Essays on Microfinance in Latin America
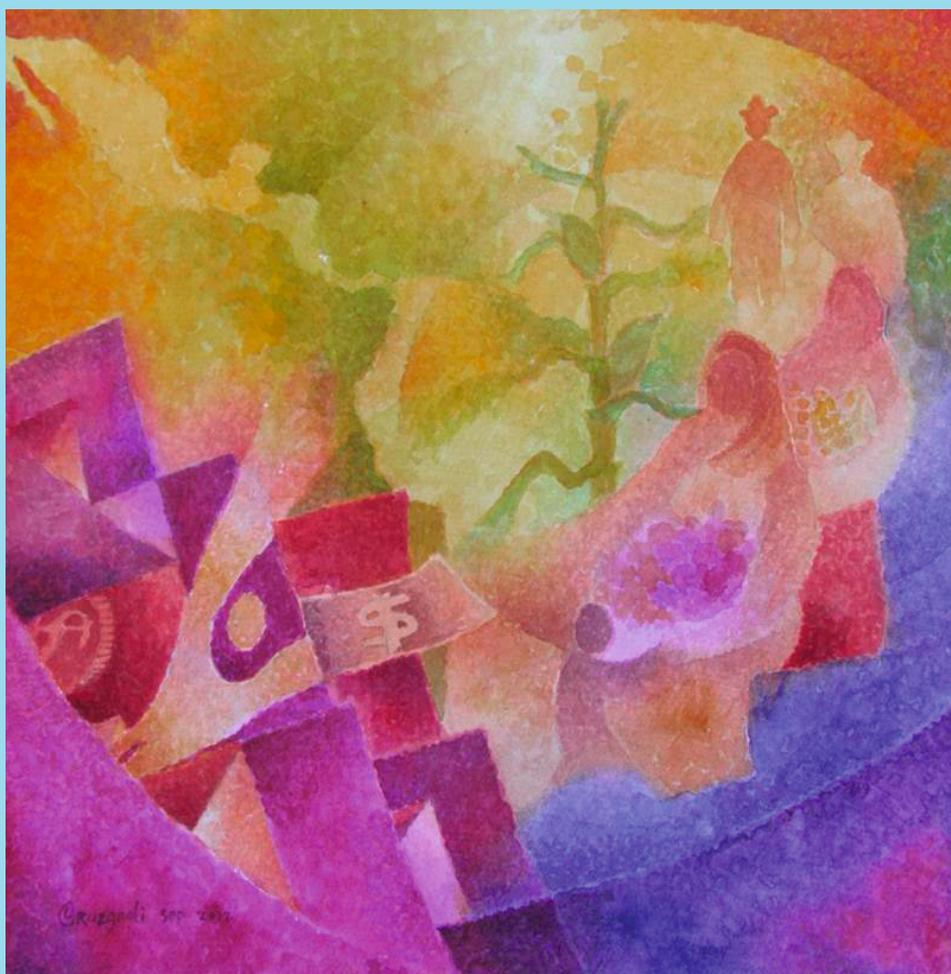
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Thesis

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I specially dedicate this thesis to

my loved daughters Rocio and Berenice,

to my husband Benigno,

and to the memory of my parents.

Abstract

In the early 1970s, microfinance came to public attention as a promising tool to reduce poverty. However, some people began to claim that microcredit is unsuitable for sustainable development. Nevertheless, the lack of scientific support for both viewpoints has created a need for empirical studies to disentangle whether microfinance interventions should be implemented, and if so, how. The objective of this thesis is to provide evidence on the role of microfinance in Latin America, with a particular emphasis on Mexico. The main innovation of this study is the focus on four topics that have thus far received relatively little attention. Firstly, the relationship between efficiency and the ownership structure of microfinance institutions (MFIs) in Latin America is investigated. Non-Governmental Organizations (NGOs) and Cooperative/Credit Unions are found to be less technically efficient and have an inferior technology relative to Banks and Non-Banks Financial Intermediaries (NBFIs). Secondly, this study assesses five different microfinance programs on household welfare in Mexico. The findings reveal that savings-oriented microfinance programs outperform programs that primarily offer microcredit, in reducing poverty. Thirdly, the impact of microfinance on vulnerability to poverty is analyzed. The results of this analysis show that membership in a savings and credit society in Mexico improves the well-being of households and reduces their vulnerability. Finally, the impact of the loan officer's characteristics on determining repayment rates in microfinance is examined. The main outcome suggests that the gender of the loan officer and his/her professional experience are important determinants of repayment rates. Further conclusions are that loan officers who work longer in Pro Mujer have higher default probabilities and that peer monitoring of group members is not a significant determinant of loan default.

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Chapter 1

Introduction

1.1 Background and Scope

Microfinance institutions (MFIs)[1] have emerged since the 1970s as an important tool to reduce poverty, particularly for women, by giving access to small loans. In 1976, the Grameen Bank was established in Bangladesh and the model has been extensively replicated in other developing economies. Banco Sol in Bolivia and Bank Rakyat in Indonesia are two examples of this. Daley-Harris (2006) reports that, between December 1997 and December 2005, the number of microcredit institutions increased from 618 to 3,133. Similarly, the number of recipients (84% of whom are women) rose from 13.5 million to 113.3 million during the same period (Hermes and Lensink, 2007).

This massive growth in the number of MFIs and recipients gave birth to *the microfinance revolution.* Microcredit has become extremely popular and has been met with much enthusiasm among supporters from around the world. The positive viewpoint on microfinance was that it had the potential to serve as an important tool to enable poor people, especially entrepreneurial women, to accumulate assets and to reduce their vulnerability to poverty. In recognition of this potential, the United Nations declared 2005 as the International Year for Microcredit. According to this organization, microcredit can contribute significantly to achieving the Millennium Development Goal of halving extreme poverty by 2015. In October 2006, attention on microfinance was intensified when Mohammad Yunus, the founder of the

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[1] Microfinance institutions (MFIs) cover different institutional forms: non-governmental organizations, credit unions, non-bank financial intermediaries, cooperatives, and state-owned and commercial banks. They provide small loans to poor people to enable them to establish or expand income-generating projects aimed at reducing poverty. Some of these MFIs are subsidized credit institutions, whereas others have become sustainable commercial financial institutions.

Grameen Bank, received the Nobel Peace Prize. As a result, donors, governments, and investors have been channeling huge amounts of resources into microfinance.

However, many MFIs worldwide have been replicating the original *Grameen Bank model* instead of adapting and innovating it to the specific complexities in which the institutions are operating (Hulme and Mosley, 1996). According to Zeller and Meyer (2002), such adaptations are the first step towards realizing the intended goals of these organizations. Furthermore, recently an increased focus on the *commercialization* of microfinance has emerged; this may imply a deviation from the original objectives of poverty alleviation focused on women as the target group, towards a vast for-profit orientation (Armendariz and Szafarz, 2011), potentially at the expense of poor borrowers. MFIs such as Compartamos Bank in Mexico have been condemned for charging exorbitant interest rates and targeting non-poor borrowers to advance their financial performance. In addition, due to the recent economic crisis in the southern Indian state of Andhra Pradesh, some people claim that microcredit has even induced suicides. As a result, enthusiasm for microfinance appears to be dissipating very quickly. Bateman (2010) even argues that microfinance may prove to be an obstacle to sustainable development and poverty reduction. However, both the existing negative viewpoint and the extremely positive view of microfinance lack serious scientific support.

The current thrust to ascertain the central role of microfinance in development policies requires a broadening of the research agenda to allow for investigation of a number of unresolved issues. Since MFIs developed in the 1970s, several major branches of literature have focused on explaining how and why microfinance works from a theoretical perspective and how microfinance programs are sustainable (Hermes and Lensink, 2007). However, most of the empirical evidence is anecdotal and only a few reliable analyses have been conducted that evaluate the real contribution of microfinance to reduction of poverty and vulnerability. Another poorly researched issue is governance: how does the ownership structure of MFIs

affect their functioning; and what is the role of loan managers, the intermediates between MFIs and their clients? Thus there are a large number of unresolved issues inadequately addressed up to now, and it is clear that further studies of microfinance are essential. This study aims to shed some light on these unexplained issues.

Accordingly, the innovative value of this thesis with respect to existing microfinance literature is threefold. First, the novel type of research questions that this study focuses on are very important for microfinance policy; however, they have scarcely been examined in microfinance literature. Second, we use a plethora of methodological approaches and data sets, and the most appropriate techniques have been applied to tackle the research questions under study. Longitudinal data have primarily been used to overcome methodological drawbacks that are known to hinder the real impact of microfinance on poverty reduction and the economic performance of MFIs. Third, the focus of the research is on a single region, namely Latin America, with a particular emphasis on Mexico. The rationale of focusing only on Latin America/Mexico is that this is a homogeneous region; thus, the research outcomes can be attributed to the characteristics of the programs and institutions under study rather than to regional disparities and/or heterogeneity in market conditions.

1.2 Research Objectives

The main objective of this study is to evaluate empirically the economic performance and the poverty impact of different types of MFIs. We tackle this core objective by using five different units of analysis (i.e. loans, borrowers, loan officers, households, and institutions), three representative data sets, and four different approaches. These strategies allow to deal with four specific research objectives, as follows:

i) to examine the relationship between efficiency and ownership structure of MFIs by measuring the intra-type and inter-type efficiency (Lansink *et al.*, 2001) of four different types of MFI (non-governmental organizations [NGOs], cooperative/credit unions, non-bank financial intermediaries [NBFIs], and banks) operating across 18 countries in Latin America from 2003 to 2009.

ii) to evaluate the relative importance of different types of microfinance services on poverty reduction (savings, microcredit, and cash transfers) by considering the impact of different microfinance programs on poverty reduction: savings and credit societies (SACPs); the Rural Microfinance Technical Assistance Program (PATMIR); the traditional MFIs; the National Savings and Financial Services Bank (BANSEFI); and the COOPERA cash transfers program. Some of these programs focus more on savings, while others offer mainly microcredit. We test which of the five microfinance programs has been most effective in improving the well-being of microfinance recipients relative to a comparable group of non-participants.

iii) to assess whether being a member of an SACP in Mexico reduces vulnerability to poverty. For this purpose, we analyze the impact of being banked on the mean and the variance of three different household indicators: per capita income, per capita education expenses, and per capita expenditure.

iv) to investigate whether the loan officer's personal characteristics determine repayment rates in joint-liability group-lending microfinance in Pro Mujer Mexico. In doing so, we link loans to borrowers and borrowers to loan officers in a three-level hierarchical structure and allow for correlation of observations between hierarchical levels.

1.3 Methodological Approaches

In this study, we have used a variety of methodological approaches to provide answers to the specific research questions that we have formulated in each empirical chapter. We have

chosen the best methods at our disposal to overcome methodological drawbacks such as endogeneity or selection bias problems that frequently undermine impact studies of social programs. In particular, we have used the following methods:

1) *Stochastic frontier analysis (SFA)*, which is a parametric method used to evaluate the technical efficiency of different ownership types of MFIs in Latin America. This method allows for the observed production of a particular MFI to deviate from the efficient frontier, due to either random events or possible inefficiencies (Gregoire and Tuya, 2006); further, it incorporates an error term that captures irregularities in the data, a suitable property when analyzing information from developing countries (Paxton, 2007). This method allows for the testing of some hypotheses in Chapter 2.

2) *The Hausman–Taylor (1981) estimator*. This is an instrumental variable approach that uses the variation between and within strictly exogenous variables in other periods as instruments (Baltagi, 2001). It serves as a suitable method for controlling for endogeneity problems in impact studies where the researcher lacks good instruments. We use this method in Chapter 3 to assess the impact of different microfinance programs on poverty reduction.

3) *Glejser's (1969) heteroskedasticity test*. This test permits the quantification of performance variability, both across-household and within-household. We use this method in Chapter 4 to estimate the impact of membership in an SACP saving institution in Mexico on the reduction of household vulnerability to poverty.

4) *Multilevel analysis*. This is a novel method that controls for observed and unobserved heterogeneity at different levels: loan, borrower, and loan officer. It also allows for correlation of observations at different levels: loans to borrowers and borrowers to loan officers. We use this approach in Chapter 5 in order to investigate the role of a

loan officer's personal characteristics and of peer monitoring on determining repayment rates in joint-liability group-lending microfinance.

1.4 Description of the Data

The empirical results presented in this thesis are based on both secondary and primary data, which are longitudinal. This means that we have repeated observations over the same unit of analysis: loan, borrower, loan officer, household, or institutions per year or per credit cycle. In the subsequent section, the particular data sets are described.

The MIX Market Data Set. This panel set was constructed with data from the well-known microfinance information exchange network − MIX market. This platform is among the most renowned and extensive databases in worldwide microfinance and includes high-quality self-reported information provided by more than 800 MFIs operating in four geographical regions (see www.mixmarket.org). From this source, we extracted information for a single region, Latin America. Our data set consists of financial and outreach indicators of 315 MFIs operating across 18 Latin American countries from 2003 to 2009. Ultimately, we built a panel set of 1,681 observations to tackle the core objective of Chapter 2, i.e. to estimate the technical efficiency of four different types of MFIs: NGOs, credit unions, NBFIs, and banks.

The BANSEFI Household Panel Survey. This is a comprehensive panel survey pertaining to savings, credit, and rural microfinance, conducted annually in Mexico from 2004 to 2007 by the BANSEFI bank in collaboration with the Ministry of Agriculture, Livestock, Rural Development, Fisheries, and Food (SAGARPA). This survey contains data that capture differences in access to financial services for a sample of banked and non-banked households. The panel set includes information about urban and rural households living in one of the three geographical regions: central, south, and north. In total, surveyors visited 27 of the 32 Mexican states to obtain information about households that did or did not participate in

financial institutions such as savinsg and credit societies, credit unions, cooperative societies, cajas solidarias, NGOs, the BANSEFI bank, and newly-established PATMIR branches.

The survey was conducted at the household level using probability proportional to size sampling techniques. First, households in which family members were clients of any financial institution included in the sampling frame during the five years prior to the survey (i.e., since 1999) were included as the treatment group. Second, comparable households in the same or nearby communities to the treatment group were asked filter questions in order to identify households that did not have any family member who was a client of a financial institution at the time of the survey and five years prior to it. Consequently, households that passed the filter questions were identified as non-banked and formed part of the control group (Berumen and Associates, 2006). The original sample in 2004 included 5,768 households: 2,975 treatment households and 2,793 control households. However, attrition was somewhat higher for households without an account in 2004 (37.1%) than for those with an account (31.5%). Furthermore, new households were added in 2006 and 2007, leading to a sample size in the final survey of 3,722. In total, the survey offers detailed information about 6,976 households over the four-year period.

To address the main objective of Chapter 3, we use 18,933 observations from households that bank with one of the five different microfinance programs: (1) the SACPs; (2) PATMIR; (3) the BANSEFI bank; (4) the traditional MFIs; and the COOPERA cash transfers program and a comparable group of non-banked households living in the same or in a nearby community. However, in Chapter 4, we reduced the sample size to only 14,245 observations, which correspond to households associated with savings and credit institutions linked to two of the above-mentioned programs: SACP and PATMIR. The rationale of this last step is to evaluate to what extent microfinance institutions focusing primarily on savings contribute to a reduction of household vulnerability to poverty. In both Chapters, 3 and 4, we extract detailed

information on the banking status of households as well as on a wide range of household welfare indicators (such as income and expenditures, economic activities, formal and informal assets and liabilities, transaction costs, self-employment [farm and off-farm activities], risk and insurance, remittances, and public cash transfers) and on regional characteristics in order to test the specific hypotheses that we formulate for these empirical investigations.

The Pro Mujer Data Set. This set consists of hand-collected primary data from a survey conducted in collaboration with Pro Mujer Mexico, an NGO working with the village banking methodology. We conducted interviews between December 2010 and March 2011 in 18 branches of Pro Mujer Mexico in four states: Mexico, Puebla, Distrito Federal, and Tlaxcala. These four states correspond to two adjacent regions: (1) the *Mexico–Distrito Federal region*, which includes 12 branches, and (2) the *Puebla–Tlaxcala region*, which features six branches.

In total, we collected information from 57 loan officers and 407 borrowers. These data were gathered from interviews with the support of 25 trained enumerators and cross-checked with inspections of the archives of Pro Mujer, which contain reports of group meetings including the number of defaults incurred. Borrowers were randomly selected from the client portfolios of the loan officers. We interviewed about 5 per cent of the clients for each loan officer. For all loans overseen by a single loan officer, we collected information on the associated officer whenever possible, either through interviews with the current loan officers or by tracking and interviewing former loan officers. Most of these officers were working as branch managers for Pro Mujer at the time of the surveys, although some had left the institution and could not be traced. We discarded loans administered by two or more loan officers, as it is simply impossible to link these loans to a consistent set of loan officer characteristics. We ultimately included in our estimation a total sample of 57 loan officers and a panel of 650 loans to 407 borrowers. In Table 1.1 below, we summarize the specific characteristics of each particular data set used in the four empirical studies that this thesis encompasses.

Table 1.1 Description of the Panel Data Sets used in the Empirical Studies

Dataset	Region	Period	Unit of analysis	Number of units[1]	Number of observations[1]
MIX market data set	Latin America	2003–2009	Microfinance institution (MFI)	315	1,681
BANSEFI panel survey	Mexico: 27 states, 3 regions	2004–2007	Household	6,976	18,933
Pro Mujer data set	Mexico: 4 states, 2 regions	2010–2011	Borrower Loan officer	407 57	650[2]
[1] These figures correspond to the maximum number of units of observations for each study					
[2] Loan observations					

1.5 Background Information on Microfinance Programs in Mexico

Microfinance programs in Mexico only started to develop at the beginning of the 1990s. At that time, local and international organizations such as Financiera Compartamos, Pro Mujer, the Foundation for International Community Assistance (FINCA), Asesoría Dinámica a Microempresas (ADMIC), and Fondo 5 de Mayo began operations. These institutions offered financial services to thousands of microfinance recipients through Solidarity Groups or Village Banking methods. By 2008, almost all these MFIs became members of Pro Desarrollo, A.C. (www.prodesarrollo.org), a national microfinance network that makes financial and outreach data from those affiliated MFIs available to the public.

At the same time, the Mexican government has also encouraged the development of micro-credit programs in Mexico to give households access to financial services. For instance, in 2001 the PRONAFIM (National Program for Financing Microenterprises), the FOMMUR (Microfinance Fund for Rural Women) and the PATMIR (Program of Technical Assistance

for Rural Microfinance) were launched as strategies to support financial institutions working with low-income recipients, especially those living in rural areas where financial services are limited. In addition, Rural Development Banks (e.g. FIRA and Financiera Rural); the socially-oriented BANSEFI bank; and commercial banks such as BANORTE and BANAMEX have initiated joint ventures with MFIs to maximize the number of people in Mexico who can benefit from micro-finance services.

Besides the aforementioned traditional MFIs, the BANSEFI census conducted in 2002 enumerated more than 800 credit and savings institutions including Cooperatives, Credit Unions, Societies of Savings and Public Credit, and Civil Associations, among others. The majority of these institutions are still undergoing a process of regulation; however they are known to play a key role in facilitating access to credit, deposits and other types of assistance to low-income groups including ethnic people living in rural areas where no financial institutions exist. Below, a brief description of five different microfinance programs is presented. These programs encompass all the types of financial institutions which are the subject of this study.

1.5.1 The Public Savings and Credit Societies Program (SACP)

This program includes small, community-based organizations created by local people using their own savings and public cash transfers from the government. Even though SACP institutions play an important role in financial inclusion in rural areas, there is still only minimal information available concerning their operation and type of clients. Most institutions are operating in communities with fewer than 10,000 inhabitants and lack technological innovation (e.g. internet, computers, efficient accounting systems), which leads to high transaction costs and cost inefficiencies (Paxton, 2006).

The major share of capital in the total portfolio of SACP institutions are savings coming from recipients participating in village banks. Thus, these institutions have not been highly reliant on external aid from donors or public subsidies, unlike the traditional microfinance institutions. In Table 1.2 we show a summary of indicators from financial institutions operating in this category.

Table 1.2 Key Indicators of SACP Financial Institutions by Legal Status

Type of Institution	Average number of members	% Female clients	% Rural clients
Saving and Credit Cooperative (CAP)	5,337	54	51
Saving and Credit Society (SAP)	105,987	53	14
Credit Union (UC)	2,163	37	66
Caja Solidaria (CS)	1,154	29	92
Civil Association (AC)	6,746	58	58
Other	5,951	53	65

Source: Author's compilation. Database property of the BANSEFI bank; SACP Census 2002.

Until now, the heterogeneity of SACP institutions represents a challenge for the Mexican financial authorities. On the one hand, institutions of 100,000 to 1 million clients operate with efficient accounting systems, are regulated, and aim for financial-sustainability. Meanwhile other institutions are very small, with 1,000 to 10,000 clients; they still rely on rudimentary accounting systems and have very low levels of technology. These smaller institutions

struggle to achieve cost-efficiency (Paxton, 2006). In 2002, the Mexican government launched a public policy to regulate and support all SACP institutions in filling the gaps in the provision of financial services, particularly in rural communities, by means of supporting them with technological innovations, resulting in the PATMIR program.

1.5.2 The Rural Microfinance Technical Assistance Program (PATMIR)

The Mexican government launched this initiative with two purposes: 1) to assist SACP institutions to comply with the regulation imposed by the financial authorities which started in 2001; and 2) to provide specialized technical assistance and capital to new or existing SACP institutions confronting technological constraints and high inefficiencies (Zapata, 2007). The adaptability of this program to rural-ethnic communities was critical as 72% of the rural indigenous population lives in those communities within PATMIR's operational area. Table 1.3 presents some basic indicators of affiliated PATMIR institutions.

Table 1.3 Basic Indicators of PATMIR Institutions

Name of the Institution	Total clients	% Ethnic clients	% Female clients	Average Savings (MXN pesos)	Average Credit (MXN pesos)
Caja Solidaria Zongolica	11,853	80	51	1811.7	1868.61
Caja Solidaria Santa Catarina Ticua	690	71	53	10821.7	8549.26
Sociedad Cooperativa San Andrés Coyutla	4,208	55	63	3751.13	2224.33
Caja Solidaria Kondoy	494	100	62	1591.16	4467.2
Caja Solidaria Xamanká	729	99	41	216.25	139.32
Fondo Cooperativo Zihualtme Kimpantiyá Tekitice	971	95	55	69.92	1693.85
Caja Solidaria El Porvenir	28	93	46	555.13	3073.17
Caja Solidaria Mulmeyah	3,173	82	79	165.08	4277.57
Caja Solidaria San Dionisio Ocotepec	967	75	61	4070.97	10694.44
Caja Solidaria Cosoltepec	91	58	34	959.47	3804.51
Caja Solidaria Bahía de la Buena Pelea	2,715	51	42	2813.65	758.97
Cajin	1,704	97	66	2414.06	2538.17
Caja Cristo Rey	10,349	96	61	1772.57	2667.2

Caja La Sagrada Familia	4,298	75	68	2848.14	2301.37
Caja Natividad	2,208	63	69	1469.31	2045.39
Chindé Etnyo	2,220	56	58	2291.19	2323.22
Caja Solidaria Tosepantomin	7,802	87	67	5358.67	2403.86
SERFINSO	4,143	60	41	1193.1	294.04

Source: Unidad Técnica Operativa, PATMIR; García De la Cruz, M. (2011).

Assessment of the Rural Microfinance Technical Assistance Program (PATMIR).

Initially, the PATMIR program was expected to integrate more than 80,000 clients from Mexico's poorest, most marginalized groups. To achieve this goal, consultant organizations and participating institutions worked extensively within three regions of the country in 13 States (Taber, 2004). Although this program has been transferred between State Secretaries over the last decade, it is still operating and is fulfilling the initial goals of supporting financial institutions with recipients located in rural communities where poverty levels are high and the supply of financial services is very limited. In the following section we describe some features of traditional microfinance institutions which differ from the SACP institutions described in this paragraph and in the previous section.

1.5.3 The Traditional Microfinance Institutions (MFI)

This program comprises institutions that do not share the same organizational structure and socio-economic objectives as the mainstream unregulated SACP or PATMIR institutions. Most traditional MFIs typically target urban women, although some exceptions are

Compartamos Bank, Finca, and Solucion Asea, who manage a portfolio of more than 90% of rural women. Table 1.4 shows some basic indicators from the most representative MFIs in this program.

Table 1.4 Key Indicators of Traditional MFIs in Mexico

Institution	Age (# years)	Active Clients	Gross Loan Portfolio (US Dollars)*	Average Loan Size (US Dollars)*	% Rural	% Female	Methodology
Compartamos Bank	20	1,961,995	790,202,429	402.75	90	98	Village Banking
F. Independencia	17	1,399,978	467,453,303	1,294.90	0	-	Individual Lending
Provident México	8	597,696	139,937,799	263.32	8	70	Individual Lending
CAME	17	232,856	54,392,725	405.91	0	80	Village Banking; Individual L.
FinComún	16	145,218	55,204,049	895.63	0	53	Individual Lending
FINCA	19	122,614	37,679,671	491.09	95	96	Village Banking
Apoyo Económico	6	111,786	65,199,540	3,697.33	0	52	Individual Lending
CrediEquipos	17	77,239	21,260,892	360.24	10	92	Solidarity Group
Solución Asea	8	64,152	15,524,934	392.96	90	91	Village Banking
FinAmigo	7	59,695	8,801,665	629.31	99	73	Solidarity Group
ProMujer	10	27,284	8,897,623	326.07	-	97	Village Banking

Source: Author's compilation from Prodesarrollo (www.prodesarrollo.com.mx) and Mix Market (www.mixmarket.org). December 2010);
* Based on an average exchange rate of 12.35 MXN pesos per 1 US dollar from December 2010 with data from the Mexican Bank (http://www.banxico.org.mx).

An imminent process of commercialization in Mexico is motivating traditional MFIs to aim at becoming financially sustainable in the near future. However, this trend may be at the expense of poverty outreach. As a result, more research is required to evaluate the impact of this type of institutions to see if they are able to balance the two goals and if this brings benefits for

recipients. Our study aims to shed some light on this issue by analysing the impact of this program relative to other types of microfinance interventions. In the following paragraph, we describe some features of the socially-oriented BANSEFI branches.

1.5.4 The BANSEFI Program

The National Bank of Financial Services, BANSEFI, has been in charge of ensuring the financial regulation of small community-based SACP institutions since the beginning of 2001. This social bank is operating through an extensive network of branches to provide access for its recipients to accounts that link different savings and investment products. Three types of savings accounts being offered by the BANSEFI to its recipients are: 1) the basic short-term savings account; 2) the "Oportunidades" account for receiving public cash transfers, and where possible, to save; and 3) the long-term deposit account, which is designed for the poorest clients (BANSEFI, 2007). In Table 1.5, we present some characteristics of the BANSEFI branches included in the panel survey.

Table 1.5 General Description of the BANSEFI Branches in the Sample

Name of the branch	Region	State	# Clients	Size
JAUMAVE	North	Tamaulipas	1,314	Small
SPM. LAZARO CARDENAS	Central	Michoacán	1,580	Small
SPM. STA. LUCIA DEL CAMINO	South	Oaxaca	1,005	Small
SAN JOAQUIN	Central	Queretaro	810	Very Small
VILLA NICOLAS ROMERO	Central	México	3,588	Small
TOLUCA	Central	México	9,777	Medium
SPM. RAYON	North	S.L.P.	579	Very Small
SPM. GUAYMAS URBANA 1	North	Sonora	2,345	Small
HERMOSILLO	North	Sonora	5,106	Medium
VILLA BENITO JUAREZ	South	Tabasco	930	Very Small
LA VENTA	South	Tabasco	1,262	Small
TEHUACAN (SUC. 705)	South	Puebla	17,712	Medium

Source: Author's compilation. Database property of the BANSEFI bank; SACP Census 2002.

The network of BANSEFI branches are conduits for facilitating the provision of financial services to low-income clients who are otherwise excluded from formal commercial banks (BANSEFI, 2007). Next, we present a brief description of a cash transfer program which is different from conventional cash transfer programs such as Oportunidades or Procampo.

1.5.5 The COOPERA Program

This program consists of branch institutions by which it is possible to make public cash transfers to the poorest of Mexican families from the "Oportunidades" and "PROCAMPO" social welfare programs implemented by the Federal Government to improve their education, health and productivity. The program has been launched as a new way to transfer government subsidies via affiliated branches to "L@ Red de la Gente" ("The People's Network") a system of institutions operating with the BANSEFI branches. The main objective of this initiative is to integrate the poorest Mexican families into using financial services. As these poor families earn interest on their savings accounts, they learn how savings can open up access to other types of financial services such as financial literacy. In the following section, we present a summary of the five microfinance programs.

1.5.6 Summary of MFI Programs and Services

In two of the empirical studies in this thesis (Chapter 3 and 4), we analyzed the impact of microfinance on household welfare and poverty level. However, the contribution of microfinance will depend on the institutional design of the sample of institutions that each particular microfinance program features as well as on the type of financial services it offers to its recipients. To have an idea of the potential of each of the microfinance programs under

study, descriptions are given in Table 1.6 according to the type of services and ownership structure.

Table 1.6 Summary of Microfinance Programs by Type of Services

Program	Type of services				Interest rate on credit	Interest rate on savings	Ownership
	(1)	(2)	(3)	(4)			
SACP	Credit	Savings	Training on health, education, and technical assistance	Input supplies	Low	Low	Privately owned by its members
PATMIR	Credit	Savings	Mobile banking	Input supplies	Low	Low	Privately owned by its members
BANSEFI		Savings	Public and private cash transfers	Financial literacy		Low[3]	Development Bank –State owned
Traditional Microfinance Institutions (MFIs)	Credit	Savings[1]		Training on health, education and business development	Very high[2]	Low	Shareholders or privately-owned
COOPERA			Public cash transfers	Financial literacy			Privately owned by its members

[1] Only a few regulated MFIs such as Compartamos Bank offer savings facilities to their clients.

[2] Very high interest rates on credit of more than 50% per annum.

3 Low interest rates on savings of 1-2% per month.

1.6 Outline of the Thesis

This thesis is made up of four empirical chapters, each addressing a different research question. Chapter 2 evaluates to what extent the ownership of MFIs have an impact on technical efficiency. To answer this research question, we rely on the parametric SFA. We analyze a sample of 1,681 observations of 315 MFIs operating across 18 countries in Latin America. In Chapter 3, we examine the extent to which microfinance programs focusing on

different financial services (e.g. savings, credit, cash transfers) contribute to poverty reduction. To address this issue, we use 18,933 observations from a representative panel survey conducted in Mexico annually from 2004 to 2007 that was administrated by the BANSEFI bank and the SAGARPA. This set differentiates between treatment and control households. With this information, we estimate several models of household welfare level by means of an instrumental variable approach, the Hausman–Taylor (1981) estimator. In Chapter 4, we also use data from the BANSEFI panel survey but on a limited sample of 14,245 observations of households associated with microfinance programs offering primarily savings. We use Glejser's (1969) heteroskedasticity test to evaluate whether being a member of an SACP helps households to reduce their vulnerability to poverty. Finally, in Chapter 5 we investigate the extent to which the loan officer's personal characteristics have an impact on loan default probabilities. In order to address this question, we use multilevel analysis, which is a novel method that considers observed and unobserved heterogeneity at three different levels: loan, borrower, and loan officer. We base the analysis of this chapter on primary data that were collected in two regions in central Mexico by means of interviews with borrowers and loan officers. This work was done in collaboration with a non-profit microfinance organization, Pro Mujer Mexico, which works with the village banking methodology. As a result, this thesis contributes to existing microfinance literature by providing evidence on different unresolved issues; at the same time, it can be informative for microfinance managers and policymakers in ways that will allow them to improve their microfinance policies.

Chapter 2

Ownership and Technical Efficiency of Microfinance Institutions: Empirical Evidence from Latin America♣

Abstract

By using stochastic frontier analysis, this article examines the technical efficiency of different types of microfinance institutions in Latin America. In particular, it tests whether differences in technical efficiency, both intra- and interfirm, can be explained by differences in ownership. With a focus on non-governmental organizations, cooperatives and credit unions, non-bank financial intermediaries, and banks, the data set contains 1,681 observations from a panel of 315 institutions operating in 18 Latin American countries. The results show that non-governmental organizations and cooperatives have much lower interfirm and intrafirm technical efficiencies than non-bank financial intermediaries and banks, which indicates the importance of ownership type for technical efficiency.

Keywords: Microfinance, Efficiency, Technology, Stochastic frontier, Ownership type, Latin America.

2.1 Introduction

Microfinance institutions (MFIs) provide financial services to poor people who have no access to commercial funding. Until recently, many people adopted extremely positive views about the potential role of microfinance. Greater access to microfinance seemed to provide an important instrument for reducing poverty in developing countries. Some observers even called the development of microfinance—which provides financial services including loans, deposits, insurance, and organizational help to poor households—one of the main innovations in the past 25 years.

Recent developments challenge this extremely positive view and question whether microcredit contributes to a true reduction in worldwide poverty in the short or long terms. Stories about loan shark–style MFIs driving borrowers to suicide in the Indian state of Andhra Pradesh took some of the shine off the rosy view of microfinance. These negative developments may result from governance failures, partly related to the recent trend of commercializing microfinance, and the expansion of services offered by MFIs. Whereas once they focused only on microcredit and small loans to the poor, today MFIs have shifted to microfinance, including savings and insurance. The funding situation also is changing: Whereas once MFIs relied mainly on private and public donors and aid organizations, an increasing number turn to the capital market for funding. The drive toward commercialization also has induced, and partly required, a change in ownership, such that some MFIs are moving away from their ownership structure as non-governmental organizations (NGO) to become shareholding companies.

To explain why some MFIs are successful but others fail, and to preclude Andhra Pradesh–like events, we need a better understanding of governance issues. Unfortunately, literature on

microfinance governance tends to be mainly anecdotal (Labie and Mersland, 2011). Some research studies the relevance of certain governance characteristics (e.g. Hartarska, 2005); other studies focus specifically on the role of the type of ownership of MFIs (e.g. Mersland and Strøm, 2009). Noting the importance of ownership structure for MFI governance, several authors argue that nonprofit MFIs should transform into shareholder-held firms (SHFs), because SHFs can be regulated by banking authorities and benefit from superior corporate governance. Yet Mersland and Strøm (2009) reject this argument and suggest instead that SHFs and NGOs perform similarly in terms of both social and financial aims.

In line with Mersland and Strøm (2009), we examine the relevance of various ownership structures for MFI performance. However, we also adopt Lansink *et al.*'s (2001) focus on intra- and inter-type technical efficiency. We derive and compare the technical efficiency of four groups of MFIs in Latin America: NGOs, cooperatives and credit unions, non-bank financial intermediaries (NBFI), and banks. These ownership types differ considerably from those of traditional commercial banks. In general, MFIs are smaller in size, limit their service provision to only poor households, and often provide small, collateral-free group loans. In addition, most MFIs have dual objectives, financial and social, and their source of income includes not only deposits but also donations (Gutierrez-Nieto *et al.*, 2009). Furthermore, a limited number of MFIs are regulated and may mobilize savings.

Our study estimates the technical efficiency of the four groups of MFIs. Other MFI efficiency studies focus solely on cost efficiency (Gregoire and Tuya, 2006; Hartarska *et al.*, 2006; Hassan and Tufte, 2001; Hermes *et al.*, 2011), whereas this investigation is the first to analyze the impact of the type of ownership on the technical efficiency of MFIs. We focus on technical efficiency for several reasons. First, for most MFIs, good price information is

lacking, which makes profit and cost functions difficult if not impossible to estimate. Second, there are theoretical and methodological objections to a focus on profit and/or cost efficiency, in that these concepts assume that MFIs maximize profits and are price takers in input markets and, in the case of profit efficiency, output markets. Yet MFIs have multiple objectives, including both helping the poor and financial sustainability, and therefore do not necessarily maximize profits, which means they should not aim to become profit efficient. Moreover, most MFIs have at least some sovereignty in setting interest rates and can affect the costs of their capital, including the share and nature of subsidies, through lobbying. Technical efficiency instead requires that they achieve the maximum output, given inputs, and thus seems a more relevant concept for MFIs. To estimate the production frontier we use stochastic frontier analysis (SFA). Contrary to alternative methods like the thick frontier approach (TFA), the distribution-free approach (DFA), and data envelope analysis (DEA), SFA incorporates an error term that captures irregularities in the data and allows observed production to deviate from the efficient frontier due to either random events or possible inefficiencies.

