheses.

The coefficients for the RD-12 program credit variables are not statistically significant in the simple regression (see Table 3.18). The same holds for the most part for the interaction term model (see Table 3.36 in Appendix II). This result is consistent for both female and male borrowers. In terms of the institutional design of RD-12 as an MFI, the structure of the institution is that of a cooperative with large separate solidarity groups for men and women. As previously noted, this institutional set up may be contributing to the different impact this credit has as compared to other institutions like Grameen and BRAC. The requirement of a 5 percent deposit to a group fund and the purchase of shares may be causing more saving than investment and this can adversely impact the return on the funds borrowed and hence overall household income. As noted earlier, one caveat of using dummy variables to represent policies is that we could potentially omit important information. This omitted variable bias could be responsible for the odd result observed for the impact of other services on household income. In Table 3.36, we observe that the dummy variable for other services is positively associated with increases in household income. However, when this dummy variable is interacted with past credit from RD-12 obtained by male borrowers, the coefficient becomes negative. Both of these results are statistically significant. One possible explanation could be that the services that are provided alone are associated with increases in income but when combined with credit, they impact income negatively. This negative effect could be explained by the fact that the services offered may not be complementary to microcredit. It could be that the services offered are unrelated to the activities microcredit tends to fund. In this case, a negative interaction effect is feasible.

The results presented in this section suggest that the provision of capability-enhancing services, particularly, primary healthcare, basic literacy and skill training by the Grameen Bank (See Table 3.16) contribute to increases in household income.

Similarly, basic literacy, skill training and other services provided by BRAC (See Table 3.18), are associated with increasing the effectiveness of microcredit in increasing household income. The results are robust which suggest that the policies employed by the MFIs matter and that these policies can complement the effectiveness of microcredit in poverty reduction.

In terms of the stability of the results, one of the issues that arises with using interactions in a multiple linear regression model is that the model tends to be vulnerable to spurious multicollinearity. This issue can cause the coefficients of the variables to be unstable across methods, which can complicate the interpretation of the results. To minimize the problems this issue can cause, I carefully looked at the correlation matrix for each regression method used to see if multicollinearity was an issue. In each correlation matrix, most correlations among the predictors did not exceed .4 and the few that were .9 were dropped from the regression to see if the results changed.

One possible way to further validate the results obtained in the study is to employ more sophisticated econometric methods. With such methods, we may be able to make further sense of the empirical relationship between the services provided by the MFI, credit and the overall effect on household income. The employment of such methods is a goal that will be pursued in future versions of this paper.

The fixed effects estimates presented in the tables above were used to calculate the marginal returns to credit for selected capability-enhancing services (specifically the ones that are statistically significant). The point stressed earlier in the discussion about the potential for the services provided by the MFIs and NGOs to augment microcredit's return to income is observed here.

When we use the estimates from Table 3.21 to calculate the marginal returns to Grameen loans, without marketing training, at the mean, an additional Tk 100 of cumulative borrowing from Grameen by women during 1998/99, increased household yearly income by Tk 5.2. When this credit is combined with marketing training, the estimates suggest that the return more than doubles to Tk 11.42. These results provide support for the assertion made in this study concerning the potential complementarity between microcredit and capability-enhancing services (see Table 3.29).

Table 3.29: Marginal Returns to Microfinance Loans Based on Household Fixed-Effects Estimates (Interaction between Microcredit and Capability-Enhancing Services (taka per 100 taka in borrowing))

Gender and Period	Household Total Yearly Income (With just Microcredit) (Taka)	Household Total Yearly Income (Microcredit*Marketing Training) (Taka)	Household Total Yearly Income (Microcredit*Other Services) (Taka)
<i>Women's Borrowing</i> Returns from Grameen Loans in 1998/99	5.2*	11.42**	
<i>Men's Borrowing</i> Returns from BRAC Loans in 1998/99	636.1**	919.2***	
Returns from BRAC Loans in 1998/99	489.01*		536.8**

*t-statistic is significant at the 10 percent level or better, **t-statistic is significant at the 5 percent level or better, ***t-statistic is significant at the 1 percent or better. *Source:* Author's calculations based on 1991/92 and 1998/99 household surveys in Bangladesh.

Using the results observed from Tables 3.26 and 3.28 (tables presented earlier in the text) for the male borrowers, at the mean, an additional Tk 100 of cumulative borrowing from BRAC by men during 1998/99, increased household yearly income by Tk 636.1. When this credit is complemented with marketing training, however, the marginal return increases to Tk 919.2 (see Table 3.29). Using the estimates from Table 3.28, we obtain a marginal return of Tk 489.01 for BRAC male borrowers during 1998/99, but when credit is combined with other services, this return increases to Tk 536.8.

11. Conclusion

Despite existing debate about the magnitude of the impact of microfinance on poverty reduction, there is consensus in the literature that microfinance benefits the poor in many ways. Such benefits range from reducing vulnerability to income shocks to empowering women and increasing income and expenditures. Given these positive impacts, future research should be geared towards finding ways to improve the effectiveness of microcredit in reducing poverty. The capability approach to micro lending suggested in this study is one that advocates for more provision of capability-enhancing services.

In the view of Amartya Sen, a view that is strongly supported throughout this dissertation, the magnitude of development will be greater when development strategies are complemented with the provision of “substantive” and “instrumental” freedoms. In terms of using microcredit as a poverty reduction tool, a good point of departure should be to establish the enabling conditions that allow the individual borrower as well as the funds that they borrow to flourish.

This study attempts to initiate a probe into the empirical relationship between the capability-enhancing services that MFIs provide and the effectiveness of credit in changing household outcomes. These types of analyses are prevalent in the banking literature and policymakers have benefited from learning about the impact of financial intermediation which is inclusive of the services that banks provide. Microcredit can be considered a type of financial intermediation in the rural sectors of poor countries and as such, the services that they provide are expected to play a role in the overall impact of MFIs (Kaboski and Townsend, 2005).

The results presented in this study suggest that there is a positive association between the issue of credit along with the provision of capability-enhancing services. Other key findings in this study lead to interesting considerations for future research. Such considerations should include the reasons why there may be differential gender impacts and why some services are more effective than others. As more data becomes available on the services that MFIs provide, further research can lead to more definitive conclusions that can confirm or invalidate the findings in this study. Also, given that for BRAC and RD-12 programs the results were not statistically significant for the most part, the question remains as to why some microfinance institutions are successful and others are not.³⁶

³⁶ This question was also postulated in Kaboski and Townsend (2005)

CHAPTER IV

Microfinance and its Effect on Income Inequality: Evidence from Rural Bangladesh

1. Background

In the past couple of decades, microfinance has been used as a tool for empowering the poor and fighting poverty around the world. Despite ongoing criticism, microfinance has continued to gain momentum and programs continue to expand throughout the world. The outreach of microfinance schemes have expanded to include online lending exchanges carried out by organizations such as Kiva, Microplace and The Mix. The growth and significance of microfinance as a poverty-alleviating tool has generated substantial academic inquiry about the impact of these programs on borrower welfare.

Despite the extensive literature on microfinance, given the inconsistency of the findings, we are still left with a general sense of inquiry as to the extent to which microfinance benefits poor borrowers and the communities in which they live. Some studies find positive socio-economic impacts such as income stability and growth, increased employment, reduced income inequality, improvements in health, nutrition and schooling, women's empowerment and stronger social networks (Beck et al., 2004; Khandker, 2003). However, there are other studies that suggest negative impacts such as higher interest rates, constant poverty levels, exploitation of women, increased inequality, increased dependencies and the discouragement of sustainable local economic and social development (Copestake, 2002; Rogaly, 1996).

Recent studies such as that of Khandker (2005), examined the effects of microfinance on poverty reduction at both the participant and village levels using panel data from Bangladesh. The results of this study show that access to microfinance helps reduce poverty at the household-level, especially for female participants. In terms of the effects on the local economy, the study concluded that microfinance has a positive impact at the village-level because it raises per capita household consumption for both participants and nonparticipants in the villages where the programs operate. Other studies also report positive impacts of microfinance in Bangladesh (e.g. Hashemi, Schuler, and Riley 1996; Schuler and Hashemi 1994). There is a consensus that microfinance increases consumption, results in higher productivity and leads to consumption smoothing (Khandker, 1998; Parker and Nagarejan, 2001; Zaman, 2001; Coung et al., 2007).

Impact studies on microfinance have focused on borrower welfare. While the focus on borrower welfare is both warranted and essential, it is also important to examine the potential spillover effects of microfinance. The reduction of credit constraints is expected to affect borrowers, but these effects may also induce other general equilibrium effects that will impact non-borrowers and the community as a whole. A common finding in the literature, and in this dissertation, is that microfinance does not affect all members of a village equally. This is evidenced in Chapter 1 where the findings suggested differential impacts by gender, labor assets and education assets. Given these differing impacts, an important outcome to explore is how microfinance affects incomes, particularly, the effect of microfinance on income inequality. In this context, examining the factors that increase or decrease income inequality would help policymakers in the design of development strategies that would reduce poverty and induce welfare effects beyond borrowers. Most impact studies have been conducted at the household level and focus on the effect of microfinance on household income and consumption.

Given data limitations, the spillover effects of microfinance have not been thoroughly explored. Such spillover effects include the increase of entrepreneurship, employment and aggregate incomes as a result of access to credit. Access to credit can increase employment opportunities as new entrepreneurs hire other workers. This new employment may result in a host of other transactions such that there is an income multiplier effect significant enough to ignite economic development. These are all general equilibrium effects that are expected to come about as a result of microfinance but that are difficult to measure given the intensity of data needed.

The aforementioned general equilibrium effects are beyond the scope of this study but one way this study attempts to explore effects that go beyond borrower welfare is to explore the factors that contribute to income inequality at the village level. Measuring the correlation between microfinance and income inequality would allow us to explore aggregate impacts that go beyond borrower welfare. Very few studies on the impact of microfinance have explored the relationship between access to microfinance and income inequality.

This study contributes to the existing literature on microfinance in that it serves as an initial inquiry into the aggregate effects of microfinance. A prevalent criticism of microfinance is that it does not reduce poverty at the aggregate level given the small size of the loans and the lack of education, managerial ability and investment opportunities for the poor. In this sense, if a development goal is to lift people out of poverty and close the income gap among the population, inquiry into income inequality would be an appropriate point of departure.

In this study, the main focus is on village effects rather than on individual borrower or household effects. Focusing on the implications of intra-village income inequality allows us to reach broader conclusions about the impact of microfinance and it would serve as a starting point to begin analyzing some of the general equilibrium effects that may be induced by access to microfinance. To conduct this study, I use village-level panel data from Bangladesh for the periods 1991-92 and 1998-99 (more details are provided in section 2). For the analysis, I employ several econometric methodologies to explore the effect of microfinance on intra-village income inequality. I first use a Pooled OLS technique to empirically test the association between village characteristics, credit, and two dependent variables: average village income and village Gini indices. The Gini index for a village is based on household income data within the village. Secondly, I use a village fixed-effect method in order to control for selection bias and unobserved effects that may bias the results. The credit variables, which are the coefficients of interest, are separated by the source of microfinance and/or microfinance institution and gender in order to capture differential effects by program.