Another main difference between this work and existing MFI efficiency studies is that previous studies have estimated a single frontier for all MFI types (NGO, cooperative/credit union, NBFI, and bank). The technology likely differs by ownership type, so a common frontier assumption may lead to biased efficiency estimates. We explicitly allow for differences in technology and test the appropriateness of this assumption with a likelihood ratio test.

Finally, our study focuses on Latin America, a region with a rich variety of MFIs in terms of ownership type. There are many small, nonprofit MFIs in Latin America, financially

supported by international funders (Gutiérrez-Nieto *et al*., 2007). Miller (2003) also locates some of the most experienced, developed, and profitable MFIs in Latin America. On average, MFIs from Latin America have more assets, are more leveraged, and make use of a growing share of commercial funds compared with institutions in other regions.

Latin America is also interesting to study because many of its MFIs are under pressure to transform their organizational structure from an unregulated, nonprofit institution to a regulated, shareholder form (Mersland and Strøm, 2009). Competition in Latin American microfinance markets has triggered MFIs to make this transformation, for which they must cover their lending costs with income generated from the outstanding loan portfolio and reduce costs as much as possible. We focus on a single region to achieve a somewhat homogeneous sample of MFIs and attribute any performance differences specifically to differences in ownership types, not regional disparities.

The remainder of this article is structured as follows. In Section 2.2 we survey literature on MFI ownership and derive hypotheses regarding the link between ownership type and technical efficiency. Section 2.3 contains the methodology, followed by a description of the empirical model in Section 2.4 and the data in Section 2.5. The estimation results appear in Section 2.6, and we conclude in Section 2.7.

2.2 Ownership Structure and MFI Technological Efficiency

The main function of microfinance governance is to control self-interested managers and resolve agency problems.[2] However, corporate governance is one of the weakest features of MFIs (Hartarska, 2005; Mersland and Strøm, 2009). The early philanthropic status of many

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[2] This section draws from Galema, Lensink and Mersland (2009, 2012).

MFIs reduced demands for their accountability, such that they were able to attract funding at an increasing rate and keep growing without adjusting their governance system. Without sufficient oversight though, managers likely enrich themselves or pursue other self-interests, at the MFI's expense. In addition, corporate governance gets more complicated in MFIs due to their dual mission, namely, to be financially sustainable while reaching out to the poor. This dual mission, together with the lack of external control, provides managers with some managerial discretion, which affects both outcomes and efficiency. However, managerial discretion is not likely to be the same for all types of MFIs.

Ownership type is a key feature of the governance system within the MFI and ultimately determines MFI performance. Within the microfinance industry, various ownership structures exist, including banks, NBFIs, credit unions and cooperatives, and NGOs. Banks and NBFIs are shareholder firms that distribute excess profits to their shareholders, though unlike banks, NBFIs are legally limited in the range of services they can offer (e.g., some cannot provide savings accounts). Credit unions and cooperatives are nonprofit organizations, owned and controlled by members. Unlike NGOs, they may distribute profits to their members. Finally, NGOs are nonprofit organizations, characterized by a non-distribution constraint.

Although MFIs of all ownership types have social and financial motives, their relative weights differ by MFI type. As shareholder firms, NBFIs and banks have clearly defined financial objectives, whereas NGOs and cooperatives put much more weight on social objectives. These varying main objectives likely prompt differential technology use in each organizational structure, because the technology determines the optimal relationship between inputs and outputs. Organizations serving poorer clients, such as NGOs and cooperatives, have higher average costs than NBFIs and banks, because small loans are costlier to provide (Cull *et al*., 2009). Moreover, MFIs with a clear social orientation often combine loan

provision with training, a labor-intensive activity that does not contribute directly to output in terms of loans provided. Finally, a poverty orientation may require targeting people in more remote areas and visiting them. These differences in orientation make it highly likely that the technology differs for the various types of MFIs: An appropriate technology for a NBFI or bank type may not be the best technology for a NGO or cooperative or credit union. This argument leads to our first hypothesis:

H1: MFIs characterized by different ownership types use different technologies

The difference in technology use may be a deliberate choice based on objectives, such that an MFI focusing primarily on social objectives may decide not to adopt a technology focused on increasing output (e.g., number of loans) given the available inputs. Rather, this type of MFI may opt for a technology that provides better opportunities to offer training, which then gets reflected in the type and skill levels of hired loan managers. A loan manager who can find new clients and/or improve repayment levels may not be the best loan manager to offer training. In addition, the difference in inter-MFI technology may result from constraints on innovation adoptions or improvements to input qualities due to managerial capability, experience, or education (Lansink *et al.*, 2001). When MFIs must deal with poorer technologies due to constraints that force them to adapt less efficient technologies, they likely switch to better technologies after the constraints relax.

Regarding our classification of MFI types, NGOs and credit unions or cooperatives should be more monetarily constrained, because they do not raise funds through capital markets and, with their focus on social goals, have fewer opportunities to attract funds from private investors. The combination of a stronger focus on social goals and a more severe constraint in terms of funding possibilities leads us to our second hypothesis.

H2: NGOs and cooperatives or credit unions achieve a lower maximum output given inputs than NBFIs and banks

The production possibilities frontier of shareholder firms also is higher than that of non-shareholder NGOs and cooperative or credit unions, because the former pursue an optimal combination of inputs and outputs in the production process, which allows them to achieve higher interfirm efficiency over time. Differences in interfirm efficiency across ownership types thus stem from efficiency differences, as well as from differences in technology. For example, NGOs generally provide credit through group lending, whereas banks and NBFIs focus more on individual lending. These different technologies have varying skill requirements for personnel and different capital requirements, so they also produce different operating costs per loan or per borrower. The characteristics of shareholder MFIs put them closer to the best production possibility frontier, whereas nonprofit MFIs rely on a dissimilar technology that is more suitable to meet their social needs.

Managerial discretion also differs across organizational types (see Table 2.1). Managers in an MFI may try to pursue policies in their own interest and gain private benefits, possibly at the expense of overall MFI performance. Or they may deliberately decide not to use the existing technology in the most optimal way to increase their own private benefits. Their opportunities to do so depend on their managerial discretion, which in turn depends on several factors that can help explain why different ownership types offer different possibilities for private benefits, which lead to intrafirm technological inefficiencies. First, because NGOs and cooperatives are nonprofit organizations, their governance is not tied to ownership. Board members of nonprofit organizations, unlike those of NBFIs and banks, rarely have a financial stake in the organization and often lack financial knowledge or experience with risk management, which probably reduces the active control of the managers. Second, NGOs,

unlike cooperatives, NBFIs, and banks, cannot distribute profits to any stakeholders. The excess profits instead get returned to the organization, and this non-distribution constraint creates organizational slack, giving NGO executives more managerial discretion (Glaeser, 2003). Third, regulation often limits the discretionary power of managers, but because NGOs and cooperatives usually do not offer savings products, they are not regulated by central banking authorities. Banks and NBFI, in contrast, are heavily regulated by monetary authorities, which reduce their discretionary power. Fourth, NBFIs and banks have more clearly defined financial objectives, whereas the objectives of NGOs and cooperatives are rather less clear. If objectives are unclear and/or have a dual character, it becomes more difficult to develop an appropriate governance system and incentive system that will induce managers to behave appropriately to optimize MFI performance. Accordingly, we posit:

H3: Own-frontier efficiency is lowest for NGOs and highest for banks. The own-frontier efficiency of cooperatives/credit unions is similar to that of NGOs, and the own-frontier efficiency of NBFIs is similar to those of banks

Table 2.1 Managerial Discretion Typology of MFIs

NGOs	Cooperatives and Credit Unions	NBFIs	Banks
Not regulated	Not regulated	Partly regulated	Regulated
Non-distribution constraint	Distribute profits to members	Distribute profits to owners	Distribute profits to owners
Governance not tied to ownership	Governance tied to members	Governance tied to ownership	Governance tied to ownership
Dual objectives	Dual objectives	Financial objectives	Financial objectives

Most   Managerial Discretion   Least

Source: Galema *et al.*, (2012).

The rationale for H3 also stems from the dual objectives of non-shareholder firms (NSHF), in that they lack an appropriated incentive scheme and suffer from a suboptimal utilization of resources (e.g., labor, capital, fixed assets). In addition, staff members of NSHFs target more poor clients than do most shareholder firms (SHF), which implies high transaction costs and greater inefficiencies. The high transaction costs for NSHF also arise because they provide more non-financial services (e.g., training, health and education). This manifestation of the social orientation of NSHF increases costs, as well as loan recovery risk. For example, unregulated NGOs and credit unions usually lack a legal department to enforce contracts in the case of loan default, because they rely more on social collateral, so their staff spend more time in loan recovery, with less time left to devote to the production process of loans. This duality in objectives causes socially oriented firms to misallocate resources and deviate more from their own optimal production frontier (intrafirm), compared with banks and NBFIs, which approach their optimal production possibilities.

In the context of Latin America, managerial discretion can be viewed as a factor explaining the differences in technical efficiency between Share-holder and Non Share-holder MFIs. In fact, in our sample, we have a total of 194 not-for-profit MFIs (62%) and 121 (38%) for-profit MFIs. Thus, according to managerial discretion theory and some empirical studies (Galema *et al*., 2009) we expect that the higher proportion of not-for-profit MFIs, particularly the 145 NGOs (46%) have a dual mission, a powerful CEO, and a large degree of managerial discretion which cannot be limited. These features can lead these institutions towards a suboptimal utilization of resources which contributes to a higher intra- and inter- type technical inefficiency and to a higher performance variability relative to for-profit MFIs.

2.3 Methodology

The production frontiers of financial intermediaries can be estimated with both parametric and non-parametric techniques. Four approaches are common: (1) stochastic frontier analysis (SFA), (2) thick frontier approach (TFA), (3) distribution-free approach (DFA), and (4) data envelope analysis (DEA).

This study uses SFA, first developed by Aigner *et al*., (1977) and Meeusen and van den Broeck (1977), which previous authors have applied both theoretically and empirically to the banking sector to evaluate production, cost, and profit efficiency (Bhattacharyya *et al*., 1997; Lensink and Meesters, 2007; Lensink *et al*., 2008; Mester, 1993; Weill, 2004), though rarely to measure the technical efficiency of MFIs in developing countries. Perhaps it seems too difficult to impose distributional assumptions on data from firms that offer little information with respect their production process and the institutional environment in which they operate. In this case, researchers might assume that deviations from the optimal production possibilities frontier are due to merely inefficiencies, rather than outcomes of the combination of environmental factors resulting from idiosyncratic or covariate shocks and inefficiencies that may shift the production frontier up or down. Yet more recently, some authors have applied SFA to measure MFI efficiency (Gregoire and Tuya, 2006; Hermes *et al*., 2011; Paxton, 2007) and consider it a suitable approach that (1) permits an analysis of efficiency using unbalanced panels; (2) allows the observed production of a particular institution to deviate from the efficient frontier, due to either random events or possible inefficiencies (Gregoire and Tuya, 2006); and (3) incorporates an error term that captures irregularities in the data, a convenient property when analyzing information from developing countries (Paxton, 2007). These latter properties do not hold for the other three approaches to efficiency measurement (TFA, DFA, and DEA).

The SFA approach decomposes error terms into a random component (v_i) and an inefficiency term (u_i), each of which has a particular statistical distribution (usually the normal distribution for the error and half normal for inefficiency). Both "error terms" are assumed to be orthogonal to the production function's exogenous variables (Meeusen and van den Broeck, 1977).

We apply SFA to estimate technical efficiency (Lansink *et al*., 2001) specifically, we investigate firm type–specific production frontiers and differentiate between inter- and intra-type technological inefficiencies. Intra-type efficiency refers to the efficiency of the MFI relative to its own production frontier; intertype efficiency is the efficiency of the MFI relative to a best practice frontier. The technique also provides an estimate of the catch-up component (CU), or the differences in technologies between firms and hence the potential to improve performance if the firm were to adopt another firm type's technology. Figure 2.1 illustrates the three type-specific efficiency measurements for MFIs, assuming one output (Y) and one input (X).
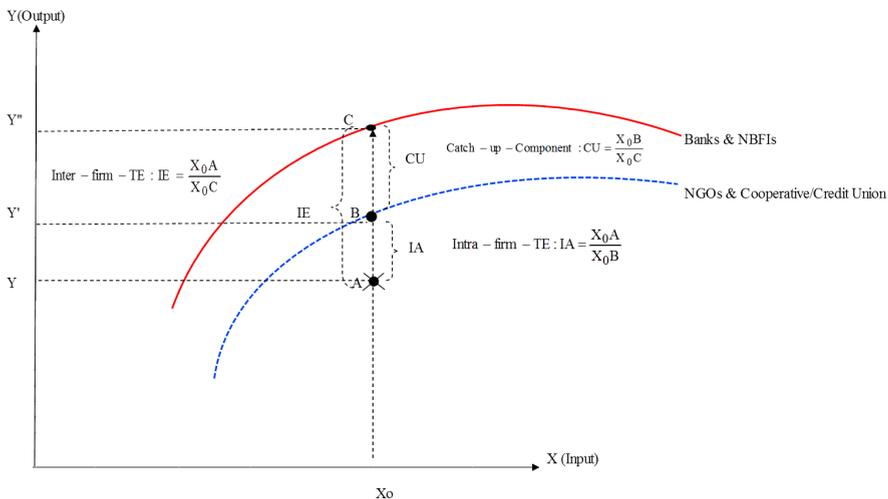
Figure 2. 1 Relationship Between Input and Output of Microfinance Institutions (MFIs) by Ownership Type

The measure of intra-type efficiency (IA) computes a particular firm's efficiency over time relative to the best practice frontier of that firm's type, according to firms with the same type of ownership, as follows:

$$IA = \frac{Y}{Y'}; \Rightarrow 0 \langle IA \leq 1 .$$

(1)

To measure catch-up, we use the ratio between the output obtained if the firm operates at the frontier of its own-type (Y') and the output obtained if the firm were to produce in line with the best practice frontier (Y''). A positive CU value may reflect differences in technology across MFI types, as a result of differences in the rate at which MFIs adopt technological innovations, or it could be due to input quality differences (e.g., labor, fixed capital). Thus a positive CU value indicates there is potential to improve performance by adopting another firm's technology type. That is, if CU = 1 for MFI_A, then its technology is better than that of MFI_B, with CU < 1. The calculation uses:

$$CU = \frac{Y'}{Y''} \Rightarrow 0 \langle CU \leq 1.$$

(2)

Finally, intertype efficiency (IE) reflects the performance of a firm over time relative to the best available technology. By definition, IE equals:

$$IE = \frac{Y}{Y''}; \Rightarrow 0 \langle IE \leq 1.$$

(3)

The relationship among the three efficiency measurements then is:

$$IE = IA * CU \Rightarrow IE = \frac{Y}{Y'} * \frac{Y'}{Y''} \Rightarrow IE = \frac{Y}{Y''}.$$

(4)

2.4 Empirical Model

We use the transcendental logarithmic (translog) production function proposed by Aigner *et al*. (1977), with a general model specified as:

$$\ln(Y_{it}) = \alpha_0 + \sum_{j=1}^{n}\alpha_j \ln(X_{it}^j) + \sum_{j=1}^{n}\sum_{k=1}^{n}\left(\alpha_{jk} \ln(X_{it}^j) \times \ln(X_{it}^k)\right) +$$
$$\sum_{l=1}^{L}\beta_l D_l + \gamma t + \psi t^2 + \phi C + \sum_{j=1}^{n}\theta_j \ln(X_{it}^j) \times C + \varepsilon_{it} \quad , \tag{5}$$

where Y_{it} is the output of MFI i at time t, X_{it}^j refers to input j of MFI i at time t, D is a set of country dummies, t is a time trend, C is a dummy for the 2007–2008 financial crisis, and α, β, γ, ψ, ϕ, and θ are the parameters to be estimated. Furthermore, $\varepsilon_{it} = v_{it} - u_i$ is the error component in the production function; v_{it} is a normally distributed random noise component with variance σ_v^2, including uncontrollable factors that affect total production (e.g., weather, luck, labor strikes, machine performance); and u_i is a nonnegative technical inefficiency component covering firm-specific production deviations or errors due to factors that are under the control of the firm management (Meeusen and van den Broeck, 1977). The inefficiency term u_i comes from a non-negative half-normal distribution with variance σ_u^2.

We then can define the technical efficiency for MFI i as:

$$TE_i = \exp(-u_i) \tag{6}$$

This measure ranges between 0 and 1, where 1 indicates a fully efficient MFI.

We estimate the frontier functions using maximum likelihood methods. The parameter $\lambda = \sigma_u/\sigma_v$ reflects the relative importance of inefficiency and noise. A value of 0 for λ implies the absence of inefficiency and indicates that ordinary least squares estimation is appropriate (see Coelli *et al.*, 1998).

2.5 Data

We use data from the Microfinance Information Exchange Network,[3] a global web-based microfinance platform that provides data on individual MFIs. The platform is among the most renowned and extensive databases in worldwide microfinance and provides high-quality information about more than 800 MFIs operating in four geographical regions, including Latin America. We extract data for 315 MFIs operating across 18 Latin American countries during the period 2003–2009. We construct a panel set of financial and outreach indicators. Our sample contains 1,681 observations for 2003–2009 and is representative of the variety of MFIs in Latin America. Table 2.2 reports the number of observations per ownership type and country.

Table 2.2   Observations by Country and Ownership Type of MFI (2003–2009)

	Country	NGO	NBFI	Cooperative or Credit Union	Bank	Total
1	Peru	100	191	42	7	340
2	Ecuador	98	7	119	21	245
3	Nicaragua	113	9	12	13	147
4	Mexico	35	85	10	7	137
5	Bolivia	80	33	10	14	137
6	Colombia	76	11	13	21	121
7	Guatemala	97	0	0	0	97
8	Honduras	30	53	0	9	92
9	Brazil	62	9	9	6	86
10	El Salvador	34	38	6	6	84
11	Argentina	24	24	0	3	51
12	Paraguay	10	14	0	13	37
13	Haiti	14	19	0	0	33
14	Dominican Republic	10	0	0	14	24
15	Chile	7	7	0	7	21
16	Panama	0	14	6	0	20
17	Venezuela	0	0	0	7	7
18	Uruguay	0	2	0	0	2
	Total	790	516	227	148	1681

Source: Authors' compilation, using data from www.mixmarket.org.

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[3] See www.mixmarket.org

As the results in Table 2.2 reveal, most observations refer to NGOs and NBFIs, especially for the largest microfinance markets in the region: Peru, Ecuador, Nicaragua, Mexico, Bolivia, and Colombia. Observations of cooperatives appear in 9 countries, and banks are in 14 of the 18 countries. This irregular distribution of ownership types across countries indicates that the microfinance sector in this region still largely relies on nonprofit organizations, despite the trend toward more commercial ownership types.

Furthermore, NGOs appear in almost all countries, with the exceptions of Panama, Venezuela, and Uruguay. Guatemala provides observations only for NGOs, not for other MFI types, which indicates a lack of diversity in ownership types in that country. Overall, 10 of the 18 countries lack observations for at least one or two ownership types. The distribution of observations by ownership type across Latin American countries thus is not homogeneous, which may have implications with respect to the technical efficiency of the different ownership structures, if they depend on country-specific factors such as regulation and competition. Table 2.3 offers some descriptive statistics of the different MFIs, classified by ownership type.

Banks are the largest MFI type in terms of assets, gross loan portfolio, and number of employees. Cooperatives and credit unions and banks have a lower percentage of female borrowers in their portfolios than NGOs and NBFIs. Although NGOs have the lowest cost per loan, their small loan sizes give them the highest cost per U.S. dollar lent. Banks outperform all other ownership types in the amount of their portfolios at risk for more than 30 days.

Table 2.3 Descriptive Statistics of MFIs by Ownership Type (mean values, 2003–2009)

Indicator	Obs.	NGO	Obs.	Cooperative or Credit Union	Obs.	NBFI	Obs.	Bank
Total assets[1]	783	10,500	226	66,100	515	48,300	147	268,000
Gross loan portfolio[1]	783	8,430	227	49,400	514	39,100	148	209,000
Operating expense[1]	735	1,497	194	5,325	460	6,857	138	29,600
Write-offs[1]	708	146	190	471	443	1,495	121	5,030
Number of active borrowers	780	13,884	227	29,815	507	39,936	148	140,423
Average loan balance per borrower (US$)	774	618	227	1,867	506	1,448	148	1,634
Cost per loan (US$)	504	136	141	188	335	209	113	224
Percentage of women borrowers	727	71	178	48	392	60	119	58
Return on assets (%)	660	1	176	1	434	1	132	4
Portfolio at risk > 30 days (%)	710	7	191	6	445	6	122	4
Personnel (no. employees)	767	88	218	78	470	203	104	491
No. of offices	650	10	187	21	427	21	135	64

[1] Thousands of US$.

The definition of inputs and outputs of financial institutions such as banks and MFIs is not straightforward. A controversy emerges about how to classify deposits, as an input or output. In financial literature, two approaches categorize bank inputs and outputs (Bikker and Bos, 2008). First, the production approach (PA) regards financial institutions as producers of loans and providers of services for account holders. Second, the intermediation approach (IA) views financial institutions as mediators of funds between savers and investors. In the former, deposits are outputs, but in the latter, they represent input. To overcome this confusion, Berger and Humphrey (1991) propose a modified production approach (MPA), which includes both input and output characteristics of deposits in cost functions.

For this study, the selection of inputs and outputs follows the PA. Labor and physical capital are the main inputs; number of processes, documents, and transactions (e.g., loans) are main outputs. This approach appears suitable for bank branches with low autonomy in loan policy (Bikker and Bos, 2008); many MFIs do not take deposits at all, so we cannot use the intermediation approach. In line with empirical efficiency studies (Gutierrez-Nieto *et al*., 2009; Meeusen and van den Broeck, 1977), our model distinguishes one output (number of loans outstanding) and three different inputs (assets, operating expenses and personnel), as we detail in Table 2.4.

Table 2.4 Definition of Output and Inputs of MFIs for Efficiency Measurement

Name	Description
Number of loans outstanding	Number of loan accounts that have any outstanding loan balance with the MFI and any portion of the loan portfolio.
Assets	Total of all asset accounts, including trade and other payables, provisions for employee benefits, other provisions, deferred revenue, financial liabilities at fair value through profit or loss, deposits, borrowings, other short-term financial liabilities, subordinated debt.
Operating expenses	Expenses related to operations, including all personnel expenses, depreciation and amortization, and administrative expenses.
Personnel	Total staff members or employees at end of period who were actively employed by the MFI. This number includes contract employees or advisors who dedicate the majority of their time to the MFI, even if they are not on the MFI's roster of employees.

Note: Definitions based on MIX-Market Taxonomy (http://www.mixmarket.org/mix-market-development-roadmap/inline-glossary; http://www.mixmarket.org/en/glossary).

We also provide a summary of descriptive statistics of inputs and outputs used in the estimation of production functions in Table 2.5. All monetary values are in 2003 U.S. constant dollars (base year), because we deflated the monetary values by their price indexes, as provided by the International Monetary Fund (www.imf.org).

Table 2.5 Descriptive Statistics of Inputs and Output to Estimate Type-Specific Technical Efficiency

Variable Description		Obs.	Mean	Std. Dev.	Min	Max
Output	Number of loans outstanding[1]					
	NGO	660	15.9	29.3	0	306
	NBFI	435	47.0	116.3	0	1,236
	Cooperative/credit union	192	34.7	131.2	0.14	1,030
	Bank	141	170.5	271.0	1.25	1,699
Input 1	Total assets[2]					
	NGO	783	10.5	34.8	0	555
	NBFI	515	48.3	88.1	0	698
	Cooperative/credit union	226	66.1	226.0	0.34	1,670
	Bank	147	268.0	528.0	1.93	3,480
Input 2	Operating expense[3]					
	NGO	735	1.5	3.0	0.01	37
	NBFI	460	6.9	15.5	0.01	153
	Cooperative/credit union	194	5.3	19.9	0	166
	Bank	138	29.6	50.4	0.5	289
Input 3	Personnel					
	NGO	767	87.8	120.8	0	876
	NBFI	470	203.0	190.6	0	989
	Cooperative/credit union	218	77.6	105.7	2	644
	Bank	104	490.8	257.8	55	995

Source: Authors' compilation, based on data from www.mixmarket.org microfinance platform.

[1] Thousands.

[2] Thousands of US$.

[3] Millions of US$.

The minimum values of zero in Table 2.5 correspond to a negligible number of observations/institutions (1 to 3). For instance, ICC MAU-CE, Fácil SCM and Progresar from Brazil and Argentina reported zero values for loans, assets and personnel in 2003 and 2007 to the Mix-Market platform. However, we expect that these values do not have any impact on the overall outcomes.

2.6 Empirical Results

We begin by estimating a production frontier for a pooled sample of all MFIs. Then we estimate separate production functions for each of the four ownership types. A likelihood ratio test of the pooled model versus the type-specific models strongly rejects the existence of a single production frontier ($\chi^2(74) = 449.61$, Prob $> \chi^2 = 0.0000$), in support of our first hypothesis. We continue the analyses using the ownership-type specific frontiers.

Table 2.6 Production Frontier Estimates of MFIs by Ownership Structure

Variable	Pooled Frontier	Separate Production Frontiers			
	1	2	3	4	5
Description	All MFIs	NGOs	Coop./CUs	NBFIs	Banks
Constant	4.181	-13.18**	23.71**	24.17**	110.6***
	[0.279]	[0.041]	[0.035]	[0.024]	[0.000]
ln(Assets)	0.615	1.140*	-2.608	-1.663*	-8.335*
	[0.138]	[0.083]	[0.146]	[0.074]	[0.081]
ln(Operating Expense)	-0.739	2.341*	-1.691	-2.865	-1.664
	[0.362]	[0.060]	[0.194]	[0.195]	[0.786]
ln(Personnel)	1.459*	-2.316*	5.827**	6.634***	-5.364
	[0.080]	[0.060]	[0.022]	[0.001]	[0.553]
ln(Assets)^2	-0.104**	-0.0944	-0.0607	-0.275***	-2.342**
	[0.014]	[0.130]	[0.732]	[0.002]	[0.018]
ln(Operating Expense)^2	-0.0171	-0.297**	-0.479***	-0.153	-5.225***
	[0.875]	[0.044]	[0.008]	[0.597]	[0.001]
ln(Personnel)^2	0.0361	-0.334**	0.658**	0.568***	2.275
	[0.722]	[0.012]	[0.050]	[0.002]	[0.160]
ln(Assets)*ln(Operating Expense)	0.0767	0.024	0.490***	0.468***	3.993***
	[0.145]	[0.730]	[0.001]	[0.000]	[0.000]
ln(Assets)*ln(Personnel)	0.0339	0.0376	-0.514**	-0.117	-1.970**
	[0.506]	[0.595]	[0.013]	[0.236]	[0.043]
ln(Operating Expense)*ln(Personnel)	-0.0849	0.303**	-0.00312	-0.479**	1.861
	[0.391]	[0.022]	[0.985]	[0.018]	[0.168]
ln(Assets)*Trend	-0.0187	0.00187	-0.119***	-0.013	-0.129
	[0.153]	[0.915]	[0.008]	[0.646]	[0.376]
ln(Operating Expense)*Trend	0.0329	0.0249	0.0820*	0.0165	0.228

	[0.191]	[0.421]	[0.086]	[0.763]	[0.201]
ln(Personnel)*Trend	-0.0132	-0.0321	0.0547	0.0284	-0.381**
	[0.541]	[0.239]	[0.356]	[0.506]	[0.040]
Trend	-0.0517	-0.209	0.489	-0.101	1.051
	[0.776]	[0.403]	[0.301]	[0.789]	[0.330]
$(\text{Trend})^2$	-0.0205*	-0.00963	0.00751	-0.0262	-0.0124
	[0.053]	[0.503]	[0.707]	[0.146]	[0.719]
Crisis dummy	0.0723	0.14	1.347	0.621	0.675
	[0.902]	[0.861]	[0.224]	[0.603]	[0.830]
ln(Assets)* Crisis dummy	0.0294	0.0859	-0.149	-0.0354	0.117
	[0.485]	[0.123]	[0.181]	[0.643]	[0.736]
ln(Operating Expense)*Crisis dummy	-0.0403	-0.117	0.0556	-0.0171	0.082
	[0.607]	[0.208]	[0.690]	[0.913]	[0.867]
ln(Personnel)*Crisis dummy	0.00956	0.0361	0.0934	0.049	-0.653
	[0.893]	[0.679]	[0.510]	[0.709]	[0.144]
$\ln\sigma_v^2$	-2.006***	-2.562***	-3.105***	-1.564***	-1.973***
Std. Err.	0.118	0.260	0.450	0.071	0.143
$\ln\sigma_u^2$	-1.179***	-1.089***	-2.411***	-9.909085	-10.51597
Std. Err.	0.158	0.206	0.672	81.629	160.5336
σ_v	0.367	0.278	0.212	0.457	0.373
Std. Err.	0.022	0.361	0.048	0.016	0.027
σ_u	0.555	0.580	0.300	0.007	0.005
Std. Err.	0.044	0.060	0.101	0.288	0.418
σ^2	0.442	0.414	0.135	0.209	0.139
Std. Err.	0.037	0.528	0.043	0.015	0.020
λ	1.512	2.088	1.415	0.015	0.014
Std. Err.	0.063	0.093	0.146	0.290	0.421
Significance Level of the Likelihood ratio or F-Statistic	0	0	0.166	1	1
Likelihood-ratio test of σ_u=0: χ^2 (1)	26.09	13.68	0.94	0	0
Log Likelihood	-929.13	-378.8	-23.31	-254.80	-42.38
Wald χ^2(27)	9153.03	4693.80	3234.85	2893.81	492.10
Number of observations	1310	638	174	400	98

*Although we included some country dummies in the estimation, we omitted them here for brevity and present only the most relevant coefficients

p-values in brackets.

* p<0.10, ** p<0.05, *** p<0.01

The best explanation for deviations from the optimal production possibilities frontier for NGOs and cooperatives and credit unions relies on the technical inefficiency component (u_i)—that is, factors under the control of the MFI's management. In contrast, the inefficiencies

of banks and NBFIs arise mostly from the random noise component, which represents random uncontrollable factors or external shocks beyond the firms' control that affect total production. This finding is in line with our second hypothesis.

From the estimations of the separate production functions (see columns 2–5 in Table 2.6), we calculate the average efficiency scores for each of the three efficiency measurements: intrafirm (IA), interfirm (IE), and catch-up component (CU). Table 2.7 summarizes the results. The t-tests indicate that the averages of the three efficiency levels differ significantly at the 0.05 level for all four ownership types.

Table 2.7 Technical Efficiency Scores and t-test on Mean Differences between MFIs Ownership Types

Variable	Obs.	Mean	Std. Dev.	Min	Max	t-test with NGO	t-test with C./CU	t-test with NBFI
1. Intra-firm Technical Efficiency (IA)								
NGO	638	0.665	0.155	0.180	0.930			
Coop./Credit Union	174	0.799	0.088	0.525	0.923	-14.85		
NBFI	400	0.994	0.000	0.994	0.995	-53.63	29.27	
Bank	98	0.996	0.000	0.996	0.996	-53.87	-29.49	-440.00
All MFIs types	1310	0.808	0.190	0.180	0.996			
2. Catch-Up Component (CU)								
NGO	725	0.641	0.234	0.117	1			
Coop./Credit Union	188	0.568	0.226	0.167	1	3.92		
NBFI	436	0.795	0.192	0.015	0.990	-12.15	12.01	
Bank	99	0.932	0.039	0.791	1	-30.52	-21.50	-13.75
All MFIs types	1448	0.698	0.235	0.015	1			
3. Inter-firm Technical Efficiency (IE)								
NGO	638	0.428	0.188	0.037	0.899			
Coop./Credit Union	174	0.448	0.188	0.136	0.839	-1.25		
NBFI	400	0.798	0.184	0.015	0.985	-31.25	20.64	
Bank	98	0.928	0.039	0.788	0.996	-59.31	-32.48	-12.96
All MFIs types	1310	0.581	0.264	0.015	0.996			

Source: Author's compilation with data from www.mixmarket.org.

The average IE of banks is 0.928; on average, banks produce just less than the overall optimal production technology. The extremely high IA of 0.996 reconfirms this finding; it results from

the insignificance of the inefficiency component in the error term of the banks' production function, as well as a CU of 0.932. The bank production function virtually never falls below that of any other production function.

Similarly, NBFI have on average negligible IA, but their production function averages somewhat lower than that of banks; the CU of their overall efficiency is 0.795. With an overall IE of 0.798, NBFIs on average produce 80% of the maximum possible output, given their inputs, mainly because they use non–output-maximizing technology.

The NGOs and cooperatives and credit unions reveal similar average IE scores: 0.428 and 0.448, respectively. Unlike banks and NBFIs, they indicate considerable intra-firm inefficiency; they could increase output using their own technology. Moreover, these technologies tend to be below both the bank and NBFI technology levels. On average, NGOs have a higher output technology than cooperatives, with CU of 0.641 compared with 0.568. In contrast, cooperatives produce closer to their own production frontier, with an IA of 0.799 compared with 0.665 for NGOs.

Kernel density plots of the different efficiency measures confirm the conclusions derived from the average results per ownership type (see Figures 2.2, 2.3 and 2.4). Moreover, they indicate that whereas IA is more than 0.99 for all banks and NBFIs, there are large differences in IA among cooperatives and NGOs, such that some institutes have efficiency of more than 0.9, but others' efficiency is as low as 0.2 (NGOs) or 0.6 (cooperatives). The CU distribution also is very flat for NGOs and cooperatives, but it shows a negatively skewed distribution for NBFI and is highly concentrated around 0.9 for banks.
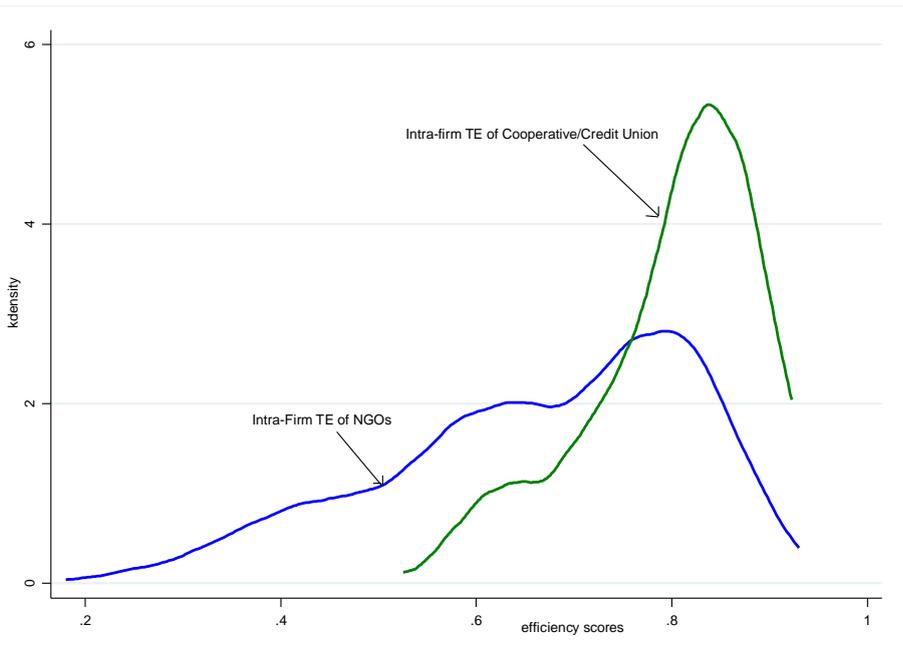
Figure 2.2 Intra-Firm Efficiency of NGO and Cooperative/Credit Union
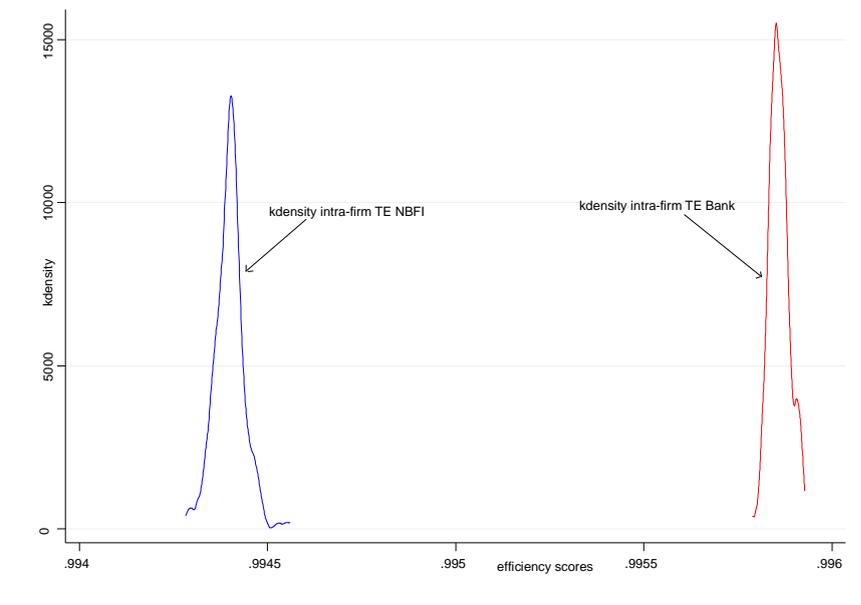
Figure 2.3 Intra-Firm Efficiency of NBFI and Bank MFIs
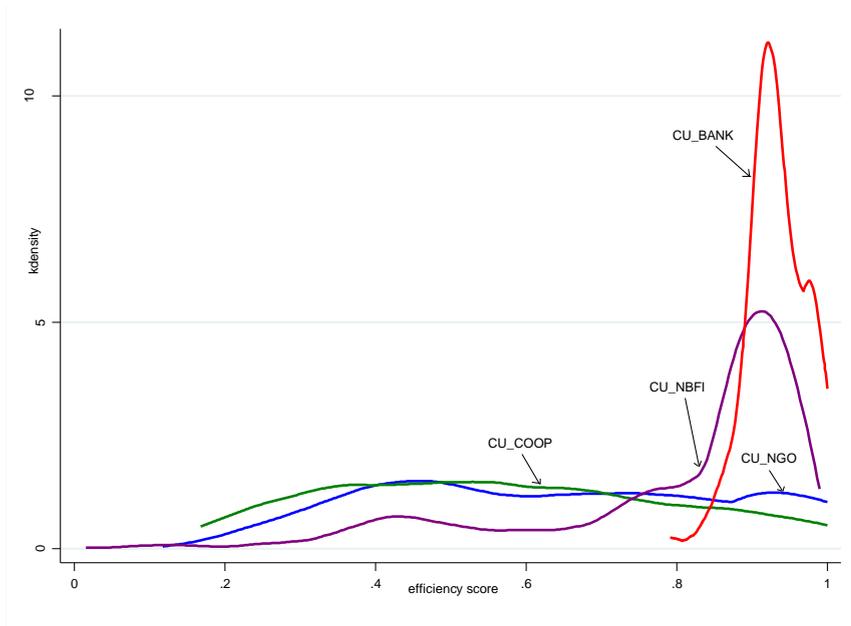
Figure 2.4 Catch-up Component of MFIs by Ownership Type

2.7 Conclusion

This article uses non-traditional measurements of efficiency with stochastic econometric frontier techniques to investigate the efficiency of MFIs with different ownership types. We use data from the microfinance platform www.mixmarket.org during the period 2003–2009 to build a sample of 315 MFIs operating in Latin America. Our methodology allows both the production frontier and the error structures to differ across four types of ownership: NGO, cooperatives and credit unions, NBFI, and banks. Robustness tests indicate that the data support this unrestricted model, in favor of the use of a single production technology.

Furthermore, the analyses suggest that MFIs with different ownership types use different technologies and have different efficiencies. Specifically, NGOs and cooperatives have a

lower technology level than banks and NBFIs, because of their stronger focus on social goals and their more severe funding constraints. Unclear objectives and the associated difficulty of developing appropriate incentive structures also causes non-shareholder MFIs to suffer from lesser efficiency with respect to their own frontier. The economic implication of these outcomes is that NGOs and cooperatives are wasting resources in the production process and incur higher inefficiencies than their peers, NBFIs and banks.

There are at least three ways to extend this research. First, researchers could enrich our approach by including multiple outputs—such as savings, training, insurance, and other financial services that an increasing number of MFIs provide—and estimating translog distance functions using corrected ordinary least squares (Coelli and Perelman, 2000). Second, productivity indicators, such as technological change, total factor productivity, and input elasticity, derived from the current type-specific production functions might help disentangle the main factors that account for differences in technologies across MFIs types. Third, by determining ownership-specific key factors that explain efficiency, further research would provide insights into how to implement better practices to increase the efficiency of struggling MFIs (NGOs and cooperatives). Battese and Coelli (1995) suggest an SFA model that simultaneously estimates the frontier and the coefficients of the efficiency variables; it also could be applied to type-specific production frontiers.

Chapter 3

Does Microfinance Improve Household Welfare? Empirical Evidence from Five Mexican Microfinance Programs♠

Abstract

Using a unique data set from the National Bank of Financial Services, this study examines the impact of five Mexican microfinance institutions (MFIs) on household welfare levels. The data set, including a random sample of 18,933 observations, differentiates between treatment groups and reliable control groups to identify the effects of being a member of a particular MFI. To control for possible selection biases, the authors use the Hausman-Taylor panel estimator. The results reveal that membership in MFIs that primarily focus on savings improves household welfare, as measured by per capita expenditures.

Keywords: Microfinance, BANSEFI, Panel survey, Household, Welfare level, Hausman-Taylor approach, Mexico.

3.1 Introduction

Until very recently, microfinance was extremely popular, and the industry grew rapidly. Such massive growth in microfinance programs followed the almost universal idea that microcredit could and would be an important instrument to lift poor people, especially women, out of poverty. This positive perception received support from a plethora of anecdotes and simple empirical analyses. Policy makers and nongovernmental organizations (NGOs) became even more excited about the possible role of microfinance when Mohammad Yunus received the Nobel Peace Prize in 2006.

Even as studies argued that microcredit could help reduce poverty though, most empirical studies of microfinance were weak, which in retrospect suggested that the positive view of microfinance was driven by wishful thinking and based on anecdotal evidence, rather than rigorous research (see Armendariz and Morduch, 2010; Hermes and Lensink, 2007; Hermes *et al.*, 2011). The studies suffered from some severe methodological issues; virtually none of the empirical studies addressed problems related to self-selection bias and/or program placement bias. Yet there were some exceptions, such as Pitt and Khandker's (1998) consideration of the impact of microcredit in Bangladesh, where they found large marginal impacts of microcredit, especially lending to women. However, when Roodman and Morduch (2009) tried to replicate these findings, they found instead rather negligible impacts of microcredit.

Several new empirical analyses have attempted to use superior methodologies to assess the impact of microcredit and address problems due to selection biases, such as through randomized controlled trials (e.g. Banerjee *et al.*, 2010; Crépon *et al.*, 2011; de Mel *et al.*, 2009; Karlan and Zinman, 2010). These studies achieve mixed results, though few have been able to detect any substantial impact of microcredit (Roodman and Morduch, 2009). Although

Lensink and Pham (2012) identify a positive effect of microcredit on household self-employment profits in Vietnam, Roodman (2012) maintains that its impact has been considerably overstated.

Going even further, Bateman (2010) argues that microfinance constitutes an obstacle to sustainable development. The microfinance crisis in the southern Indian state of Andhra Pradesh led some observers to accuse microcredit of inducing suicides. Thus the nearly universal support for microfinance seems to have faded very quickly. Yet just as the extremely positive view did, this overwhelmingly negative view of microfinance also lacks any serious scientific support. Microfinance institutions (MFIs), which traditionally focused on providing microcredit to the poor in the informal sector, have started to recognize that diversification represents an essential step in their development and begun experimenting with financial products other than credit, such as savings and insurance products. Some recent studies suggest that, unlike microcredit, these microfinance products may be able to improve the welfare of the poor (e.g. Roodman, 2012). Karlan and Appel (2011) designate micro savings one of the ideas that actually supports development and probably the best financial service available to reduce poverty. To avoid the errors of the past though, we require additional studies that address the impact of microfinance.

This article aims to contribute to this ongoing discussion by investigating the impact of becoming a member of a microfinance program in Mexico on per capita consumption. We focus on five programs—SACP, PATMIR, MFI, BANSEFI, and COOPERA—that are similar in the sense that they all deal with microfinance but also differ considerably. For example, SACP and PATMIR offer a wide range of financial services, including credit and savings products; BANSEFI focuses on savings; the MFI program primarily offers micro credit; and

COOPERA specializes in channeling public cash transfers. By investigating this wide range of services, our study provides new evidence about the importance of microfinance in general, as well as a preliminary analysis of the relative importance of different financial services that MFIs can offer to improve the well-being of low-income people.

Furthermore, despite the importance of microfinance in Mexico, few studies address the impact of Mexican microfinance programs in particular. Cotler and Woodruff (2008), in a cross-sectional study of the impact of short-term credit, provide some evidence that access to microcredit increases the profits of the smallest firms. Niño-Zarazúa (2007) suggests that group-based lending methods in Mexico are effective in reducing the poverty of microfinance recipients. Yet both studies are limited in their coverage and deal with microfinance only in urban settings in Mexico.

Our study is unique in several ways. First, we base our analysis on a unique, rich, longitudinal panel survey from the National Bank of Financial Services (BANSEFI), which includes information about the controls and treatments adopted by each of the five microfinance programs we investigate. This data set provides broad coverage of the microfinance sector in Mexico, including both traditional MFIs and modern, commercialized microfinance programs. Therefore, we can study not only the "average" impact on household welfare derived from membership in a Mexican microfinance program but also whether these impacts differ according to the type of microfinance program. Furthermore, the contributions from our data set advance the discussion on the relative importance, in terms of poverty reduction, of different financial services (e.g., micro savings, microcredit, cash transfers, micro-insurance). Second, we use the Hausman-Taylor (HT) panel estimator to determine the impact of being a member of a Mexican microfinance program. Existing estimates of microfinance impacts

suffer from (1) selection bias, because the household's decision to participate in a microfinance program is endogenous, and (2) placement bias, due to the possibly non-random locations of microfinance programs. In principle, the best way to avoid both selection and placement biases is to use a randomized, controlled trial. However, these expensive trials are not currently available in relation to the impact of microfinance in Mexico, and they are too difficult to organize on a broad scale in the near future. Thus observational studies remain important and may reveal insights into issues that cannot be covered by randomized, controlled trials. In this case, the HT estimator provides a good estimation technique, because reliable external instruments are not available. The HT estimator can identify variables that do not change over time (e.g., membership in a MFI), even if they correlate with fixed effects. By using the HT estimator, we disentangle the impact of membership in a microfinance program from observed attributes that affect household welfare. Moreover, this estimator controls for relevant, unobserved household and community characteristics that do not change over time.

To present this approach, we begin by describing the five microfinance programs we study, followed by a detailed description of the data set. We then specify both our estimation procedure and the empirical model. Finally, we present our results and some conclusions derived from them.

3.2 Overview of Mexican Microfinance Programs

The microfinance sector in Mexico comprises a range of models, though they mostly reflect two types: public and private. Private microfinance programs usually offer a full range of financial services, such as savings, microcredit, and health and nutrition assistance (e.g., SACP, PATMIR), though a few focus primarily on microcredit (MFI). Public microfinance programs instead center on savings (BANSEFI) or facilitate monetary transfers from the government (COOPERA), but they do not offer microcredit.

3.2.1 Public Savings and Credit Societies Program (SACP)

The SACP includes mostly semi-formal institutes and a predominantly rural clientele (Paxton, 2006). The cajas solidarias, savings and credit cooperatives or societies, credit unions, civilian associations and societies, and social solidarity societies all fall within this category. Although some SACP institutes—especially the savings and credit societies—are quite large, most of them are small, community-based organizations that operate with funds obtained from deposits by clients, sometimes complemented with funding from the federal government for institutional innovation and limited international donations.

A BANSEFI inventory of non-regulated financial institutions in 2002 identified more than 800 unregulated credit and savings organizations, targeting more than 2 million active clients, predominantly the rural poor who were not being served by commercial banks. In the past decade, all SACP institutions have undergone a process of regulation, initiated by the National Commission of Banking and Values. The Mexican government now requires all SACP institutions to be supervised by upper-tier organizational bodies, called federations. However, most institutions still rely on rudimentary accounting systems and have minimal technology access, which creates costly inefficiencies (Paxton, 2006).

3.2.2 Rural Microfinance Technical Assistance Program (PATMIR)

In 2002, the Mexican government launched a public policy to support the SACP institutions and stimulate the expansion of financial services to underserved rural communities. This policy resulted in the PATMIR program, which received technical support from the World Council of Credit Unions in the United States, the Deutscher Genossenschafts un Raiffeisenverbad Cooperative Confederation from Germany, and the Développement International Desjardins of Canada (Towsend and Woodruff, 2006). The program assists

affiliated SACP institutions with specialized technical assistance and basic start-up capital to advance their technology, which in turn enables them to reduce transaction costs when operating in disadvantaged rural communities (Zapata, 2007).

The program also stimulates the creation of new branches through technological innovations, which then serve as examples of cost-efficient institutions to serve the rural poor. Originally, the PATMIR program focused on small, impoverished communities in hard-to-reach areas, and many new clients were rural women. Subsequently, it shifted to focusing on new branches in communities with fewer than 10,000 inhabitants. Most of these branches did not make a profit when their operations began, but within three years, nearly half had become financially sustainable.

Near the end of 2006, the PATMIR project was operating across 13 states with 34 different institutions in 163 branches, and 77% of them were newly established branches. In total, these institutions managed 202,000 savings accounts, 57.9% of which belonged to clients who had not been banked before. Deposits amounted to more than USD$23.73 million (SAGARPA, 2007).

3.2.3 Traditional Microfinance Institutions (MFI)

This category includes mostly small to medium-sized institutions, but also some of the largest MFIs in Mexico, and even in Latin America, such as Compartamos Bank and Financiera Independencia, which together serve close to 3 million clients and manage a gross loan portfolio of nearly USD$1.5 billion. The size of the institutions represents the main objective of the institution (profit or nonprofit), largely determined by market conditions. However, many MFIs in this category have been accused of charging exorbitant interest rates above

50% per annum, which, in addition to the seemingly nonrandom placement of the program outposts in wealthier zones, implies a divergence from the claimed social mission.

Unlike the SACP institutes, traditional MFIs focus primarily on microcredit, at least partly due to their regulatory status. Some NGOs, such as Pro Mujer, initially collected savings from their clients but later shifted to microcredit services, because Mexican regulatory authorities denied them permission to mobilize savings. The MFIs in this category typically target urban women and grant small loans, ranging from USD$263.32 to USD$895.63. However, the Compartamos Bank, Finca, and Solucion Asea also manage loan portfolios that consist predominantly (more than 90%) of rural women.

3.2.4 BANSEFI Program

The National Bank of Financial Services (BANSEFI) is a socially oriented savings bank that serves approximately 3.75 million clients through a network of more than 2000 branches across the country. Its main objective is to integrate the poorest Mexican families into the financial services industry. The size of the branches range from less than 600 clients to more than 15,000 clients. The BANSEFI branches offer both basic, short-term savings accounts and long-term deposit accounts (BANSEFI, 2007). Account holders also receive financial literacy training. Emigrants living outside Mexico can use BANSEFI accounts to make cost-effective cash transfers to recipients in some of Mexico's poorest and most remote areas.

3.2.4 COOPERA Program

This program consists of institutions that make cash transfers from the federal "Oportunidades" and "PROCAMPO" public programs, which were implemented to improve the health, education, and agricultural production of the poorest Mexican families. The federal government uses the financial infrastructure of the BANSEFI branches and more than 50

affiliated institutions in "La Red de la Gente" as conduits for these transfers. In December 2003, 78% of the 633,974 people who received transfers from the public Oportunidades program maintained savings accounts with positive balances in La Red de la Gente network.

3.3 Data Description

We use a national panel survey pertaining to savings, credit, and rural microfinance, conducted annually in Mexico from 2004–2007, to support our analysis. The survey is part of the "Programme for Strengthening Savings, Social Credit and Rural Microfinance" project, which also has prompted an agreement between BANSEFI and the Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food. The panel data include detailed information about urban and rural households in three geographical regions: central, south, and north. In total, surveyors visited 27 of the 32 total Mexican states to obtain information about households that either participated or not in one of the five microfinance programs.

The survey also covers household welfare, with items related to income and expenditures, economic activities, formal and informal assets and liabilities, transaction costs, self-employment (farm and off-farm activities), risk and insurance, remittances, and public cash transfers. This information refers to the household level, and the goal is to determine the impact of access to financial services on household welfare, as well as on the economic, social, and institutional environment in which these financial institutions operate.

A two-step process identified the sample of participating households, which represents the treatment group. First, the survey administrators identified branches of institutions with a probability proportional to their size (i.e., number of accounts) from the baseline BANSEFI Census of SACP institutions conducted in 2002. For each selected branch, they randomly selected 20–35 client records. Second, a similar number of households from the same or a

nearby community was screened through a survey. Households in which no family members were clients of any financial institution during the five years prior to the survey (i.e., since 1999) were included as the control group. The survey does not provide enough evidence to conclude that treatment/control households were members of two different institutions/programs at the time that the survey was conducted (2004-2007).

The original sample included 5,768 households: 2,975 treatment and 2,793 control households. This sample diminished substantially over the four survey years, due to attrition or the intentional exclusion of households when budget constraints demanded it. Thus 3,437 households were surveyed in all four rounds. Attrition was somewhat higher for households without an account in 2004 (37.1%) than for those with some account (31.5%). Furthermore, new households were added, leading to a sample size in the final survey of 3,722. In total, the survey offers detailed information about 6,976 households. These data suggest that during the period of analysis, some control households became clients of financial institutions, and some clients dropped out of programs in which they had been participating. However, we retained the original assignment to treatment and control groups for all years, because omitting dropouts from the treatment group would bias the impact estimates upward, if they dropped out because they had been negatively affected by their participation in the program (Tedeschi, 2008).

From the data, we calculated a t-test of mean differences between participating and non-participating households in the five microfinance programs under study (see Table 3.1 for a list of key household characteristics). From the t-values, we can see that there are significant differences between groups for all observable attributes. Thus, we took these characteristics

into account for the estimation of the different empirical models of household welfare thereafter in Section 3.5.

Table 3.1. Mean Differences between Microfinance Clients and Non-clients

Household indicator	Non-Clients	Clients	t-test
Per capita Expenditure (constant MXN pesos 2004)	15,088.63	22,107.59	-11.57
Head gender (1 if male)	0.78	0.82	-6.79
Head age (years)	47.99	49.22	-5.42
Head years of formal schooling	4.87	6.59	-26.79
Head civil status (1 if married)	0.76	0.81	-9.50
Head has a formal job	0.80	0.82	-3.94
Household size	4.36	4.47	-3.46
Dependency ratio[1]	0.35	0.32	9.32
Household mean age (years)	32.27	32.99	-2.93
Household formal years of schooling	5.17	6.77	-35.71
Household has a business	0.23	0.33	-14.90
Household shocks	1.31	1.22	3.78
Household has insurance	0.36	0.55	-26.23
Urban household	0.51	0.53	-2.29

[1] Number of dependents/total family members

Source: Author's compilation; data set property of the BANSEFI bank.

3.4 Methodology

We focus our analysis on the impact of microfinance on household consumption. We estimate the consumption (y) of household i at time t as a function of a vector of participation dummies that includes all five microfinance programs (P), a vector of time-variant household characteristics (X), a vector of regional dummies (Z), and a vector of $t-1$ year dummies (T) that accounts for covariate shocks:

$$y_{i\ t} = \beta_0 + P_i\beta_1 + X_i\beta_2 + Z_i\beta_3 + T_t\beta_4 + c_i + u_i,$$

(1)

where c_i is a time-invariant, household-specific effect. Table 3.2 provides details about the control variables, X and Z.

Table 3.2 Control Variables in Empirical Models of Household Welfare Level

Time-Variant (X)

Head gender	Gender of the household's head, 1 = male, 0 = female
Head age	Number of years the household's head has been alive
Head education	Number of years of the household head's formal education
Head civil status	Household head's civil status, 1 = married, 0 = otherwise
Head has a formal job	Dummy variable, 1 = head of the household had a formal job the previous year, 0 = otherwise
Household size	Total number of individual household members
Dependency ratio	Ratio of the total family members under 18 years of age to total household family members
Household mean age	Mean age (years) of total family members in the household
Household mean education	Mean number of years of education of all household's family members
Household business	Dummy variable, 1 = household head owned a business, 0 = otherwise
Household shocks	Total number of idiosyncratic and covariate shocks faced by the household family members during the previous year
Household insurance	Dummy variable, 1 = some family members had health insurance, 0 = otherwise

Time-Invariant (Z)

Urban community	Dummy variable, 1 = household is living in an urban community of more than 10,000 inhabitants, 0 = otherwise
Southern region	Dummy variable, 1 = household was in the southern region, 0 = otherwise
Central region	Dummy variable, 1 = household was in the central region, 0 = otherwise

A major advantage of our data set is that it differentiates treatments and controls for each microfinance program. Including reliable, predetermined controls in the data set improves our ability to identify the impact of the different microfinance programs. Nevertheless, we still need to control for possible remaining self-selection biases and program placement biases. To

attain unbiased estimates of the causal impact of membership in a microfinance program on household welfare, we must account for all time-varying and time-invariant observable and unobservable control variables that affect household welfare and correlate with membership in the microfinance program. We thus control for observable time-varying variables by including relevant determinants of household welfare, and we try to control for program placement bias by including regional dummies and a dummy for urban areas (see Appendix 3-1 and 3-2). The main problem we face thus are the unobserved variables that cannot be included directly in the model. For example, it may be the case that some household characteristics, such as innovation skills, affect both the likelihood of becoming a member of a microfinance program and the possibility of escaping poverty.

We start by conducting a Hausman test to determine if there is any correlation between the unobserved time-invariant variables c and the other regressors in the model. If the test indicates no correlation, we can estimate a random effects model. That is, if all unobserved factors that affect household welfare are randomly distributed across cross-sectional units and the unobserved time-invariant individual effects are uncorrelated with all other regressors in the model, a random effects model is preferable, because it would be more efficient than ordinary least squares or a fixed effects panel estimator. However, if the Hausman test indicates correlation between the unobserved time-invariant variables and other regressors, the random effects model yields inconsistent and likely biased estimators. Therefore, we would need to rely on another estimator in this case. A fixed-effects model assumes that all observed and unobserved differences across the cross-sectional units can be captured by differences in the constant term (fixed effects). It also allows the unobserved effects to correlate with the included variables, because the estimator eliminates fixed effects from the model. However, it eliminates anything that is time invariant and cannot identify such variables. Our main

independent variable, "being a member of a microfinance program" is time invariant for most of the program, so we rule out the fixed effects estimator.

Instead, we use the Hausman-Taylor (HT) (1981) estimator, which assumes that the set of explanatory variables contains both time-varying and time-invariant variables. A subset of both types is assumed to be exogenous and uncorrelated with the unobserved time-invariant individual effects, though some of both types of variables may correlate with the time-invariant individual effects. The HT estimator can identify time-invariant determinants; it also is more efficient than the fixed effects approach, which essentially assumes that all regressors are correlated with the unobserved fixed effects and thus that all time-varying observed variables are instrumented by their deviation from individual means. If only some regressors correlate with the unobserved individual effects, not all variables need to be instrumented. By differentiating between exogenous and endogenous regressors, the HT estimator accounts for this possibility. Furthermore, the HT model uses the variation between and within strictly exogenous variables in other periods as instruments. The individual means of the strictly exogenous covariates serve as instruments for the time-invariant covariates, correlated with the individual effects (Baltagi, 2001).

We further note that the HT model, similar to ordinary least squares, the random-effects model, and the fixed-effects estimator, assumes that none of the regressors is correlated with the individual time-varying disturbance terms. If they do, using an instrumental variable technique can solve the problem. As is common, our data set does not include reliable outside instruments, so we rely on random effects or HT estimates. However, we carefully test the reliability of the assumption that none of the regressors correlates with the individual time-varying disturbance terms by applying an overidentification test of the instruments, using the

Hansen J statistic. In this test of the null hypothesis that the excluded instruments are uncorrelated with the error term, a high p-value would provide some support for the prediction that none of the regressors is correlated with the individual time-varying disturbance terms. In addition, we test the power of the (internal) instruments in the HT estimator by using the Craig-Donald Wald F statistic, which tests the null hypothesis of weak instruments. We use the critical values applied by Stock-Yogo. Finally, we present robust standard errors based on bootstraps with 250 replications. This procedure is suitable when the asymptotic sampling distribution is difficult to derive for an instrumental variable estimation, such as the HT method.

3.5 Estimation Results

In total, we estimated seven specifications of our empirical models of household welfare. We start by estimating the two models that use the entire sample and provide the results in Table 3.3. Model 1 does not distinguish between different microfinance programs and thus provides an estimate of the average impact of being a member of a microfinance program in Mexico. Model 2 assumes that the impact of the different programs may differ, so it features separate dummies for each one. Because the Hausman test indicates that the unobserved time-invariant variables correlates with the other regressors, we present these results using the HT estimator.

Table 3.3 Estimates of the Impact of Microfinance Program Participation on Annual Household Per Capita Expenditures (MXN$), 2004–2007

	Hausman-Taylor Estimator	
Model	1	2
Variable	Pooled Sample	Five Independent Programs
Panel A. Time-Invariant Endogenous		
Treatment Group	8700.8**	
	[0.013]	
SACP Program		13787.6**
		[0.019]
PATMIR Program		24964.9
		[0.103]
MFI Program		-19033.3
		[0.226]
BANSEFI Program		10357.3
		[0.471]
COOPERA Programme		-38983.0*
		[0.060]
Panel B. Time-Variant Exogenous		
Head gender (1 = male)	2429.5	2788.1
	[0.157]	[0.116]
Head age (# years)	-46.49*	-63.47**
	[0.083]	[0.047]
Head education (number of years)	475.0***	267
	[0.004]	[0.119]
Civil status of the head (1 = married)	-3196.6*	-3220.2
	[0.093]	[0.109]
Head has a formal job	226.1	-770
	[0.833]	[0.552]
Household size (# individuals)	-2069.4***	-2131.6***
	[0.000]	[0.000]
Household dependency ratio	-3965	-5299.8*
	[0.149]	[0.092]
Household mean age (# years)	139.1**	105.2*
	[0.010]	[0.066]
Household mean education (# years)	1038.7***	563.7**
	[0.000]	[0.013]
Household owns a business	5832.7***	4503.8***
	[0.000]	[0.000]
Household number of shocks	883.2***	966.4***
	[0.000]	[0.000]
Household insurance	911.7	1762.5***

	[0.111]	[0.003]
Year dummy 2004	3771.2***	3190.5***
	[0.000]	[0.000]
Year dummy 2006	-643.4**	-430.6
	[0.048]	[0.172]
Year dummy 2007	2166.5**	2813.9***
	[0.022]	[0.002]
Panel C. Time-Invariant Exogenous		
Urban community	1297.9**	3755.1***
	[0.032]	[0.008]
Southern region	-906.1	2043.1
	[0.200]	[0.487]
Central region	2753.5***	6397.3**
	[0.000]	[0.020]
Constant	7930.4*	11050.1**
	[0.050]	[0.018]
Number of observations	18933	18933
Number of households	6976	6976
Number of explanatory variables	19	23
p-value, Hausman test (FE vs. RE)	0.0010	0.0024
p-value, Hansen J statistic	0.0023	0.0522
Craig-Donald Wald F statistic Stock-Yogo weak identifier test of critical values	47.279	4.65
5% maximal IV relative bias	21.41	21.41
10% maximal IV relative bias	11.51	11.51
20% maximal IV relative bias	6.42	6.56
30% maximal IV relative bias	4.63	4.80

Notes: Bootstrap standard errors with 250 replications served to estimate both equations. The p-values obtained from these estimations appear in brackets below the corresponding parameters. FE = fixed effect, RE = random effect, IV = independent variable.
***Significant at 1%.
** Significant at 5%.
* Significant at 10%.

The results for Model 1 suggest that on average, membership in a Mexican microfinance program reduces poverty: The "Treatment Group" dummy is highly significant with a positive sign. However, Model 2 reveals that the impact differs considerably, depending on the program joined. Whereas the SACP program appears to improve household welfare,

membership in the PATMIR, MFI, and BANSEFI programs does not contribute to poverty reduction. Being a member of COOPERA even seems to have a negative impact.

The results in Table 3.3 offer an initial assessment of the impact of different microfinance programs in Mexico. However, the p-value of the Hansen J statistic in both estimates also rejects the null hypothesis that the excluded instruments are uncorrelated with the error term, which may imply that the estimation results are biased. Moreover, the Craig-Donald F statistic of Model 2 is low, such that the (internal) instruments appear weak. Therefore, we offer this first set of estimates with some caution.

The tests for the reliability of the instruments also suggest problems with the HT estimates, so we undertake estimates for different samples in each microfinance program, namely, the treatment and control households for each program. By using different samples, we allow the coefficients of the control variables to differ for each program. However, the smaller samples reduce the degrees of freedom per estimate, though the number of observations for each program estimate remains quite high. The number of observations is lowest for the MFI program sample, but even it exceeds 900 observations.

We provide these estimates for the separate samples in Table 3.4, using different models for each program. The Hausman test suggests no correlation between the unobserved time-invariant variables and the other regressors for the BANSEFI and COOPERA programs, so we use the random effects estimator for these samples. For the other programs, the estimates are based on the HT estimator.

Table 3.4 Estimates of the Impact of Five Mexican Microfinance Programs on Annual Household Per Capita Expenditures (MXN$), 2004–2007

	A. Hausman-Taylor Estimator (HT)			B. Random Effect Estimator (RE)	
Model	1	2	3	4	5
Program	SACP	PATMIR	MFI	BANSEFI	COOPERA
Panel A. Time-Invariant Endogenous					
SACP Program	15231.9***				
	[0.005]				
PATMIR Program		15535.4***			
		[0.004]			
MFI Program			-9958.2*		
			[0.082]		
BANSEFI Program				3830.4***	
				[0.007]	
COOPERA Program					-1625.1
					[0.783]
Panel B. Time-Variant Exogenous					
Head gender (1 = male)	2812.3	-1790.8	809.3	-869.7	9625.8
	[0.356]	[0.434]	[0.777]	[0.709]	[0.217]
Head age (# years)	-31.03	-105.3**	50.09	96.75	-523.2**
	[0.414]	[0.033]	[0.349]	[0.494]	[0.022]
Head education (number of years)	563.9*	214.3	336.2	297	77.51
	[0.062]	[0.126]	[0.122]	[0.242]	[0.900]
Civil status of the head (1 = married)	-4347.1	625.4	-2744.6	1750.3	-13878.5
	[0.232]	[0.718]	[0.376]	[0.439]	[0.119]
Head has a formal job	-587.5	-924.5	1458.9	1609.6	802
	[0.613]	[0.572]	[0.389]	[0.687]	[0.722]
Household size (# individuals)	-2336.1***	-1513.7***	-1699.9***	-1575.2***	-1728.8**
	[0.000]	[0.000]	[0.000]	[0.002]	[0.047]
Household dependency ratio	-1739.9	4000.2	5031	-9969.4*	-32869.2*
	[0.627]	[0.242]	[0.376]	[0.094]	[0.092]
Household mean age (# years)	74.15	343.7***	93.47	74.64	-197.3
	[0.257]	[0.009]	[0.389]	[0.486]	[0.540]
Household mean education (# years)	1003.5**	776.1***	1234.6***	1020.1***	-1835
	[0.027]	[0.001]	[0.000]	[0.001]	[0.226]
Household owns a business	6255.0***	4063.7***	4059.8***	6383.8***	3551.8
	[0.000]	[0.000]	[0.000]	[0.001]	[0.149]
Household number of shocks	959.4***	919.1**	485.2*	-2.426	1165.2*
	[0.000]	[0.027]	[0.091]	[0.997]	[0.084]
Household insurance	641.2	-45.84	1477.4	2605.1**	2942.7*
	[0.389]	[0.963]	[0.111]	[0.041]	[0.099]
Year 2004	4437.5***	2369.9***	-1583	1547.1	5618

	[0.000]	[0.000]	[0.227]	[0.122]	[0.237]
Year 2006	-600.6	193.6	-1499.6	-829.9	-3083.6**
	[0.185]	[0.780]	[0.187]	[0.322]	[0.021]
Year 2007	2028.2*	4303.6**	-1503.4	3716.1	-2151.3
	[0.064]	[0.034]	[0.196]	[0.264]	[0.102]
Constant	8788.6**	-2331.9	12596.1	4386.5	85076.3**
	[0.029]	[0.535]	[0.177]	[0.715]	[0.022]
Panel C. Time-Invariant Exogenous					
Urban community	2290.9**	4139.9***	1126.8	-4652.8	4636.7
	[0.046]	[0.008]	[0.357]	[0.123]	[0.352]
Southern region	-1390.7	695.5	-2260.8	8178.9	-18306.2**
	[0.197]	[0.549]	[0.227]	[0.108]	[0.017]
Central region	448.9	-1192.3	599	5360.4***	
	[0.705]	[0.628]	[0.752]	[0.000]	
Number of observations	9523	4324	936	2560	1590
Number of households	3486	1497	476	1014	503
Number of explanatory variables	19	19	19	19	18
p-value, Hausman test (FE vs. RE)	0.0057	0.0010	0.018	0.5222	0.8713
p-value, Hansen J statistic	0.5742	0.1295	0.5709		
Craig-Donald Wald F statistic	49.118	17.743	2.072		
Stock-Yogo weak identifier test critical values					
5% maximal IV relative bias	21.41	21.41	21.41		
10% maximal IV relative bias	11.51	11.51	11.51		
20% maximal IV relative bias	6.42	6.42	6.42		
30% maximal IV relative bias	4.63	4.63	4.63		

Notes: Bootstrap standard errors with 250 replications served to estimate both equations. The *p*-values obtained from these estimations appear in brackets below the corresponding parameters. FE = fixed effects, RE = random effects, IV = independent variable.
***Significant at 1%.
** Significant at 5%.
* Significant at 10%.

The results in Table 3.4 confirm the significant positive effect of being a member of the SACP program on household consumption. Moreover, being a member of PATMIR and BANSEFI seems to contribute to poverty reduction. In contrast with the test results in Table 3.3, the Hansen J statistic and Craig-Donald Wald F statistic now indicate support for the underlying assumption of the HT model that the regressors are not correlated with the individual time-varying disturbance terms.

We do not observe a significant impact of membership in the COOPERA program on household welfare; we find a negative impact of being a member of the MFI program. The latter result demands some caution though, because the value of the Craig-Donald Wald F statistic is very low, which indicates that the instruments are weak.

How can we interpret these results? It may be useful to compare our estimation results with the main focus of each microfinance program. The SACP and PATMIR programs offer a wide range of financial products, though they focus on savings products. In addition, BANSEFI focuses on savings products and does not even supply microcredit. The MFI program instead primarily uses microcredit, though some regulated institutions such as Compartamos Bank also offer savings. The focus of COOPERA is public cash transfers. Thus in the microfinance programs for which savings products are very important, membership seems to increase per capita expenditures, implying poverty reduction for the household. The largest effects emerge from SACP and PATMIR, the programs with most diversified services. Participation in them is associated with additional per capita expenditures of more than USD$1,374. In contrast, membership in the MFI program, which mostly offers credit, does not seem to help reduce poverty. Although more research is needed to study what drives theses outcomes, the results are in line with several recent randomized, controlled trials that indicate only a marginal role of microcredit but a much greater welfare-enhancing role for other microfinance products, such as savings which if provided by MFIs with a suitable institutional design to cover the specific needs of the targeted clientele, can lead to a larger impact on poverty reduction.

It is noteworthy that our regressions indicate negative welfare effects of the MFI program. This finding may reflect the program's strong focus on credit or arise because several MFIs within this program are highly commercialized and demand very high interest rates on loans.

The quick commercialization of microfinance has been widely criticized; the shift even induced some microfinance institutions to go public and act like normal, commercial banks. The most well-known example of this shift is Compartamos Bank, which is part of the MFI program in our sample. In contrast with the argument that the commercialization of microfinance is a positive development that improves both MFI performance and the availability of funds for the poor, we note that it implies that MFIs have moved away from their original mission. Commercialization also likely encourages MFIs to put shareholders' interests above those of the poor they serve. Our results thus provide some support for the argument against the commercialization of microfinance.

3.6 Conclusion

This study analyzes the impact of five microfinance programs on welfare using data from a longitudinal panel survey of 6,976 households conducted in Mexico during 2004–2007. Our study adds to extant research because we study not just the average impact of microfinance but also compare the effects of five different programs, each with its own goals and activities. Therefore, this investigation advances understanding of how various financial services provided through microfinancing contribute to poverty reduction. We also use an HT estimator to limit the problems associated with self-selection bias and program placement bias.