The overall findings in this study suggest that microfinance, particularly when measured by loan source, does contribute to income inequality at the village-level. The ownership of assets such as nonagricultural and transport assets is also positively associated with an increase in income inequality. An interesting and robust result is the negative correlation between education and income inequality. The results suggest that higher educational achievement reduces income inequality. The organization of the study is as follows; section 1 presents background information about income inequality and microfinance, section 2 outlines the data used in the study, section 3 describes the theoretical model and estimation strategy employed, section 4 discusses the results, and section 5 concludes the chapter.

1.1 Microfinance and Inequality

Economic inequality, or “wealth and income differences” represents disparities in the distribution of income and other economic assets (Tchouassi, 2011). Generally, the term economic inequality refers to equality of outcome and is usually linked to the idea of equal opportunity (ibid). According to Tchouassi (2011), the concept of inequality can be explored within the realm of three types of processes and three different dimensions: (1) economic, which refers to income, employment and access to physical assets; (2) social, which refers to access to health, education and social security; and (3) political, which refers to the right to vote, access to political power and legal institutions. The three different dimensions include geography (across regions), location (rural/urban) and population groups (gender, ethnicity and race). In terms of measuring differences in income equality, typically, the Gini coefficient is used.

Income inequality is a variable that is measured and closely monitored throughout the world because it has important implications for economic growth and development. Studies have found that inequality and economic growth are negatively correlated and that individuals with income and wealth below a certain threshold are unable to acquire human capital and in turn this limits economic growth (see Clarke, 1995; Peterson and Tabellini, 1994; Galor and Zeira, 1993; Beck, Demirguc-Kunt, Levine 2007). Although most of these studies have traced the linkages between inequality and economic growth at the macro level, similar results can be expected at the micro level.

Microfinance has been considered an important development policy that aims to reduce poverty, vulnerability and inequality. The assumption is that if the poor receives more credit, inequality and vulnerability would be reduced (Stewart et al., 2010). The idea here is that financial depth eases the credit constraints on the poor and vulnerable populations and increases productivity of assets. Increased productivity in turn contributes to poverty reduction (Hulme and Mosley, 1996; World Bank, 2001; Jalilian and Kirkpatrick, 2002; Kai and Hamori, 2009b). Other studies contradict the aforementioned studies by showing that financial depth only benefits the rich and as a result, income inequality and vulnerability is increased (Beck et al., 2004).

Recent studies, such as that of Ahlin and Jiang (2008), develop a model in which microfinance is used as a proxy for financial development. The aim of their study was to explore whether microfinance could bring long-term development and reduce income inequality for a country. The authors made the distinction between entrepreneurship and self-employment and argued that these two concepts are not the same. They defined entrepreneurship as an activity that requires saving and the acquisition of new labor and capital, whereas self-employment requires little or no saving, minimal capital and mainly one's own labor.

Microcredit, the authors argued, is based on self-employment schemes and as such, without saving and significant capital accumulation, long-term economic development is difficult to come about. In terms of income inequality, the authors argue that if poor borrowers "graduate" from self-employment into entrepreneurship, this in turn will decrease income inequality because it would raise savings, create employment and increase the incomes of the newly hired individuals. This argument is relevant for this study in that it can explain the contradicting results found here and in the literature.

In this sense, it would then be possible for microcredit to increase inequality if the self-employed does not generate income to close the income gap or it can reduce inequality if entrepreneurship flourishes. Green et al. (2006) also make a similar argument by asserting that improvements in access to credit among the poor can reduce poverty and thus close the income gap among the population.

Cross-country studies on the empirical relationship between microfinance and inequality show that microfinance has either an increasing effect or a decreasing effect on income inequality. Tchouassi (2011), for instance, examines the relationship of microfinance, inequality and vulnerability in 11 developing countries in Central Africa. The findings in this study show that the number or intensity of microfinance institutions has an “equalizing” or negative impact on the Gini index in Central Africa countries. Kai and Hamori (2009) echo these findings. They use a cross-country regression methodology to examine the impact of microfinance on inequality in 61 developing countries. Using the number of microfinance institutions as a proxy for the intensity of microfinance in a country, they show that microfinance has a decreasing effect on inequality. In this context, they conclude that since microfinance lowers inequality, it can be used as a effective redistribution tool. Another study supporting the aforementioned findings is that of Cuong, Bigman, den Berg, and Thieau (2007). They examine the effect of micro loans disbursed to the poor by the Vietnam Bank for Social Policies (VBSP), on household welfare and find that microfinance is associated with a small decrease in income inequality.

Consensus about the relationship between microfinance and income inequality is lacking and the findings are as mixed as those about the impact of microfinance on borrower welfare. There are studies such as the ones discussed above that find that access to microfinance reduces income inequality but others find that inequality is actually enhanced.

Copestake (2002), for instance, explores the Zambian Copperbelt and finds that impact on income distribution depends upon who obtains loans, who graduates to larger loans, who exits and group dynamic. The findings suggest that although there are some initial increases in business income among borrowers, microfinance increases income inequality. This inequality in income, the study shows, is determined by factors such as who receives the loans, who is able to get larger loans, and the dynamics of the lending group. The study concludes by asserting that there are many reasons why microcredit may have a “polarizing” or increasing effect on inequality. One main reason is that there may be discrimination in favor of richer clients who benefit from better access to credit and the exclusion of poorer people. If this is the case, or if there are differential impacts from access to credit, then it is possible that in some cases inequality increases and in other cases it decreases or it may remain constant.

Exploring the relationship between microfinance and income inequality is important for many reasons. One important reason, particularly for poor countries, is that high income inequality is associated with crime and political instability. Another reason is that inequality hampers the processes of economic development and poverty reduction (Kai and Hamori, 2009). If income inequality creates a barrier for economic growth as some studies suggest, then reducing income inequality should be a development policy initiative. In this context, establishing some sort of consensus about the relationship between microfinance and income inequality will contribute to development strategies that promote a balanced income growth that would result in substantial poverty reduction.

2. Data

This study relies on the 1991/92 and the 1998/99 household surveys conducted by the Bangladesh Institute of Development Studies (BIDS) and the World Bank. This household-level data was aggregated into village-level data for the purpose of this study. The surveys covered 1,798 households drawn from 87 villages in 29 thanas.³⁸ The 1991/92 survey was conducted during three cropping seasons: round 1 during *Aman* rice (November-February), round 2 during *Boro* rice (March-June), and round 3 during *Aus* rice (July-October). The 1998/99 survey was collected only once during this period (Pitt and Khandker, 1998 and Khandker, 2005).

The purpose of this survey was to generate the data for an analysis of three major credit programs: the Grameen Bank, Bangladesh Rural Advancement Committee (BRAC), and the Rural Development-12 program of the Bangladesh Rural Development Board (BRDB). Villages where these programs operated were surveyed as well as non-program villages where no micro lending or any similar lending activities took place. Target households and non-target households were surveyed. Target households are those who meet the program eligibility criteria, which is to own less than or equal to half of an acre of land. Non-target households are those who do not meet the landholding criteria. Non-target households were surveyed in both program villages and non-program villages (ibid).

Out of the 29 thanas covered, 24 were program thanas (8 from each of the three programs) and 5 were non-program thanas. The thanas included in the survey were selected from 391 rural thanas out of 460 thanas. Three villages in each program thana were randomly selected from a group of program villages where a program had been in operation for at least

³⁸ A thana is an administrative unit that is smaller than a district and consists of a number of villages. In Bangladesh, you have “Divisions” and under those divisions you have “Zilas”. Thanas are under the umbrella of zilas.

three years. Three villages in each of the non-program thanas were also randomly selected. These villages were drawn from the village census of the Government of Bangladesh. In terms of the village survey design, villages with fewer than 51 number of households and villages with more than 600 households, were excluded (ibid).

The households surveyed in 1991/92 were revisited in 1998/99. This time, however, the households were interviewed in one round, rather than in three. Among the 1,769 households surveyed in 1991/92, 113 could not be interviewed in 1998/99 and only 1,656 households were available for the re-survey. Included in the re-survey were new households from previous villages and newly included villages. Also three non-target households were randomly selected from each of the previous 87 villages. Also included, are three new thanas that were randomly selected from the southern and southeastern regions that were seriously affected by cyclone in 1991/92. These thanas were excluded in the first round survey. From the new thanas, three villages were also drawn randomly, adding an additional 9 villages. In the new villages, 20 households were drawn from target and non-target households. In total, 2,599 households were surveyed in 1998/99.³⁹

The distribution of households by program membership is presented in Table 4.1. Out of all the households surveyed in 1991/92, 11.6 percent were BRAC members, 8.5 percent were Grameen Bank members and 6.2 percent were RD-12 members. In the 1998/99 survey, the number of Grameen Bank borrowers increased to 14.3 percent; the number of BRAC borrowers actually decreased to 9.3 percent and RD-12 project borrowers also decreased to 3.6 percent. The interesting trend we see in the 1998/99 survey is the increasing presence of other NGOs, with 11.1 percent of participating members.

³⁹ Details of these surveys were provided by Pitt and Khandker (1998) and Khandker (2005).

As we can note from Table 4.1, participation in rural Bangladesh has increased from 26.3 percent in 1991/92 to 45.7 percent in 1998/99. The number of eligible non-participants decreased from 40.3 percent to 25.6 percent and non-target households also decreased from 33.1 percent to 28.8 percent.

Table 4.1: Distribution of Households by Program Membership

Program Membership	1991/92	1998/99
Grameen Bank members	8.5%	14.3%
BRAC members	11.6%	9.3%
BRDB RD-12 members**	6.2%	3.6%
Other NGO members	0%	11.1%
Multiple program members	0%	7.4%
Target non-members	40.3%	25.6%
Non-target households	33.4%	28.8%
No. of observations	1,769	2,599

** Other NGOs: ASA, PROSHIKA, GSS, Youth Development and other small NGOs.

Source: Author's calculation from the 1991/92 and 1998/99 surveys. A similar table is presented in Khandker (2003).

Participation in microfinance programs is more prevalent among individuals who have very little land or no land at all. In the 1991/92 survey, the participation rate among the landless is 56 percent and this rate increased to 59 percent in the 1998/99 survey (see Table 4.2). Also observed is the fact that households who do not meet the qualifying criteria for obtaining microcredit (those households who own more than .50 acre of land) also participate in microcredit programs. Participation of this group increases in the 1998/99 period. This observation becomes relevant for the study of income inequality as it relates to microfinance because if some borrowers are initially wealthier or less poor than others, this can have important implications for inequality.