This study in turn reveals that only savings-oriented microfinance programs (i.e., SACP, PATMIR, and BANSEFI) exerted a positive, significant impact in terms of increasing household per capita expenditures. We do not find such effects for MFIs focused mainly on credit or for COOPERA, the program that facilitates cash transfers from the government. These findings are in line with studies by Roodman (2012) and Karlan and Appel (2011) that

suggest that savings products have a much greater impact on the welfare of the poor than does microcredit.

Most savings and credit cooperatives under SACP and PATMIR currently are undergoing regulation processes, which might affect the benefits that members reap from these programs. More research is needed to disentangle the thus far overlooked consequences of regulation policies on the financial sustainability and poverty outreach benefits of these financial intermediaries.

APPENDIX 3

Appendix 3-1 Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Minimum	Maximum
Real annual per capita expenditures (MXN$)	19089	18895.02	42977.74	0	2395459
Household part of the treatment group	19090	.54	.50	0	1
Client of a SACP institution	19090	.27	.44	0	1
Client of a PATMIR institution	19090	.12	.32	0	1
Client of BANSEFI	19090	.07	.26	0	1
Client of a MFI institution	19090	.03	.18	0	1
Client of COOPERA institution	19090	.05	.22	0	1
SACP Program	9599	.53	.50	0	1
PATMIR Program	4364	.51	.50	0	1
BANSEFI Program	2584	.54	.50	0	1
MFI Program	942	.69	.46	0	1
COOPERA Program	1601	.60	.49	0	1
Gender of the head (1 = male)	19089	.80	.40	0	1
Age of the head (number of years)	19089	48.66	15.49	16	99
Education of the head (number of year)	19029	5.80	4.58	0	23
Civil status of the head (1 = married)	19083	.79	.41	0	1
Head has a formal job (1 if has)	19030	.81	.39	0	1
Household size (number of family members)	19089	4.42	1.99	1	18
Household dependency ratio (# members < 18 years/total members)	19089	.33	.25	0	1
Household mean age (number of years)	19089	32.66	16.57	7.5	99
Household mean education (number of years)	19084	6.04	3.23	0	21
Ownership of a business (1 = own)	19066	.28	.45	0	1
Total number of shocks (idiosyncratic or covariant)	19090	1.26	1.64	0	7
Health insurance (1 = family member has insurance)	19081	.47	.50	0	1
Urban community	19090	.52	.50	0	1
Southern region	19090	.48	.50	0	1
Central region	19090	.34	.47	0	1
Year dummy, 2004	19090	.29	.46	0	1
Year dummy, 2006	19090	.21	.40	0	1
Year dummy, 2007	19090	.25	.43	0	1

Source: Authors' compilation; data set property of the BANSEFI bank.

Appendix 3-2 Correlation Matrix of Key Variables

	Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
(1)	Per-capita expenditure (MXN$ pesos)	1.0																							
(2)	Gender of the head (1 if male)	-0.014	1.0																						
(3)	Age of the head (years)	0.022	-0.130	1.0																					
(4)	Education of the head (year)	0.119	0.109	-0.422	1.0																				
(5)	Civil status of the head (1 if married)	-0.038	0.794	-0.180	0.111	1.0																			
(6)	Head has a formal job	0.003	0.304	-0.387	0.185	0.257	1.0																		
(7)	Number of family members	-0.126	0.237	-0.185	0.018	0.301	0.139	1.0																	
(8)	Dependency ratio (# members < 18 years/total members)	-0.113	0.067	-0.551	0.169	0.161	0.223	0.556	1.0																
(9)	Mean age of the family members (years)	0.080	-0.132	0.774	-0.306	-0.226	-0.320	-0.560	-0.790	1.0															
(10)	Mean Education of the family members (years)	0.132	0.056	-0.242	0.734	0.069	0.107	0.089	-0.012	-0.281	1.0														
(11)	Ownership of a business (1 if household own a business)	0.093	-0.037	0.030	0.087	-0.023	0.092	-0.013	-0.030	0.015	0.107	1.0													
(12)	Number of shocks (# of idiosyncratic or covariant shocks)	0.027	0.022	0.008	-0.063	0.016	-0.019	0.058	0.015	-0.021	-0.049	0.139	1.0												
(13)	Health insurance (1 if a family member has a health or life insurance)	0.049	0.023	0.076	0.183	0.017	-0.062	0.003	-0.076	0.066	0.212	-0.042	-0.081	1.0											
(14)	Urban community	0.053	-0.029	-0.015	0.145	-0.051	-0.049	-0.042	-0.051	0.021	0.151	-0.008	-0.018	0.117	1.0										
(15)	Southern Region	-0.035	0.027	-0.041	-0.035	0.026	0.054	0.003	0.017	-0.038	-0.051	0.065	0.023	-0.067	-0.274	1.0									
(16)	Central region	0.038	-0.029	0.045	-0.016	-0.016	-0.047	-0.021	-0.035	0.048	-0.004	-0.037	0.000	-0.055	0.249	-0.689	1.0								
(17)	Year dummy, 2004	0.037	0.007	-0.060	0.014	0.002	0.023	0.000	0.026	-0.045	-0.009	0.048	0.103	-0.156	0.008	0.012	-0.014	1.0							
(18)	Year dummy, 2006	-0.028	0.008	0.025	-0.012	0.013	-0.003	-0.004	-0.009	0.018	-0.009	-0.030	-0.052	0.030	-0.005	-0.020	0.020	-0.328	1.0						
(19)	Year dummy, 2007	0.006	-0.005	0.034	-0.005	-0.014	-0.011	0.011	-0.014	0.023	0.022	-0.043	-0.088	0.171	0.003	-0.001	-0.001	-0.373	-0.293	1.0					
(20)	Client of a SACP institution	0.110	0.044	0.029	0.215	0.052	0.009	-0.034	-0.095	0.049	0.255	0.097	-0.044	0.141	0.112	-0.131	0.138	0.000	0.010	-0.002	1.0				
(21)	Client of a PATMIR institution	-0.002	0.022	-0.001	0.056	0.036	0.050	0.035	-0.008	-0.022	0.079	0.093	0.004	-0.015	-0.187	0.225	-0.230	0.032	-0.009	-0.042	-0.221	1.0			
(22)	Client of a BANSEFI branch	0.004	-0.016	-0.013	0.004	-0.013	0.006	0.060	0.065	-0.051	0.016	-0.058	0.007	0.098	0.039	-0.080	-0.018	-0.021	-0.002	0.040	-0.170	-0.102	1.0		
(23)	Client of a MFI institution	-0.009	-0.018	-0.036	0.040	-0.020	0.018	0.014	0.020	-0.038	0.041	0.034	0.007	0.006	0.056	-0.035	0.082	-0.069	0.001	0.075	-0.114	-0.069	-0.053	1.0	
(24)	Client of a COOPERA institution	-0.033	0.027	0.083	-0.132	0.031	-0.051	-0.009	-0.047	0.076	-0.124	-0.054	0.007	0.040	-0.004	0.113	-0.032	-0.006	0.018	-0.008	-0.139	-0.084	-0.064	-0.043	1.0

Source: Authors' compilation; data set property of BANSEFI bank.

Chapter 4

Does Microfinance Reduce the Vulnerability of Households to Poverty? ♣

Abstract

This study examines whether membership of a savings and credit society (SACP) reduces the vulnerability of households to poverty. We use a representative survey from the National Savings and Financial Services Bank (BANSEFI) in Mexico, which consists of 14,245 observations taken over the period 2004−2007. By using Glejser's heteroskedasticity test, we show that membership of SACP institutions leads to (a) an increase in the level of annual household per capita income, per capita education expenses, and per capita expenditure and (b) a decrease in the variance of annual household per capita income, per capita education expenses, and per capita expenditure. These results provide convincing evidence that membership of SACP institutions indeed reduce vulnerability.

Keywords: Microfinance, Risk, Banking, Welfare, BANSEFI, Savings societies, Mexico.

4.1 Introduction

There is a growing body of literature focusing on the impact of microfinance on the ex post poverty status of households; however, there is a shortage of papers studying the role of microfinance in reducing households' vulnerability to poverty. This is unfortunate since what really matters is the ex ante risk that households that are non-poor now will become poor in the future or the ex ante risk that households that are poor now will remain in poverty in the future (Chaudhuri et al., 2002). In most developing countries, insurance and credit markets function poorly (Besley, 1995). As a result, poor households find it difficult to cope with the risk of events that could easily push them into extreme poverty — illness and death, theft of assets such as livestock, a bad harvest, job loss, physical insecurity, weather related events (droughts, floods, and earthquakes), or economic downturns such as price fluctuations (Christiaensen and Subbarao, 2005; Suryahadi *et al*., 2000). In such circumstances, policies aimed at assisting households to reduce vulnerability to poverty can be an important poverty reducing strategy (Holzmann and Jørgensen, 2001).

Household vulnerability and risk are two related concepts, yet there is no clear-cut definition of what a vulnerable household is. For instance, within the disaster risk assessment framework, vulnerability is defined by its relation to hazards. Thus, an external hazard that acts on a vulnerable entity, in our case a household, can lead to an undesirable outcome: a disaster. In contrast, in a food security context, vulnerability refers to an undesirable outcome (e.g. hunger, food insecurity, or famine) that vulnerable people face (Dilley and Boudreau, 2001). Policies to reduce a household's vulnerability aim either to eliminate the risk factors in the household's environment, to mitigate the household's exposure to those risk factors, or to strengthen its capacity to cope with them (Christiaensen and Subbarao, 2005). Our study focuses only on the latter aspect. More precisely, we proxy household vulnerability by the probability that a household with certain characteristics will become (or remain) poor.

The main aim of our study is to examine the hypothesis that the vulnerability to poverty of banked households is lower than that of non-banked households. Banked households are expected to use a wide-range of coping strategies including precautionary savings (e.g. liquid and non-liquid) relative to non-banked households. We test our hypothesis by focusing on one specific type of microfinance institutions in Mexico. More specifically, we concentrate on the savings and credit societies (SACPs) in Mexico.

The contribution of this study is threefold. First, our study is one of the few studies that examines whether membership of a microfinance institution helps to reduce the vulnerability to poverty. The only other recent study we are aware of is Swain and Floro (2012). Second, we use a unique dataset that allows one to differentiate between treatment and control households, which helps us to address the attribution question. Third, we use Glejser's (1969) heteroskedasticity tests to examine whether membership of an SACP increases the mean and reduces the variance of three alternative indicators for poverty. By using Glejser's (1969) heteroskedasticity tests, we are able to estimate the impact of membership of SACP on the mean and variance of different poverty indicators. Membership of an SACP may both increase the level and reduce the variance of a poverty indicator; in this case, we argue that the probability of being poor, i.e. the vulnerability, then reduces. We focus on three indicators: per capita income, per capita education expenses, and per capita expenditure. We use these indicators to measure household vulnerability to poverty for several reasons: (1) they are suitable measurements to evaluate the impact of being a member of savings and credit societies on household welfare level and its variability; (2) they are linked directly with a household's poverty dynamics and its exposure to risk; (3) they allow changes in the household's welfare status to be tracked over time, both in the short and in the long term.

The rationale for analysing per capita education expenses, which is a non-conventional measure that serves as a proxy for investment in children's schooling, is that, theoretically,

education has been identified as crucial in reducing long-term poverty (Schultz, 1961). It is related to GDP growth (Barro, 1991; Benhabib and Spiegel, 1994; Garcia De la Cruz, 2008; Mankiw *et al.*, 1992; Middendorf, 2006) and has an unambiguous positive effect on human capital formation. In fact, empirical studies (Behrman *et al.* 1989; Haveman and Wolfe, 1995; Schultz *et al.*, 1988) suggest that educational achievement is affected by household size and resources. Thus, if the households are financially constrained, their investments in human capital can be affected (Garcia De la Cruz, 2008). If that is the case, we expect that investment in children's schooling, facilitated through access to savings and credit facilities from the SACP institutions, can help to reduce a household's vulnerability to poverty.

An important advantage of conducting Gelsjer's heteroskedasticity test is that we do not need long-term time series to estimate variances, so that we can determine the impact on vulnerability even from cross-sectional data. The approach we use is to some extent similar to the Chaudhuri *et al*. (2002) approach.

The structure of this paper is as follows. Section 4.2 presents the theoretical framework on microfinance and risk. In section 4.3, we develop some hypotheses on the link between being banked and three different outcome indicators. Section 4.4 presents descriptive statistics of our dataset. In Section 4.5, we explain our empirical methodology. Finally, the main results and the conclusions are offered in sections 4.6 and 4.7, respectively.

4.2 The Role of Microfinance in Risk Mitigation

It is common to differentiate between covariate and idiosyncratic risks (Dercon, 2002). Idiosyncratic risks can be dealt with or managed within a community because they affect only a particular individual or household. In contrast, covariate risks are aggregate, are experienced across the economy, and affect everybody in the community. They cannot be shared and can

only be dealt with by means of formal or informal transfers (e.g. credit, insurance, public transfers) or mechanisms originating from outside the community.

Households use a variety of risk-management strategies to smooth their income and consumption levels. For instance, households in a community may informally agree to insure each other or provide state contingent transfers and remittances to friends and neighbors (Besley, 1995; Morduch, 1995; Rosenzweig, 1988). Households may also use their savings (Paxson, 1992; Paxton and Young, 2011), take loans from the formal financial sector (Udry, 1994), sell assets such as grain reserves and livestock (Deaton, 1992), or send their children to work instead of school in order to supplement their income (Jacoby and Skoufias, 1997). Additional strategies include income diversification, participation in credit and informal insurance arrangements such as rotating savings and credit associations (ROSCAs), kinship-based networks, multiple job holding, and engagement in other informal economic activities (Kochar, 1999; Morduch, 1995). However, these insurance mechanisms may not be efficient for dealing with covariate risks such as natural disasters. In such situations, access to resources for investment in mitigation becomes relevant. Financial-sector institutions that target households can play an important role here in assisting the poor with suitable insurance mechanisms for adjusting to these risks (Vatsa and Krimgold, 2000).

In low-income countries, the most important sources of credit for poor people to generate their livelihoods are informal institutions such as moneylenders, landlords, shopkeepers, friends, and family members (Fofana, 2010), particularly for non-banked people. However, people with access to deposit and credit facilities can, in addition to the informal sources, use a wide range of formal instruments to mitigate risk (e.g. loans, savings, life insurance, and cash transfer services). Theoretical and empirical literature (Kumar and Newport, 2005; Palier and Prevost, 2007) suggests that microfinance emerges as an efficient solution for risk coping through insurance and saving mechanisms and through the creation of microenterprises. It is

argued that microfinance helps to reduce the negative effect of idiosyncratic and covariate risks and prevents households from adopting costly self-insurance strategies in response to unanticipated income shocks. One way of doing so is by means of facilitating financial services that enable banked households to diversify their income sources (e.g. different jobs, regular employment, etc.), to increase their income-earning and asset-building opportunities. After weather disasters, for instance, microfinance has proved to assist farmers to rebuild their houses and re-establish their agricultural production, without having to rely on governmental disaster relief (Hoff *et al*., 2003). Even in extreme events, such as the Bangladesh major floods of 1988 or the 2004 Tsunami in Sri Lanka, microfinance played a crucial role in relief and rehabilitation alongside government efforts to deal with the adverse impact on the poor.

In Bangladesh, the Grameen Bank and the Bangladesh Rural Advancement Committee encompass more than 3 million clients and more than 750 non-governmental organizations operating microcredit schemes. They have delivered extra loans to meet consumption and investment expenses with a six-month extension of the repayment schedule and allowed clients to withdraw up to 50 per cent of their savings if needed in the event of disaster (Shah, 1999).

In Mexico, government efforts are not enough for relief and reconstruction in the event of risks such as earthquakes or floods. As a result, funds from public programs are shifted to assist the communities affected by these risks, a practice that is known to be disruptive to important development efforts of such programs. One of the alternative mechanisms that the Mexican government can do in such events is to transfer the risk to other parties, for instance to insurance companies and to capital markets (Kreimer *et al.*, 1999). However, market imperfections prevent these mechanisms from functioning well because poor people lack access to formal insurance and capital markets. Nevertheless, financial institutions such as

SACPs, which are the subject of this study, can play an important role in reducing vulnerability to poverty.

4.3 Hypothesis Development

Participation in a microfinance program may help to reduce vulnerability to poverty since microfinance institutions may provide loans and savings possibilities to its credit constrained members. The loans and accumulated savings may help households to reduce the level of poverty and to deal with shocks, especially in case of idiosyncratic shocks. Empirical evidence suggests that microfinance participation has a positive effect on the smoothing of income and consumption in the event of risk. This is due to a positive link between the financial services being offered by microfinance institutions (MFIs), such as savings, and the reduction of uncertainty (Carroll *et al.*, 1992; Paxson, 1992). In line with this, Lee and Sawada (2010) found in rural Pakistan that the precautionary savings motive is more pronounced when access to credit markets for the poor is limited, as is the case in Mexico. Further research (Paxson, 1992; Paxton and Young, 2011; Paxton and Zhuo, 2011) supports the role of savings as a buffer stock to cope with income variability due to economic shocks. According to the latter studies, households accumulate stock savings prior to a shock and make use of these during or in the aftermath of shocks to smooth their income and consumption. For instance, Shoji (2009) found that a contingent repayment schedule of savings and installments during natural disasters such as the Bangladeshi major floods of 2004 functioned as a safety net by decreasing the probability that MFI recipients skip meals by 5.1 per cent; this was particularly so for the landless and females.

Consequently, we expect that SACP members in Mexico are better able to cope with risk in comparison to non-banked households. Our first hypothesis is formulated as follows:

H1 Household participation in savings and credit societies improves the mean of annual per capita income and per capita expenditure and reduces the variance of annual per capita income and per capita expenditure

Some theoretical and empirical work (Armendariz and Morduch, 2010; Garcia-De la Cruz, 2011; Garcia De la Cruz, 2008; Paxton and Young, 2011; Paxton and Zhuo, 2011) suggests that access to formal deposit facilities has a positive impact on human capital formation, particularly on schooling choices and/or in financing major school expenses. Pitt and Khandker (1998) and Ersado (2005) found that membership of microcredit programs in Bangladesh improved children's schooling and reduced child labor. However, another stream of literature (Jacoby, 1994; Maldonado and González-Vega, 2008; Wydick, 1999) suggests that access to credit and income-earning opportunities in the family enterprise may increase the marginal product of child labor, leading to an increase in the opportunity cost of schooling. In addition, Jacoby (1994) pointed out that, if hired labor and child labor are not easily substitutable, the demand for child labor can lead to a negative impact on investment in children's schooling.

Furthermore, Paxton and Young (2011) pointed out that higher levels of education have been associated with higher levels of total savings. An evaluation study of the PATMIR Program (Garcia-De la Cruz, 2011, pp. 9-12), which includes some of the sampled SACP institutions in this study, reports that clients used 14-28% of their loans and 12-29% of their savings for education expenses. Similarly, 20% of non-clients declared to be willing to save and 20-40% claimed to have access to credit for the purpose of covering education expenses. In a related study, Garcia-De la Cruz (2008) found that access to both deposit and loans, in comparison with no access, reduced the schooling gap by 1.2 years. After adding an interaction term of both probabilities (access to deposits and loans), the author found that access to credit

increases rather than reduces the gap. As a result, the latter study pointed out that financial institutions offering deposit facilities, rather than simply loans, may bring additional benefits on human capital formation. Our study aims to shed some light on this issue by testing whether SACP clients do better in terms of per capita education expenditure, and whether they have a lower variability in per capita education expenditure as compared to a control group of non-banked households. We hypothesize:

H2 Being a client of a savings and credit society improves investment in children's schooling and reduces its variance

4.4 Data

This study uses data from a representative household panel survey from 2004 until 2007, commissioned by the National Savings and Financial Services Bank (BANSEFI) in Mexico through a collaborative project with the Ministry of Agriculture, Livestock, Fisheries, and Rural Development (SAGARPA) and supported by a World Bank project on rural financial markets. The main objective of the survey was to learn about the differences in access to financial services for a sample of banked and non-banked households.

Based on differences in access to formal financial institutions, it is possible to collect information on two groups of households: (1) banked households, defined as those with at least one family member identified as being a client of a microfinance institution (in our case a savings and credit society) at the time of the survey and five years prior to it; (2) non-banked households, defined as those that did not have any family member who was a client of a microfinance institution at the time of the survey and five years prior to it. The latter households' classification has been proposed in empirical studies (Paxton and Young, 2011) that analyzed the liquidity profiles of Mexican households. We use this grouping because it

seems suitable to test hypotheses on the impact of being a member of an SACP institution on reducing household vulnerability to poverty.

To ensure comparability between both groups of households, enumerators guaranteed that banked and non-banked households shared similar socio-economic characteristics and are living in a similar environment, either in the same or in a nearby community. Information is gathered at the household level using probability proportional to size sampling techniques that are carried out in several steps. First, all Mexican states are classified according to one of the three geographic regions: northern, central, and southern. Next, the survey team identifies four strata according to the total number of clients that each financial institution had at the time of the survey: very small, small, medium, and large. In the first stage of the sampling, the number of institutions that are randomly selected from each stratum is proportional to the size of the stratum (number of clients). In the second stage, the banked households (treatment group) are selected randomly from the previously selected sample of institutions in the first stage. The sampling framework is based on the client directory of each financial institution (Berumen and Associates, 2006).

Once the communities where the banked households (treatment group) were living had been established, an additional sample of non-banked households (control group) that were living in the same or in nearby communities as the banked households were randomly selected. Some filter questions were asked to households in such communities to identify households that did not have any family member who was a client of any financial institution at the time of the survey and five years prior to it. Consequently, a comparable group of households that passed the filter questions were identified as non-banked and formed part of the control group (Berumen and Associates, 2006).

The four waves of the survey (2004, 2005, 2006, and 2007) correspond to about 5,700 households. The survey contains detailed information on household income, expenditures, credit and savings, risk, employment, remittances, cash transfers, assets, liabilities, household demographic characteristics, and regional variables (Zapata, 2007). The overall survey, including banked and non-banked households, encompasses 19,090 observations, which correspond to households linked with one of the four different programs: (1) the Savings and Credit Societies (SACPs); (2) the BANSEFI bank; (3) the traditional MFIs; and (4) the COOPERA cash transfers program. However, for the purpose of this study, we use information from one program only, SACPs. This program is by far the largest; it corresponds to a random sample of 14,245 observations. SACPs in Mexico include cooperatives, credit unions, cajas de ahorro, cajas solidarias, and savings and loan associations that are owned and managed by its members. They focus primarily on savings, although sometimes offer credit and other assistance (e.g. financial literacy, technical assistance, education, health, etc.) to its members. We exclude the other programs in order to have a more homogeneous sample of microfinance institutions that offer similar microfinance services. In Table 4.1, we present a summary of observations per annum and by household category.

Table 4.1 Number of Observations of Panel Survey

Year	Banked	Non-banked	Total	%
2004	2,297	2,069	4,366	30.65
2005	1,886	1,739	3,625	25.45
2006	1,542	1,319	2,861	20.08
2007	1,789	1,604	3,393	23.82
Total	7,514	6,731	14,245	100.00

Source: Author's compilation. Dataset property of the BANSEFI bank.

From this information, it is possible to make an account of the most relevant coping strategies used by households according to their frequency (see Table 4.2). In doing so, we identify that both banked and non-banked households mitigate risk differently. The data in Table 4.2

suggest that there is no unique alternative used by households to mitigate risk. They use a combination of formal and informal coping strategies to cope with shocks that relates to the household's specific characteristics and context. Among the coping strategies, we can see that households used savings and acquired loans, cut consumption, searched for jobs, and turned to relatives and friends for assistance when needed in order to mitigate risk. All these alternatives were used by households to improve their welfare level on different dimensions (e.g. income, consumption, education, health, or production process) and to reduce their vulnerability and poverty level. Based on this, we expect that all strategies, including their membership in SACP savings institutions, could have played an important role in reducing poverty and vulnerability at least in the short term.

Table 4.2 Risk Coping Strategies used by Banked and Non-Banked Households in Mexico (2004-2007)

Coping Mechanism	Banked	%	Non-Banked	%	Total	%
Cut consumption	702	9.76	700	9.74	1402	19.50
Sell assets	44	0.61	30	0.42	74	1.03
Pawn personal items	9	0.13	10	0.14	19	0.26
Use of savings	445	6.19	305	4.24	750	10.43
Loans[1]	387	5.38	300	4.17	687	9.56
Stop paying debts	36	0.50	21	0.29	57	0.79
Job search	310	4.31	385	5.36	695	9.67
Temporary job	190	2.64	230	3.20	420	5.84
Work extra hours	48	0.67	63	0.88	111	1.54
Aid from family	150	2.09	172	2.39	322	4.48
Aid from friends	90	1.25	145	2.02	235	3.27
ROSCA[2]	4	0.06	2	0.03	6	0.08
Social insurance	58	0.81	42	0.58	100	1.39
Government aid	19	0.26	47	0.65	66	0.92
Reduce prices of products	47	0.65	24	0.33	71	0.99
Product promotion	57	0.79	22	0.31	79	1.10
Other	162	2.25	146	2.03	308	4.28
Nothing	957	13.31	830	11.55	1787	24.86
Total	3715	51.68	3474	48.32	7189	100.00

[1] Loans with and without interest
[2] ROSCA: rotating savings and credit association
Source: The present authors' compilation with data property of the BANSEFI bank.

In addition to the information provided in this section, we present a detailed description of the data in the Appendix 4. In Appendix 4-2 we present a definition of the core variables used to estimate the empirical models underlined in section 4.6 below. In Appendix 4-3, we present some descriptive statistics and t-tests of mean differences between banked and non-banked groups with unequal variance of key variables used in all empirical models; finally, in Appendix 4-4, we show a correlation matrix for the most relevant variables. From the results of the t-tests given in Appendix 4-3, we can observe some differences in household characteristics between both banked and non-banked households. These findings led to the conclusion that banked and non-banked households differ in some demographic characteristics such as their education level and on their use of financial services, particularly savings. We decided to account for these differences in our empirical models of household welfare level and its variability. In the following section, we describe the methodology used to answer the research question that we formulated for this empirical research.

4.5 Empirical Method

In this study we analyzed, by means of Glejser's (1969) heteroskedasticty test, the impact that banking with savings and credit societies has on risk mitigation. This method is described below.

4.5.1 Heteroskedasticity test

This approach has previously been applied in the financial literature by Adams *et al.*(2005); Cheng (2008); Pathan (2009) and Galema *et al*. (2012), and others. This test permits the quantification of performance variability both across-household and within-household. One of the main advantages of the test is that vulnerability to poverty can be assessed by using cross-

sectional data, and hence that long-term time series data, which are often lacking, are not needed. The test is structured in two steps.

4.5.1.1 *First step*

The first step consists of estimating an empirical model that captures the effect of membership in a savings and credit society on the level of a particular outcome indicator. In doing so, we estimated a welfare equation (e.g. per capita income, per capita education expenses, or per capita expenditure) on a binary indicator capturing the membership status of the household, plus a set of control variables by means of an ordinary least square (OLS) method. The results of this estimation offer parameters of the mean value of the outcome variable conditional on a set of explanatory variables. The empirical specification for this step can be written as follows:

$$Y_{i,t} = Y(H, \alpha, \varepsilon) = \alpha_0 + \alpha_1 Banked_{i,t} + \alpha_2 X_{i,t} + \varepsilon_{i,t}, \tag{1}$$

where $Y_{i,t}$ is a continuous variable referring to one of three outcome indicators under study: per capita income, per capita education expenses, or per capita expenditure of household i at time t. H is the vector of independent variables. $Banked_{i,t}$ is a binary indicator that takes 1 if household i was a client of a saving and credit society at time t and zero if not. The $X_{i,t}$ indicator is a vector of livelihood capital variables such as human, social, financial, natural, physical, and location capital as well as context-specific variables such as regional dummies referring to household i at time period t. The error term, $\varepsilon_{i,t}$, represents the unexplained part of $Y_{i,t}$. α_0 is a constant term, and α_1 and α_2 are parameters to be estimated.

4.5.1.2 *Second step*

Similar to the procedure in the first step, we again evaluated the impact of being a client of a savings and credit institution but this time on the variance of the outcome indicator. To

achieve this, we estimate the variance of $\varepsilon_{i,t}$, and hence the variance of $Y_{i,t}$, on the same set of independent variables, including the binary indicator of membership in an SACP institution. This implies that we assume that the variance is not equal for all households but may depend on household characteristics, context-specific variables, and the membership of an SACP. The explicit modeling of the variance of the disturbance terms is similar to a heteroskedasticity correction, hence the term 'heteroskedasticity test'. The variance of the unexplained part of $Y_{i,t}$ is given by

$$\varepsilon_{it}^2 = H\beta = \beta_0 + \beta_1 Banked_{i,t} + \beta_2 x_{i,t} + v_{i,t}.$$

(2)

In equation (2), the dependent variable is expressed as a variability measure $\varepsilon_{it}{}^2$, which includes both across-household and within-household variability. To test whether household welfare variability is affected by membership in a savings and credit society, we used a t-test for the null that $\beta_1 = 0$. A negative β_1 and a high t-statistic indicate that being banked decreases the variance of a particular outcome indicator. We hypothesize that $\beta_1 < 0$ and hence that being banked reduces the variability of per capita income, per capita education expenses, and per capita expenditure of household i at time t.

By making some assumptions about the distribution of Y, we would, in principle, be able to estimate the vulnerability (v) to poverty, i.e. the probability that a household is poor, or in other words the probability that Y is below some appropriate poverty level: $v = \Pr(Y \leq z)$. Assuming normality, this would be given by

$$\hat{v} = \Pr\left[\hat{Y} < z\right] = \Phi\left[\frac{z - H\hat{\alpha}}{(H\hat{\beta})^{0.5}}\right],$$

where Φ denotes the cumulative density of the standard normal.

However, we are not interested in the vulnerability level as such, which also would depend on the value of the threshold variables z. Rather we are interested in the question whether being a member of an SACP reduces vulnerability to poverty. The expression above shows that this will always be the case if membership of an SACP increases the mean of Y and at the same time reduces the variance of Y; this will be the case if α_1 is significantly positive and β_1 is significantly negative. In the remainder of the analysis we will focus, therefore, on the impact of being *Banked* on the mean and variance of the three household welfare indicators we look at.

4.6 Estimation Results

In this section we present the results of three empirical models discussed in section 4.5. The difference between the three models is that they are different channels by which it is possible to identify the contribution of microfinance in improving household welfare and in reducing vulnerability to poverty. By using a unique indicator, it is difficult to unravel different mechanisms by which microfinance participation, in SACP savings institutions, can contribute to poverty reduction. While per-capita income and per-capita expenditure are two straightforward measurements used in impact assessment of microfinance, per-capita education expenses is an innovative household welfare measurement that can help to disentangle why microfinance recipients save and borrow from savings and credit societies in Mexico in a continuous basis. It may be the case that households with membership in SACPs institutions aim to cover school fees and other education expenses of their children. If that is the case, financial products from these institutions can contributing to improvements in human capital and to poverty reduction.

In Table 4.3 we present the outcomes from the first step of Glejser's (1969) heteroskedasticty test corresponding to the level of the different dependent variables as described earlier. We have estimated the three models by means of the ordinary least square (OLS) method with robust standard errors.

Table 4.3 Estimation Results on the Impact of Membership in an SACP Institution on Household Welfare Level − First Step of the Glejser's (1969) Heteroskedasticty Test (OLS)

Model	1	2	3
Variable **Welfare Indicator**	**Per capita Income (log)**	**Per capita Education Expenses (log)**	**Per capita Expenditure (log)**
Banked (yes=1)	**0.221*****	**0.149*****	**0.208*****
	[0.000]	[0.000]	[0.000]
Panel A. Human Capital			
Head gender (1 if female)	-0.170***	0.0214	0.0496*
	[0.001]	[0.398]	[0.055]
Head age (years)	0.00974***	0.00625***	0.00101**
	[0.000]	[0.000]	[0.032]
Head marital status (1 if married)	-0.144***		0.0615***
	[0.004]		[0.010]
Head formal education			0.0165***
			[0.000]
Head has completed primary school (yes=1)	-0.0343	0.0505***	-0.0247*
	[0.202]	[0.009]	[0.053]
Head has completed secondary school (yes=1)			-0.0518***
			[0.001]
Head speaks an ethnic language (yes=1)	0.0166	-0.102***	-0.192***
	[0.566]	[0.000]	[0.000]
Family size (log)	-0.547***	-0.631***	-0.580***
	[0.000]	[0.000]	[0.000]
Dependency ratio		0.172***	-0.268***
		[0.004]	[0.000]
Percentage of female adults	0.095		-0.209***
	[0.252]		[0.000]
Household nutritious status (1 if good)	0.190***		
	[0.000]		
Household is illiterate (yes=1)	0.158*		-0.0545
	[0.074]		[0.157]
Household mean years of schooling	0.0495***	0.100***	0.0566***

	[0.000]	[0.000]	[0.000]
Household completed primary education (yes=1)	-0.0292	-0.0212	-0.0186
	[0.436]	[0.456]	[0.258]
Household completed secondary education (yes=1)			-0.0737***
			[0.008]
Family labour (no. of employees)	0.0234		0.115***
	[0.289]		[0.000]
Non-family labour (no. of employees)	0.155***		0.165***
	[0.000]		[0.000]
Panel B. Social Capital			
ROSCAS (1if participated)	0.0729**	0.0724***	
	[0.017]	[0.001]	
Family and friends aid (gifts in cash: yes=1)	0.0672*	-0.0925***	
	[0.065]	[0.003]	
Trader relationship (yes=1)	-0.0515		-0.0138
	[0.225]		[0.527]
Moneylender relationship (yes=1)	-0.0645		0.0887*
	[0.441]		[0.055]
Shop relationship (yes=1)			0.150***
			[0.000]
Panel C. Financial Capital			
Number of goats	0.000887	0.00897*	
	[0.940]	[0.065]	
Number of cows			0.00963***
			[0.000]
Number of pigs	0.00592*		
	[0.050]		
Amount of credit (log)	0.0323***	0.0118***	0.0251***
	[0.000]	[0.000]	[0.000]
Amount of savings (log)	-0.0184***	-0.000824	0.00497***
	[0.000]	[0.779]	[0.003]
Income from diversification (log)	0.101***		-0.0000203
	[0.000]		[0.987]
Income from business (log)	0.0815***	0.00808***	
	[0.000]	[0.000]	
Public cash transfers programme (yes=1)			-0.224***
			[0.000]
Amount of remittances (log)	0.0585***		
	[0.000]		
Value of assets (log)	0.168***		
	[0.000]		
Panel D. Natural Capital			

Land proprietorship (yes=1)		0.037	0.128***
		[0.121]	[0.000]
Panel E. Physical Capital			
Clean water (1 if available)		0.0970***	
		[0.003]	
Electricity (1 if available)		0.197***	
		[0.008]	
Drainage (1 if available)	-0.0168	0.143***	
	[0.536]	[0.000]	
Phone (1 if available)		0.151***	
		[0.000]	
Panel F. Location Capital			
Urban community (>10,000 inhabitants)	-0.0516**	0.174***	
	[0.043]	[0.000]	
Southern region (yes=1)	-0.110***	-0.0426*	-0.103***
	[0.001]	[0.081]	[0.000]
Central region (yes=1)	-0.155***	-0.0948***	0.0459***
	[0.000]	[0.000]	[0.003]
Panel G. Additional Controls			
Year 2004	0.405***	-0.153***	
	[0.000]	[0.000]	
Year 2006	0.481***	0.0279	-0.0269**
	[0.000]	[0.285]	[0.029]
Year 2007		0.0217	
		[0.432]	
Constant	6.036***	4.889***	9.784***
	[0.000]	[0.000]	[0.000]
Statistics			
Number of observations	12769	8557	14245
Model degrees of freedom	32	26	29
Model sum of square	8599.6	2193.4	3820.7
Root mean square error	1.297	0.809	0.622
R-square	0.286	0.282	0.41
Adjusted R-square	0.285	0.28	0.409
F statistic	171.3	116.6	312.8
Akaike Information Criterion (AIC)	42909.8	20693.1	26940.6
Bayesian Information Criterion (BIC)	43155.8	20883.6	27167.5

OLS: ordinary least square
ROSCA: rotating savings and credit associations
SACP: savings and credit society

As we can see from Table 4.3, the individual regressions of the three different models suggest that being banked has a positive and significant effect on the mean values of log of per capita income by 0.221, log of per capita education expenses by 0.149, and log of per capita expenditure by 0.208.

In order to examine the impact of being a member of an SACP institution on a household's vulnerability to poverty, we also need to consider the impact on the variance of the three outcome indicators; this will be done by conducting the second step of Glejser's (1969) heteroskedasticty test.