To better control for unobserved heterogeneity in the sample, this paper relies on panel data to estimate the marginal impact of microcredit on village income and to see what effect microcredit has on the Gini index. Once the sample is restricted to households that were interviewed in both periods to form a panel, we are left with 1,656 households for each survey and approximately 87 villages. Summary statistics for relevant variables are provided in Table 4.3.

Table 4.2: Household Participation in Micro-credit Programs

Landholding (acres)	1991/92 Survey		1998/99 Survey	
	Participation rate in each landholding group (%)	Distribution of participants by landholding group (%)	Participation rate in each landholding group (%)	Distribution of participants by landholding group (%)
0	56.4	8.3	58.8	10.9
.1-.20	33.1	53.8	58.0	49.8
.21-.50	29.5	15.3	48.3	14.5
.51-1.00	24.3	9.4	43.7	11.3
1.01-2.50	16.0	10.3	35.0	10.6
2.51+	7.1	2.9	12.0	2.9
All households	26.0	100.0	45.6	100.0
Observations	1,769	894	2,599	1,630

Source: Author's calculation from the 1991/92 and 1998/99 surveys. A similar table is presented in Khandker (2003).

Table 4.3: Summary Statistics of Village Income, Assets and Credit Variables

Variable	1991/92		1998/99	
	Mean	Std. Dev.	Mean	Std. Dev.
Village average yearly income (taka)	3039.896	2699.58	11265.81	8090.016
Village Gini coefficient	0.6014713	0.1170468	0.6406667	0.1241001
Avg. years of education of village adults (15-59yrs)	2.764324	1.029669	2.483238	1.129816
Avg. village holding of equipment & livestock (taka value)	1048.694	428.1217	250.5154	463.1458
Avg. village holding of transport assets (taka value)	9020.91	7118.409	1118.073	1852.786
Avg. village holding of land (acres of land)	33.70085	62.18996	54.2179	39.03127
Avg. village holding of nonagricultural assets (taka value)	982.1134	1037.885	1292.334	9747.425
Current village avg. of women's loans from BRAC (taka)	258.274	466.1732	397.7179	544.4104
Current village avg. of men's loans from BRAC (taka)	95.88652	259.3547	16.76502	75.6949
Current village avg. of women's loans from BRDB (taka)	168.0837	377.8233	129.5267	312.0768
Current village avg. of men's loans from BRDB (taka)	287.5427	558.7238	108.3815	314.2197
Current village avg. of women's loans from Grameen (taka)	400.1323	730.1934	702.2535	978.364
Current village avg. of men's loans from Grameen (taka)	171.4244	464.2168	165.626	541.2363
Number of Observations	87		92	

Source: Author's calculations from the 1991/92 and 1998/99 survey of households and villages in Bangladesh

In terms of the households that split into multiple households, they were combined with the original households to form a single household. In terms of the biases or problems that this may cause, previous studies have conducted statistical tests to see if merging the data was appropriate and the tests indicate that combining the data does not significantly alter the results obtained by keeping the households separate (see Khandker and Pitt 2002).

For the purpose of this study, household-level data was collapsed to village-level data in order to measure the effects of microcredit on village outcomes. In terms of village income, this variable was derived by aggregating household incomes in each village to get average income for each village. The aggregated data resulted in a panel of 87 villages.

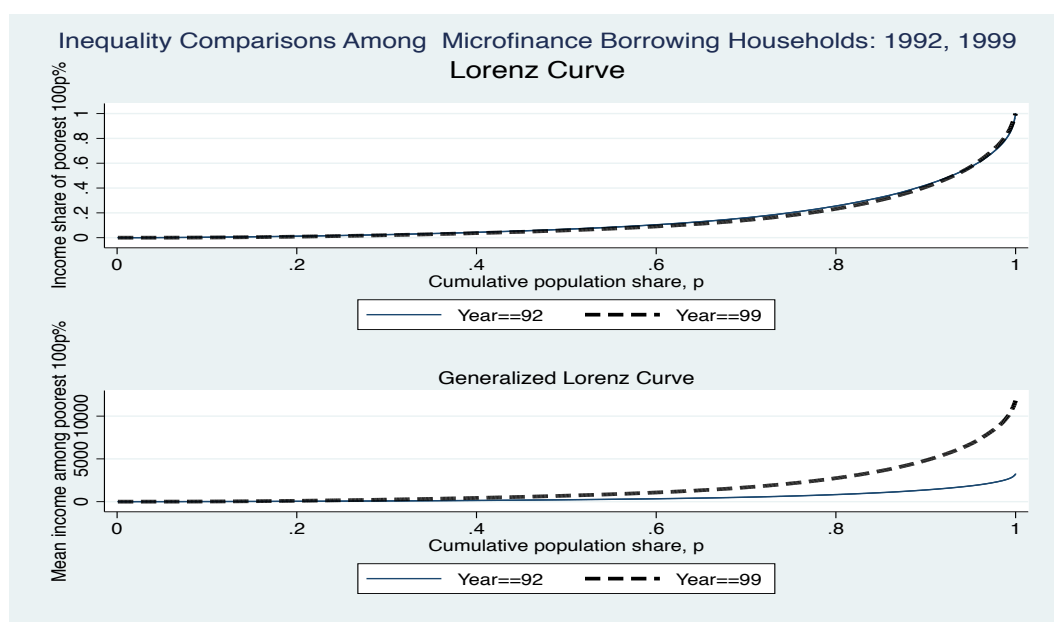
2.1 Measuring Inequality and Poverty

Economists use two fundamental measures of income distribution to explore issues of income inequality. The two measures are, the personal or size distribution of income and the functional or distributive factor share distribution of income (Todaro and Smith, 2009, p. 210).

The personal or size distribution of income is the measure typically employed by economists. The personal income measure focuses on the incomes of individual persons or households and the total incomes they receive. To explore personal income, economists and statisticians arrange all individuals by ascending personal incomes and then separate the total population into different groups. A common method of dividing the population into groups is to divide the population into quintiles (fifths) or deciles (tenths). Income levels are arranged in ascending income levels and then the income share received by each individual or group is determined (ibid).

A common way to examine personal income statistics is to construct a Lorenz curve. Figure 4.1 illustrates a Lorenz curve (top) and a Generalized Lorenz curve (bottom). In the Lorenz curve, the cumulative proportion of income recipients is plotted on the horizontal axis.

We can see that at point .2, we have the lowest (poorest) 20% of the population; at point .6 we have the bottom 60%; and at the very right of the axis, all 100% of the population has been accounted for. The vertical axis illustrates the cumulative income share received by each proportion of the population. We can represent perfect equality by drawing a diagonal line from the left corner (the origin) of the square, all the way to the upper right corner of the square.



Source: Author's calculations from the 1991/92 and 1998/99 surveys of households in Bangladesh

Figure 4.1: Lorenz Curves—Microfinance Borrowing Households in Bangladesh

The farther away the Lorenz curve is from the diagonal line (perfect equality), the greater the degree of inequality is displayed (Todaro and Smith, 2009, p. 212). The Gini coefficient can be derived from the Lorenz curve and it equals twice the area between the Lorenz curve and the 45 degree line (Jenkins, 2006).⁴⁰

⁴⁰ <http://econpapers.repec.org/paper/bocusug06/07.htm>. Accessed October 29, 2012.

The Generalized Lorenz curve (bottom graph in Figure 4.1) is similar to the Lorenz curve but it is scaled up at each point by the cumulative mean income of the population. Units are arranged in ascending order of income (ibid). As can be noted from Figure 4.1, the data displays the presence of income inequality among microcredit borrowing households. This fact is not uncommon since countries and therefore households, typically do not exhibit perfect equality or perfect inequality in their distribution of income (Todaro and Smith, 2009, p. 212).

In terms of inequality among microfinance borrowers, the Lorenz curve (top) suggests that between the periods 1992 and 1999 income inequality remained relatively constant for the households in the bottom (poorest) 20% of the population. In other words, the poorest borrowers were no better or worse off between the two periods. Figure 4.1 also suggests that income inequality among the top earners slightly decreased (see dash line in both diagrams). The Generalized Lorenz curve also suggests that nominal incomes increased more for households in the 50th percentile of income and above.

3. Theoretical Model and Estimation Strategy

In assessing the effectiveness of any development program or service, one issue that instantly arises with impact evaluation is the biases that could come from endogenous participation in such programs. In the impact assessment literature, the typical sources of correlation are referred to as program placement bias and household selection bias (Pitt, Rosenzweig, & Gibbons, 1993; Ravallion, 1999). If there is a systematic geographical bias in the way the program targets the population, a program placement bias is created.

This is certainly the case in Bangladesh where poor households are specifically targeted and happen to live in areas where poverty is more prevalent. A household selection bias would also occur if participation in the program is correlated with unobserved individual characteristics. In this study, the concern is the potential bias on the credit estimate created by the correlation between unobserved heterogeneity and micro loans. A major challenge facing development programs, particularly microcredit programs, is that policy conclusions are difficult because the results of impact studies are sensitive to the empirical method used to estimate program effects. In this context, there are compelling reasons to employ alternative methods to estimate program impacts and determine whether microfinance benefits participants and their communities.

3.1 Pooled OLS Regression Model: Effect of Microcredit on Village Income

As a point of departure in the estimations, I begin by pooling the data in the two periods in order to take advantage of the increased number of observations that results from this econometric technique. Since we only have approximately 87 villages in each period, pooling the data may result in better estimates. I begin with an income equation that relates village income y_t in year t to the village's asset endowment and characteristics X , the amount of loan M received by the village, and a random error ε :

$$y_{jt} = \beta_1 X_{jt} + \beta_2 M_{jt}^F + \beta_3 M_{jt}^M + \varepsilon_{jt} \quad (1)$$

where y_{jt} is average village income in village j , which is assumed to depend on village characteristics and village current borrowing. X is a vector of village assets and characteristics.

M^F and M^M respectively are vectors of average current microcredit received by village female and male borrowers from different programs. Parameters β_2 and β_3 measure the effects of credit (stock) for loans given to all female and male borrowers in the village by each of the microcredit programs. Loans are separated by gender because since credit markets are imperfect and labor markets are different for men and women, the impact of microfinance borrowing is expected to differ by gender.

Equation (1), if estimated in this standard way, would suffer from the biases discussed earlier since it is likely that exogenous factors will affect household and village level income. To the extent these factors cause the error term in (1) to be correlated across all periods for a particular village, cross-section estimates that do not account for this correlation will not be efficient. If the omitted variables are correlated with village income, then estimating equation (1) with methods such as cross-section will in fact yield biased results (see Mundlak, 1978 and Hsiao, 1986).