In Table 4.4 we present the estimation results of three different empirical models based on equation (2), which were estimated with an OLS method with robust standard errors. For these estimations, we used the same set of explanatory variables as we did in equation (1) but now with the quadratic value of the residuals $\varepsilon_{i,t}^{2}$ from the first step as the dependent variable, which corresponds to the variability measure and includes both across-household and within-household variability.

Table 4.4 Estimation Results on the Impact of Membership in an SACP Institution on the Variability of Different Outcome Indicators−Squared Value of Residuals: Second Step of the Glejser's (1969) Heteroskedasticty Test (OLS)

Model	1	2	3
Variable Welfare Indicator	Per capita Income (log)	Per capita Education Expenses (log)	Per capita Expenditure (log)
Banked (yes=1)	**-0.258****	**-0.0663****	**-0.0372***
	[0.010]	[0.036]	[0.054]
Panel A. Human Capital			
Head gender (1 if female)	-0.182	-0.00536	0.000457
	[0.255]	[0.873]	[0.992]
Head age (years)	-0.00515*	0.00235**	0.000345
	[0.092]	[0.049]	[0.564]
Head marital status (1 if married)	0.115		-0.0402
	[0.502]		[0.320]
Head formal education (years)			-0.00105
			[0.655]
Head has completed primary school (yes=1)	0.102	-0.0421*	-0.0061
	[0.219]	[0.100]	[0.703]
Head has completed secondary school (yes=1)			-0.0259
			[0.125]
Head speaks an ethnic language (yes=1)	-0.106	0.0828**	0.0819***
	[0.245]	[0.016]	[0.000]
Family size (log)	-0.385***	0.0258	-0.038
	[0.000]	[0.499]	[0.146]
Dependency ratio		-0.184**	-0.00991
		[0.027]	[0.839]
Percentage of female adults	0.033		-0.0501
	[0.905]		[0.533]
Household nutritious status (1 if good)	0.176		
	[0.224]		
Household is illiterate (yes=1)	-0.23		0.135*
	[0.540]		[0.085]
Household mean years of schooling	-0.000487	0.0339***	-0.000438
	[0.975]	[0.000]	[0.900]
Household completed primary education (yes=1)	-0.0304	-0.0296	-0.0236
	[0.792]	[0.503]	[0.239]
Household completed secondary education (yes=1)			-0.000964
			[0.976]
Family labour (no. of employees)	0.0853*		0.0144

[0.065]		[0.244]
Non-family labour (no. of employees) 0.0478		0.151***
[0.117]		[0.000]

Panel B. Social Capital

ROSCAs (1if participated) 0.155	-0.00497	
[0.124]	[0.878]	
Family and friends aid (gifts in cash: yes=1) -0.353***	0.0447	
[0.001]	[0.305]	
Trader relationship (yes=1) -0.134		-0.0712***
[0.258]		[0.001]
Moneylender relationship (yes=1) -0.0209		0.038
[0.949]		[0.632]
Shop relationship (yes=1)		-0.0309
		[0.244]

Panel C. Financial Capital

Number of goats 0.00884	-0.00152	
[0.734]	[0.874]	
Number of cows		0.00459***
		[0.003]
Number of pigs -0.00339		
[0.436]		
Amount of credit (log) -0.0459***	-0.0033	0.00294*
[0.000]	[0.346]	[0.087]
Amount of savings (log) 0.0508***	0.00561	0.00231
[0.000]	[0.148]	[0.327]
Income from diversification (log) -0.143***		-0.00471***
[0.000]		[0.003]
Income from business (log) -0.137***	-0.000256	
[0.000]	[0.922]	
Public cash transfers programme (yes=1)		-0.0308*
		[0.063]
Amount of remittances (log) -0.0800***		
[0.000]		
Value of assets (log) 0.0446		
[0.121]		

Panel D. Natural Capital

Land proprietorship (yes=1)	-0.0149	0.0759***
	[0.659]	[0.000]

Panel E. Physical Capital

Clean water (1 if available)	-0.0202	
	[0.676]	
Electricity (1 if available)	-0.231**	

	Model 1	Model 2	Model 3
		[0.046]	
Drainage (1 if available)	0.0279	-0.0579*	
	[0.743]	[0.065]	
Phone (1 if available)		0.0168	
		[0.565]	
Panel F. Location Capital			
Urban community (>10,000 inhabitants)	0.444***	-0.0474	
	[0.000]	[0.118]	
Southern region (yes=1)	0.0969	0.0698**	-0.00754
	[0.360]	[0.028]	[0.747]
Central region (yes=1)	0.358***	0.168***	-0.00953
	[0.001]	[0.000]	[0.661]
Panel G. Additional Controls			
Year 2004	-0.644***	0.0151	
	[0.000]	[0.690]	
Year 2006	-0.907***	-0.0202	-0.0704***
	[0.000]	[0.570]	[0.000]
Year 2007		0.00198	
		[0.958]	
Constant	3.762***	0.588***	0.514***
	[0.000]	[0.000]	[0.000]
Statistics			
Number of observations	12769	8557	14245
Model degrees of freedom	32	26	29
Model sum of square	12266.3	147.8	229.1
Root mean square error	4.139	1.131	0.851
R-square	0.0532	0.0134	0.0218
Adjusted R-square	0.0508	0.0103	0.0198
F statistic	21.94	3.413	6.013
Akaike Information Criterion (AIC)	72547.3	26423.2	35860.8
Bayesian Information Criterion (BIC)	72793.3	26613.6	36087.7

OLS: ordinary least square
ROSCA: rotating savings and credit associations
SACP: savings and credit society

The results from this second step suggest that being banked in a savings and credit society in Mexico leads to a decrease in the variability of log of per capita income by 0.258, of log of per capita education expenses by 0.0663, and of log of per capita expenditure by 0.0372. All coefficients for the binary indicators of the banking status of a household were statistically significant at 5% in models 1 and 2 and at 10% in model 3, respectively. It is noteworthy that

our analysis provides new evidence that membership in microcredit programs not only improves investment in children's schooling (Ersado, 2005; Garcia De la Cruz, 2008; Pitt and Khandker, 1998), but also reduces the variability of this relevant welfare indicator. This improvement in children's investment in education and reduction of its variability is expected to bring additional benefits for households through human capital formation in the long term.

Overall, our results clearly indicate that being a cooperative member of a savings and credit society in Mexico helps to smooth per capita income, per capita education expenditure, and per capita expenditure. Since being a member of an SACP also increases the mean of these indicators, as shown in Table 4.3, the analysis strongly suggests that membership of an SACP savings institution reduces the probability to become poor, or in other words the vulnerability to poverty.

4.7 Conclusion

In this study, we focus on the potential positive effect of being a member of a savings and credit society on a household's vulnerability to poverty. The potential impact of being banked on the probability of becoming poor – our proxy for vulnerability – is a very important topic that has almost completely been ignored in the microfinance literature. Most importantly, in contrast to other studies that focus on the impact of microfinance on the level of some key welfare indicators, we examine its impact on both the level as well as the variance of a set of welfare indicators. We apply our analysis to SACP institutions in Mexico. We argue that, only if SACP membership is both positively related to the mean and negatively related to the variance, there is convincing evidence that SACP membership reduces the vulnerability to poverty. We use three outcome indicators: per capita income, per capita education expenses, and per capita expenditure.

We analyze a random sample of 14,245 observations over the period 2004–2007 with data gathered from a representative panel survey, property of the National Savings and Financial Services Bank in Mexico. We estimated three different empirical models and find convincing evidence that being a cooperative member of an SACP institution positively affects the mean of log of per capita income, log of per capita education expenses, and log of per capita expenditure; at the same time, such membership reduces the variance of these three outcome indicators. These results strongly suggest that being a member of an SACP institution reduces a household's vulnerability to poverty, which provides new evidence on the importance of microfinance for improving the welfare of a household.

Finally we would like to point at a possible area of further research. Although we tried to deal with selection problems as good as possible, e.g. by using a sample which includes treatment households and comparable control households, and by adding a long list of control variables which may correct for selection based on observables, our results may still be biased due to selection on unobservable. In order to test to what extent our results are driven by selection bias it would be recommendable to organise a randomised controlled trial on the impact of microfinance on the vulnerability to poverty, and compare these results with ours.

APPENDIX 4

Appendix 4-1 Collinearity Diagnostics

Variable	VIF	SQRT VIF	Tolerance	R-Squared
Per capita Income	1.63	1.28	0.62	0.38
Per capita Education Expenses	1.56	1.25	0.64	0.36
Per-capita Expenditure	2.48	1.57	0.4	0.6
Head gender (female=1)	3.42	1.85	0.29	0.71
Head age (years)	1.67	1.29	0.6	0.4
Head marital status (married=1)	3.09	1.76	0.32	0.68
Head formal education (years)	2.57	1.6	0.39	0.61
Head completed primary education (yes=1)	1.17	1.08	0.86	0.14
Head completed secondary education (yes=1)	1.27	1.13	0.79	0.21
Head speaks an ethnic language (yes=1)	1.31	1.14	0.77	0.23
Family size (log)	1.63	1.28	0.61	0.39
Dependency ratio	2.61	1.62	0.38	0.62
Percentage of female adults	2.33	1.53	0.43	0.57
Household's nutritious status (good=1)	3.08	1.76	0.32	0.68
Household is illiterate (yes=1)	1.01	1	0.99	0.01
Household's mean years of formal schooling	2.75	1.66	0.36	0.64
Household completed primary education (yes=1)	1.03	1.01	0.98	0.03
Household completed secondary education (yes=1)	1.04	1.02	0.96	0.04
Family labour (no. employees)	1.14	1.07	0.87	0.13
Non-family labour (no. employees)	1.09	1.05	0.92	0.08
ROSCAs (1 if participate)	1.09	1.05	0.91	0.09
Family aid (yes=1)	1.05	1.02	0.95	0.05
Trader relationship (yes=1)	1.1	1.05	0.91	0.09
Moneylender relationship (yes=1)	1.04	1.02	0.97	0.03
Shop relationship (yes=1)	1.12	1.06	0.89	0.11
Number of goats	1.01	1.01	0.99	0.01
Number of cows	1.06	1.03	0.94	0.06
Number of pigs	1.02	1.01	0.98	0.02
Amount of credit (log)	1.39	1.18	0.72	0.28
Amount of savings (log)	1.23	1.11	0.81	0.19
Amount of income from diversification (log)	1.45	1.2	0.69	0.31
Amount of income from family business (log)	1.55	1.25	0.64	0.36
Public cash transfer programme (yes=1)	1.49	1.22	0.67	0.33
Amount of remittances (log)	1.12	1.06	0.89	0.11
Value of assets (log)	1.79	1.34	0.56	0.44
Land proprietorship (yes=1)	1.42	1.19	0.71	0.29
Safe water (1 if available)	1.23	1.11	0.81	0.19
Electricity (1 if available)	1.06	1.03	0.95	0.05
Drainage (1 if available)	1.35	1.16	0.74	0.26
Phone (1 if available)	1.58	1.26	0.63	0.37
Urban community	1.48	1.21	0.68	0.32
Southern region	2.11	1.45	0.47	0.53
Central region	2.06	1.44	0.48	0.52

Appendix 4-2 Definition of Key Variables Used in the Empirical Models of Household Welfare

Indicator	Type	Description
Per capita Income (log)	Numeric	Log of total household's annual income (MXN$ real pesos) resulting from family business, liquid assets, and public cash transfers to the total family members
Per capita Education Expense (log)	Numeric	Log of total household's annual expenses (MXN$ real pesos) on children's enrollment in education such as registration fees, school supplies, school uniforms, lunches, and related costs to the total number of family members in logarithm
Per capita Expenditure (log)	Numeric	Log of annual consumption and production expenses (MXN real pesos) divided by the total number of family members in logarithm
Banked (yes=1)	Binary	Binary indicator that takes 1 if the household have family members who were clients of savings and credit associations (SACPs) during the current year of the survey and five years prior to it, 0 otherwise
Head gender (female=1)	Binary	Binary indicator that takes 1 if the household head is female, 0 otherwise
Head age (years)	Numeric	Number of years that the household's head has been alive
Head marital status (married=1)	Binary	Binary indicator that takes 1 if the household head is married, 0 otherwise
Head formal education (years)	Numeric	Number of years of formal schooling of the household's head
Head completed primary education (yes=1)	Binary	Binary indicator that takes 1 if the household's head has completed primary education, 0 otherwise
Head completed secondary education (yes=1)	Binary	Binary indicator that takes 1 if the household's head has completed secondary education, 0 otherwise
Head speaks an ethnic language (yes=1)	Binary	Binary indicator that takes 1 if the household's head speaks an ethnic language, 0 otherwise
Family size (log)	Numeric	Total number of individual family members in logarithm
Dependency ratio	Numeric	Number of family members under 18 years (children) to the total family members
Percentage of female adults	Numeric	Total number of female adults to the total family members
Household's nutritious status (good=1)	Binary	Binary indicator that takes 1 if the household declared their nutritious status as being good, 0 otherwise
Household is illiterate (yes=1)	Binary	Binary indicator that takes 1 if all family members have zero years of formal schooling, 0 otherwise
Household's mean years of formal schooling	Numeric	Household's mean years of formal schooling
Household completed primary education (yes=1)	Binary	Binary indicator that takes 1 if all family members have completed primary education, 0 otherwise
Household completed secondary education (yes=1)	Binary	Binary indicator that takes 1 if all family members have completed secondary education, 0 otherwise
Family labor (no. employees)	Numeric	Number of family members who were working as employees in the family business over the last year

Variable	Type	Description
Non-family labor (no. employees)	Numeric	Total non-family members who were working as employees in the family business over the last year
ROSCAs (1 if participate)	Binary	Binary indicator that takes 1 if the household's head participated in rotating savings and credit associations (ROSCAs) over the last 12 months, 0 otherwise
Family and friends aid	Binary	Binary indicator that takes 1 if the household received financial aid from relatives and friends over the last year, 0 otherwise
Trader relationship (yes=1)	Binary	Binary indicator that takes 1 if over the last year traders engaged in a lending relationship lending with the household, 0 otherwise
Moneylender relationship (yes=1)	Binary	Binary indicator that takes 1 if over the last year moneylenders provided loans to the household when needed
Shop relationship (yes=1)	Binary	Binary indicator that takes 1 if local shops facilitated credit to the household over the last year
Number of goats	Numeric	Total number of goats owned by the household at the time of the survey
Number of cows	Numeric	Total number of cows owned by the household at the time of the survey
Number of pigs	Numeric	Total number of pigs property of the household at the time of the survey
Amount of credit (log)	Numeric	Log of total annual volume of credit (MXN$ real pesos), both formal and informal, that the household acquired
Amount of savings (log)	Numeric	Log of total annual volume of savings (MXN$ real pesos) that the household had accumulated in formal savings institutions
Amount of income from diversification (log)	Numeric	Log of annual total income (MXN$ real pesos) from activities other than the family business
Amount of income from family business (log)	Numeric	Log of total annual income (MXN$ real pesos) from family business
Public cash transfer programs (yes=1)	Binary	Binary indicator that takes 1 if the household was a beneficiary of public programs such as Oportunidades, PROCAMPO, Alianza para el Campo, Empleo Temporal, FONAES, or Jovenes con Oportunidades, 0 otherwise
Amount of remittances (log)	Numeric	Log of total annual remittances (MXN$ real pesos) received by the household
Value of assets (log)	Numeric	Log of total value of assets (MXN$ real pesos) owned by the household over the last year
Land proprietorship (yes=1)	Binary	Binary indicator that takes 1 if the household has land proprietorship at the time of the survey, 0 otherwise
Safe water (1 if available)	Binary	Binary indicator that takes 1 if the household had safe water available at the time of the survey, 0 otherwise

Electricity (1 if available)	Binary	Binary indicator that takes 1 if household had electricity services at the time of the survey, 0 otherwise
Drainage (1 if available)	Binary	Binary indicator that takes 1 if household had drainage services available at the time of the survey, 0 otherwise
Phone (1 if available)	Binary	Binary indicator that takes 1 if the household had phone, either cellular or fixed line, at the time of the interview, 0 otherwise
Urban community	Binary	Binary indicator that takes 1 if the household is living in an urban community of more than 10,000 inhabitants, 0 otherwise
Southern region	Binary	Binary indicator that takes 1 if the household is living in the Southern region, 0 otherwise
Central region	Binary	Binary indicator that takes 1 if the household is living in the Central region, 0 otherwise
Year indicators	Binary	Binary indicator that takes 1 if the household was interviewed in a particular year (e.g. 2004, 2006, 2005 or 2007), 0 otherwise

[1] National and international remittances

Appendix 4-3 Summary Statistics of Key Variables by Household Banking Status During 2004-2007

Indicator	Non-banked Households					Banked Households					Total Sample		
	Obs.	Mean	Std. Dev.	Min	Max	Obs.	Mean	Std. Dev.	Min	Max	Obs.	Mean	t-test
Per capita Income (log)	6671	8.50	1.49	0.16	17.03	7463	9.08	1.49	0.04	15.45	14134	8.81	-23.16
Per capita Education Expenses (log)	4184	5.32	0.89	0.60	8.98	4924	5.73	0.96	1.28	9.88	9108	5.54	-21.36
Per capita Expenditure (log)	6795	9.25	0.73	4.21	14.28	7569	9.70	0.82	6.47	14.44	14364	9.49	-34.58
Head gender (female=1)	6797	0.22	0.42	0	1	7569	0.17	0.38	0	1	14366	0.20	7.87
Head age (years)	6797	47.69	16.74	16	99	7569	49.13	13.93	17	99	14366	48.45	-5.59
Head marital status (1 if married)	6797	0.75	0.43	0	1	7569	0.82	0.38	0	1	14366	0.79	-10.76
Head formal education (years)	6775	4.94	3.88	0	18	7550	7.06	4.85	0	21	14325	6.06	-29.03
Head completed primary education (yes=1)	6775	0.28	0.45	0	1	7550	0.26	0.44	0	1	14325	0.27	2.61
Head completed secondary education (yes=1)	6775	0.16	0.37	0	1	7550	0.19	0.39	0	1	14325	0.18	-3.97
Head speaks an ethnic language (yes=1)	6758	0.21	0.41	0	1	7539	0.23	0.42	0	1	14297	0.22	-3.04
Family size (log)	6797	1.35	0.53	0	2.89	7569	1.38	0.47	0	2.71	14366	1.37	-4.05
Dependency ratio	6797	0.35	0.25	0	1	7569	0.30	0.24	0	0.88	14366	0.33	11.69
Percentage of female adults	6797	0.36	0.22	0	1	7569	0.37	0.20	0	1	14366	0.37	-2.89
Nutritious status (good=1)	6797	0.19	0.39	0	1	7570	0.24	0.43	0	1	14367	0.22	-8.27
Household is illiterate (yes=1)	6797	0.05	0.23	0	1	7570	0.02	0.14	0	1	14367	0.04	10.96
Household's mean education (years)	6793	5.51	2.79	0	18	7568	7.35	3.28	0	20	14361	6.48	-36.43
Household's completed primary education (yes=1)	6797	0.12	0.32	0	1	7570	0.11	0.31	0	1	14367	0.11	1.49
Household's completed secondary education (yes=1)	6797	0.03	0.17	0	1	7570	0.04	0.20	0	1	14367	0.04	-3.53
Family labour (no. employees)	6797	0.06	0.35	0	7	7570	0.14	0.59	0	16	14367	0.10	-10.36
Non-family labour (no. employees)	6797	0.02	0.26	0	10	7570	0.11	0.75	0	30	14367	0.07	-10.17
ROSCAs (1 if participate)	6797	0.15	0.36	0	1	7569	0.20	0.40	0	1	14366	0.18	-6.81
Family and friends aid (yes=1)	6797	0.14	0.34	0	1	7570	0.09	0.29	0	1	14367	0.11	7.76
Trader relationship (yes=1)	6797	0.06	0.25	0	1	7570	0.05	0.21	0	1	14367	0.05	4.78
Moneylender relationship (yes=1)	6797	0.02	0.13	0	1	7570	0.01	0.11	0	1	14367	0.01	2.24
Shop relationship (yes=1)	6797	0.08	0.27	0	1	7570	0.06	0.25	0	1	14367	0.07	3.11

Does microfinance reduce the vulnerability of households to poverty?

Number of goats	6797	0.08	1.48	0	70	7570	0.06	0.77	0	30	14367	0.07	1.34
Number of cows	6797	0.22	2.26	0	100	7570	0.96	7.87	0	350	14367	0.61	-7.87
Number of pigs	6797	0.16	1.09	0	40	7570	0.30	4.35	0	340	14367	0.23	-2.69
Amount of credit (log)	6797	2.14	3.51	0	13.74	7570	3.99	4.53	0	16.04	14367	3.12	-27.48
Amount of savings (log)	6797	0.49	1.84	0	11.95	7570	4.90	3.99	0	13.15	14367	2.82	-86.47
Amount of income from diversification (log)	6797	7.71	4.50	0	14.70	7570	7.29	4.95	0	15.40	14367	7.49	5.31
Amount of income from family business (log)	6797	2.34	4.25	0	15.03	7570	3.86	5.22	0	16.00	14367	3.14	-19.24
Public cash transfer programme (yes=1)	6796	0.33	0.47	0	1	7568	0.35	0.48	0	1	14364	0.34	-2.42
Amount of remittances (log)	6797	0.99	2.52	0	11.27	7570	1.27	2.90	0	12.28	14367	1.14	-6.22
Value of assets (log)	6416	7.95	1.32	2.30	13.02	7286	8.92	1.53	2.88	13.50	13702	8.47	-40.11
Land proprietorship (yes=1)	6795	0.17	0.38	0	1	7563	0.28	0.45	0	1	14358	0.23	-15.28
Safe water (1 if available)	6797	0.89	0.32	0	1	7569	0.91	0.29	0	1	14366	0.90	-15.28
Electricity (1 if available)	6731	0.97	0.16	0	1	7539	0.98	0.12	0	1	14270	0.98	-4.63
Drainage (1 if available)	6774	0.66	0.47	0	1	7538	0.70	0.46	0	1	14312	0.68	-4.74
Phone (1 if available)	6732	0.36	0.48	0	1	7537	0.61	0.49	0	1	14269	0.49	-31.14
Urban community	6568	0.48	0.50	0	1	7199	0.47	0.50	0	1	13767	0.48	0.70
Southern region	6797	0.52	0.50	0	1	7570	0.50	0.50	0	1	14367	0.51	2.37
Central region	6797	0.31	0.46	0	1	7570	0.33	0.47	0	1	14367	0.32	-1.86

Source: Authors' calculations based on data property of the BANSEFI bank.

Appendix 4-4 Correlation Matrix of Key Variables

	Indicator	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(1)	Per capita Income (log)	1.00																			
(2)	Per capita Education Expenses (log)	0.23	1.00																		
(3)	Per capita Expenditure (log)	0.42	0.54	1.00																	
(4)	Banked	0.21	0.22	0.29	1.00																
(5)	Head gender (female=1)	0.00	0.06	0.04	-0.06	1.00															
(6)	Head age (years)	0.05	0.06	0.01	0.09	0.06	1.00														
(7)	Head marital status (1 if married)	0.00	-0.05	-0.04	0.09	-0.82	-0.11	1.00													
(8)	Head speaks an ethnic language (yes=1)	-0.09	-0.16	-0.23	0.03	-0.04	0.04	0.03	1.00												
(9)	Head formal education (years)	0.21	0.30	0.40	0.24	-0.10	-0.30	0.10	-0.14	1.00											
(10)	Family size (log)	-0.10	-0.26	-0.35	-0.04	-0.25	0.08	0.26	0.09	-0.16	1.00										
(11)	Dependency ratio	-0.20	-0.22	-0.27	-0.18	0.03	-0.43	0.01	0.03	-0.03	0.28	1.00									
(12)	Household's mean education (years)	0.28	0.42	0.46	0.31	-0.01	-0.02	0.01	-0.14	0.69	-0.14	-0.35	1.00								
(13)	Percentage of female adults	0.12	0.18	0.21	0.09	0.36	0.34	-0.33	-0.06	-0.02	-0.37	-0.64	0.21	1.00							
(14)	Number of cows	0.07	0.01	0.10	0.06	-0.02	0.01	0.02	-0.03	0.00	-0.01	0.00	0.02	-0.01	1.00						
(15)	Amount of credit (log)	0.21	0.11	0.23	0.21	-0.05	-0.04	0.07	-0.04	0.14	0.02	-0.03	0.16	0.01	0.02	1.00					
(16)	Amount of savings (log)	0.13	0.13	0.22	0.57	-0.03	0.05	0.04	0.00	0.17	-0.04	-0.10	0.20	0.07	0.05	0.14	1.00				
(17)	Public cash transfer programme (yes=1)	-0.11	-0.21	-0.34	-0.04	0.00	0.04	0.02	0.30	-0.30	0.15	0.15	-0.31	-0.11	0.05	-0.07	-0.06	1.00			
(18)	Amount of Remittances (log)	0.08	0.00	0.04	0.06	0.13	0.10	-0.06	-0.04	-0.10	0.01	0.02	-0.07	0.05	0.01	0.04	0.04	0.04	1.00		
(19)	Land proprietorship (yes=1)	-0.05	-0.10	-0.09	0.13	-0.11	0.16	0.11	0.29	-0.16	0.12	-0.04	-0.13	-0.03	0.15	0.00	0.03	0.36	0.07	1.00	
(20)	Urban community	0.08	0.20	0.24	0.00	0.02	-0.05	-0.03	-0.28	0.17	-0.03	-0.04	0.18	0.02	-0.03	0.02	0.02	-0.36	-0.07	-0.34	1.00

Source: Authors' calculations based on data property of the BANSEFI bank.

Chapter 5

Loan Officers' Characteristics and Microfinance Repayment Rates ♦

Abstract

This study examines the impact of loan officer characteristics on repayment rates of microfinance borrowers in Mexico. Our results strongly suggest that loan officers play a crucial role in improving repayment rates in microfinance. There are, at the least, three outcomes that are extremely relevant in terms of reducing loan defaults in microfinance: (1) unlike the "traditional" view that microfinance repayment rates are high primarily due to "peer monitoring" effects, our paper suggests that loan officer characteristics are much more relevant for reducing loan defaults; (2) contrasting the evidence that female borrowers repay their debt better than male borrowers, our study suggests that male loan officers are better able to induce borrowers to repay than female loan officers; (3) more experienced loan officers are better able to reduce loan default probabilities than relatively inexperienced loan officers.

5.1 Introduction

An estimated 2.5 billion adults do not use formal financial services (Chaia *et al*., 2009). In particular, banks lack information and effective enforcement mechanisms to cater to the poor, although this does not mean that impoverished people lack any access to credit. They may borrow from informal sources, such as relatives and local moneylenders. The resources of such lenders are, however, limited, so financial constraints may curb the capacity of the poor to invest in profitable ventures or to cope with shocks to their income or heightened expenditures. Microfinance represents a successful attempt to address this challenge (Armendariz and Morduch, 2010); it has reached an estimated 150 million people worldwide (Daley-Harris, 2009). Despite this impressive number, statistics about the global poor still suggest a significant potential to increase the outreach of microfinance.

To achieve this potential, microfinance organizations must keep their costs low and achieve high repayment rates on their loans. This will allow ensuring sustainability and capacity to expand activities. However, in situations in which borrowers may choose among various microfinance organizations, high repayment rates are increasingly hard to maintain (Vogelgesang, 2003). Recently, many microfinance organizations have been criticized for lending practices that have led to overindebted clients. The southern Indian state of Andhra Pradesh even plunged into a microcredit crisis after the microfinance-induced suicides of 2010. Due to bad lending practices, several branches of large microfinance institutions (MFIs) in Ecuador, India, and Nicaragua have been closed by the authorities.

Microfinanciers therefore must initiate strategies to improve the quality of their portfolios, such as the intensively researched methodology of group lending. In group lending, the members of the borrowing group have incentives to monitor one another and exclude risky borrowers from their group (Morduch, 1999). Based on field experiments, Cassar *et al*. (2007)

show personal trust between group members and social homogeneity to be important for loan repayment. Hermes *et al.* (2006), however, suggest that only the social ties of the group leader and not those of the other members are important for repayment rates. They do not find any effect on repayment rates of group characteristics after controlling the characteristics of the group leader. The paper thus criticizes the well-known view that microfinance repayment rates are high primarily due to peer monitoring. Instead, the paper suggests that "peer monitoring" among group members will not take place, or is not effective, if somebody, for instance a group leader, acts as a delegated monitor for the microfinance organization. Indirectly, that paper therefore draws attention to a potential important role for microfinance loan managers, who mediate between the microfinance organizations and the borrower groups.

While the role of borrower groups has been studied extensively, the literature on microfinance pays hardly any attention to the role of loan managers. Some exceptions are Beck *et al.* (2010), Dixon *et al.* (2007), and Agier (2012). Beck *et al.* (2010) assess the impact of the gender of loan officers on default rates in Albania; Dixon *et al.* (2007) focus on the roles of loan officers with regard to loan delinquency in Zambia; and Agier (2012) analyses how loan officers influence the performance of microcredit loans in Brazil.

With this study we aim to contribute to the limited literature on microfinance loan managers. A special feature of the study is that we focus on the role of loan managers in improving repayment rates of microfinance borrowers who are organized in joint-liability groups. This enables the role of loan managers and group characteristics to be compared explicitly in their relevance for improving repayment rates. We hypothesize that loan officers in Pro Mujer, the microfinance lender we focus on, play a key role in credit decisions such as loan approvals, extensions, renegotiation, credit contracts, and repayment. Thus, their role may trade-off peer

monitoring and screening of group members. Our study is also innovative because it analyses the gender effects of loan managers on loan repayments. This issue has been overlooked in the existing banking literature, as only a few empirical studies have investigated whether repayment rates are affected by the gender of the loan officer. Finally, we investigate the role of loan officers' professional experience on improving repayment rates.

Our empirical analysis uses data from Pro Mujer Mexico. However, Pro Mujer is an international microfinance organization that uses a similar approach, with a similar role for loan managers, in all countries where it is active; thus, our results have a wide external validity, beyond the case of Mexico. Pro Mujer was founded in 1990. The international headquarters are in New York, USA. Currently, the organization operates in Argentina, Bolivia, Nicaragua, Peru, and Mexico. It focuses on group lending to poor women, who are engaged in small income-generating activities. Several characteristics of Pro Mujer are similar to most other MFIs around the world: more than 90% of the borrowers are female, and the institution offers healthcare, education, and training to women groups.

The remainder of this article is organized into six sections. The next section introduces background information about Pro Mujer Mexico. Then we formulate some hypotheses on the role of loan officers in repayment in section 5.3. In section 5.4, we briefly describe the study region and the data, before outlining the methodology in section 5.5. The main results of the study appear in section 5.6, prior to the conclusion.

5.2 Background Information: Pro Mujer Mexico

This research was conducted in collaboration with Pro Mujer, a non-profit microfinance organization working in Latin America. Pro Mujer Mexico started operations in 2002 in the state of Hidalgo. Recently it extended its operations throughout Mexico, in the states of Puebla, Tlaxcala, Mexico, Distrito Federal, Veracruz, Queretaro, and Oaxaca. It lends to more

than 27,000 borrowers, 90 per cent of whom are women, and it has a loan portfolio of more than US$7 million. The organization operates through branches called Centros Focales, or neighborhood centers, where financial services are disbursed to customers.

Pro Mujer's objective is to support entrepreneurial women of modest means, between the ages of 18 and 65 years, who lack sufficient access to credit and physical collateral. The organization provides an integrated package of financial services, including credit for business, mandatory savings, education (e.g. training on topics such as gender, self-esteem, intra-family violence, communication, depression, and women's rights), and financial literacy (business administration, accounting, and access to cash machines).

The methodology that Pro Mujer uses is village banking, which is based on social collateral. This technique encourages the exchange of experiences among group members pertaining to relevant human development topics, as well as building social ties and networks. Communal associations consist of 8–35 members, of which only two may be men. Each communal association has a board in which only women can participate and a credit committee that, together with the loan officer and branch manager, is responsible for evaluating and approving credit at the start of each new credit cycle. These communal associations often are subdivided into smaller solidarity groups (4–8 members) where all group members serve as guarantors for one another.

The amount of credit and the conditions offered by Pro Mujer vary according to the credit cycle in which the borrower is involved. For example, the maximum amount of credit increases from 500 to 20,000 Mexican pesos between the first and the fifth cycle, with maturities of three to four months for the first cycle and four to eight months thereafter. Interest rates depend on group size and history. Groups of 5–7, 8–14, and 15–35 members pay 4, 3.5 and 3 per cent monthly flat interest rates, respectively. Groups of 15–35 members with

bad debt in the previous credit cycle pay an additional 0.5 per cent flat interest rate per month. Pro Mujer also requests a guarantee of 10–20 per cent of the value of loans in all credit cycles. In the first cycle, borrowers pay the total amount equally divided across installments; from the second cycle onward, they pay half the amount due at the beginning and the remainder during the credit cycle.

Loan officers serve as intermediaries between Pro Mujer and its communal associations, solidarity groups, and clients. The loan officers have multiple tasks. They provide advice to clients about how to use the financial services that are most suitable to their needs and train them in business growth and personal development. In addition, they must evaluate credit applications and recommend appropriate amounts to the credit committee. They also provide guidelines for group meetings and for the board. To safeguard Pro Mujer's continuity, loan officers must maintain a healthy portfolio, by monitoring clients jointly with group members and identifying causes of dissatisfaction among existing clients. Finally, loan officers are supposed to maintain updated, organized files about each communal association under their responsibility and obtain information from competitors,[4] which they transmit directly to branch managers, with whom they have shared obligations.

Loan officers register individual transactions and note weekly installments on outstanding loans, savings deposits, and fees, ensure that the totals add up correctly, and sort out discrepancies. They also offer advice and make arrangements for customers to obtain new loans and let groups know which members are succeeding and who is facing difficulties (Armendariz and Morduch, 2010). Moreover, loan officers play an important role in screening and monitoring loan applicants, and they decide on loan approvals (Agier and Szafarz, 2010; Holtman, 2001; Labie *et al*., 2010). This variety of tasks and responsibilities means that the traits and skills that Pro Mujer requires are diverse, and not all are met by all loan officers. For

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[4] In terms of competitive products offered, interest rates, operating areas, and so forth.

example, loan officers should display social responsibility and motivation to contribute effectively and freely to social improvement. They should assume active roles and balance social and financial goals, while also providing professional education in social sciences or agronomy, knowledge of marketing services, mastery of techniques for adult education, basic knowledge of the microenterprise sector, expertise with computer programs, and familiarity with the target region.

Pro Mujer initially offers two consecutive contracts to loan officers, for three months each. After these contracts expire, they have an option to enter an open-ended contract. At the beginning of 2011, the base salary of a loan officer was approximately US$360[5] per month for a weekly workload of approximately 40–50 hours. In addition to this base salary, loan officers received average bonuses of US$80 per month, based on the performance of their borrowing groups. However, bonus requirements recently changed to address individual loan officer performance with regard to targets assigned by regional managers (e.g. reduced portfolio risk, formation of new groups, inclusion of new borrowers in existing groups). Their total salary is high compared with those of unskilled workers but lower than the salaries of professionals in other sectors.

In some branches, several loan officers quit after only a few contracts, which may present a threat to loan repayment. Comparisons of the Pro Mujer employee lists for September 2010 and January 2011 for Mexico State and for November 2010 and February 2011 for Puebla show that, in just these short periods, 34 per cent of the loan officers left the organization. The main reasons they gave were high work pressure, low pay, and insufficient training and support from the organization.

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[5] According to an average exchange rate of 12.22 pesos per 1 US dollar during September 2010–March 2011 (http://www.banxico.org.mx).

5.3 Development of Hypotheses

All loan officers are neither equally efficient in collecting and dealing with information, nor are they equally competent when enforcing loan contracts. Therefore, the characteristics of the loan officer providing the credit are a determining factor in ensuring loan repayments. Based on this assumption, we outline the anticipated relationship between the outcome indicator (loan default, measured as the borrower's failure to pay her/his installment during at least one group meeting) and the core variables: loan officer's gender, professional experience, and peer monitoring and peer screening. In addition, we present other influential links between the main characteristics of a loan officer and loan repayment (see Table 5.2 for the statistical data). Thus, we formulated three hypotheses.