3.2 Fixed-Effect Estimator: Effect of Microcredit on Village Income

To eliminate the potential biases discussed above, the income equation is expanded to capture village level unobserved heterogeneity. The income equation is rewritten:

$$y_{jt} = \beta_1 X_{jt} + \beta_2 M_{jt}^F + \beta_3 M_{jt}^M + \varphi_j + \varepsilon_{jt} \quad (2)$$

The term ϕ_j is the village unobserved effect, which include village characteristics such as the managerial ability of the population in a village, land quality and external factors such as local conditions or the presence of other government programs. ε_{jt} is the error term and is potentially serially correlated with X and M . To estimate the above equation, a village fixed-effect (FE) estimator is used.

As mentioned previously, the first issue that arises is the homogeneity of village effects. Here, the null hypothesis of homogeneity is that ϕ_j is constant for all j . If this is not the case, cross-sectional estimators such as pooled OLS are inconsistent and may yield biased coefficient estimates. To help us determine which model yields the most consistent estimates, we employed a Hausman test (see Hausman, 1978 and Hsiao, 1986). According to the results of this test, the null hypothesis of homogeneity, which says that ϕ_j is constant for all i , must be rejected. Therefore, this analysis looks at the results from the pooled OLS regressions but relies on the FE estimator to analyze the empirical correlation between microfinance and village income.

3.3 Pooled OLS Regression Model: Effect of Microcredit on Village Income Inequality

Once I look at the effects of microcredit on village-level income to see if microcredit has a statistically significant effect on village income, I proceed to examine whether microfinance is associated with intra-village income inequality. I start with an equation that relates income inequality (as measured by the Gini coefficient).

$GINI_{jt}$ in year t , dependent on the village's asset endowment and characteristics X , the amount of loan received by the village, M , and a random error ε :

$$GINI_{jt} = \beta_1 X_{jt} + \beta_2 M_{jt}^F + \beta_3 M_{jt}^M + \varepsilon_{jt} \quad (3)$$

where $GINI_{jt}$ is the village j GINI coefficient, which is assumed to depend on village characteristics and village microcredit borrowing. X is a vector of village assets and characteristics. M^F and M^M respectively are vectors of the average current micro loans received by female and male borrowers from different programs in each village. Parameters β_2 , and β_3 , measure the effects of credit (stock) for loans given to female and male borrowers in each village by each of the microcredit programs.

3.4 Fixed-Effect Estimator: Effect of Microcredit on Village Income Inequality

As previously noted, the above equation is vulnerable to the biases discussed earlier since it is likely that exogenous factors will also affect village level income. To mitigate the potential biases discussed above, the income inequality equation is expanded to capture village level unobserved heterogeneity.

The income inequality equation is rewritten:

$$GINI_{jt} = \beta_1 X_{jt} + \beta_2 M_{jt}^F + \beta_3 M_{jt}^M + \varphi_j + \varepsilon_{jt} \quad (4)$$

The term ϕ_j is the village unobserved effect, which include village characteristics such as the managerial ability of the population in a village, land quality and external factors such as local conditions or the presence of other government programs. ε_{jt} is the error term and is potentially serially correlated with X and M . To estimate the above equation, a village fixed-effect (FE) estimator is used.

4. Results

In this section, the results of the regression equations outlined in Section 3 are presented and discussed. The first set of results includes the effect of microcredit on village income using both Pooled OLS and a village fixed effect estimator. Since previous chapters in this dissertation examined the impact of microfinance on household-level income, it seemed warranted to examine whether earlier results could be confirmed at the village-level. The second set of results are obtained from the regressions using the Gini coefficient as a dependent variable to examine the effect of microcredit on village income inequality. Similarly to the first set of results, Pooled OLS and fixed-effects strategies are employed to estimate the effect of microcredit on income inequality.

4.1 Pooled OLS Regression Model: Effect of Microcredit on Village Income

The results from the Pooled OLS regression model suggest that ownership of assets as well as access to microfinance are associated with increases in income at the village level (see Table 4.4). In terms of assets, the ownership of equipment and livestock is negatively associated with increases in village income.

This result is counterintuitive since asset accumulation and ownership have been found to augment income in previous studies. It could be the case that since equipment and livestock are combined in this variable, it may be causing a measurement error and/or a correlation with some other variable.⁴²

Table 4.4: Pooled OLS Regression Model: Effect of Microcredit on Village Income

VARIABLES	lnincome
Bank in the village (dummy)	0.120 (0.164)
Electricity in the village (dummy)	-0.0204 (0.129)
Avg. years of education of village adults (15-59yrs)	-0.0799 (0.0596)
Log of Avg. village holding of equipment & livestock (taka value)	-0.147*** (0.0452)
Log of Avg. village holding of transport assets (taka value)	0.0849 (0.0548)
Log of Avg. village holding of nonagricultural assets (taka value)	0.187*** (0.0398)
Log of Avg. village holding of land (decimals)	-0.0939 (0.0979)
Log of avg. loans given to women in the village from BRAC	0.0215 (0.0249)
Log of avg. loans given to women in the village from BRDB	0.0447* (0.0252)
Log of avg. loans given to women in the village from Grameen	0.0189 (0.0246)
Log of avg. loans given to men in the village from BRAC	0.0580 (0.0371)
Log of avg. loans given to men in the village from BRDB	0.0422 (0.0265)
Log of avg. loans given to men in the village from Grameen	0.0687** (0.0267)
Observations	151
F-statistics (20, 130)	15.77
Prob > F	0.0000

*t-statistic is significant at the 10 percent level of better, **t-statistic is significant at the 5 percent level of better, ***t-statistic is significant at the 1 percent or better.

Note: Robust standard errors are in parentheses. Regressions also include the following:

Average number of adult female and male in the village, average adult age in the village, average years of education achieved by village, year dummy, village level infrastructure and price variables to account for the impact of time-varying changes in local economic conditions.

Source: Author's computations based on 1991/92 and 1998/99 household surveys in Bangladesh.

⁴² This will be addressed in future versions of this paper.

Ownership of non-agricultural assets is associated with increases in income in the village. The results suggest that a 10 percent increase in the value of non-agricultural assets increases income by 1.9 percent. In terms of microcredit, the results from this regression confirm the results obtained previously. Microcredit, particular the credit disbursed by BRDB and the Grameen Bank is associated with generating income at the village-level. The findings indicate that one additional female borrower in the village with a 10 percent increase in credit from BRDB contributed to a .4 percent increase in average village income. Similarly, one additional male borrower in the village with a 10 percent increase in credit from the Grameen Bank contributed to a .6 percent increase in average village income.

The coefficients for the other credit variables in the regression were not statistically significant. This result can be partly attributed to the fact that microfinance institutions are different and as such, the way credit is delivered and services are administered can have an impact on the effectiveness of credit in creating economic growth at the village-level. This issue was explored in Chapter 3. The role of assets in income generation should also be noted since the coefficients on the asset variables are significantly larger than those from the credit variable. These findings suggest that assets play a significant role in income generation at the village-level, at times, more so than access to microcredit.

4.2 Fixed-Effect Estimator: Effect of Microcredit on Village Income

As previously discussed, the Hausman test employed indicated that the errors in the equations are correlated for this data, therefore this panel data analysis uses the village fixed-effect method. The results for this regression presented in Table 4.5 are more robust than for the Pooled OLS method.

The findings from this regression show a robust result for the effectiveness of nonagricultural assets in generating income in the village. This result suggests that the ownership of assets by the village plays an important role in income generation.

Table 4.5: Fixed-Effect Estimator: Effect of Microcredit on Village Income

VARIABLES	lnincome
Avg. years of education of village adults (15-59yrs)	-0.137 (0.103)
Log of Avg. village holding of equipment & livestock (taka value)	-0.168* (0.0882)
Log of Avg. village holding of transport assets (taka value)	0.0454 (0.106)
Log of Avg. village holding of nonagricultural assets (taka value)	0.234*** (0.0734)
Log of Avg. village holding of land (decimals)	0.0289 (0.184)
Log of avg. current loans given to women in the village from BRAC	0.0947* (0.0478)
Log of avg. current loans given to women in the village from BRDB	0.0148 (0.0367)
Log of avg. current loans given to women in the village from Grameen	0.0944* (0.0538)
Log of avg. current loans given to men in the village from BRAC	0.151** (0.0662)
Log of avg. current loans given to men in the village from BRDB	0.160*** (0.0562)
Log of avg. current loans given to men in the village from Grameen	0.103* (0.0515)
Observations	151
Number of Villages	92
F-statistics (18,41)	23.49
Prob > F	0.0000

*t-statistic is significant at the 10 percent level of better

**t-statistic is significant at the 5 percent level of better

***t-statistic is significant at the 1 percent or better

Note: Robust standard errors are in parentheses. Regressions also include the following:

Average number of adult female and male in the village, average adult age in the village, average years of education achieved by village, year dummy, village level infrastructure and price variables to account for the impact of time-varying changes in local economic conditions.

Source: Author's computations based on 1991/92 and 1998/99 household surveys in Bangladesh.

In terms of microcredit, the results confirm the earlier findings in this dissertation. The coefficients for almost all of the credit variables are positive and statistically significant (with the exception of the BRDB loans disbursed to women in the village). The results suggest that one additional female borrower in the village with a 10 percent increase in credit from BRAC contributed to a .9 percent increase in average village income. Similarly, one additional female borrower in the village with a 10 percent increase in credit from the Grameen Bank contributed to a .9 percent increase in average village income. The results in Table 4.5 suggest that all of the loans disbursed to male borrowers in the village contribute to income generation in the village. One additional male borrower in the village with a 10 percent increase in credit from BRAC, BRDB and the Grameen Bank contributed to village income increases of 1.5, 1.6 and 1.0 percent respectively. The fixed-effects estimates in Table 4.5 are used to calculate the marginal returns to credit for male and female borrowers (see Table 4.6).

Table 4.6: Marginal Returns to Microfinance Loans (taka per 100 taka in borrowing)

Gender and Period	Village Total Yearly Income (Taka)
<i>Women's Borrowing</i>	
Returns from Grameen Loans in 1998/99	4.5*
Returns from BRAC Loans in 1998/99	8.04*
<i>Men's Borrowing</i>	
Returns from Grameen Loans in 1998/99	21.02*
Returns from BRAC Loans in 1998/99	303.8**
Returns from BRDB Loans in 1998/99	49.9***

*t-statistic is significant at the 10 percent level of better, **t-statistic is significant at the 5 percent level or better, ***t-statistic is significant at the 1 percent or better

Source: Author's calculations based on 1991/92 and 1998/99 household surveys in Bangladesh.

Note: Because the estimation equations are in log-log (elasticity) form, marginal returns are calculated using the formula:

$$\frac{dY}{dX} = \beta \left(\frac{\bar{Y}}{\bar{X}} \right)$$

Table 4.6 suggests that at the mean, an additional Tk 100 of borrowing in the period 1998/99 from Grameen by women in the village increased village yearly income by Tk 4.5 and borrowing from BRAC in the same period increased village yearly income by 8.04. The marginal returns for men are much larger . At the mean, an additional Tk 100 of borrowing in the period 1998/99 from Grameen by men in the village increased village yearly income by Tk 21.02 and borrowing from BRAC and BRDB in the same period increased village yearly income by Tk 303.8 and Tk 49.9 respectively. As we can see, the marginal return to credit for credit received by men from BRAC is quite substantial in terms of its effect on village income.