Hypothesis 1: The Likelihood of Loan Repayment Increases when the Loan Officer is a Male

There are a number of reasons why especially *female* loan managers may reduce loan defaults. Empirical evidence suggests that financial and investment decisions made by women are influenced by an aversion to take greater risks, and their level of self-confidence is lower in comparison to that of their male counterparts (e.g.Croson and Gneezy, 2009; Eckel and Grossman, 2008; Powell and Ansic, 1997). Female loan officers might also be more motivated to obtain higher repayment rates, compared with their male colleagues, because female loan officers generally have fewer alternative employment opportunities and tend to be less mobile. Because they are more dependent on their existing job, they may go to greater lengths to reduce loan defaults. Furthermore, female loan officers are likely to be more conservative (Beck *et al*., 2010).

However, women are also known to be less selfish and less opportunistic because they cooperate more on a basis of "moral responsibility" (Gilligan, 1977; Hartmann-Wendels *et al*.,

2009). According to this latter theory, female loan officers may fall short when dealing with loan repayments, because they tend to show more solidarity by being sympathetic and possibly by imposing less stringent credit requirements (e.g. loan approvals, re-negotiations, terminations, contractual terms, etc.); these factors, in turn, may weaken their capacity to enforce loan contracts. If the latter is the case, *male* loan managers may perform "better" on loan repayments.

Thus, theories on the role of loan officers' gender in terms of improving repayment rates are conflicting. Empirical studies are needed to provide some conclusive evidence. However, very little empirical evidence is available on the role that the gender of the loan officer plays on loan repayments. Nevertheless, the literature provides some evidence that the gender of the loan officers as decision maker together with their behavior and character are key factors in determining the outcome of the bank–firm relationship (Bellucci *et al*., 2010; Bellucci *et al*., 2011). Among the very few empirical studies available regarding microfinance loan officers is Becck *et al*., (2010), who have analyzed the default probability of loans approved by male and female officers at five branches of a commercial bank in Tirana, Albania. The results of this study maintain that the loan portfolios of female loan officers exhibit default rates significantly lower than those of male loan officers. The differences in performance reflect the varying efforts exerted by loan officers to monitor clients, rather than screen them. However, Bellucci *et al*., (2010) suggest that the role of a loan officer's gender in terms of improving repayment rates decreases with the length of the relationship. Female loan officers do not seem to behave differently from their male counterparts as the interaction between the bank and the entrepreneur extends over time.

Although both the theoretical and the empirical literature are ambiguous, we hypothesize that for Mexico it is likely that male loan officers are better in reducing loan defaults than female

loan officers. In the context of Mexico, a patriarchal society, it would seem logical that female loan officers have less authority when sanctioning loan contracts and repayments. Moreover, first-hand observations of the borrowing groups suggest that female loan officers, in their role as counselors, work more closely with their borrowers and tend to demonstrate more "solidarity." Therefore, it is likely that they will apply less stringent loan-approval criteria and less pressure for repayment than their male colleagues. In addition, it is very likely that gender equality between female borrowers, who are a majority in the Pro Mujer portfolio, and female loan officers lead to less intense monitoring of loan contracts on the part of the loan officer as the business relationship progresses. Moreover, although some male loan officers have good communication skills, it is likely that gender barriers may prevent female borrowers asking them if postponement of their payments is possible when financial or personal difficulties arise; this could intensify obligations on the part of the female borrowers to repay their loans.

Another influential factor affecting loan repayments in Mexico is the geographical location of Pro Mujer in relation to the borrowers. Loan contracts are difficult to monitor in both urban and rural settings because of cultural aspects and delinquency. In these circumstances, male loan officers might have more advantages over female loan managers in making regular contact with the defaulting borrower, particularly if the defaulters live far away from Pro Mujer branches in remote areas. Female loan officers are generally less mobile and face more time constraints, particularly if they have children. Hence, we hypothesize that male loan officers will perform better in repayment issues in comparison to their female counterparts. In our empirical analysis, we will test this hypothesis by including a gender dummy which takes a value of 1 if the loan officer is male and zero if she is female.

Hypothesis 2: Experienced Loan Officers are Better in Improving Repayment Rates of Microfinance Borrowers

Previous empirical research has evaluated the role of the loan officer's professional experience on loan repayment and on investment decisions (e.g. Agarwal and Wang, 2008; Andersson, 2004). Thus, we hypothesize that experienced loan officers are better in improving repayment rates of microfinance borrowers than inexperienced loan officers. This is based on the following reasoning. Hands-on experience with Pro Mujer loans and shared experiences with current borrowers may facilitate communication with group borrowing and thereby improve repayment rates. In line with this, Andersson (2004) finds that senior loan officers reach more consistent financial decisions than inexperienced loan officers because they have improved their screening and monitoring skills over time.

On the other hand, there are some studies in the literature, such as Agarwal and Wang (2008), that suggest that younger and less-experienced loan officers who are concerned about their careers may be induced to avoid loan losses in order to maximize their prospects. In addition, some others studies such as Beck *et al.* (2010) find no relation between default probability and the loan officers' experience. In spite of these findings, we hypothesize that, in the context of Pro Mujer Mexico, the work experience of loan officers is a crucial determinant of repayment rates, particularly if their professional experience refers to a previous job as loan officer.

We will test this second hypothesis with experience variables such as: the number of months the loan officer has worked for Pro Mujer; a dummy for whether the loan officer had a job before joining Pro Mujer; a more specific dummy variable indicating whether each officer previously worked for another microfinance lender; and age. Age may affect other aspects of the loan officer–client relationship as well, perhaps through the prestige of the loan officer. We also used whether the loan officer was former client of Pro Mujer as an experience

indicator. Prior knowledge of Pro Mujer's village banking methodology, of borrower profiles and behavior, and of the context can mean that the loan officer takes optimal credit decisions and brings efficiency in his/her operation by preventing asymmetries of information and moral hazard problems, thereby leading to improved repayment rates.

Hypothesis 3: Loan Officers are More Effective in Improving Repayment Rates than Peer Monitoring and Peer Screening of Group Members

Stimulated by the widespread adoption of group lending schemes, such as the Grameen Bank (see, for example, Morduch 1999 and Ghatak and Guinnane 1999), and the success of those programs, several academic papers analyze the advantages of peer monitoring. Many MFIs offer group loans where borrowers are jointly liable for all loans taken up by group members. It is argued that joint liability will induce a process of peer monitoring, which may play a crucial role in alleviating ex ante moral hazard problems (e.g. Chowdhury, 2005; Conning, 1999; Laffont and Rey, 2003; Stiglitz, 1990). Joint liability and peer monitoring may also ameliorate ex post moral hazard problems (e.g. Besley and Coate,1995). The reason is that, if a bank writes a contract in which borrowers are made jointly liable for the repayments of the loans, each borrower has an incentive to monitor her/his peer. This may provide incentives to the group members to invest in safe projects, and thus may reduce problems of moral hazard. This community-based monitoring may be a cost-efficient system of monitoring, because people living close to each other have better information about borrowers than banks (Varian, 1990). There are also some papers that have explored the key mechanisms why peer monitoring may help to solve adverse selection problems (e.g. Armendáriz and Gollier, 2000; Gangopadhyay et al., 2005; Ghatak, 2000; Laffont, 2003; Laffont and N'Guessan, 2000). These papers show that joint liability lending may solve adverse selection problems and improve efficiency. The key to this result is that debt contracts containing a joint-liability component provide incentives for assortative matching (Becker, 1993) implying that similar

types of firms group together (Ghatak, 2000). Consequently, the assortative matching property enables banks to price discriminate between pairs or sets of borrowers, because the group of risky firms is less willing to accept an increase in the joint-liability component than the group of safe firms.

Based on the theoretical literature on group lending and peer monitoring, several authors argued that, due to peer monitoring, group lending systems play a crucial role in reducing loan defaults and improving repayment rates. A famous study of Wydick (1999) provides some empirical evidence for the role of peer monitoring on repayment rates. He studied the social cohesion of 137 borrowing groups with a group lending institution in Guatemala. In doing so, the author tested empirically the significance of three different types of social cohesion on group-borrowing performance: peer monitoring, social ties, and group borrowing pressure. The paper analyzes their effects on the provision of intra-group insurance, the mitigation of moral hazards within borrowing groups, and overall group repayment performance. Wydick's (1999) results indicate that peer monitoring affects group borrowing performance significantly by stimulating intra-group insurance, which diminishes moral hazard problems.

However, there are also some papers that question the importance of peer monitoring for reducing loan defaults. The standard peer monitoring model assumes that peer monitoring in a group lending system is costless. However, the assumption that group members can observe each other's actions without costs and thus can side-contract and monitor each other without costs is unrealistic. It seems much more realistic to assume that each borrower in a group needs to incur a non-observable monitoring cost. This immediately implies that peer monitoring may not take place automatically. It may also be the case that group members try to search for a more cost-effective alternative, for instance by delegating the monitoring tasks to one of the group members. Some evidence for this is given by Hermes *et al.* (2006).

In a study on the effects of monitoring and social ties among the participants of 102 microfinance groups in Eritrea, Hermes *et al.* (2006) show that that social ties with the group leader do have a positive effect on repayment performance of groups, whereas this is not the case for social ties between other group members. Because the group leader is the intermediary between the group and the program staff, and regularly reports to the program's staff on the performance and sustainability of the group, he/she functions as a delegated monitor. Thus, the paper by Hermes *et al.* (2006) implicitly suggests that delegated monitoring may be more cost-effective than peer monitoring, and hence be more effective in improving repayment rates.

Loan managers play an important role in most MFIs, even those that lend via group lending systems. This also holds for Pro Mujer, the MFI we focus on. If peer monitoring is not costless, which will especially be the case if borrowers do not live close to each other, it may be argued that group members will decide to rely on the loan manager and give up their "peer monitoring" role. If that is the case, the delegated monitor or loan officer is of primary importance in undertaking such activities, which leads to an improvement in loan repayment. We assume that this is the case in the context of Pro Mujer, where group members do not "usually" live close to each other and may not have strong social ties, personal trust, or social homogeneity. In such circumstances, it will be costly for borrowers to obtain adequate information about each other's projects, risks, and personal prospects. A loan manager may then become very important for the enforcement of loan contracts. Therefore, we hypothesize that a loan officer may prove to be more effective than peer monitoring in reducing loan default probabilities.

In our empirical analysis, we use the following variables to proxy for peer monitoring and peer screening: the weekly frequency of group meetings; the total number of group members; a dummy variable for whether the loan officer provided training to borrowers during group

meetings; and a dummy variable for whether the borrower was a group leader during the evaluated credit cycle. We compare these peer-monitoring variables with the following list of loan officer characteristics: a dummy variable for the marital status being married; a binary indicator for the religion being Catholic; a dummy indicator for having children; the total number of years of formal schooling; a dummy variable for whether she/he has other job than Pro Mujer; and the time the loan officer spent living in the community. We expect loan officers who have lived for a long period of time in the same community to have acquired knowledge about the clients' customs, local lenders, representatives in local governmental bodies, and operations of formal and informal institutions in the surrounding context. This prior knowledge should help them to make optimal credit decisions with respect to screening, monitoring, and enforcing loan contracts, which in turn can lead to better repayment rates as it may act as a substitute for collateral.

The variables used in this study as proxies for peer monitoring and peer screening are in line with Hermes *et al.* (2006) and Wydick (1999). For instance, Hermes *et al.* (2006) used a dummy to account for whether the group leader was regularly visiting other group members. Instead, we used the frequency of group meetings to capture the extent to which group members acquired information about each other during the credit cycle, which may assist them to monitor each other. First, weekly meetings can lead to a better communication and enforcement of the credit contract; this is particularly so at the beginning of the business relationship where private information is being acquired by both the borrowers and the loan officer. Furthermore, both previous studies used a group-level indicator (the number of members in a borrowing group) to account for group pressure. We also included this variable. On the one hand, the larger the borrowing group, the more likely that group members can monitor each other and enforce the contract. Smaller groups, on the other hand, may face the risk of having similar risk projects and borrower profiles. This may increase the probability of

loan default, particularly if group members are not living close to each other. We also included a dummy for training in group meetings. Training can allow trust and commitment to be built between group members and with the loan officer; this in turn can lead to an improvement in loan repayment. Finally, while a group leader's dummy does not proxy for peer monitoring per se, we added this variable in order to make a comparison with the Hermes *et al*. (2006) results. In fact, borrowers who act as group leaders can enforce the contract and motivate group members to fulfill their mutual credit obligations with Pro Mujer.

Similar to work experience, education should affect the capabilities of loan officers. We measure it by the number of years of formal schooling and predict that education improves communication skills. Such skills may increase borrowers' understanding of how best to handle their loans. Education also should improve the loan officers' ability to manage the risk in their portfolios.

Job dependency varies beyond the effects of gender; that is, job security is more important for loan officers with no other job that generates income and for people with children, especially if they are not married and represent the sole caregiver for their children. Married loan officers also may have less time available for their jobs and exert less effort to screen, monitor, and enforce contracts with group members. Moreover, we expect that loan officers who depend more on their existing jobs make more effort to achieve good loan performance. In Table 5.1, we present the descriptive statistics of the key loan officer's characteristics that are referred to in the section and used in the empirical analysis. Additional control variables, collinearity diagnostics, and a correlation matrix are given in Appendixes 5-2, 5-3, and 5-4, respectively.

Table 5.1 Descriptive Statistics for Loan Officer's Characteristics

Variable	N	Mean	Standard deviation	Minimum	Maximum
Loan officer is male	57	0.19	0.4	0	1
Marital status (1 if married)	57	0.4	0.49	0	1
Former loan officer in other MFIs	57	0.14	0.35	0	1
Former client of Pro Mujer	57	0.37	0.49	0	1
Religion (1 if Catholic)	57	0.81	0.4	0	1
Experience with Pro Mujer (months)	57	14.09	12.24	1	54
Children (1 if have children)	57	0.47	0.5	0	1
Time living in the community (years)	57	20.89	11.94	1	57
Training in group meetings (1 if offered)	57	0.75	0.43	0	1
Number of years of formal education	57	15.34	2.39	10	21
Age (years)	57	32.07	9.39	19	57
Previous job (1 if had one)	57	0.81	0.4	0	1
Other job than Pro Mujer (1 if had one)	57	0.32	0.47	0	1

MFI: Microfinance institution

Source: Authors' compilation based on survey data.

Whether loan officers are Catholic also may influence loan default probabilities. Most borrowers in our sample (81%) are Catholic, as are the majority of people in central Mexico. People are likely to share similar attitudes with members of the same religion; this then may facilitate communication during group meetings and create commitment and incentives for clients to repay their loans. Therefore we include a binary indicator of whether the loan officer was Catholic or not.

5.4 Study Region and Data

Between December 2010 and March 2011, we conducted interviews in 18 branches of Pro Mujer Mexico operating in four states: Mexico, Puebla, Distrito Federal, and Tlaxcala. These branches are geographically distributed across two regions (Figure 5.1). First, the Mexico-Distrito Federal region includes 12 branches, most of which register very low default rates of

less than 2 per cent monthly; this makes this region one of the most efficient in terms of loan repayment. It is a densely populated area, with anywhere from 679 to 5,920 inhabitants/km^2, and has a good availability of public services (e.g. potable water, electricity, drainage, telephone, roads) and many microfinance providers (INEGI, 2011). Second, Puebla-Tlaxcala features six branches, some of which have high default rates (>5% monthly). With the exception of two branches, they target a rural clientele living in municipalities with a high degree of marginalization and few basic services available. Competition with other microfinance providers is relatively low.

	Region 1: Mexico-Distrito Federal		Region 2: Puebla-Tlaxcala

Figure 5.1 Study area: scattering of Pro Mujer branches in two geographic regions in Central Mexico.

We collected data from 57 loan officers and 407 borrowers. Borrowers and loan officers were interviewed with the support of 25 trained enumerators. The resulting data was cross-checked

with information from the archives of Pro Mujer, which contain reports of all group meetings including the number of defaults incurred. Borrowers were selected randomly from the client portfolios of the loan officers. We interviewed about 5 per cent of the clients for each loan officer. Some borrowers had only begun their first credit cycle, especially in the four new branches[6] included in our study. For other borrowers, we gathered information only about the latest two cycles, to avoid recall bias.

Some borrowers switched loan officers within the credit cycles recorded. For all loans overseen by a single loan officer, we collected information of the associated officer whenever possible, either through the interviews with the current loan officers or through tracking and interviewing former loan officers. Most of these officers were working as branch managers for Pro Mujer at the time of the surveys, although some had left the institution and could not be traced. This could bias the result, because capability and leaving the organization may be related. However, we expect this bias to be very small. Only few loans and loan officers are concerned (e.g. only 2–3 loan offices could not be tracked). We also discarded those loans administered by two or more loan officers, because it is simply impossible to link these loans to a consistent set of loan officer characteristics. We ultimately included in our estimation a total sample of 57 loan officers and a panel of 650 loans to 407 borrowers (see Table 5.2).

Loan officer rotation is very high. In an explorative study (Roscam Abbing, 2010), we found that, in a period of 2–5 months at the end of 2010, 14 out of 41 loan officers in the states of Mexico and Puebla had left their job; this was presumably due to high work pressure. Put differently, few loan officers keep their job for more than one or two years and a substantial number leave Pro Mujer every year. The current loan officers intended to stay, on average, about one more year in their current job.

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[6] Coronango, San Cristobal Ecatepec, Tlahuac, and Xochimilco.

Table 5.2 Number of Observations per Branch

Branch name	Number of loan officers [a]	Number of borrowers	Number of borrower observations
Coronango	3	11	21
Cuapiaxtla	2	19	30
Huamantla	3	14	16
Huauchinango	3	31	48
Huehuetoca	2	19	31
Jardines de Morelos	2	16	24
Puebla	4	24	37
San Cristobal Ecatepec	2	6	7
Tecamac	5	27	47
Teoloyucan	5	30	50
Teotihuacan	4	35	62
Tepotzotlan	2	14	21
Texcoco	4	26	42
Tlahuac	2	18	18
Tonanitla	3	42	67
Tultepec	5	30	54
Xochimilco	3	16	20
Zacatlan	3	29	55
Total = 18	57	407	650

Source: Authors' compilation based on survey data.

[a] Five loan officers handled cycles in different branches, so we interviewed a total of 57 officers.

5.5 Methodology

With the novel approach of multilevel analysis, suitable for analyzing hierarchically clustered data, we analyze the impact of various loan officer characteristics on the probability of loan default. As we explained above, we define loan default as failure of the borrower to pay her/his installment during at least one group meeting. Because the dependent variable is binary, the model is estimated using a logit model. It should be noted, however, that we use a three-level random-intercept logit model of the probability of loan default because this

enables observed and unobserved heterogeneity at the loan, borrower, and loan officer levels to be accounted for, as we explain below.

The data used for the analysis have a hierarchical structure: each loan officer services a number of borrowers, who all get one or more loans. For efficient estimation of the determinants of default on loans, the lowest level of the hierarchy, we need to account for dependence of the observations for the two higher levels –borrowers and loan officers. Default rates for different loans of a single borrower are likely to be correlated and so are default rates for loans administered by a single loan officer. These correlations can be accounted for using a multilevel hierarchical random-intercept model (Günther and Harttgen, 2009; see Apendix 5-1). This method is basically an extension of the well-known random-effects model, which is used when there are two hierarchical levels, for example borrowers with clusters of loans. In multilevel models, the clusters themselves are nested in super-clusters, such that they form hierarchical structures (Bryk and Raudenbush, 1992; Hox, 2010; Kreft and De Leeuw, 1998; Rabe-Hesketh and Skronda, 2005).

In our case, we have loan cycles i for repeated borrowers j who work with loan officers k, as in Figure 5.2.
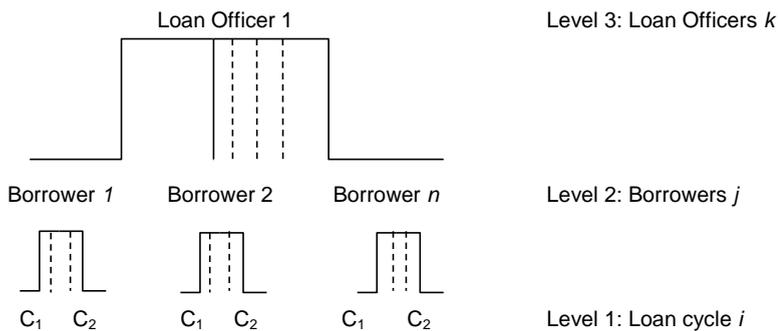

Figure 5.2 Borrower–loan officer hierarchical model

Within this nested framework, the binary variable loan default Y can be estimated as follows:

$$Y_{ijk} = \alpha + \varsigma_{jk} + \varsigma_k + \beta_1 L_k + \beta_2 Z_{ijk} + \varepsilon_{ijk} \,, \tag{1}$$

where α is the common intercept; the βs are vectors of coefficients; ς_{jk} and ς_j are random intercepts at the borrower and loan officer level, respectively; and ε_{ijk} is the residual random intercept. The random effects are assumed to be independent of each other and across clusters. The explanatory variables comprise loan officer characteristics L and a set of controls Z, which include loan and borrower characteristics, peer monitoring, and region dummies.

5.6 Estimation Results

In this section, we present three versions of our borrower default model (Table 5.3). In the simple Model 1, loan default depends only on loan officer characteristics. With this model, we evaluated the impact of a loan officer's characteristics on loan default probabilities. In Model 2, we added the borrower's characteristics and some other control variables. Model 3 is a comprehensive model that includes loan officer and borrower characteristics, peer-monitoring and peer-screening variables, and additional controls.

From the results in Table 5.3, we can see that eight of twelve loan officer characteristics significantly affect default rates in all three model specifications; the only control factor with a significant impact is the borrower's marital status. In addition, peer-monitoring and peer-screening variables appear not to be statistically significant in any model. Moreover, the loan officer characteristics fully explain the impact of the loan officer on the probability of default — the random loan officer effect is not significantly different from zero, and unobserved borrower characteristics are significant determinants of default— whereas the random borrower effect remains significant even after we introduced borrower characteristics.

Table 5.3 Three-level Random Intercept Logit Model (GLLAMM) of Probability of Loan Deafult in Group Lending Microfinance

Variable description	Model 1: Loan officer characteristics	Model 2: Loan officer and borrower's characteristics	Model 3: Loan officer, borrower, and peer monitoring characteristics
Panel A. Loan officer characteristics			
Gender of the loan officer:			
Gender (1 if male)	-1.283**	-1.174**	-1.132**
	[0.035]	[0.035]	[0.030]
Loan officer's professional experience:			
Experience with other MFIs	-1.807***	-1.392**	-1.387**
	[0.004]	[0.019]	[0.018]
Former client of Pro Mujer	-1.161**	-0.986*	-0.950*
	[0.026]	[0.054]	[0.050]
Experience with Pro Mujer (months)	0.0376**	0.0300*	0.0343*
	[0.044]	[0.090]	[0.057]
Previous job	0.522	0.675	0.646
	[0.352]	[0.193]	[0.238]
Age (years)	0.0254	0.0247	0.0217
	[0.159]	[0.152]	[0.198]
Other loan officer characteristics:			
Marital status (1 if married)	1.507***	1.234***	1.202***
	[0.005]	[0.007]	[0.007]
Religion (1 if Catholic)	-1.285**	-1.322***	-1.329***
	[0.014]	[0.003]	[0.003]
Children	-1.148**	-0.779**	-0.830**
	[0.013]	[0.031]	[0.024]
Time spent living in the community	-0.0399**	-0.0319*	-0.0331**
	[0.037]	[0.056]	[0.046]
Education (years)	-0.084	-0.104	-0.107
	[0.435]	[0.286]	[0.272]
Other job than Pro Mujer	-0.282	-0.396	-0.407
	[0.451]	[0.255]	[0.254]
Panel B. Peer monitoring and screening:			
Weekly meetings			0.071
			[0.885]
Group size (# members)			-0.0522
			[0.131]
Training in group meetings	-0.57	-0.55	-0.604
	[0.199]	[0.171]	[0.123]

Group leader		-0.417	-0.423
		[0.246]	[0.245]
Panel C. Borrower characteristics:			
Borrower marital status (1 if married)		0.823*	0.826*
		[0.062]	[0.070]
Borrower age (years)		-0.0138	-0.0156
		[0.441]	[0.397]
Borrower education (years)		-0.0471	-0.0515
		[0.371]	[0.354]
Borrower speaks a local language		0.898	1.02
		[0.399]	[0.318]
Borrower's time spent living in the same community		-0.0255	-0.0266
		[0.117]	[0.108]
Borrower was client of other microfinance lenders		-0.293	-0.253
		[0.320]	[0.410]
Borrower owns a business		-0.52	-0.548
		[0.257]	[0.241]
Duration of borrower with Pro Mujer (contracts)		-0.0132	-0.0158
		[0.818]	[0.809]
Duration of borrower with loan officer (contracts)		-0.128	-0.112
		[0.505]	[0.570]
Panel D. Additional controls:			
Ln (loan size in pesos)			0.0446
			[0.903]
Ln (loan maturity in months)			-0.0457
			[0.968]
Mexico State			-0.423
			[0.380]
Puebla State			-0.634
			[0.203]
Constant	-0.115	1.983	2.999
	[0.939]	[0.245]	[0.349]
Key statistics:			
Log-likelihood	-278.4	-271.3	-270.1
ROC	0.58	0.6	0.55
AIC	586.8	592.6	602.1
BIC	654	704.5	740.9
Rank	15	25	31
Wald test	19.29	36.24**	42.49*
Likelihood ratio test	16.15***	11.4***	10.65***
Number of observations	650	650	650
Random coefficients:			
Borrower level 2	2.399***	2.036***	2.037***
	[0.002]	[0.005]	[0.007]

Loan officer level 3	-0.00000389	-7.46E-08	-5.51E-08
	[0.712]	[0.890]	[0.960]
Median odds ratios	9.85	6.97	6.98
Intra-class correlations	0.64	0.56	0.48

Notes: *p*-values are in brackets; ***, **, and * indicate 1, 5, and 10 per cent significance levels, respectively. All models were estimated by using the maximum likelihood method with 12 quadrature points. Adding more quadrature points did not produce any significant change in the coefficients and/or standards errors. The Wald test indicates if all explanatory variables in the model are jointly equal to 0 except for the constant. Likelihood ratio test indicates the significance of the loan officer level. AIC = Akaike's information criterion; BIC = Bayesian information criterion; the receiver operating characteristic (ROC) indicates the equality of the ROC areas for the true value (observed default) versus the predicted default probability. Ln: loan.

The empirical estimations in Table 5.3 have enabled us to derive three important results that are linked to the three hypotheses highlighted in section 5.3. First, in line with the first hypothesis on the gender of the loan officer, we find that male loan officers are better in enforcing credit contracts and in dealing with loan repayments compared to their female counterparts. This finding contrasts with the results of Beck *et al*. (2010) in the context of Albania, who found that loans screened and monitored by female loan officers registered lower default probabilities than loans handled by male loan officers. In our study, however, we find the opposite and we attribute these performance differences to the lesser authoritative power of female loan officers in sanctioning loan contracts. This lower level of capacity to ensure repayment recovery may emerge from the female loan officer having higher risk aversion and lower self-confidence (Croson and Gneezy, 2009; Eckel and Grossman, 2008; Powell and Ansic, 1997) and by their more cooperative behavior and "solidarity" with borrowers, which is based on "moral responsibility" (Gilligan, 1977; Hartmann-Wendels *et al*., 2009).

Another influential factor affecting our results on hypothesis 1 relates to geographical location. As we can see from Figure 5.1, Pro Mujer branches are scattered and irregularly distributed, particularly in the Puebla-Tlaxcala region, where borrowers live far away from their particular branch. In these circumstances, male loan officers may be more able to follow-

up regular weekly meetings with their borrowing groups in their own communities and to visit more defaulting clients for repayment compared to their female colleagues. In such cases, we estimate that male loan officers will be better at recovering repayments, as our first hypothesis claims.

Second, with respect to hypothesis 2 on the role of a loan officer's professional experience on loan repayment, we find that the probability of loan default decreases for loans managed by loan officers with previous work experience in other MFIs and for those who were former clients of Pro Mujer. This result confirms the earlier empirical findings of Andersson (2004) and Agarwal and Wang (2008) that senior loan officers make more consistent financial decisions than inexperienced loan officers. However, this result contrasts with that of Beck *et al.* (2010), who find no relation between loan default probability and the loan officers' experience in Albania. Surprisingly, loans handled by a loan officer who has worked longer for Pro Mujer have higher, not lower, default rates. Perhaps loan officers become demotivated over time, as the extremely high rotation of loan officers in Pro Mujer suggests. Alternatively, loan officers who worked already for a long period of time in the institution may have more possibilities to collude with borrowers; this could also contribute to worsening repayment rates. So, with respect to professional experience of the loan officers, our findings are inconclusive and partly confirm our hypothesis 2.

Third, in contrast to Wydick (1999), we find that peer monitoring of group members is not significant in improving loan performance, while the characteristics of the delegated monitor/loan officer are very important. Although the direction of the change for most of the coefficients of the set of explanatory variables that determine peer monitoring (e.g. group size, training in group meetings, and group leader) is in line with what we expected, none of them are statistically significant in any of the models. An important reason for this is probably that transaction costs for the borrowers are very high because they do not live close to each other.

Most "peer monitoring" theories simply assume that "peer monitoring" is without costs because borrowers know each other very well. However, in reality, this is very often not the case, and hence the peer monitoring costs may be very high. In such a setting, the intense involvement of the loan officer may make peer monitoring redundant; further, because peer monitoring is not costless, the group members may then decide not to monitor each other. These findings confirm our third hypothesis. Note that, in contrast to Hermes *et al.* (2006), monitoring by the group leader does not substitute for "peer monitoring." Apparently, the availability of well-functioning loan managers also makes the monitoring role for a group leader redundant.

In addition to the above-mentioned results concerning our three hypotheses, we find that, with respect to the loan officer's characteristics, closeness or similarity of loan officers with their borrowers appears beneficial to loan repayment. Loans administered by Catholic loan officers who were former clients of Pro Mujer and who had lived longer in the same community were less likely to be in default. This result is in line with the idea that close interactions between borrowers and loan officers reduce information asymmetry, lead to fewer moral hazards, and strengthen contract enforcement, all of which can improve loan repayment rates. Furthermore, we do find evidence that loans managed by unmarried loan officers with children were less likely to be in default; this suggests that such loan officers are very motivated to keep their jobs and obtain substantial bonuses. We do not find a similar effect for loan officers without a second job, other than their job at Pro Mujer, nor do we find any effect of education. In the following section, we present some conclusions emanating from this empirical study.

5.7 Conclusion

By applying multilevel analyses, the paper studies the role of loan officers on loan repayment. We use survey data for a sample of 57 loan officers and 407 borrowers of Pro Mujer Mexico — an organization that provides joint-liability, group-based microfinance — and show that loan officer characteristics exert significant impact on loan repayment rates, whereas borrower characteristics (other than marital status) and peer monitoring have little effect.

In particular, we have formulated three core hypotheses. First, we hypothesize that default probabilities of loan portfolios handled by male loan officers outperform those administrated by female loan officers. Our results strongly confirm this hypothesis. Moreover, we formulate a second hypothesis concerning the impact of the loan officer's professional experience on loan default probabilities. The empirical estimations are ambiguous on this issue. Loan officers who were former employees in other MFIs and those who were former clients of Pro Mujer were found to have a higher repayment rates, while those with more experience within Pro Mujer were found to have higher loan default probabilities. As a result, our findings partly confirm hypothesis 2.

In addition, we hypothesize that the loan officers' personal characteristics have a stronger positive impact on the repayment performance of borrowers relative to "peer monitoring and peer screening." Our results confirm this hypothesis. Loan officers appear to play a key role in reducing monitoring and screening costs in an environment where borrowers live far from each other and where the capacity of the group members to enforce contracts is limited and peer monitoring costs are high. This result provides new doubts with respect to the relevance of the costless peer monitoring model in general, and the importance of joint-liability group lending schemes in reducing loan defaults in particular. Most importantly, it draws specific attention to the crucial role of loan managers in reducing loan defaults in microfinance, an

issue that has almost completely been overlooked in the traditional microfinance literature.

APPENDIX 5

Appendix 5.1 Model Specification of a Three-level Random-Intercept Model

We estimated a three-level, random-coefficient logistic model, as proposed by Rabe-Hesketh and Skrondal (2005), to assess the probability of loan default y for different loans i nested in borrowers j clustered in loan officers k:

$$\log it\left\{\Pr(y_{ijk} = 1 \middle| x_{ijk}, \varsigma_{jk}^{(2)}, \varsigma_k^{(3)})\right\} = \beta_1 + \beta_2 x_{2ijk} + ... \beta_{11} x_{11}, k + \varsigma_{jk}^{(2)} + \varsigma_k^{(3)}$$

$$= (\beta_1 + \varsigma_{jk}^{(2)} + \varsigma_k^{(3)}) + \beta_2 x_{2ijk} + ... \beta_{11} x_{11}, k$$

$$= (x_{ijk}, ..., x_{11}, k)'.$$

Here

$\varsigma_{jk}^{(2)} \middle| x_{ijk}, \varsigma_{jk}^{(3)} \approx N(0, \psi^{(2)})$ is a random intercept varying over borrowers (level 2),

$\varsigma_{jk}^{(2)}, \varsigma_k^{(3)})$ is a random intercept varying over loan officers (level 3),

$\varsigma_k^{(3)} \middle| x_{ijk} \approx N(0, \psi^{(3)})$ are assumed to be independent of each other and across clusters, and

$\varsigma_{jk}^{(2)}$ is assumed to be independent across units

The model alternatively can be written as a latent-response model:

$$y_{ijk}^* = \beta_1 + \beta_2 x_{2ijk} + ... \beta_{11} x_{11}, k + \varsigma_{jk}^{(2)} + \varsigma_k^{(3)} + \varepsilon_{ijk}$$

where

$\varepsilon_{ijk} \middle| x_{ijk}, \varsigma_{jk}^{(2)}, \varsigma_k^{(3)}$ has a logistic distribution with variance $p^2/3$.

The observed dichotomous responses are presumed to be generated from the threshold model:

$$y_{ijk} = \begin{cases} 1 & \text{If } y^*_{ijk} > 0 \\ 0 & \text{Otherwise.} \end{cases}$$

a. Intra-class correlations

We can consider two types of intra-class correlations for the latent responses of two borrowers i and i'. First, for the same branch k but different loan officers j and j', we obtain

$$\rho(loan\_officer) \equiv Cor(y^*_{ijk}, y^*_{i'j'k} \mid x_{ijk}, x_{i'j'k}) = \frac{\Psi^{(3)}}{\psi^{(2)} + \psi^{(3)} + \pi^2/3}.$$

Here

X_{ijk} is a vector containing all covariates,

$\Psi^{(3)}$ is the variance between the loan officer random intercept at level 3, and

$\Psi^{(2)}$ equals the between-borrower, within-loan officer variance at level 2 (borrower)

Second, for the same borrower j (and the same loan officer k), we get

$$\rho(borrower, loan.officer) \equiv Cor(y^*_{ijk}, y^*_{i'jk} \mid x_{ijk}, x'jk) = \frac{\Psi^{(2)} + \Psi^{(3)}}{\psi^{(2)} + \psi^{(3)} + \pi^2/3}.$$

Here $\Psi_{(2)}$ and $\Psi_{(3)}$ are positive (>0), and ρ(borrower, loan officer) $> \rho$(loan officer). The latter relationship indicates that borrowers working with the same loan officer are more likely to exhibit correlated performance than if they fell under the supervision of different loan officers.

b. Median odds ratios

In our model of loan default, we quantify unobserved heterogeneity by considering the median odds ratio proposed by Larsen *et al.* (2000) and Larsen and Merlo (2005) for pairs of randomly sampled units with the same covariate values. The unit with a larger random intercept is compared with the unit of the smaller random intercept. For example, comparing loans of different borrowers from the same loan officer gives the following median odds ratio:

$$OR(loan.officer)._{median} = \exp\left\{ \sqrt{2\psi^{(2)}\phi^{-1}(3/4)} \right\}$$

and comparing loans of different borrowers from different loan officers indicates

$$OR_{median} = \exp\left\{ \sqrt{2\psi^{(2)} + \psi^{(3)}\phi^{-1}(3/4)} \right\} \quad .$$

Appendix 5-2 Descriptive Statistics of Additional Control Variables

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Borrower's marital status (1 if married)	650	0.55	0.5	0	1
Borrower speaks a local language	650	0.04	0.19	0	1
Borrower's time spent living in the same community (years)	650	20.9	14.08	1	74
Borrower's age (years)	650	38.52	11.7	17.78	80.78
Borrower's number of years of education	650	9.17	3.99	0	20
Borrower as group leader	650	0.31	0.46	0	1
Borrower was client of other microfinance lender	650	0.29	0.45	0	1
Borrower's duration with Pro Mujer (contracts)	650	3.7	3.07	1	21
Borrower's duration with the loan officer (contracts)	650	1.66	1.11	0	11
Borrower living in Mexico State	650	0.62	0.48	0	1
Borrower living in Puebla State	650	0.28	0.45	0	1
Group size (clients)	650	11.98	4.25	5	30
Weekly group meetings	650	0.31	0.46	0	1
Ln (loan size in pesos)	650	8.68	0.69	6.91	9.9
Ln (loan maturity in months)	650	1.61	0.23	1.1	2.08

Ln: logarithm

Source: Authors' compilation based on survey data.

Appendix 5-3 Collinearity Diagnostics

Variable	VIF	SQRT VIF	TOLERANCE	R-SQUARE
Loan default	1.09	1.04	0.92	0.08
Loan officer's gender (1 if male)	1.61	1.27	0.62	0.38
Loan officer's marital status (1 if married)	2.88	1.7	0.35	0.65
Loan officer's prior experience	1.68	1.3	0.6	0.41
Loan officer as former client of Pro Mujer	2.58	1.61	0.39	0.61
Loan officer's religion (1 if Catholic)	1.86	1.37	0.54	0.46
Loan officer's experience at Pro Mujer	1.95	1.4	0.51	0.49
Loan officer's time living in the community	1.65	1.28	0.61	0.39
Loan officer offers training in group meetings	1.17	1.08	0.85	0.15
Loan officer has children	2.71	1.65	0.37	0.63
Loan officer's number of years of education	1.71	1.31	0.59	0.41
Loan officer's age (years)	1.99	1.41	0.5	0.5
Loan officer had a previous job	1.88	1.37	0.53	0.47
Loan officer has job besides Pro Mujer	1.51	1.23	0.66	0.34
Borrower's marital status (1 if married)	1.13	1.06	0.88	0.12
Borrower's time spent living in the community	1.29	1.13	0.78	0.22
Borrower's age (years)	1.44	1.2	0.7	0.3
Borrower's number of years of education	1.41	1.19	0.71	0.29
Borrower speaks a local language	1.29	1.14	0.77	0.23
Borrower as group leader (1 if leader)	1.05	1.03	0.95	0.05
Borrower was client of other microfinance lender	1.11	1.06	0.9	0.1
Borrower owns business	1.06	1.03	0.95	0.05
Borrower's duration with Pro Mujer (contracts)	1.57	1.25	0.64	0.36
Borrower's duration with loan officer (contracts)	1.31	1.15	0.76	0.24
Group size (clients)	1.05	1.02	0.95	0.05
Weekly meetings	2.33	1.53	0.43	0.57
Ln (loan size in pesos)	1.85	1.36	0.54	0.46
Ln (loan maturity in months)	2.04	1.43	0.49	0.51
Borrower living in the Mexico State	3.52	1.88	0.28	0.72
Borrower living in the Puebla State	3.55	1.88	0.28	0.72

Notes: VIF = variance inflation factor. Mean VIF = 1.78.

Ln: logarithm

Appendix 5-4 Correlation Matrix

No.	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	Loan default	1.00																													
2	Loan officer's gender (1 if male)	-0.10	1.00																												
3	Loan officer's marital status (1 if married)	0.00	0.08	1.00																											
4	Loan officer's experience	-0.10	0.29	0.31	1.00																										
5	Loan officer as former client in Pro Mujer	-0.20	0.19	-0.30	0.00	1.00																									
6	Loan officer's religion (1 if Catholic)	-0.10	0.07	0.38	0.00	0.29	1.00																								
7	Loan officer's experience with Pro Mujer (months)	0.03	0.11	0.10	0.00	0.47	0.17	1.00																							
8	Loan officer has children	0.00	-0.10	0.64	0.09	0.30	0.01	0.00	1.00																						
9	Loan officer's time spent living in the same community	-0.10	-0.10	0.10	-0.10	0.39	0.20	0.35	0.05	1.00																					
10	Loan officer offers training in group meetings	0.00	-0.20	0.02	-0.20	0.06	0.01	-0.10	0.06	0.06	1.00																				
11	Loan officer's education (years)	-0.10	0.04	-0.10	0.10	0.15	0.05	-0.20	0.33	0.05	0.10	1.00																			
12	Loan officer's age (years)	0.00	-0.30	0.21	-0.10	0.51	0.31	0.30	0.19	0.36	0.16	0.10	1.00																		
13	Loan officer's previous job	-0.10	0.19	-0.10	-0.10	0.24	0.18	0.11	-0.20	0.23	0.00	0.50	0.23	1.00																	
14	Loan officer's other job besides Pro Mujer	0.00	0.14	-0.10	0.01	0.08	-0.20	0.12	0.00	-0.10	0.00	0.28	0.11	0.29	1.00																
15	Borrower's marital status (1 if married)	0.10	-0.10	0.00	-0.10	0.02	0.05	0.05	-0.10	0.03	0.00	0.03	0.04	0.00	0.00	1.00															
16	Borrower's age (years)	0.00	0.04	0.00	0.02	0.05	0.00	0.00	0.03	0.02	-0.10	0.00	0.00	0.00	0.00	0.16	1.00														
17	Borrower's education (years)	0.00	-0.10	0.01	-0.10	0.01	0.00	0.00	0.09	0.00	0.07	-0.10	0.14	0.02	0.05	0.02	-0.40	1.00													
18	Borrower's local language	0.03	0.20	0.00	0.03	0.11	0.04	0.34	-0.10	0.07	-0.10	0.00	0.00	0.00	0.05	0.00	0.07	-0.20	1.00												
19	Borrower as group leader (1 if leader)	-0.10	0.00	0.00	0.08	0.01	-0.10	0.00	0.04	0.00	0.00	-0.10	-0.10	0.00	0.05	0.01	-0.10	0.04	0.00	1.00											
20	Borrower owns business	-0.10	0.00	0.00	0.07	0.00	0.00	0.03	0.00	0.04	-0.10	0.00	0.05	-0.10	0.00	0.02	0.06	0.00	0.03	0.00	1.00										
21	Borrower's time living in the community	-0.10	0.00	0.04	0.18	0.00	-0.10	0.14	0.01	0.01	-0.10	-0.10	0.00	-0.10	-0.10	0.00	0.33	-0.20	0.00	0.02	0.00	1.00									
22	Borrower has been client of other lender	0.00	0.09	0.01	0.06	-0.10	0.03	0.03	-0.10	-0.10	-0.10	0.00	0.05	-0.10	-0.10	-0.10	0.02	-0.10	0.05	0.00	0.04	0.04	1.00								
23	Borrower's duration with Pro Mujer (contracts)	0.00	-0.10	0.00	0.00	0.17	0.06	0.13	0.00	0.09	0.03	0.00	0.03	0.00	0.02	0.03	0.16	-0.10	0.05	0.00	0.00	0.09	0.09	1.00							
24	Borrower's duration with loan officer (contracts)	0.00	-0.10	0.01	-0.10	0.15	0.15	0.20	0.00	0.23	0.02	0.00	0.05	0.00	-0.20	0.02	0.06	-0.10	0.00	0.00	0.00	0.04	0.00	0.27	1.00						
25	Ln (loan size in pesos)	0.00	-0.20	0.01	-0.10	0.04	-0.10	0.00	0.10	0.03	0.06	-0.10	0.02	-0.20	0.00	0.03	0.13	0.12	0.00	0.02	-0.10	0.03	0.01	0.49	0.20	1.00					
26	Ln (loan maturity in months)	0.00	-0.10	0.04	-0.10	0.18	0.13	0.12	0.04	0.11	0.03	0.00	0.10	-0.10	0.12	0.10	0.08	0.13	0.04	0.00	0.00	0.00	-0.10	0.41	0.11	0.51	1.00				
27	Weekly group meetings	0.00	0.10	0.00	0.19	-0.10	0.00	0.00	-0.10	-0.10	0.00	0.09	-0.20	0.08	-0.10	-0.20	-0.10	-0.20	0.00	0.00	0.03	0.07	0.09	-0.30	0.01	-0.40	-0.60	1.00			
28	Group size (clients)	0.00	0.04	-0.10	0.04	0.00	0.00	0.07	-0.10	-0.10	-0.10	0.00	0.00	0.02	0.01	-0.10	0.06	0.00	0.10	0.03	0.00	0.02	0.00	0.00	0.00	0.00	0.04	0.00	1.00		
29	Borrower living in Mexico State	0.02	-0.20	-0.10	-0.30	0.08	-0.20	0.20	0.20	0.18	0.18	0.25	0.25	-0.10	0.18	0.12	0.24	0.00	0.01	0.00	0.07	-0.10	0.07	0.33	-0.60	0.29	0.33	-0.60	0.00	1.00	
30	Borrower living in Puebla State	0.00	0.25	0.01	0.22	0.00	0.16	0.25	-0.20	0.08	-0.20	0.11	-0.30	0.06	-0.20	-0.10	0.00	-0.30	0.23	0.00	0.06	0.00	0.19	0.00	0.20	-0.20	0.20	0.49	0.04	-0.80	1.00

Source: Authors' compilation based on survey data.

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Chapter 6

General Discussion and Conclusions

6.1 Introduction

This study provides evidence on how microfinance interventions can improve the well-being of financially constrained households in developing economies. It also contributes to a broader understanding of how microfinance institutions (MFIs) and programs in Latin America can become more financially sustainable in order to have a lasting impact on poverty alleviation. As a result, this examination makes at least three major contributions to microfinance literature. First of all, it formulates novel research questions that have received only limited attention in empirical research such as: (1) the relationship between efficiency and the ownership structure of MFIs; (2) the relative importance of different types of microfinance services on poverty reduction; (3) the impact of membership in microfinance institutions on vulnerability to poverty; and (4) the role that microfinance loan managers have on repayment rates in group-lending microfinance. These four issues are important for improving public policies and the performance of MFIs operating in contexts characterized by market imperfections. Secondly, this study offers four different and innovative methodological approaches for the analysis of microfinance performance that can be applied in similar contexts where MFIs are operating. Thirdly, it makes use of rich longitudinal datasets that enable the changes in the status of households, MFIs, borrowers, and loans to be tracked over time; these datasets can be extended for further investigations in the microfinance sector in Mexico in particular and Latin America in general.

The remainder of this chapter is structured as follows. Section 6.2 presents key findings emanating from the four empirical chapters of this thesis. Section 6.3 offers some overall conclusions derived from the empirical studies. Section 6.4 looks at some policy implications, and Section 6.5 concludes by presenting the limitations of the study and offering some suggestions for further research.

6.2 Main Findings

We formulated four specific research objectives in order to assess the economic performance and the poverty impact that different types of MFIs have in Latin America and Mexico. Each of these objectives generated some empirical results. Below we present the four core objectives of this thesis, followed by their corresponding empirical findings.

6.2.1 Assessing whether the technical efficiency of MFIs in Latin America, both intra-firm and inter-firm, can be explained by differences in type of ownership

The results of this investigation show that non-shareholder MFIs such as non-governmental organizations (NGOs) and cooperative/credit unions have much lower inter-firm and intra-firm technical efficiencies than shareholder MFIs such as non-bank financial intermediaries (NBFIs) and banks. In particular, we found that deviations from the optimal production possibilities frontier for NGOs and cooperative/credit unions result from the technical inefficiency component (u_i) — that is, factors over which the MFIs' management have control. In contrast, the inefficiency of banks and NBFIs arises mainly as a result of the random noise component (v_i); this represents random factors or external shocks which are beyond the MFIs' control and, as a result, have an adverse effect on the total production, such as market competition or stringent regulations.

Furthermore, from the estimation of the separate production functions, we also found that on average, the technology levels of NGOs and cooperative/credit unions tended to be similar (0.428 and 0.448, respectively), yet considerably lower than those of the bank and the NBFI. The catch-up distribution for banks is mainly concentrated around 0.9 and indicates a negatively skewed distribution for NBFIs. However, it is very flat for NGOs and cooperative/credit unions. Thus, banks produce just less than the overall optimal production technology. Overall, they have an average inter-firm efficiency of 0.928. Specifically, NGOs and cooperatives/credit unions have a lower technological level, a more pronounced focus on social goals and more severe funding constraints in comparison with banks and NBFIs. Unclear objectives associated with the difficulty of developing appropriate incentive structures also causes non-shareholder MFIs to suffer from lower levels of efficiency with respect to their own frontier. The economic implication of these outcomes is that NGOs and cooperatives/credit unions are wasting resources in the production process and, as a result, are not as efficient as their peers, i.e. NBFIs and banks.

Moreover, whereas intra-firm efficiency (IA) is more than 0.99 for all banks and NBFIs, there are significant differences in IA among NGOs and cooperatives/credit unions: some institutes have an efficiency of more than 0.9, while the efficiency of NGOs and cooperatives/credit unions is as low as 0.2 and 0.6, respectively. The bank production function virtually never falls below that of any other production function. Thus, the findings of Chapter 2 highlight the importance that ownership type has on the technical efficiency of MFIs.

6.2.2 Evaluating the impact of becoming a member of a microfinance program in Mexico (i.e. SACP, PATMIR, MFI, BANSEFI, and COOPERA) on the level of household welfare

This investigation raises the level of understanding of how different microfinance services can alleviate poverty. The main objective is to compare the effects of participation in different microfinance programs, each with its own objectives and activities. The results of this study, reveal that only savings-oriented microfinance programs (i.e. savings and credit society [SACP], the Rural Microfinance Technical Assistance Program [PATMIR], and the National Savings and Financial Services Bank [BANSEFI]) exert a significantly positive impact in terms of increasing household expenditures per capita. We did not find such effects for MFIs focused mainly on credit or COOPERA, the program that facilitates cash transfers from the government. These findings are in line with studies carried out by Roodman (2012) and Karlan and Appel (2011), which suggest that savings products have a much greater impact than microcredit on the welfare of the poor.

This result suggests that, on average, membership in MFIs that focus primarily on savings improves household welfare. However, the impact differs considerably, depending on which MFI program the household is a member of. Thus, in the microfinance programs for which savings products are very important (SACP, PATMIR, and BANSEFI), membership seems to increase expenditure per capita, and can reduce household poverty effectively. The most significant effects on improving welfare emerged from SACP and PATMIR, whose programs have the most diversified financial products. Participation in these programs is associated with additional expenditures per capita of more than US$1,374. In contrast, membership in an MFI program that mainly offers credit does not seem to alleviate poverty. Although more research is needed, the results are in line with several recent randomized controlled trials that indicate only a marginal role for microcredit, while other microfinance products, such as savings and insurance, play a greater welfare-enhancing role.

6.2.3 Measuring whether membership in an SACP in Mexico reduces the vulnerability of households to poverty

The results of this study yielded two important outcomes: (1) being a member of an SACP institution has a positive effect on the mean values of log of per capita income by 0.221, log of per capita expenditure by 0.208, and log of per capita education expenses by 0.149; (2) banking with an SACP institution in Mexico results in a decrease in the variability of the log of per capita income by 0.258, of log of per capita expenditure by 0.0372, and of log of per capita education expenditure by 0.0663. These results clearly point out that banking with an SACP institution plays a crucial role in reducing household vulnerability to poverty by smoothing out the income and expenditure per capita. Another important finding, which is in line with prior empirical research (Ersado, 2005; Garcia De la Cruz, 2008; Pitt and Khandker, 1998), is that membership in an SACP institution reduces the variability of investment in children's schooling. This issue has hardly ever been examined in microfinance literature.

6.2.4 Examining the impact of the loan officer's characteristics on repayment rates for microfinance borrowers in Mexico

The findings of this study suggest that there are at least three outcomes that are extremely relevant in terms of reducing loan default probabilities in microfinance: (1) the loan officer's personal characteristics are much more relevant for reducing loan default probabilities than "peer monitoring" and "screening" of the group; (2) male loan officers are better able to reduce loan default probabilities than female loan officers; and (3) experienced loan officers are better at enforcing loan repayments than relatively inexperienced loan officers. Moreover, the results suggest that loan officers appear to play a key role in reducing monitoring and screening costs in an environment where borrowers live far from each other, where the capacity of the group members to enforce contracts is limited, and where peer monitoring

costs are high. This finding draws specific attention to the crucial role of loan managers in reducing loan default probabilities in microfinance, an issue that has almost completely been overlooked in traditional microfinance literature.

6.3 Overall Conclusions

We can draw at least two main conclusions from the afore-mentioned findings. Firstly, from Chapters 2 and 5 we have learnt that MFIs in Latin America can improve their institutional performance (i.e. technical efficiency and the quality of their portfolio) by choosing an appropriate type of ownership and by hiring proficient loan officers with a specific profile. Secondly, the results from Chapters 3 and 4 underscore that microfinance institutions that focus primarily on facilitating savings have a greater impact on poverty reduction compared with microfinance institutions that focus on providing microcredit services only. As a result, these two conclusions provide some insight as to how microfinance managers and policymakers can improve microfinance policies and the performance of MFIs in the context of Mexico and Latin America.

Moreover, although the results from Chapter 2 show that NGOs and cooperative/credit unions perform worse in terms of technical efficiency compared to banks and NBFIs, the results in Chapters 3 and 4 also suggest that cooperative/credit unions outperform the banks and NBFIs in terms of poverty reduction. Thus, what we conclude from Chapters 2, 3, and 4 is that there is a potential trade-off between efficiency and poverty reduction of MFIs in Latin America and Mexico. This conclusion reinforces the need for MFIs to balance their main goals of poverty alleviation and financial sustainability. This can potentially be achieved by means of a greater diversification in financial services, particularly savings and insurance products. If that happens, the overall sustainability of MFIs can potentially be attained in the long term.

However, greater diversification of MFIs also requires an appropriate regulatory framework as well as a set of suitable incentives that will enable MFIs to reach this goal.

6.4 Policy Implications

Overall, the policy implications derived from Chapters 2 and 5 point to the need for an improvement in microfinance management. Firstly, at the micro-level, it would seem necessary for microfinance managers to pay more attention to ascertaining whether or not the current MFI ownership type fulfills the intended goals of poverty alleviation and financial sustainability. If that is not the case, it will be necessary for them to consider a possible transformation to a different ownership type, in the hope that this could lead to an improvement in the MFI's overall performance. In addition, at the macro-level, financial authorities and policymakers in Latin America are prompted to re-orient their policies towards providing support to those MFIs that require a transformation of their ownership type in order for them to achieve sustainability in the long term. Overall, this would help to improve their efficiency and competitiveness in the microfinance sector. Secondly, it seems fundamental for managers of MFIs to pay more attention to the role of the loan officers' personal characteristics as a key determinant in repayment rates and institutional performance. Until now, loan managers have generally been ignored, which in turn has led to a worsening of institutional performance. Proof of this is the high turnover of loan managers, which was identified in Pro Mujer in Mexico in this study. In order to combat this problem, microfinance managers should implement an appropriate hiring and incentive policies that permit the recruitment of apt loan officers who can also be compensated for their demanding responsibilities; this in turn could lead to an improvement in overall institutional performance.

Furthermore, the results from Chapters 3 and 4 highlight the importance for policymakers, donors, and aid organizations in supporting microfinance programs and institutions that

primarily offer savings products, because this activity leads to poverty reduction. Notably, public policies and microfinance interventions in Mexico are currently pointing towards a contrary development. Microfinance policies in Mexico are generally oriented towards stimulating the growth of credit-oriented MFIs in order to potentially increase their coverage of the poor. However, MFIs primarily offering credit have the following characteristics: (1) they target specific groups of people, but not necessarily the poor; and (2) they are highly reliant on national and international aid. As a result, a more holistic approach should be considered by policymakers in order to provide support to SACP savings institutions in improving their portfolio of financial instruments that are suitable for the specific needs of their targeted clientele, particularly the rural poor. This is mainly important in rural areas of the southern region (e.g. Chiapas, Yucatan, Oaxaca, Veracruz, and Puebla), where a huge range of SACP savings institutions exists that can potentially play a key role in risk mitigation and poverty reduction.

6.5 Limitations and Suggestions for Further Research

Firstly, with respect to the limitations of this study, as in any other impact evaluation of a social program, we encountered some methodological drawbacks. In particular, when measuring the impact of household membership in one of the five microfinance programs that are studied in Chapter 3, we identified three out of five empirical models of household welfare which were affected by endogeneity and selection bias problems. We tried to deal with these endogeneity and selection bias problems in several ways, for instance by using the Hausman–Taylor estimator, which is an instrumental variable approach that generates internal instruments; and by using a comparable sample of treatment and control groups. Nevertheless, some selection bias may still remain. There are two main options for overcoming these problems: (1) the use of randomized control trials (RCTs), and (2) reliance on a set of robust instruments to control for such problems. However, for the purpose of this study, we neither

had a set of robust instruments nor did we conduct an RCT. Nevertheless, we recommend that further impact studies on microfinance participation make use of RCTs.

Secondly, based on the results and conclusions emanating from this empirical study, we identified several important ways in which this research can be extended, which are described as follows.

6.5.1 Concerning the Impact of Ownership Type on the Technical Efficiency of MFIs

Firstly, researchers could enrich our approach by including multiple outputs, such as savings, training, insurance, and other financial services, which are provided by an increasing number of MFIs, and estimating translog distance functions using a corrected ordinary least squares method (Coelli and Perelman, 2000). Secondly, productivity indicators, such as technological change, total factor productivity, and input elasticity, derived from the current type-specific production functions might help disentangle the main factors that account for differences in technologies across MFI types. Thirdly, by determining ownership-specific key factors that explain efficiency, further research would provide insight on how to implement better practices in order to increase the efficiency of struggling MFIs (NGOs and cooperative/credit unions). Battese and Coelli (1995) suggest a stochastic frontier analysis model that simultaneously estimates the frontier and the coefficients of the efficiency variables and this could also be applied to type-specific production frontiers.

6.5.2 Concerning the Impact of Different Microfinance Services on Poverty Reduction

The analysis in Chapters 3 and 4 can be extended in two important ways. Firstly, since the savings-oriented microfinance programs such as the SACPs and PATMIR were shown to have a positive impact on poverty reduction, it might be interesting to look at the factors that contribute to improving the performance of MFIs operating within these two programs. One

possibility would be to conduct more research on the SACPs affiliated to these programs, in order to disentangle the consequences of regulation policies on the financial sustainability and poverty outreach benefits of these financial intermediaries, which have been overlooked so far.

Moreover, another line of research could be developed based on the findings emanating from Chapter 4. In this chapter we evaluated the impact of being a client of an SACP institution on the mitigation of household exposure to risk and on the reduction of household vulnerability to poverty. In particular, the results from Chapter 4 emphasize the need to identify the channels by which microfinance services, particularly savings products, can assist households in mitigating risk. For instance, perhaps microfinance helps households to reduce the negative impact of particular types of shocks, either idiosyncratic or covariate or a combination of both. Thus, we recommend that a study should be conducted both for savings-oriented SACP institutions and for MFIs focusing primarily on microcredit or on cash transfers services. The focus of such a study would be on the impact of banking when confronting shocks and would enable the comparison of the impact of different financial services on mitigating ex ante and ex post exposure to idiosyncratic and covariate risks. This type of research could help microfinance managers and policymakers to design a range of risk-coping instruments to be offered by MFIs that are suitable for the specific needs of the targeted clientele, particularly the rural poor.

6.5.3 Concerning the Impact of Microfinance Loan Managers on Loan Performance

The results of the investigation on the role of a loan officer's personal characteristics on loan performance in Chapter 5 can be extended in two important ways. The first would be to conduct RCTs in order to test for differences in treatment groups of loan officers with the personal characteristics and activities (i.e. gender, experience, age, etc.) indicated in Chapter

5. This approach could bring new insights as to how MFI performance could be improved based on the selection criteria of loan officers by branch or geographical region. Secondly, it seems necessary to follow up more credit cycles of the borrowers which, if linked to the loan officer's personal attributes and to the group's characteristics, could lead to a panel data set of loans that could be evaluated. This would allow further insight to be gained on the determinants of loan repayment at the individual and at the group level.

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Summary

In the early 1970s there was an overriding interest in poverty alleviation; this brought microfinance to the attention of donors, governments, and investors as a promising and cost-effective innovation tool to reduce poverty and to improve economic development (Armendariz and Morduch, 2010; Microcredit Summit Campaign, 2005; Morduch, 1999). The idea was to put in place an organizational model to provide finance to the poor that would mitigate the risks and reduce the transaction costs of administering small unsecure loans to poor borrowers living in contexts characterized by asymmetric information and moral hazard problems. Grameen Bank in Bangladesh, Banco Sol in Bolivia, and Bank Rakyat in Indonesia are three examples of pioneering microfinance institutions (MFIs). These institutions work through joint liability; this means that all borrowers within a group are jointly liable for each other's loans repayments (Ghatak and Guinnane, 1999). This system is accompanied by dynamic incentives such as the promise of having access to progressive credit for borrowers who repay their loans in time and denying future access to defaulter borrowers (Berhane, 2009; Besley, 1995; Morduch,1999). This latter feature also helps to reduce the default risk.

The positive viewpoint that microfinance enables poor people to break out of poverty, thus contributing to establishing long lasting peace (Norwegian Nobel Committee, 2006), has led to a euphoric attitude among policy makers, aid organizations, and academics about the potential role of microfinance. In contrast with this optimistic view, Bateman (2010) argues that microfinance is unsuitable for sustainable development and poverty reduction. Also, given the economic crisis in the southern Indian state of Andhra Pradesh, some people even claim that microcredit has induced suicides. However, the lack of serious scientific support of both views, positive and negative, has created a desire for empirical studies to inform microfinance policy makers and relief organizations on whether microfinance interventions should be implemented, and if so, how. Consequently, a broadening of the research agenda is

needed in order to allow for the investigation of a long list of unresolved issues. Mosley (2001) indicates that many questions remain to be answered concerning the impact of microfinance on the different dimensions of poverty. Most studies deal with the impact of microcredit on poverty. However, microfinance is much more than microcredit. The main innovation of this thesis is the focus on four topics that have received relatively little attention: (1) the relationship between efficiency and the ownership structure of MFIs; (2) the relative importance of different types of microfinance services on poverty reduction; (3) the impact of microfinance on vulnerability to poverty; and (4) the role of microfinance loan managers on repayment rates.

This thesis is also innovative in terms of the broad range of methodologies and the variety of data sets we have used. In each case, we use the most appropriated method for the content of the study. In Chapter 2, for instance, we use the parametric stochastic frontier analysis (SFA) to measure efficiency. This method allows for the observed production of a particular institution to deviate from the efficient frontier, due to either random events or possible inefficiencies (Gregoire and Tuya, 2006), and incorporates an error term that captures irregularities in the data (Paxton, 2007). In contrast, in Chapter 3 we use the Hausman–Taylor (1981) estimator, a method suitable to control for endogeneity problems in impact studies. This method uses the variation between and within strictly exogenous variables in other periods as instruments (Baltagi, 2001), a convenient feature when good instruments are absent in the data. Furthermore, in Chapter 4 we rely on Glejser's (1969) heteroskedasticity test, which permits the quantification of performance variability both across-household and within-household. Finally, in Chapter 5, we use multilevel analysis, which accounts for observed and unobserved heterogeneity at three different levels (i.e. loan, borrower, and loan officer level).

Concerning the data sets, in Chapter 2, to study the relationship between ownership structure of MFIs and efficiency, we used the well-known MIX market (see www.mixmarket.org) data

set consisting of financial and outreach information from different types of MFI ownership (e.g. non-governmental organization [NGO], cooperative/credit union, non-bank financial intermediary [NBFI], and bank). This data set is unique in terms of the broad coverage of MFIs all around the world. The MIX market data set is probably the best data set with balance sheet information at the MFI level that is publicly available. We need data at the MFI level to conduct the efficiency analyses. However, we also need household-level data to study the impact of microfinance. For this part of our study, we relied on household panel data from a representative survey conducted in Mexico by the National Savings and Financial Services Bank (BANSEFI) from 2004 to 2007. This data set consists of 18,933 observations; one of its major advantages is that it differentiates treatment and control households for each microfinance program. The inclusion of reliable, predetermined controls in the data set improves our ability to identify the impact of the different microfinance programs. This set allows for the investigation of two issues: the relative importance of different types of microfinance services on poverty reduction in Chapter 3 and the impact of microfinance on vulnerability to poverty in Chapter 4. Both the MFI-level data set and the household-level data set were readily available. However, we also collected primary data. Hand-collected data regarding both loan officers and borrowers in two adjacent regions of Pro Mujer Mexico enabled us to investigate the influence of loan managers on repayment rates.

The study has been carried out using a sample of Latin American MFIs, with a particular emphasis on Mexico. In Latin America, we evaluated data from 318 MFIs operating across 18 countries, whereas in Mexico the study focuses on 6,976 households living in three geographical regions (northern, central, and southern) and on 407 borrowers and 57 loan officers living in the central region. The study regions are representative of the country and reflect diversity in poverty levels, household demographic characteristics, and market accessibility.

In **Chapter 1**, we present background information on microfinance, a detailed description of each particular research objective, a brief description of the different data sets, microfinance programs and of the methods used for the empirical analysis.

Chapter 2 assesses the extent to which the ownership type of MFI determines the technical efficiency of MFIs in Latin America. This question is relevant because it provides some evidence on the necessity to account for heterogeneity of goals and ownership types when measuring the economic performance of MFIs. In addition, it can help financial authorities and microfinance managers to improve their policies in order to achieve sustainability in the operation of MFIs. For instance, if NGOs and cooperative/credit unions are inefficient, technological innovations accompanied by an appropriated regulatory framework can reduce their inefficiency level and bring them towards their optimal production frontier. In line with this, the main focus of Chapter 2 is to estimate the intra-type and inter-type efficiency (Lansink *et al.*, 2001) of four different types of microfinance organizations: NGOs, credit unions, NBFIs, and banks. To do so, we estimate separate production frontiers by means of a parametric method, SFA. The results of this examination suggest that non-shareholder MFIs (NGOs and credit unions) are less technically efficient and have an inferior technology relative to shareholder MFIs (banks and NBFIs). The differences in performance are attributed primarily to the managerial characteristics of the inefficient non-shareholder MFIs rather than to external effects confronted by the shareholder MFIs, such as regulation and competition.

Chapter 3 evaluates the poverty impact of five different microfinance programs in Mexico: (1) the public savings and credit societies (SACPs); (2) the Rural Microfinance Technical Assistance Program (PATMIR); (3) the BANSEFI bank; (4) the traditional MFIs; and (5) the COOPERA cash transfers program. This impact analysis is relevant because it can shed some light on the real contribution of different types of MFI, some focusing primarily on savings and others on microcredit or cash transfers. In addition, the results of this study can help

policy makers in Mexico to reorient their policies towards providing assistance to MFIs that contribute greatly in terms of poverty reduction and to prevent the immeasurable delivery of subsidies to microcredit organizations that do not. The five programs under study have some similarities, they all deal with microfinance, although they do differ considerably: SACP and PATMIR offer a wide range of financial services, including credit and savings products, technical assistance, and marketing of inputs and outputs to their recipients; BANSEFI focuses on savings products; the MFI program offers primarily microcredit; and the COOPERA program specializes in channeling public cash transfers. Thus, some programs focus on savings while others offer primarily microcredit or cash transfers. We have tested which of the five microfinance programs has been most effective in improving the well-being of microfinance recipients towards a comparable group of non-participants by means of an instrumental variable approach, the Hausman–Taylor (1981) estimator. The findings show that savings-oriented microfinance programs outperformed programs that offer primarily microcredit in reducing poverty. In this way, we emphasize the role of each microfinance program in terms of the type of financial instruments that they offer to their recipients: savings, credit, and cash transfers. Thus, our study provides some new evidence on the importance of microfinance in general, as well as on the relative contribution of SACPs in Mexico in improving the well-being of people in low-income brackets.

Chapter 4 examines the impact of membership in a savings and credit society on household vulnerability to poverty. This is an important question for microfinance policy because it unravels the contribution of microfinance as an exante coping strategy in assisting households to cope with risk and in preventing them from falling into extreme poverty. Thereafter, microfinance policies can be improved in their scope to provide suitable financial instruments to their recipients that enable them to mitigate ex ante risk and to reduce their vulnerability to poverty. We use Glejser's (1969) heteroskedasticity test to examine the hypothesis that being

banked both increases the size of income/expenditures and reduces the variance of income/expenditures. If this would indeed be the case, we argue that the vulnerability to poverty will decline. The results of this investigation suggest that being a member of a savings and credit society improves per capita income, per capita education, and per capita expenditure and reduces the variability of these indicators. These findings allow us to conclude that membership in a savings and credit society in Mexico reduces vulnerability to poverty.

Chapter 5 focuses on measuring the impact of the loan officer's characteristics on determining repayment rates in group lending microfinance. This is an important issue, because it unveils the real contribution of these executives on reducing default probabilities of microfinance borrowers participating in joint-liability group lending in microfinance. In addition, the results can inform microfinance managers on the hiring and incentive policies of the institution, and how these can be improved if necessary in order to progress the overall performance of the institution. To explore this issue, we carry out an empirical investigation in 18 branches of Pro Mujer Mexico, an NGO working with the village banking methodology. This organization operates in seven Mexican States; however, for the purpose of this study, we select only four states: Mexico, Puebla, Distrito Federal, and Tlaxcala. These four states correspond to two adjacent regions: (1) the *Mexico–Distrito Federal region* with 12 branches, and (2) the *Puebla–Tlaxcala region*, which features six branches. Ultimately, in our study we include information taken from a total sample of 650 loans given to 407 borrowers, arranged by 57 loan officers. We use a novel method to measure institutional performance called the "multilevel approach"; this controls for observed and unobserved heterogeneity at three different levels: loan, borrower, and loan officer. The main findings suggest that the characteristics of the loan officers are very significant in explaining loan default probabilities. In particular, we find the gender of the loan officer and his/her professional experience to be

important determinants of repayment rates. The results suggest that male loan officers are better in improving repayment rates of microfinance borrowers than female loan officers and that loan officers with previous professional experience in other microfinance organizations and those who have been clients of Pro Mujer are better at improving repayment rates. Further findings of interest are that loan officers who work longer in Pro Mujer have higher default probabilities in their portfolio and that peer monitoring and peer screening of group members are not significant determinants of loan default probabilities. The overall findings suggest that the personal characteristics of the loan officer are very important in determining repayment rates; therefore, this reinforces the need for microfinance managers to revisit their hiring and incentives policies to provide the loan officers with the appropriate means to improve the quality of their portfolio and the overall institutional performance.

Chapter 6 summarizes and discusses major outcomes from the empirical investigations that cover this study. This is done by returning to the specific research objectives and by discussing key findings based on prior microfinance literature on impact evaluation, institutional performance, vulnerability to poverty and, loan performance. Furthermore, this chapter presents the policy implications derived from the main findings, recognizes the limitations of the study, and draws an outline for future research.

Samenvatting

Aan het begin van de jaren '70 van de vorige eeuw bestond er veel interesse in armoedebestrijding; dit bracht microfinanciering onder de aandacht van donoren, overheden en investeerders als een veelbelovend, kosteneffectief en innovatief instrument om armoede te bestrijden en economische ontwikkeling te stimuleren (Armendariz and Morduch, 2010; Microcredit Summit Campaign, 2005; Morduch, 1999). Het idee was om een organisatiemodel op te zetten dat arme mensen van leningen zou voorzien en dat zou leiden tot minder risico's en transactiekosten geassocieerd met het verstrekken van kleine, onveilige leningen aan arme kredietnemers die leven in contexten gekenmerkt door asymmetrische informatie en moral hazard-problemen. Grameen Bank in Bangladesh, Banco Sol in Bolivia en Bank Rakyat in Indonesië zijn drie voorbeelden van baanbrekende microfinancieringsinstellingen (MFI's). Deze instellingen opereren met hoofdelijke aansprakelijkheid, wat inhoudt dat alle kredietnemers binnen een groep gezamenlijk verantwoordelijk zijn voor elkaars afbetalingen (Ghatak and Guinnane, 1999). Dit systeem bevat verdere dynamische incentives, zoals toegang tot grotere kredieten voor kredietnemers die hun leningen op tijd terug betalen, en het ontzeggen van de toegang tot kredieten voor wanbetalers (Berhane, 2009; Besley, 1995; Morduch, 1999). Dit laatste kenmerk verlaagt het risico van wanbetaling.