4.3 Pooled OLS Regression Model: Effect of Microcredit on Village Income Inequality

In order to explore the effect of microfinance loans on village income inequality, I run the village income inequality regressions using both the Pooled OLS and the village fixed-effect methods. The results from the first method are presented in Table 4.7. An interesting result that stands out from Table 4.7 is the coefficient for average years of education of village adults. The findings suggest that a one-unit increase in average years of education in the village decreases village income inequality or the Gini coefficient by .0353.

Table 4.7: Pooled OLS Estimates: Effect of Microcredit on Village Income Inequality

VARIABLES	gini
Avg. years of education of village adults (15-59yrs)	-0.0353*** (0.00987)
Avg. village holding of equipment & livestock (taka value)	0.000110 (0.00176)
Avg. village holding of transport assets (taka value)	0.000489** (0.000196)
Avg. village holding of nonagricultural assets (taka value)	0.000217*** (4.00e-05)
Avg. village holding of land (decimals)	-0.000133 (0.000209)
Avg. current loans given to women in the village from BRAC	0.00601*** (0.00174)
Avg. current loans given to women in the village from BRDB	0.00130 (0.00204)
Avg. current loans given to women in the village from Grameen	0.000853 (0.00147)
Avg. current loans given to men in the village from BRAC	0.00376 (0.00444)
Log of avg. current loans given to men in the village from BRDB	0.00433* (0.00220)
Log of avg. current loans given to men in the village from Grameen	0.00375* (0.00202)
Observations	151
Number of Villages	92
Observations	151
F-statistics (20, 130)	6.93
Prob > F	0.0000

*t-statistic is significant at the 10 percent level of better

**t-statistic is significant at the 5 percent level of better

***t-statistic is significant at the 1 percent or better

Note: Robust standard errors are in parentheses. Regressions also include the following:

Average number of adult female and male in the village, average adult age in the village, average years of education achieved by village, year dummy, village level infrastructure and price variables to account for the impact of time-varying changes in local economic conditions.

Source: Author's computations based on 1991/92 and 1998/99 household surveys in Bangladesh.

The results in Table 4.7 shed light on important policy implications since the overall results from this regression suggest that asset ownership and microcredit do tend to increase inequality at the village level. One conclusion that can be derived from this result is the fact that education will tend to increase the entrepreneurial abilities of borrowers and overall productivity.

As such, it is expected that as the village population as a whole becomes more educated, incomes will simultaneously grow and thus potentially reduce the income gap among the villagers. In terms of asset holdings, a one-unit increase in both transport assets and nonagricultural assets increase village income inequality by .0005 and .0002 respectively. Microcredit has a similar effect in terms of widening income inequality at the village level.

The findings suggest that when one additional female borrower in the village obtains a one-unit increase in credit from BRAC this contributed to a .006 increase in village income inequality. In terms of loans given to male borrowers in the village, a one-unit increase in microcredit from BRDB and the Grameen Bank, increases village income inequality by .004 and .004 respectively. The results from this regression suggest that increases in average years of schooling in the village decreases income inequality while access to microcredit for both men and women in the village increase income inequality.

From a policy perspective, if income inequality is viewed as a barrier for creating economic growth within a village, it would be beneficial to create incentives for increasing education along with the disbursement of credit. In this context the results we have discussed so far suggest that microcredit increases income and income inequality while education reduces income inequality. With a combination of both microcredit and education, it may be possible to achieve a more equalizing income effect in the villages where microfinance institutions operate.

4.4 Fixed-Effect Estimator: Effect of Microcredit on Village Income Inequality

The results from the fixed-effect estimations are similar to the Pooled OLS results illustrated in Table 4.8. As before, average years of education of village adults is associated with a decrease in income inequality while the holding of assets, particularly nonagricultural assets tend to increase income inequality. In terms of microfinance, credit received from the Grameen Bank by the women in the village is associated with increases in income inequality in the village.

Table 4.8: Fixed-Effect Estimates: Effect of Microcredit on Village Income Inequality

VARIABLES	gini
Avg. years of education of village adults (15-59yrs)	-0.0359* (0.0184)
Avg. village holding of equipment & livestock (taka value)	0.00520 (0.00418)
Avg. village holding of transport assets (taka value)	0.000637 (0.000417)
Avg. village holding of nonagricultural assets (taka value)	0.000229*** (6.32e-05)
Avg. village holding of land (decimals)	-0.00108 (0.0393)
Avg. current loans given to women in the village from BRAC	0.00273 (0.00303)
Avg. current loans given to women in the village from BRDB	0.00812 (0.00646)
Avg. current loans given to women in the village from Grameen	0.00302* (0.00159)
Avg. current loans given to men in the village from BRAC	0.00565 (0.00431)
Avg. current loans given to men in the village from BRDB	0.00817* (0.00461)
Avg. current loans given to men in the village from Grameen	0.00219 (0.00345)
Observations	151
Number of newvillid	92
F-statistics (18, 41)	11.11
Prob > F	0.0000

*t-statistic is significant at the 10 percent level of better, **t-statistic is significant at the 5 percent level of better, ***t-statistic is significant at the 1 percent or better

Note: Robust standard errors are in parentheses.

Source: Author's computations based on 1991/92 and 1998/99 household surveys in Bangladesh.

The results from Table 4.8 suggest that a one-unit increase in Grameen credit disbursed to women in the village increases income inequality by .003. Similarly, a one-unit increase in BRDB credit disbursed to men in the village increases income inequality by .008. It would be of interest to explore the characteristics of borrowers and the sources of income in order to decompose inequality and trace some of these dynamic effects.

5. Conclusion

Having explored the empirical relationship between microfinance and borrower welfare as measured by the effect on household income in previous chapters, this chapter serves to expand impact analysis by examining effects beyond individual borrowers. To do this, I estimate the effect of microcredit and other village characteristic on village income inequality.

I find robust evidence that suggest that microcredit augments income at the village level. The results suggest that microfinance also increases income inequality at the village-level. This was evident across most model specifications and econometric methods. Increases in holdings of nonagricultural assets also tend to increase village income inequality. Another robust result is the empirical association between higher educational achievement and decreases in income inequality at the village-level.

One important implication we can gather from these results is the fact that assets are not homogeneous in terms of the return to income or the contribution they may have to changes in income inequality. The results obtained here are reasonable in terms of what we would expect.

We would expect that education assets would have a decreasing or equalizing effect on income inequality since higher education levels are typically associated with greater managerial ability, higher productivity and subsequently, higher incomes. Other assets, such as equipment and livestock tend to fluctuate both in value and in quantities (this is true particularly in Bangladesh where weather conditions tend to be severe and destructive) and as such we would expect that the contribution of these assets to income generation would vary over time. In this context, obtaining consistent results for these assets would be difficult.

The results and analysis presented in this chapter are preliminary, but they raise important questions. First, if microfinance helps poor households generate income, why do we observe, as suggested by the empirical results here, an increase in income inequality as a result of access to microcredit? Intuitively, if microfinance benefits the poorest borrowers, one would expect income inequality to decrease. One possible explanation for the results observed here is the fact that in the sample, there was a significant number of non-target households who received microcredit loans from the three programs analyzed in this study. As mentioned earlier, a non-target borrower or a borrower who does not qualify to receive a micro loan, is a person who owns more than half an acre of land. A poor borrower in this study is defined as a borrower who owns half an acre of land or less. If we look at Table 4.2, presented earlier, we would observe that in the 1991/92 survey, the participation rate in the group that owns .51-1.00 acre of land is 24.3%, 16.0% in the group owning 1.01-2.50 acres of land and 7.1% in the group owning 2.51+ acres of land. The participation rate among these wealthier borrowers increased significantly in the 1998/99 re-survey.

In the 1998/99 survey, the participation rate in the group that owns .51-1.00 acre of land is 43.7%, 35.0% in the group owning 1.01-2.50 acres of land and 12.0% in the group owning 2.51+ acres of land. If these households were resource wealthy (as defined by the World Bank/BIDS study) before they obtained the micro loan, it is possible for microcredit's return to be greater than that of poorer borrowers. Given this scenario, it is also possible for the income gap between these groups to become wider. If this is the case, the results observed in this study, namely that microfinance has a positive and statistically significant effect on intra-village inequality, are not counterintuitive.

Another question prompted by the results obtained in this chapter is whether microcredit loans are associated with a positive and statistically significant effect on income for all income quantiles. The magnitude of this effect would also be worthy of analysis. The findings in this chapter contribute to the understanding of the relationship between microfinance and income inequality but they do not end the discussion.

As mentioned in the earlier sections of this paper, the literature on this topic presents mixed results as to the effect microfinance has on income inequality. Future research should focus on short-term and long-term effects concerning issues within-household inequality and distribution as well as village-level effects. Other issues that should be addressed in future research is whether the institutional policies and delivery methods of the microfinance institution (MFI) have any effect on income inequality.

Looking at the empirical relationship between microfinance and income inequality serves as a point of departure for exploring the general equilibrium effects of microfinance.

Establishing consensus about these general equilibrium effects is important for future economic development because if income inequality is viewed as having negative consequences for development as well as social indicators of welfare, it must be addressed in future research.

If microfinance has the effect of increasing inequality within a village, then this is an issue that needs further examination because as previously stated, this can undermine economic development and poverty reduction efforts.

CHAPTER V

Microfinance as a Development and Poverty Reduction Tool: Concluding Remarks

This dissertation examined the empirical relationship between microfinance and economic outcomes for households and villages in Bangladesh. The main objective was to explore how microfinance contributes to income and how the services provided by microfinance programs enhance the effectiveness of microcredit in increasing household income. Once a general empirical relationship between microfinance and income was established, this study was expanded to analysis at the village level to see if spillover effects could be traced as a result of access to microfinance loans. The study of spillover effects was limited to an inquiry as to whether microfinance creates income inequality at the village level and whether there are other factors that contribute to income inequality.

The topics chosen for this dissertation contribute to the current literature on microfinance in important ways. In the study presented in chapter 2, household-level panel data from Bangladesh was used to trace the marginal effect of microcredit on household income. The motivation for this study stemmed from the idea that if income growth is important for poverty reduction, then looking at whether microfinance loans contribute to increases in income would be a relevant research question. Other studies that use this dataset have examined the impact of microfinance on household consumption expenditure (i.e. Khandker 2005). Since both income and consumption are used to measure poverty, one of the objectives of this study was to see if the results in Khandker (2005) could be confirmed.