Het positieve uitgangspunt dat arme mensen dankzij microfinanciering aan de armoede kunnen ontsnappen en dat dit concept dus bijdraagt aan het komen tot langdurige vrede (Norwegian Nobel Committee, 2006), heeft geleid tot een euforische stemming onder beleidsmakers, hulporganisaties en academici over de mogelijke rol van microfinanciering. In tegenstelling tot deze optimistische houding stelt Bateman (2010) dat microfinanciering niet geschikt is voor duurzame ontwikkeling en armoedebestrijding. Gegeven de economische

crisis in de zuidelijke Indiase deelstaat Andhra Pradesh stellen sommige mensen zelfs dat microkredieten hebben geleid tot zelfmoorden. Het gebrek aan solide wetenschappelijke onderbouwing van deze standpunten, zowel positief als negatief, heeft echter geleid tot een vraag naar empirisch onderzoek waarmee hulporganisaties en beleidsmakers op het gebied van microfinanciering kunnen bepalen of microfinanciering geïmplementeerd dient te worden, en zo ja, hoe. Daarom is een verbreding van de onderzoeksagenda noodzakelijk om een groot aantal onopgeloste problemen te onderzoeken. Mosley (2001) geeft aan dat veel vragen omtrent de impact van microfinanciering op de verschillende dimensies van armoede onbeantwoord blijven. De meeste onderzoeken behandelen de impact van microkredieten op armoede. Microfinanciering bestaat echter uit meer dan alleen microkredieten. De belangrijkste innovatie in dit proefschrift is de focus op vier onderwerpen die relatief onderbelicht zijn gebleven: (1) de relatie tussen efficiëntie en de eigendomsstructuur van MFI's; (2) het relatieve belang van verschillende soorten microfinancieringsdiensten voor armoedebestrijding; (3) de impact van microfinanciering op de kwetsbaarheid voor armoede; en (4) de invloed van kredietmanagers op aflossingspercentages.

Dit proefschrift is ook innovatief als het gaat om de grote hoeveelheid methodes en de verschillende datasets die we gebruikt hebben. In alle gevallen hebben we de methode gebruikt die het best paste bij de inhoud van het onderzoek. In hoofdstuk 2, bijvoorbeeld, hebben we de 'parametric stochastic frontier analysis' (SFA) toegepast om efficiëntie te meten. Bij deze methode kan de waargenomen productie van een bepaalde instelling afwijken van de 'efficient frontier' door random events of mogelijke inefficiënties (Gregoire and Tuya, 2006) en bestaat er een foutmarge die onregelmatigheden in de data opvangt (Paxton, 2007). In hoofdstuk 3 gebruiken we echter de schatter van Hausman–Taylor (1981), een methode die gebruikt wordt om te corrigeren voor endogeniteitsproblemen bij impactonderzoek. Deze methode gebruikt de variaties tussen en binnen strikt exogene variabelen in andere periodes

als instrumenten (Baltagi, 2001), een handig kenmerk als de data niet beschikt over goede instrumenten. Ook gebruiken we in hoofdstuk 4 de heteroskedasticiteitstest van Glejser (1969), waarmee we de prestatievariabiliteit tussen en binnen huishoudens kunnen kwantificeren. Tot slot voeren we in hoofdstuk 5 een multilevel analyse uit, die corrigeert voor de waargenomen en niet-waargenomen heterogeniteit op drie verschillende niveaus (lening, kredietnemer en kredietmanager).

Wat datasets betreft gebruikten we in hoofdstuk 2 de bekende MIX market dataset (zie www.mixmarket.org) om de relatie tussen eigendomsstructuur van MFI's en efficiency te onderzoeken. Deze dataset bestaat uit financiële en outreach-informatie van verschillende eigendomsstructuren van MFI's (bijv. niet-gouvernementele organisatie (NGO), coöperatieve/kredietunie, niet-bancaire financiële instelling (NBFI) en bank). Deze dataset is uniek wat betreft zijn brede dekking van MFI's over de hele wereld. De MIX market dataset is waarschijnlijk de beste dataset met balansinformatie over MFI's die openbaar beschikbaar is. We hebben gegevens nodig op MFI-niveau om efficiëntieanalyses uit te kunnen voeren. We hebben echter ook gegevens over huishoudens nodig om de impact van microfinanciering te onderzoeken. Voor dit gedeelte van ons onderzoek hebben we gebruikgemaakt van paneldata van een representatief onderzoek dat tussen 2004 en 2007 is uitgevoerd door de National Savings and Financial Services Bank (BANSEFI) in Mexico. Deze dataset bestaat uit 18.933 observaties. Een van zijn grote voordelen is dat deze dataset voor elk microfinancieringsprogramma onderscheid maakt tussen huishoudens die microfinanciering hebben ontvangen en een controlegroep bestaande uit huishoudens die geen microfinanciering ontvangen hebben. Het feit dat een betrouwbare, vooraf bepaalde controlegroep onderdeel uitmaakt van de dataset, maakt het voor ons makkelijker om de impact van de verschillende microfinancieringsprogramma's te identificeren. Dankzij deze dataset kunnen wij de volgende twee issues onderzoeken: het relatieve belang van verschillende soorten

microfinancieringsdiensten voor armoedebestrijding (hoofdstuk 3) en de impact van microfinanciering op de kwetsbaarheid voor armoede (hoofdstuk 4). Zowel de dataset op MFI-niveau als de dataset op huishoudniveau waren eenvoudig beschikbaar. We verzamelden echter ook primaire gegevens. Dankzij handmatig verzamelde gegevens over zowel kredietmanagers als kredietnemers in twee aangrenzende regio's van Pro Mujer Mexico konden wij de invloed van kredietmanagers op aflossingspercentages onderzoeken.

Het onderzoek is uitgevoerd onder een selectie Latijns-Amerikaanse MFI's, met nadruk op Mexico. In Latijns-Amerika evalueerden wij gegevens van 318 MFI's, werkzaam in 18 landen, terwijl het onderzoek in Mexico zich richtte op 6.976 huishoudens in drie geografische regio's (noord, centraal, en zuid) en 407 kredietnemers en 57 kredietmanagers in de centrale regio. De onderzochte regio's zijn representatief voor het hele land en vormen een afspiegeling van de diversiteit in armoedeniveaus, demografische kenmerken van huishoudens en markttoegang.

In **hoofdstuk 1** geven wij achtergrondinformatie over microfinanciering, een gedetailleerde omschrijving van alle onderzoeksdoelstellingen en een korte omschrijving van de verschillende datasets en methodes gebruikt voor de empirische analyses.

Hoofdstuk 2 gaat in op de vraag in hoeverre de technische efficiëntie van MFI's in Latijns-Amerika bepaald wordt door de eigendomsstructuur van MFI's. Deze vraag is relevant omdat het enig bewijs levert voor de noodzaak om te corrigeren voor de heterogeniteit van doelstellingen en eigendomsstructuren bij het meten van de economische prestaties van MFI's. Bovendien kan het financiële autoriteiten en microfinancieringsmanagers helpen bij het verbeteren van hun beleid om zo te komen tot duurzaam functioneren binnen MFI's. Als NGO's en coöperatieve/kredietunies bijvoorbeeld inefficiënt zijn, dan kunnen technologische innovaties in combinatie met aangepaste regelgeving dit tegengaan en ze optimaal laten

functioneren. De focus van hoofdstuk 2 ligt dan ook op het schatten van de intra-type en inter-type efficiëntie (Lansink *et al*., 2001) van vier verschillende soorten microfinancieringsorganisaties: NGO's, kredietunies, NBFI's en banken. Hiervoor schatten wij afzonderlijke productiegrenzen door middel van een parametrische methode, SFA. De resultaten van dit onderzoek suggereren dat MFI's zonder aandeelhouders (NGO's en kredietunies) technisch inefficiënter zijn en over inferieure technologieën beschikken in vergelijking met MFI's met aandeelhouders (banken en NBFI's). De verschillen in prestaties worden vooral toegekend aan bestuurlijke eigenschappen van de inefficiënte MFI's zonder aandeelhouders in plaats van aan externe effecten die MFI's met aandeelhouders ondervinden, zoals regelgeving en concurrentie.

Hoofdstuk 3 evalueert de impact op armoede van vijf verschillende microfinancieringsprogramma's in Mexico: (1) de openbare spaar- en kredietverenigingen (OSKV's); (2) het Rural Microfinance Technical Assistance Program (PATMIR); (3) de National Savings and Financial Services Bank (BANSEFI); (4) de traditionele MFI's; en (5) het cashtransferprogramma COOPERA. Deze impactanalyse is relevant omdat het een licht kan werpen op de daadwerkelijke bijdrage van verschillende soorten MFI's; sommige richten zich primair op sparen, andere op microkredieten of cash transfers. Ook kunnen de resultaten van dit onderzoek beleidsmakers in Mexico helpen om hun beleid opnieuw af te stemmen op het bieden van ondersteuning aan MFI's die in grote mate bijdragen aan de armoedebestrijding, en om te voorkomen dat er subsidies worden gegeven aan organisaties die daar niet aan bijdragen. De vijf programma's die onderwerp zijn van dit onderzoek hebben enkele onderlinge overeenkomsten omdat zij allemaal onder de noemer microfinanciering vallen, maar toch verschillen zij substantieel van elkaar: de OSKV's en PATMIR leveren een groot aantal financiële diensten aan de ontvangers, inclusief krediet- en spaarproducten, technische ondersteuning en de marketing van inputs en outputs; BANSEFI richt zich op

spaarproducten; het MFI-programma verschaft vooral microkredieten; en het COOPERA-programma specialiseert zich in de begeleiding van publieke cash transfers. Sommige programma's richten zich dus voornamelijk op sparen, terwijl andere programma's voornamelijk microkredieten of cash transfers aanbieden. Door middel van een instrumentele variabele aanpak, de schatter van Hausman–Taylor (1981), hebben wij onderzocht welke van de vijf microfinancieringsprogramma's het meest hebben bijgedragen aan het welzijn van de ontvangers van de microfinancieringen in vergelijking met een vergelijkbare groep niet-deelnemers. De resultaten tonen aan dat microfinancieringsprogramma's gericht op sparen beter presteerden op het gebied van armoedebestrijding dan programma's die voornamelijk microkredieten leveren. Op deze manier benadrukken wij de rol van alle microfinancieringsprogramma's wat betreft de soorten financiële instrumenten die zij leveren aan hun ontvangers: sparen, krediet en cash transfers. Ons onderzoek levert dus nieuw bewijs voor het belang van microfinanciering in het algemeen, alsmede voor de relatieve bijdrage van OSKV's in Mexico aan het verbeteren van het welzijn van de mensen met lagere inkomens.

Hoofdstuk 4 onderzoekt de impact van lidmaatschap van een spaar- en kredietvereniging op de kwetsbaarheid van huishoudens voor armoede. Dit is een belangrijk aspect van microfinancieringsbeleid, omdat het de bijdrage van microfinanciering ontrafelt als een ex ante copingstrategie die huishoudens helpt om te gaan met risico's en voorkomt dat ze in zware armoede belanden. Daarna kan het microfinancieringsbeleid verbeterd worden zodat ontvangers kunnen beschikken over geschikte financiële instrumenten waarmee zij ex ante risico's kunnen voorkomen en hun kwetsbaarheid voor armoede kunnen verminderen. Wij gebruiken de heteroskedasticiteitstest van Glejser (1969) om de hypothese te testen dat klant zijn bij een bank zowel de omvang van inkomsten/uitgaven vergroot als de variantie van inkomsten/uitgaven verkleint. Als dit inderdaad het geval is, dan stellen wij dat de

kwetsbaarheid voor armoede zal afnemen. De resultaten van dit onderzoek suggereren dat lidmaatschap van een spaar- en kredietorganisatie het inkomen, de opleiding en de uitgaven per hoofd van de bevolking verhoogt en de variabiliteit van deze indicatoren verlaagt. Op basis van deze bevindingen concluderen wij dat lidmaatschap van een spaar- en kredietorganisatie in Mexico de kwetsbaarheid voor armoede vermindert.

Hoofdstuk 5 richt zich op het meten van de impact van de eigenschappen van een kredietmanager op het vaststellen van het aflossingspercentage van groepsleningen binnen microfinanciering. Dit is een belangrijk issue omdat het inzicht verschaft in de daadwerkelijke invloed van deze managers op het verkleinen van de kans op wanbetaling van kredietnemers die deelnemen aan groepsleningen met gedeelde aansprakelijkheid. Ook kunnen de resultaten microfinancieringsmanagers inzicht verschaffen in het aanname- en beloningsbeleid van de instelling en de manier waarop dit beleid, indien nodig, verbeterd kan worden om de algemene resultaten van de instelling te verbeteren. Om dit issue te onderzoeken voeren wij een empirisch onderzoek uit binnen 18 vestigingen van Pro Mujer Mexico, een NGO die opereert volgens de 'village banking'-methode. Hoewel deze organisatie actief is in zeven Mexicaanse staten, richten wij ons voor dit onderzoek op vier staten: Mexico, Puebla, Distrito Federal en Tlaxcala. Deze vier staten komen overeen met twee aangrenzende regio's: (1) de *Mexico-Distrito Federal region* met 12 vestigingen, en (2) de *Puebla-Tlaxcala region* met zes vestigingen. In totaal omvat ons onderzoek informatie over 650 leningen die zijn verstrekt aan 407 kredietnemers en zijn beheerd door 57 kredietmanagers. We gebruiken een nieuwe methode, de multilevel benadering, om de prestaties van de instellingen te meten; deze methode corrigeert voor waargenomen en niet-waargenomen heterogeniteit op drie verschillende niveaus: lening, kredietnemer, en kredietmanager. De belangrijkste bevindingen suggereren dat de eigenschappen van de kredietmanagers vaak van significant belang zijn voor het verklaren van de kans op wanbetaling. Vooral het geslacht van de kredietmanager en

zijn of haar professionele ervaring bleken bepalende factoren te zijn bij het vaststellen van aflossingspercentages. De resultaten suggereren dat mannelijke kredietmanagers beter zijn in het verbeteren van aflossingspercentages van ontvangers van microfinanciering dan vrouwelijke kredietmanagers. Ook suggereren de resultaten dat kredietmanagers met eerdere professionele ervaring bij andere microfinancieringsorganisaties of die cliënt zijn geweest bij Pro Mujer, beter zijn in het verbeteren van aflossingspercentages. Verdere interessante bevindingen zijn dat kredietmanagers die langer bij Pro Mujer werkzaam zijn, grotere kansen op wanbetaling in hun portfolio hebben en dat onderlinge controle of screening van groepsleden geen significante bepalende factoren zijn voor de kans op wanbetaling. De algemene bevindingen suggereren dat de persoonlijke eigenschappen van de kredietmanager van groot belang zijn bij het vaststellen van aflossingspercentages; dit versterkt de noodzaak dat microfinancieringsmanagers hun aanname- en beloningsbeleid herzien zodat kredietmanagers over de juiste middelen kunnen beschikken om de kwaliteit van hun portfolio en de prestaties van de instelling in het algemeen te verbeteren.

Hoofdstuk 6 vat de belangrijkste uitkomsten van de empirische onderzoeken samen en bespreekt deze. Er wordt teruggegrepen op de specifieke onderzoeksdoelstellingen en de belangrijkste bevindingen worden besproken tegen de achtergrond van bestaande literatuur over microfinanciering: over impactevaluatie, prestaties van instellingen, kwetsbaarheid voor armoede en kredietprestaties. Verder bespreekt dit hoofdstuk de gevolgen voor het beleid die uit deze bevindingen voortkomen, de beperkingen van dit onderzoek en mogelijkheden voor toekomstig onderzoek.

Resumen

Al inicio de los años 1970s se generó un interés preponderante en reducción de la pobreza. Este hecho trajo consigo la atención hacia las microfinanzas por parte de donadores, gobiernos e inversionistas como una herramienta innovadora, prometedora y eficiente en costos que permitía reducir pobreza y mejorar el desarrollo económico (Armendariz and Morduch, 2010; Microcredit Summit Campaign, 2005; Morduch, 1999). La idea fue implementar un modelo de organización para proveer financiamiento a los pobres y que pudiera reducir los riesgos y los costos de transacción de administrar prestamos pequeños e inseguros a prestamistas pobres que viven en contextos caracterizados por asimetrías de información y problemas de riesgo moral. El Banco Grameen en Bangladesh, el Banco Sol en Bolivia, y el Banco Rakyat in Indonesia son tres ejemplos de instituciones microfinancieras (MFIs) pioneras. Esas instituciones trabajan por medio de responsabilidad mutua; esto implica que todos los prestamistas dentro de un grupo son mutuamente responsables por la recuperación de préstamos de cada integrante del grupo (Ghatak and Guinnane, 1999). Este sistema se acompaña de incentivos dinámicos como la promesa de acceder a crédito progresivo para prestamistas que cumplen con sus pagos puntualmente y la negación de dicho acceso a los prestamistas morosos (Berhane, 2009; Besley, 1995; Morduch, 1999). Esta última característica también ayuda a reducir el riesgo de mora.

El punto de vista positivo de que las microfinanzas permiten a la gente pobre salir de la pobreza, factor que contribuye a establecer paz de largo plazo (Norwegian Nobel Committee, 2006), ha conducido a una actitud eufórica entre tomadores de decisiones, organizaciones filantrópicas, y académicos acerca del role potencial de las microfinanzas. En contraste con este punto de vista optimista, Bateman (2010) argumenta que las microfinanzas son inapropiadas para un desarrollo sostenible y para la reducción de la pobreza. Asimismo, dada la crisis económica en el sur del estado Indio de Andhra Pradesh, alguna gente incluso afirma

que el microcrédito ha inducido suicidios. Sin embargo, la falta de un soporte científico serio de ambos puntos de vista, el positivo y el negativo, ha creado una necesidad de estudios empíricos que sean informativos para los tomadores de decisiones de las microfinanzas y organizaciones filantrópicas sobre si las intervenciones microfinancieras deberían ser implementadas, y de ser así, cómo. Consecuentemente, una amplia agenda de investigación es necesaria que permita la investigación de una lista amplia de aspectos no resueltos. Mosley (2001) indica que muchas preguntas permanecen sin respuesta en relación al impacto de las microfinanzas en las diferentes dimensiones de la pobreza. La mayoría de estudios refieren al estudio del impacto del microcrédito en la pobreza. Sin embargo, las microfinanzas son mucho mas que microcrédito. La principal innovación de esta tesis es el énfasis en cuatro temas que han recibido relativamente una atención limitada: (1) la relación entre eficiencia y el tipo de estructure de propiedad de las IMFs; (2) la importancia relativa de diferentes tipos de servicios financieros en la reducción de pobreza; (3) el impacto de las microfinanzas en la vulnerabilidad hacia la pobreza; y (4) el papel de los oficiales de crédito en la microfinanzas en tasas de recuperación.

Esta tesis es también innovadora en términos del amplio rango de metodologías y de la variedad de bases de datos que hemos utilizado. En cada caso, hemos utilizado el método más apropiado para abordar el tema de estudio. En el Capítulo 2 por ejemplo, hemos utilizado el análisis estocástico de fronteras (SFA) para medir la eficiencia. Este método permite que la producción observada de una institución particular pueda desviarse de la frontera eficiente debido a eventos aleatorios o posibles ineficiencias (Gregoire and Tuya, 2006), e incorporar un termino de error que captura irregularidades en los datos (Paxton, 2007). En contraste, en el Capítulo 3 hemos utilizado el estimador Hausman–Taylor (1981), un método conveniente para controlar problemas de endogeneidad en estudios de impacto. Este método usa la variación entre y dentro de variables estrictamente exógenas en otros periodos como

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instrumentos (Baltagi, 2001), una propiedad conveniente ante la ausencia de instrumentos apropiados en los datos. Adicionalmente, en el Capítulo 4 nos hemos basado en el test de heterocedasticidad Glejser's (1969), el cual permite la cuantificación de variabilidad de desempeño de ambos, entre-hogares y dentro-hogares. Finalmente, en el Capítulo 5, hemos utilizado un análisis de niveles múltiples de datos, el cual toma en cuenta la heterogeneidad observable y no observable a tres niveles diferentes (por ejemplo, a nivel de préstamo, de prestamista y de oficial de crédito).

En lo que respecta a las bases de datos, en el Capítulo 2, para analizar la relación entre la estructura de propiedad de las IMFs y su eficiencia, hemos utilizado la renombrada base de datos Mix Market (ver www.mixmarket.org) que consiste de información financiera y cobertura de diferentes tipos de estructuras de propiedad de IMFs (por ejemplo organizaciones no gubernamentales [ONGs], cooperativa/unión de crédito, intermediario financiero no bancario [IFNB], y banco). Esta base de datos es única en términos de la amplia cobertura de IMFs a nivel mundial. La base de datos Mix Market es probablemente la mejor base de datos con la información del balance general a nivel de la IMF que esta públicamente disponible. Hemos requerido datos a nivel de la IMF para conducir el análisis de eficiencia. Sin embargo, también hemos necesitado datos a nivel del hogar para estudiar el impacto de las microfinanzas. Para cubrir esta parte de la investigación, nos hemos basado en panel de datos de los hogares de una encuesta representativa conducida en México por parte del Banco Nacional del Ahorro y Servicios Financieros (BANSEFI) de 2004 a 2007. Esta base de datos consiste de 18,933 observaciones; una de sus mayores ventajas es que permite diferenciar entre hogares de tratamiento y hogares de control para cada programa microfinanciero. La inclusión de controles confiables y predeterminados en la base de datos mejora nuestra habilidad para identificar el impacto de diferentes programas microfinancieros. Esta base permite la investigación de dos aspectos: la importancia relativa de diferentes tipos de

servicios financieros en la reducción de pobreza en el Capítulo 3 y el impacto de las microfinanzas en la vulnerabilidad hacia la pobreza en el Capítulo 4. Ambas bases de datos, a nivel de MFIs y a nivel de los hogares, estuvieron fácilmente accesibles. Sin embargo, también hemos recolectado información primaria. Recopilación primaria de información concerniente a ambos, oficiales de crédito y prestamistas, en dos regiones adyacentes de Pro Mujer México nos permitió investigar la influencia de los oficiales de crédito en tasas de recuperación.

El estudio se llevó a cabo usando una muestra de IMFs de América Latina, con un énfasis particular en México. En América Latina, hemos evaluado datos de 318 IMFs operando en 18 países, mientras que en México, el estudio está enfocado a 6,976 hogares ubicados en tres regiones geográficas (norte, centro y sur), y a 407 prestamistas y 57 oficiales de crédito localizados en la región central. Las regiones de estudio son representativas del país y reflejan la diversidad en niveles de pobreza, características demográficas de los hogares, y acceso al mercado.

En el **Capítulo 1**, presentamos antecedentes sobre las microfinanzas, una descripción detallada de cada objetivo específico de investigación, una descripción breve de las diferentes bases de datos, de los programas microfinancieros, y de los métodos usados para los análisis empíricos.

Capítulo 2 evalúa hasta que punto el tipo de estructura de propiedad de la IMF determina la eficiencia técnica de las IMFs in América Latina. Esta pregunta es relevante debido a que provee alguna evidencia sobre la necesidad de tomar en cuenta la heterogeneidad en metas y tipos de propiedad en la medición del desempeño económico de las IMFs. Adicionalmente, esta puede ayudar a las autoridades financieras y a los administradores de microfinancieras a mejorar sus políticas a fin de lograr la sostenibilidad en la operación de las IMFs. Por

ejemplo, si las ONGs y cooperativas/uniones de crédito son ineficientes, innovaciones tecnológicas acompañadas de un marco regulatorio apropiado pueden reducir su nivel de ineficiencia y un mayor acercamiento hacia su frontera óptima de producción. De acuerdo con esto, el énfasis principal del Capítulo 2 es estimar la eficiencia intra-tipo y entre-tipo (Lansink, *et al*., 2001) de cuatro tipos diferentes de organizaciones microfinancieras: ONGs, uniones de crédito, IFNB, y bancos. Para esto, hemos estimado fronteras separadas de producción por medio de un método paramétrico, Análisis Estocástico de Fronteras (ASF). Los resultados de este análisis sugieren que IMF no-accionistas (ONGs and uniones de crédito) son técnicamente menos eficientes y tienen una tecnología inferior en comparación con IMF accionistas (bancos y IFNB). Las diferencias en desempeño se atribuyen primordialmente a las características gerenciales de las IMFs ineficientes no-accionistas más que a factores externos confrontados por las IMFs accionistas tales como regulación y competencia.

Capítulo 3 evalúa el impacto de pobreza de cinco programas microfinancieros diferentes en México: (1) las sociedades públicas de ahorro y crédito (SACPs); (2) el Programa de Asistencia Técnica al Microfinanciamiento Rural (PATMIR); (3) el banco BANSEFI; (4) las IMFs tradicionales; y (5) el programa de transferencias públicas COOPERA. Este análisis de impacto es relevante debido a que puede proveer alguna evidencia sobre la contribución real de diferentes tipos de IMFs, algunas con un enfoque primordial en el ahorro y otras en el microcrédito o en las trasferencia públicas. Adicionalmente, los resultados de este estudio pueden servir de base a los tomadores de decisiones en México a reorientar sus políticas hacia proveer asistencia a IMFs que contribuya ampliamente en términos de reducción de la pobreza y a prevenir la trasferencia desmesurada de subsidios a organizaciones de microcrédito que no contribuyen. Los cinco programas de microfinanciamiento objeto de éste estudio tienen algunas similitudes, todos ellos abordan microfinanzas, aunque difieren considerablemente:

SACP y PATMIR ofrecen un amplio rango de servicios financieros, incluyendo crédito y productos de ahorro, asistencia técnica, y comercialización de insumos y productos a sus socios; BANSEFI se enfoca en productos de ahorro; el programa de IMFs ofrece predominantemente microcrédito; y el programa COOPERA se especializa en canalizar transferencias públicas de recursos. De esta forma, algunos programas se enfocan al ahorro mientras que otros ofrecen primordialmente microcrédito o transferencias en efectivo. Nosotros hemos probado cual de los cinco programas microfinanceros ha sido más efectivo en mejorar el nivel de bienestar de los beneficiarios de microfinanzas en relación a un grupo comparativo de no beneficiarios por medio de un método de variables instrumentales, el estimador Hausman–Taylor (1981). Los resultados muestran que los programas microfinancieros enfocados al ahorro superan los programas que ofrecen principalmente microcrédito en reducción de la pobreza. De esta manera, enfatizamos el papel de cada programa microfinanciero en términos del tipo de instrumentos financieros que ofrecen a sus beneficiarios: ahorros, crédito, y transferencia de recursos públicos. Así, nuestro estudio provee nueva evidencia empírica sobre la importancia de las microfinanzas en general, así como también sobre la contribución relativa de las SACPs en México en mejorar el nivel de bienestar de los grupos de bajos ingresos.

Capítulo 4 analiza el impacto de ser socio de una sociedad de ahorro y crédito en la vulnerabilidad de los hogares hacia la pobreza. Esta es una pregunta importante para la política microfinanciera debido a que permite dilucidar la contribución de las microfinanzas como una estrategia ex ante en asistir los hogares para hacer frente al riesgo y para prevenir su caída en pobreza extrema. Posteriosr a esto, las políticas microfinancieras se pueden mejorar en su alcance para proveer instrumentos financieros apropiados a sus beneficiarios que les permitan mitigar el riesgo ex ante y reducir su vulnerabilidad hacia la pobreza. Nosotros usamos el test de heterocedasticidad Glejser's (1969) a fin de examinar la hipótesis de que el

ser bancarizado de forma silmultánea, incrementa el volumen de ingreso/gasto y reduce la varianza de nivel de ingresos/gastos. Si este fuera el caso, nosotros argumentamos que la vulnerabilidad hacia la pobreza podría reducirse. Los resultados de esta investigación sugieren que el ser miembro de una sociedad de ahorro y crédito mejora el nivel de ingreso per capita, de educación per capita, y de gasto per capita y reduce la variabilidad de dichos indicadores. Esos resultados nos permiten concluir que la membresía en una sociedad de ahorro y crédito en México reduce la vulnerabilidad hacia la pobreza.

Capítulo 5 se enfoca en medir el impacto de las características de los oficiales de crédito en la determinación de las tasas de recuperación en préstamo grupal en microfinanzas. Este es un aspecto importante debido a que éste esclarece la contribución real de esos ejecutivos en reducir la probabilidad de mora de prestamistas microfinnacieros que participan en préstamos grupales de responsabilidad mutua en microfinanzas. Además, los resultados pueden ser informativos para los administradores de microfinancieras sobre como mejorar las políticas de contratación y de incentivos institucionales y sobre como éstas pueden contribuir al mejorar el desempeño general de la institucion. A fin de explorar este aspecto, hemos conducido una investigación empírica en 18 oficinas de Pro Mujer México, una organización microfinanceira que trabaja con la metodología de banca comunal. Esta organización opera en 7 estados mexicanos; sin embargo, para fines de este estudio, hemos seleccionado solo cuatro estados: México, Puebla, Distrito Federal, y Tlaxcala. Esos cuatro estados corresponden a dos regiones adyacentes: (1) la región México-Distrito Federal con 12 oficinas, y (2) la región Puebla-Talaxcala con seis oficinas. Al final, hemos incluido en nuestro estudio información sobre una muestra total de 650 préstamos ofrecidos a 407 prestamistas administrados por 57 oficiales de crédito. Hemos usado un método novedoso para medir el desempeño institucional conocido como "análisis de niveles múltiples" el cual toma en cuenta la heterogeneidad observable y no observable a tres niveles diferentes: préstamo, prestamista y oficial de crédito.

Los hallazgos principales siguieren que las características de los oficiales de crédito son muy significativas en explicar la probabilidad de mora.

En específico, hemos encontrado que el género de los oficiales de crédito así como su experiencia profesional son factores importantes que determinan las tasas de recuperación. Los resultados siguieren que los oficiales de crédito masculinos son mejores en mejorar las tasas de recuperación de créditos que los oficiales de crédito femeninos y que los oficiales de crédito con experiencia profesional previa en otras organizaciones microfinancieras y aquellos que han sido clientes de Pro Mujer son mejores en mejorar las tasas de recuperación. Resultados adicionales de interés se refieren a que los oficiales de crédito que han trabajado por más tiempo en Pro Mujer tienen una alta probabilidad de mora en su cartera y que la supervisión y seguimiento de integrantes del grupo no determinan de una manera significativa las probabilidades de mora. Los resultados generales siguieren que las características personales de los oficiales de crédito son importantes determinantes de las tasas de recuperacion; consecuentemente, esto refuerza la necesidad de que los administradores de microfinancieras revisen sus políticas de contratación y de incentivos a fin de proveer a los oficiales de crédito los medios apropiados para mejorar la calidad de su cartera y con esto el desempeño general de la institucion.

Capítulo 6 sintetiza y discute los resultados principales de las investigaciones empíricas que comprende este estudio. Esto se lleva a cabo mediante una recapitulación de los objetivos específicos de investigación y por medio de una discusión de los resultados principales que se basa en literatura microfinanciera previa sobre evaluación de impacto, desempeño institucional, vulnerabilidad hacia pobreza, y desempeño de crédito. Adicionalmente, este capítulo presenta las implicaciones de política que se derivan de los resultados principales, reconoce las limitaciones del estudio, señala y determina futuras líneas de investigación.

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Completed Training and Supervision Plan

Roselia Servín Juárez
PhD candidate, Wageningen School of Social Sciences (WASS)

Name of the course	Department/Institute	Year	1 ECTS
I. General part			
Research Methodology I: From topic to proposal	Mansholt Graduate School (MG3S)	2007	4,0
End Note Advanced	Wageningen Graduate Schools	2007	1,5
Information Literacy	Wageningen Graduate Schools	2007	0,6
The Art of Writing (PhD)	Language Centre	2008	1,8
Scientific Writing (PhD)	Language Centre	2009	1,8
Effective Behaviour in your Professional Surroundings	Mansholt Graduate School (MG3S)	2009	0,7
Presentation Skills	Language Centre	2009	1,0
Voice and Presentation Skills Training	WASS	2012	-
Stress Identification & Management	WASS	2012	-
The Last Stretch of the PhD Programme	WASS	2012	-
II. Specific part			
Introductory Course Mansholt Graduate School	MG3S	2007	1,5
Presentation in 'European Microfinance Seminar', European Microfinance Program, Brussels	Wageningen, NL	2008, 2010	1,0
Presentation in 'PhD Day 2009' in the Mansholt Multidisciplinary Seminar	Wageningen University	2009	1,0
Presentation in '2nd International Research Workshop on Microfinance and Governance'	Kristiansand, Norway	2009	1,0
Presentation in '3rd International Research Workshop on Microfinance'	Groningen, NL	2010	1,0
Presentation in '1st Valencian Workshop on Efficiency and Productivity'	Valencia, Spain	2010	1,0
Presentation in '117 EAAE Seminar: Climate Change, Food Security and Resilience of Food and Agricultural Systems'	Hohenheim, Germany	2010	1,0
Presentation in the 'WASS Cluster Economics Seminar'	Wageningen, NL	2010, 2011	2,0
Presentation in '2nd European Research Conference on Microfinance'	Groningen, NL	2011	1,0
Presentation in "4th International Research Workshop on Microfinance"	Nantes, France	2011	1,0

Name of the course	Department/Institute	Year	ECTS
III. Discipline-specific part			
New Institutional Economics: Governance of Transactions, Incomplete Contacts, and Barganing	MG3S	2007	4,0
Food Policy for Developing Countries: Governance, Institutions and Markets in Global, National and Local Food Systems	MG3S	2007	4,0
Finance and Banking	NAKE	2007	3,0
Quantitative Research Methods	MG3S	2007	4,0
Advanced Econometrics	MG3S	2008	6,0
Theory and Practice of Efficiency and Productivity Measurement: Nonparametric Static Approach	MG3S	2008,2010	3,0
Theory and Practice of Efficiency and Productivity Measurement: Dynamic Efficiency Approaches	MG3S	2008,2010	3,0
Experiment! A Workshop on Experimental Methods in Social Science and Interdisciplinary Research	MG3S/CERES	2008	1,5
WIAS Advanced Statistics Course Design of Experiments	WIAS	2011	1,0
IV. Teaching and supervising activities (optional)			
Course A: Methods, Techniques and Data Analysis of Field Research	RDS-21306	2008 & 2009	2,0
Supervision of MSc thesis "Coping with Risk by means of Credit in Mexico"	DEC	2010	1,0
Supervision of MSc thesis "The role of loan officers in microfinance in Mexico"	DEC	2010	1,0
TOTAL			**56.4**

*One ECTS on average is equivalent to 28 hours of course work

About the Author

Curriculum Vitae

Roselia Servin Juarez was born in Coeneo, Michoacán Mexico on July 24, 1971. From 1986-1993, she studied at Universidad Autónoma Chapingo (UACh) where she graduated as an Agricultural Engineer, with a specialization in Agricultural Economics. After a year of teaching (1993-1994) at Colegio de Bachilleres del Estado de Veracruz (COVAEV), she did a MSc programme at Colegio de Postgraduados (COLPOS) from 1995-1996 and she got her Master Degree in Economics in 1997. In 2008-2009 she participated in specialized coffee courses in Huatusco,Veracruz. In 2001-2002 she became a consultant in rural development at the Veracruz Institute for Rural Development (INVEDER) and acted as a Regional Manager of the Microfinance Fund for Rural Women (FOMMUR) at Central de Promoción Rural de Acayucan, Vearacruz. Since 2002, Roselia has been working at Colegio de Postgaraduados (COLPOS), Campus Córdoba, where she is responsible of conducting research and training projects on microfinance, impact assessment, sugar cane, agro-ecological technologies, among others in Veracruz's central region. In 2007, the National Council of Science and Technology (CONACYT) granted Roselia a scholarship to start her PhD programme at Wageningen University, Development Economics Group (DEC). During her stay in Wageningen, she attended a number of courses in the WASS graduate school and in the NAKE program. In addition, she advised MSc theses related to her research project in microfinance and participated in a number of workshops, conferences and research seminars in Wageningen and abroad.

List of publications:

Servin Juarez, R.; Lensink, B.W.; Berg, M.M. van den (2012)
Ownership and Technical Efficiency of Microfinance Institutions: Empirical Evidence from Latin America. *Journal of Banking and Finance 36 (7). p. 2136 - 2144.*

Servin Juarez, R.; Lensink, B.W.; Berg, M.M. van den., s*ubmitted*. Does Microfinance Improve Household Welfare? Empirical Evidence from Five Mexican Microfinance Programs.

Servin Juarez, R.; Lensink, B.W.; Berg, M.M. van den., *submitted*, Does Microfinance Reduce the Vulnerability of Households to Poverty?

Servin Juarez, R.; Lensink, B.W.; Berg, M.M. van den., *in review*, Loan Officers' Characteristics and Microfinance Repayment Rates.