The findings in this study confirm the results in Khandker (2005) and provide further robustness to the evidence on the effectiveness of microfinance in poverty alleviation. In the Khandker (2005) study, the findings suggested that microfinance benefits women borrowers more than men. In this study, the results suggest that both men and women benefit from receiving microfinance loans. Furthermore, this study suggests that the greatest benefit from receiving microfinance loans accrues to households who are resource poor (i.e. own ≤ 0.50 acres of land) and households that are less educated (i.e. < 4 yrs of schooling).

The results from the study in chapter 2, have important policy implications for microcredit as a development strategy and as poverty reduction tool. The results suggest that as an economic development strategy, microfinance can contribute to higher earnings and thereby encourage the use of these loans for entrepreneurial activities. In terms of poverty, if loans contribute to increases in income, then this is a positive step towards less poverty and more economic prosperity.

The findings in chapter 2, also provide some ground for further research on the impact of microfinance. The findings suggest that given the small magnitude of the impact, the provision of credit alone will not create significant poverty reduction. In this context, in order to increase the magnitude of the impact, microcredit should be complemented with education, training, investment opportunities and gender equality. The extent to which microfinance institutions should be responsible for providing these conditions is not the issue here. Rather, this study advocates for the provision of a social and economic environment that would be conducive for the poor to flourish both as entrepreneurs and as people.

The study presented in chapter 3, extends the analysis in chapter 2 by exploring whether the services provided by MFIs, particularly, BRAC, BRDB and the Grameen Bank, have any effect on the effectiveness of credit in increasing household income. In this chapter, the capability framework of Amartya Sen was used to argue that development, as well as positive economic outcomes for borrowers, requires the removal of the major barriers that cause “unfreedoms” such as tyranny, poor economic opportunities, systematic social deprivation, neglect of public facilities as well as oppression (Sen 1999, p. 3). In this context, it is argued that without the provision of “capabilities”, or the set of opportunities that would allow borrowers to flourish, microfinance will not be effective in significant poverty reduction.

Due to data limitations, the objective of this study was not to measure how freedoms or capabilities are enhanced by microcredit but rather how the provision of capability-enhancing services and microcredit enhance economic outcomes. This study contributes to the literature on microfinance in that it provides a link that seems to be missing in the literature. The missing link appears to be the connection or complementarities between capability-enhancing services and microfinance. For a country like Bangladesh, particularly in rural areas, where extensive social and economic deprivation exists, the combination of microcredit with a set of opportunities such as education and training can play a significant role in the effectiveness of credit in reducing poverty. The results obtained in this study suggest that the services provided by MFIs can complement or enhance the effectiveness of micro loans in augmenting household income. In this context, the results presented here imply that credit policies should include the provision of other services that may help the borrower attain positive returns both socially and economically. The results also imply that economic development, as measured by income is enhanced by the provision of complementary services.

Chapter 4 enhances this dissertation by expanding the empirical analysis of the relationship between microfinance and economic outcomes (income) at the borrower level to the village level. The objective here was to look beyond borrower welfare and to explore whether microfinance has any impact on village outcomes. Two village outcomes were explored: (i) the effect of microcredit on average village income, and (ii) the effect of microcredit on intra-village income inequality. The idea here was to see if microcredit has an impact beyond individual borrowers and on the community as whole and whether microcredit polarizes in terms of income equality.

Income inequality is a variable that is closely monitored by policymakers because it has important implications for economic growth and development. At the macroeconomic level, income inequality has been linked to negative economic growth and one of the reasons is that if a large percentage of the population is at the bottom of the income ladder, then economic growth will lag and possibly decline. These effects can also be expected at the village level because if income is not accruing somewhat evenly or balanced to everyone in the village, then economic transactions will lag and slow economic growth and development in those communities.

Chapter 4 presents robust results for the effect of microfinance on village income and income inequality. The findings suggest that microfinance does contribute to increases in income at the village-level and that it also increases income inequality. The results also suggest that increases in the stock (or value) of nonagricultural assets also increase village income inequality. The only factor that is empirically associated with decreases in income inequality is education.

The overall findings in Chapter 4 suggest that microfinance is an adequate policy in terms of promoting income growth at the village-level but it does tend to polarize incomes. In this context, the results also suggest that if we complement microcredit with more education and more investment opportunities for asset accumulation, we may be able to achieve a more equalizing effect in terms of village incomes. The findings also provide a basis for further research into the association between access to microcredit and income inequality.

The motivation behind the work employed in this dissertation stemmed from the belief that microfinance as designed by Muhammad Yunus is a good policy for reducing poverty. Microfinance is also an appropriate tool for encouraging entrepreneurship and fueling economic development at the community level. The main objective of this study was to further explore the empirical and intuitive relationship between microcredit and economic outcomes at the individual and at the village level in order to contribute to the discussion and debate about the effectiveness of microcredit in alleviating poverty.

The premise that leads to the conclusion of this study is that microfinance is an appropriate policy for alleviating poverty but more is needed to attain significant poverty reduction. The provision of funds to the poor for the acquisition of start-up capital is essential, but those funds must be complemented with a “capability” set such as education, training and equal opportunity for female and male borrowers. In this context, policymakers should look at ways to invest in human capital while making credit accessible to the poor.

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APPENDIX I

Table 2.4: Summary Statistics of Household Panel Data—Bangladesh

Variable	1991/92		1998/99	
	Mean	Std. Dev.	Mean	Std. Dev.
Household per capita yearly income	3046.808	8837.298	11380.91	28409.02
Number of adults in Household (15-59yrs)	2.652778	1.318552	3.144324	1.684209
Number of males in household	1.502415	0.9596041	1.492754	1.004495
Avg. years of education of household adults	2.773777	3.057403	2.502537	2.708624
Bank in village (dummy)	0.1105072	0.3136157	0.1630435	0.3695169
Electricity in village (dummy)	0.5096618	0.5000576	0.2057387	0.4010778
Price of rice	9.712077	0.9627498	18.65293	5.37642
Price of flour	8.636473	1.363648	14.58242	1.462706
Price of sugar	28.44565	2.954755	30.43284	2.577227
Price of eggs	2.338768	0.3498175	2.802961	0.4939884
Price of milk	12.14432	3.214441	15.68864	4.591778
Price of beef	43.8587	12.44548	65.07631	8.517669
Price of chicken	56.72283	11.21355	83.36996	15.55956
Men's wages	35.30287	8.158553	74.78022	23.23186
Women's wages	19.52937	9.076317	44.19702	14.6972
Avg. household holding of equipment & livestock (taka value)	1051.614	1445.173	252.8308	1688.683
Avg. household holding of transport assets (taka value)	9141.644	19296.06	1120.601	6828.165
Avg. household holding of nonagricultural assets (taka value)	990.6817	2459.643	1360.181	45034.63
Land assets (acres)	34.05528	276.3581	54.71744	127.7051
Women's loans from Grameen, (t)	402.6219	1091.663	720.4798	1660.28
Men's loans from Grameen, (t)	174.275	780.3449	171.3315	929.2802
Women's loans from Grameen, (t-1)	0	0	402.6219	1091.663
Women's loans from BRAC, (t)	265.1234	833.6114	401.5155	1162.914
Men's loans from BRAC, (t)	97.3694	543.0897	16.40459	259.8861
Women's loans from BRAC, (t-1)	0	0	265.1234	833.6114
Men's loans from BRAC, (t-1)	0	0	97.3694	543.0897
Women's loans from RD-12, (t)	168.7802	640.3247	133.2195	703.1621
Men's loans from RD-12, (t)	281.7089	897.7147	106.0139	640.6023
Women's loans from RD-12, (t-1)	0	0	168.7802	640.3247
Men's loans from RD-12, (t-1)	0	0	281.7089	897.7147
Women's loans from other NGOs, (t)	10.77899	131.1236	250.8761	851.0397
Men's loans from other NGOs, (t)	16.80254	259.1942	39.72826	320.4553
Women's loans from other NGOs, (t-1)	0	0	10.77899	131.1236
Men's loans from other NGOs, (t-1)	0	0	16.80254	259.1942
Women's loans from other sources, (t)	51.7965	561.5595	88.64701	564.9819
Men's loans from other sources, (t)	965.2138	7048.803	519.9299	1880.558
Women's loans from other sources, (t-1)	0	0	51.7965	561.5595
Men's loans from other sources, (t-1)	0	0	965.2138	7048.803
Number of Observations	1656		1656	

Source: Author's computations based on 1991/92 and 1998/99 household surveys in Bangladesh.

Table 2.5. Household Fixed-Effects Estimates of the Impact of Microfinance Loans on Household income

VARIABLES	lnincome
Number of adults in Household (15-59yrs.)	0.191*** (0.0388)
Avg. years of education of household adults	0.0169 (0.0240)
Bank in village (dummy)	0.294** (0.121)
Electricity in village (dummy)	0.301*** (0.101)
Log of household land (decimals)	0.0997** (0.0435)
Log of women's loans from Grameen, (t)	0.0690*** (0.0218)
Log of men's loans from Grameen, (t)	0.0914** (0.0382)
Log of women's loans from Grameen, (t-1)	-0.00774 (0.0181)
Log of men's loans from Grameen, (t-1)	0.0526 (0.0339)
Log of women's loans from other NGOs, (t)	0.0265 (0.0234)
Log of men's loans from other NGOs, (t)	0.118*** (0.0431)
Log of women's loans from other NGOs, (t-1)	0.134*** (0.0369)
Log of men's loans from other NGOs, (t-1)	0.175*** (0.0669)
Log of women's loans from other, (t)	-0.0735** (0.0368)
Log of men's loans from other, (t)	0.0610*** (0.0174)
Log of women's loans from other, (t-1)	-0.115** (0.0525)
Log of men's loans from other, (t-1)	0.0581** (0.0237)
Observations	3294
Number of Households	1656
F-statistics (29,1609)	29.43
Prob > F	0.0000

*t-statistic is significant at the 10 percent level of better

**t-statistic is significant at the 5 percent level of better

***t-statistic is significant at the 1 percent or better

Note: Robust standard errors are in parentheses. Regressions also controlled for the following: sex, age, education, year dummy, village level infrastructure and price variables to account for the impact of time-varying changes in local economic conditions.

Source: Author's computations based on 1991/92 and 1998/99 household surveys in Bangladesh.

Table 2.7: Household Fixed-Effects Estimates of the Impact of Microfinance Loans on Household income for Selected Groups

VARIABLES	(1) lnincome Land Assets <50 acres	(2) lnincome Land Assets >50 acres	(3) lnincome Education Assets <4.5 years	(4) lnincome Education Assets >4.5 years	(5) lnincome Labor Assets <4 adults	(6) lnincome Labor Assets >adults
Number of adults in Household (15-59yrs)	0.277*** (0.0525)	-0.0282 (0.138)	0.216*** (0.0516)	0.107 (0.133)	0.261*** (0.0680)	0.339*** (0.121)
Avg. years of education of household adults	0.00372 (0.0341)	0.0722 (0.0742)	0.0742 (0.0478)	0.0185 (0.0900)	0.0459 (0.0368)	0.0201 (0.0709)
Bank in village (dummy)	0.0961 (0.150)	0.662 (0.538)	0.0933 (0.149)	1.212** (0.507)	0.197 (0.176)	0.446 (0.402)
Electricity in village (dummy)	0.197 (0.127)	0.749 (0.466)	0.320** (0.133)	0.116 (0.373)	0.320** (0.150)	0.112 (0.364)
Avg. household holding of equipment & livestock (taka value)	-0.0439* (0.0265)	-0.0708 (0.237)	-0.0423 (0.0290)	-0.210* (0.120)	-0.0428 (0.0324)	0.0312 (0.100)
Avg. household holding of transport assets (taka value)	-0.0204 (0.0216)	0.0164 (0.0701)	-0.0392* (0.0230)	0.0422 (0.0514)	-0.0270 (0.0231)	0.0358 (0.0549)
Avg. household holding of nonagricultural assets (taka value)	0.0202 (0.0373)	-0.0463 (0.173)	-0.00426 (0.0433)	0.0525 (0.0946)	0.00621 (0.0459)	-0.179* (0.108)
Land assets (acres)	0.0754 (0.0604)	0.178 (0.352)	0.0627 (0.0565)	0.0877 (0.147)	0.127** (0.0633)	0.132 (0.158)
Log of women's loans from Grameen, (t)	0.0731*** (0.0256)	0.148 (0.135)	0.0683** (0.0271)	0.104 (0.105)	0.0609** (0.0283)	0.258*** (0.0984)
Log of men's loans from Grameen, (t)	0.0984* (0.0517)	0.180 (0.202)	0.0894* (0.0519)	-0.0960 (0.0871)	0.0824* (0.0448)	0.0678 (0.199)
Log of women's loans from Grameen, (t-1)	0.00581 (0.0223)	-0.0141 (0.140)	-0.00558 (0.0222)	0.0112 (0.0998)	0.00693 (0.0256)	0.0557 (0.0985)
Log of men's loans from Grameen, (t-1)	0.0677* (0.0402)	0.0622 (0.153)	0.0338 (0.0385)	0.00324 (0.0861)	0.0330 (0.0419)	0.0784 (0.133)
Women's loans from BRAC, (t)	-0.00452 (0.0275)	-0.0429 (0.135)	-0.0245 (0.0297)	-0.0940 (0.112)	0.0141 (0.0310)	-0.117 (0.116)
Men's loans from BRAC, (t)	0.162 (0.104)	0.209 (0.270)	0.160 (0.107)	-0.0196 (0.163)	0.323* (0.167)	0.140 (0.130)
Women's loans from BRAC, (t-1)	-0.0334 (0.0338)	0.0520 (0.176)	-0.0830** (0.0398)	-0.0267 (0.0781)	-0.0369 (0.0425)	0.0379 (0.0825)
Men's loans from BRAC, (t-1)	0.174 (0.109)	0.0230 (0.104)	0.140 (0.104)	-0.123* (0.0705)	0.306* (0.177)	0 (0)
Women's loans from RD-12, (t)	0.0368 (0.0358)	-0.100 (0.230)	0.00807 (0.0347)	0.154 (0.157)	0.0182 (0.0389)	0.284 (0.256)
Men's loans from RD-12, (t)	-0.0551 (0.0395)	0.207 (0.255)	-0.0853* (0.0471)	0.0187 (0.138)	-0.0311 (0.0412)	-0.140 (0.290)
Women's loans from RD-12, (t-1)	0.0283 (0.0410)	-0.118 (0.202)	0.00800 (0.0380)	0.0931 (0.147)	0.0257 (0.0426)	0.331 (0.265)
Men's loans from RD-12, (t-1)	-0.0779* (0.0402)	0.119 (0.207)	-0.121*** (0.0454)	-0.0435 (0.113)	-0.0458 (0.0389)	-0.134 (0.283)
Women's loans from other NGOs, (t)	0.0130 (0.0270)	0.151 (0.199)	0.0351 (0.0294)	-0.0283 (0.113)	0.00725 (0.0331)	0.000876 (0.115)
Men's loans from other NGOs, (t)	0.0921* (0.0520)	0.231 (0.178)	0.116** (0.0570)	0.0655 (0.303)	0.0813 (0.0576)	0.332 (0.215)

Table 2.7 Continued

Men's loans from other NGOs, (t-1)	0.183** (0.0897)	0 (0)	0.223** (0.0923)	0.220 (0.322)	0.123 (0.0950)	0.448** (0.226)
Women's loans from other sources, (t)	-0.0735 (0.0487)	-0.0144 (0.124)	-0.0542 (0.0514)	-0.00343 (0.103)	-0.0467 (0.0493)	-0.240 (0.153)
Men's loans from other sources, (t)	0.0561** (0.0223)	0.0326 (0.0760)	0.0436* (0.0232)	0.0956 (0.0628)	0.0810*** (0.0249)	0.0195 (0.0676)
Women's loans from other sources, (t-1)	-0.130** (0.0634)	-0.139 (0.137)	-0.0809 (0.0692)	0.0500 (0.149)	-0.0622 (0.0667)	-0.268 (0.176)
Men's loans from other sources, (t-1)	0.0376 (0.0290)	0.0764 (0.0930)	0.0353 (0.0335)	0.0717 (0.0851)	0.0438 (0.0366)	0.0313 (0.0790)
Year (dummy)	0.527** (0.240)	1.157 (1.881)	0.629** (0.251)	0.429 (1.078)	0.560** (0.277)	0.551 (0.947)
Constant	5.903*** (0.340)	5.352* (2.720)	6.221*** (0.333)	6.285*** (1.248)	5.727*** (0.387)	5.155*** (1.142)
Observations	2594	700	2428	866	2425	869
R-squared	0.227	0.505	0.291	0.314	0.234	0.511
Number of nh	1462	508	1380	590	1419	633

*t-statistic is significant at the 10 percent level of better

**t-statistic is significant at the 5 percent level of better

***t-statistic is significant at the 1 percent or better

Note: Robust standard errors are in parentheses. Regressions also controlled for the following: sex, age, education, year dummy, village level infrastructure and price variables to account for the impact of time-varying changes in local economic conditions.

Source: Author's computations based on 1991/92 and 1998/99 household surveys in Bangladesh.

APPENDIX II

Table 3.9: Summary Statistics of Household Income, Credit Variables and Policy Variables

Variable	1991/92		1998/99	
	Mean	Std. Dev.	Mean	Std. Dev.
Household per capita yearly income	3,049.30		11,397.93	28,431.95
Number of adults in the household ages 16-59	2.65	1.32	3.14	1.68
Price of wheat flour	8.64	1.36	14.58	1.46
Average Male Wage	35.30	8.16	74.76	23.24
Average Female Wage	19.53	9.08	44.18	14.69
Avg. years of education of household adults	2.77	3.06	2.50	2.71
Bank in the village (dummy)	0.11	0.31	0.16	0.37
Electricity in the village (dummy)	0.51	0.50	0.21	0.40
Women's loans from Grameen, (t)	400.88	1,088.80	719.38	1,659.66
Men's loans from BRAC, (t)	97.55	543.57	16.43	260.12
Men's loans from Grameen, (t)	174.59	781.02	171.64	930.09
Women's loans from BRDB, (t)	168.8	640.3	133.2	703.2
Men's loans from BRDB, (t)	281.7	897.7	106	640.6
Women's loans from BRDB, (t-1)	0	0	168.8	640.3
Men's loans from BRDB, (t-1)	0	0	281.7	897.7
Primary Health Care	0.32	0.47	0.35	0.48
Basic Literacy	0.31	0.46	0.35	0.48
Marketing Training	0.11	0.31	0.04	0.19
Skill Training	0.17	0.37	0.37	0.48
Other Services	0.16	0.37	0.04	0.19
Number of Observations	1,653.00		1,653.00	

Source: Authors calculations from the 1991/92 and 1998/99 surveys in Bangladesh

Table 3.34: Household Fixed-Effects Estimates of the Association Between Grameen Credit, Capability-Enhancing Services and Household Income.

VARIABLES	(1) lnincome Primary Health Care	(2) lnincome Basic Literacy	(3) lnincome Marketing Training	(4) lnincome Skill Training	(5) lnincome Other Services
Number of adults in Household (15-59yrs.)	0.184** (0.0714)	0.187*** (0.0703)	0.186*** (0.0702)	0.187*** (0.0695)	0.198*** (0.0694)
Avg. years of education of household adults	0.0346 (0.0466)	0.0409 (0.0451)	0.0333 (0.0460)	0.0403 (0.0450)	0.0368 (0.0465)
Bank in village (dummy)	0.240 (0.167)	0.183 (0.169)	0.261 (0.175)	0.210 (0.166)	0.210 (0.179)
Electricity in village (dummy)	0.381** (0.193)	0.396* (0.213)	0.333* (0.198)	0.303 (0.197)	0.283 (0.201)
Log of household land (decimals)	-0.0148 (0.0828)	-0.0447 (0.0871)	-0.0308 (0.0832)	-0.0463 (0.0828)	-0.0339 (0.0879)
Log of women's loans from Grameen, (t)	0.0609 (0.0436)	0.0275 (0.0471)	0.0621* (0.0343)	0.0860* (0.0519)	0.0581* (0.0350)
Log of women's loans from Grameen, (t-1)	-0.0389 (0.0540)	-0.0254 (0.0525)	-0.0204 (0.0460)	-0.0141 (0.0479)	0.0294 (0.0484)
Log of men's loans from Grameen, (t)	0.000702 (0.0518)	0.0541 (0.0551)	0.0803** (0.0395)	0.0991 (0.0711)	0.0974** (0.0407)
Log of men's loans from Grameen, (t-1)	0.112 (0.0703)	0.00432 (0.0789)	0.0990* (0.0564)	0.0509 (0.0749)	0.0882 (0.0558)
Primary Health Care (dummy)	0.301 (0.348)				
Log of women's loans from Grameen, (t-1)*Primary Health Care	0.0767** (0.0387)				
Log of women's loans from Grameen, (t)*Primary Health Care	-0.0308 (0.0523)				
Log of men's loans from Grameen, (t-1)*Primary Health Care	-0.0297 (0.0606)				
Log of men's loans from Grameen, (t)*Primary Health Care	0.0978* (0.0554)				
Basic Literacy (dummy)		-0.196 (0.356)			
Log of women's loans from Grameen, (t-1)*Basic Literacy		0.0469 (0.0355)			
Log of women's loans from Grameen, (t)*Basic Literacy		0.0493 (0.0494)			
Log of men's loans from Grameen, (t-1)*Basic Literacy		0.0875 (0.0610)			
Log of men's loans from Grameen, (t)*Basic Literacy		0.0383 (0.0618)			
Marketing Training (dummy)			-0.155 (0.409)		

Table 3.34 Continues

VARIABLES	lnincome Primary Health Care	lnincome Basic Literacy	lnincome Marketing Training	lnincome Skill Training	lnincome Other Services
Log of women's loans from Grameen, (t-1)*Marketing Training			0.136** (0.0546)		
Log of women's loans from Grameen, (t)*Marketing Training			-0.0262 (0.0549)		
Log of men's loans from Grameen, (t-1)*Marketing Training			0.0599 (0.0626)		
Log of men's loans from Grameen, (t)*Marketing Training			0.101* (0.0575)		
Skill Training (dummy)				0.732** (0.331)	
Log of women's loans from Grameen, (t-1)*Skill Training				0.0475 (0.0436)	
Log of women's loans from Grameen, (t)* Skill Training				-0.0554 (0.0459)	
Log of men's loans from Grameen, (t-1)* Skill Training				0.0377	
Log of men's loans from Grameen, (t)* Skill Training				-0.0563 (0.0674)	
Other Services (dummy)					-0.797* (0.442)
Log of women's loans from Grameen, (t-1)*Other Services					-0.0598 (0.0645)
Log of women's loans from Grameen, (t)* Other Services					0.141** (0.0684)
Log of men's loans from Grameen, (t-1)* Other Services					0 (0)
Log of men's loans from Grameen, (t)* Other Services					0.0112 (0.0816)
Observations	878	878	878	878	878
Number of hhcode	439	439	439	439	439
F-statistics	15.71	15.22	17.35	15.01	16.83
Prob > F	0.000	0.000	0.000	0.000	0.000

Table 3.35: Household Fixed-Effects Estimates of the Association Between BRAC Credit, Capability-Enhancing Services and Household Income.

VARIABLES	(1) lnincome Primary Health Care	(2) lnincome Basic Literacy	(3) lnincome Marketing Training	(4) lnincome Skill Training	(5) lnincome Other Services
Number of adults in Household (15-59yrs.)	0.249** (0.106)	0.252** (0.109)	0.276** (0.107)	0.250** (0.104)	0.272*** (0.104)
Avg. years of education of household adults	-0.00864 (0.0602)	-0.00601 (0.0603)	-0.0109 (0.0602)	-0.00167 (0.0605)	0.00877 (0.0597)
Bank in village (dummy)	-0.476 (0.430)	-0.552 (0.442)	-0.496 (0.431)	-0.531 (0.430)	-0.396 (0.433)
Electricity in village (dummy)	0.670** (0.274)	0.678** (0.282)	0.658** (0.279)	0.695** (0.284)	0.699** (0.277)
Log of household land (decimals)	0.0476 (0.127)	0.0596 (0.127)	0.0317 (0.127)	0.0515 (0.127)	0.0440 (0.126)
Log of women's loans from Grameen, (t)	-0.0310 (0.0504)	-0.00416 (0.0483)	-0.0122 (0.0405)	-0.0228 (0.0484)	-0.0197 (0.0414)
Log of women's loans from BRAC, (t-1)	0.0553 (0.0851)	0.0348 (0.0827)	-0.00130 (0.0660)	0.0129 (0.0714)	-0.0185 (0.0694)
Log of men's loans from BRAC, (t)	0.140 (0.101)	0.208** (0.0983)	0.173** (0.0693)	0.173* (0.105)	0.133* (0.0753)
Log of men's loans from BRAC, (t-1)	0.147 (0.104)	0.166* (0.0951)	0.191** (0.0758)	0.118 (0.109)	0.0524 (0.103)
Primary Health Care (dummy)	0.0548 (0.491)				
Log of women's loans from BRAC, (t-1)*Primary Health Care	-0.0406 (0.0616)				
Log of women's loans from BRAC, (t)*Primary Health Care	0.0404 (0.0625)				
Log of men's loans from BRAC, (t-1)*Primary Health Care	0.0357 (0.0882)				
Log of men's loans from BRAC, (t)*Primary Health Care	0.0187 (0.0874)				

Table 3.35 Continues
VARIABLES

	(1) lnincome Primary Health Care	(2) lnincome Basic Literacy	(3) lnincome Marketing Training	(4) lnincome Skill Training	(5) lnincome Other Services
Basic Literacy (dummy)		0.0747 (0.420)			
Log of women's loans from BRAC, (t-1)*Basic Literacy		-0.0276 (0.0559)			
Log of women's loans from BRAC, (t)*Basic Literacy		-0.0102 (0.0604)			
Log of men's loans from BRAC , (t-1)*Basic Literacy		0.0485 (0.0834)			
Log of men's loans from BRAC, (t)*Basic Literacy		-0.0473 (0.0865)			
Marketing Training (dummy)			-0.257 (0.682)		
Log of women's loans from BRAC, (t-1)*Marketing Training			0.230** (0.0890)		
Log of women's loans from BRAC, (t)*Marketing Training			-0.0291 (0.0946)		
Log of men's loans from Grameen, (t-1)*Marketing Training			0.250*** (0.0941)		
Log of men's loans from BRAC, (t)*Marketing Training			0.141 (0.235)		
Skill Training (dummy)				-0.189 (0.347)	
Log of women's loans from BRAC, (t-1)*Skill Training				-0.0131 (0.0532)	
Log of women's loans from , BRAC (t)* Skill Training				0.0283 (0.0483)	
Log of men's loans from BRAC, (t-1)* Skill Training				0.102 (0.0846)	

Table 3.35 Continues
VARIABLES

	(1) lnincome Primary Health Care	(2) lnincome Basic Literacy	(3) lnincome Marketing Training	(4) lnincome Skill Training	(5) lnincome Other Services
Log of men's loans from BRAC, (t)* Skill Training				-0.0397 (0.0807)	
Other Services (dummy)					0.396 (0.521)
Log of women's loans from BRAC, (t-1)*Other Services					0.0143 (0.0701)
Log of women's loans from BRAC, (t)* Other Services					-0.0549 (0.0806)
Log of men's loans from BRAC, (t-1)* Other Services					0.146** (0.0655)
Log of men's loans from BRAC, (t)* Other Services					-0.158* (0.0833)
Observations	668	668	668	668	668
Number of hhcode	338	338	338	338	338
F-statistics	7.03	6.94	8.27	6.62	11.35
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000

Table 3.36: Household Fixed-Effects Estimates of the Association Between RD-12 Credit, Capability-Enhancing Services and Household Income.

VARIABLES	(1) lnincome Primary Health Care	(2) lnincome Basic Literacy	(3) lnincome Marketin g Training	(4) lnincome Skill Training	(5) lnincome Other Services
Number of adults in Household (15-59yrs.)	0.159* (0.0846)	0.160* (0.0843)	0.216*** (0.0826)	0.140 (0.0870)	0.165** (0.0804)
Avg. years of education of household adults	0.0472 (0.0533)	0.0516 (0.0555)	0.0410 (0.0565)	0.0578 (0.0539)	0.0456 (0.0531)
Bank in village (dummy)	0.744** (0.331)	0.563* (0.325)	0.553* (0.317)	0.717** (0.325)	0.621* (0.317)
Electricity in village (dummy)	0.472** (0.206)	0.476** (0.204)	0.379* (0.210)	0.560*** (0.211)	0.453** (0.199)
Log of household land (decimals)	-0.0161 (0.0879)	-0.00679 (0.0901)	-0.0213 (0.0896)	-0.0197 (0.0936)	0.000702 (0.0883)
Log of women's loans from RD-12 (t)	-0.0117 (0.0412)	0.000735 (0.0449)	-0.0116 (0.0372)	-0.00445 (0.0417)	-0.0198 (0.0351)
Log of women's loans from RD-12, (t-1)	-0.0699 (0.0546)	-0.0294 (0.0555)	-0.0199 (0.0549)	-0.0549 (0.0572)	-0.0721 (0.0516)
Log of men's loans from Grameen, (t)	-0.0103 (0.0462)	-0.0294 (0.0374)	-0.0272 (0.0372)	-0.0282 (0.0481)	-0.0457 (0.0344)
Log of men's loans from RD-12, (t-1)	-0.0623 (0.0575)	-0.0537 (0.0622)	-0.0451 (0.0508)	-0.0513 (0.0618)	-0.0447 (0.0476)
Primary Health Care (dummy)	-0.0558 (0.373)				
Log of women's loans from Grameen, (t-1)*Primary Health Care	0.0622 (0.0556)				
Log of women's loans from RD-12, (t)*Primary Health Care	0.00440 (0.0513)				
Log of men's loans from RD-12, (t-1)*Primary Health Care	0.0428 (0.0495)				
Log of men's loans from RD-12, (t)*Primary Health Care	-0.0413 (0.0498)				
Basic Literacy (dummy)		-0.0451 (0.343)			

Table 3.36 Continues

VARIABLES	lnincome Primary Health Care	lnincome Basic Literacy	lnincome Marketing Training	lnincome Skill Training	lnincome Other Services
Log of women's loans from RD-12, (t-1)*Basic Literacy		0.0350 (0.0603)			
Log of women's loans from RD-12, (t)*Basic Literacy		0.00439 (0.0519)			
Log of men's loans from RD-12, (t-1)*Basic Literacy		0.0591 (0.0597)			
Log of men's loans from RD-12, (t)*Basic Literacy		0.0210 (0.0456)			
Marketing Training (dummy)			-0.424 (0.536)		
Log of women's loans from RD-12, (t-1)*Marketing Training			0.106 (0.0929)		
Log of women's loans from RD-12, (t)*Marketing Training			0.120 (0.0780)		
Log of men's loans from RD-12, (t-1)*Marketing Training			-0.0971 (0.0742)		
Log of men's loans from RD-12, (t)*Marketing Training			-0.0121 (0.0645)		
Skill Training (dummy)				0.496 (0.359)	
Log of women's loans from RD-12, (t-1)*Skill Training				0.0317 (0.0520)	
Log of women's loans from RD-12, (t)* Skill Training				-0.0265 (0.0521)	
Log of men's loans from RD-12, (t-1)* Skill Training				0.00805 (0.0515)	
Log of men's loans from RD-12, (t)* Skill Training				-0.0284 (0.0523)	

Table 3.36 Continues

VARIABLES	lnincome Primary Health Care	lnincome Basic Literacy	lnincome Marketing Training	lnincome Skill Training	lnincome Other Services
Other Services (dummy)					0.963* (0.572)
Log of women's loans from RD-12, (t-1)*Other Services					0.0696 (0.0989)
Log of women's loans from RD-12, (t)* Other Services					-0.0533 (0.0646)
Log of men's loans from RD-12, (t-1)* Other Services					-0.319*** (0.111)
Log of men's loans from RD-12, (t)* Other Services					-0.00240 (0.0747)
Observations	577	577	577	577	577
Number of hhcode	289	289	289	289	289
F-statistics	7.45	7.30	7.11	8.79	9.11
Prob > F	0.000	0.000	0.000	0.000	0.000