The impacts of microcredit on income poverty, labour and well-being:
A quasi-experimental study in urban Mexico

by

Miguel Angel Niño Zarazúa

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Dedicated to the women and men of the Chalco Valley, San Miguel Teotongo and Tula Hidalgo, for their daily efforts to improve their lives.

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Abstract

Mexico has undergone a drastic reform in financial markets that transformed the system from financial repression to financial liberalisation and yet, a large percentage of enterprising households, particularly at the bottom-end of the income distribution, remain excluded from institutional financing. In 2001, the Mexican government launched the National Programme for Financing the Microentrepreneur with the explicit objective of expanding access of poor households to credit, through capital subsidisation of microfinance organisations. The intervention was based on the proposition that the impacts of credit on income and well-being are positive and significant. In this thesis we test such a proposition in the context of urban poverty.

One of the main challenges in analysing the impacts of credit emerges from the problems of self-selection and endogeneity that are related to the choice of borrowing. The very few studies that control for these estimation constraints employ methodologies that are restricted to rural areas. We propose an alternative quasi-experimental research methodology specifically designed to work in the urban context, where a large percentage of microfinance organisations in the developing world actually operate. We collected primary data from 148 households, members of three microfinance organisations that operate in shantytowns located to the Eastern periphery of the Metropolitan area of Mexico City.

Although we find that credit has positive impacts on income poverty, the magnitude of the impacts is marginal and only significant at the upper thresholds of human deprivation, where the moderate poor are located. We find no evidence of impacts on extreme poverty. The empirical evidence reveals that rigid screening, incentive and enforcement devices that microfinance organisations exploit to mitigate moral hazard and adverse selection, generate a significant and increasing utility cost of borrowing that undermine the potential effects on poverty and well-being. We also find that these devices exacerbate micro-rationing in credit markets, leading to constrained Pareto inefficiency. In this sense, government interventions that go beyond the objective of expanding access to credit, and facilitate, through temporal subsidisation, technological and financial innovations, could improve market efficiency and benefit both lenders and borrowers.

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Variables	Definition	Obs	Mean	S.D.	Min	Max
Impact variables						
LGMAXCREDIT, C_i	Logarithm of the maximum amount of credit borrowed in the last credit cycle	148	5.475	4.466	0	10.621
LGMAXCREDIT†, I_i	If household has been treated = 1	148	0.608	0.490	0	1
Variables contained in X_i						
AVEDU	Years of education	148	7.047	3.777	0	17
HOWNER	If household owns residence = 1	148	0.682	0.467	0	1
HESTATE	If house is still in construction = 1	148	0.791	0.408	0	1
TIMEBUS	Years in business	148	5.162	5.746	0	30
WWORKER	Number of household members with a waged job	148	0.547	0.703	0	3
DEPENDRATIO	Dependency ratio (number of children, students and old members / household size)	148	0.498	0.222	0.125	1
AGE	Age of borrower	148	42.189	10.846	19	74
WOMAN	If borrower is woman = 1	148	0.730	0.446	0	1
MARITAL	If borrower is in a relationship = 1	148	0.757	0.430	0	1
NHS	If household has access to institutional health care = 1	148	0.595	0.493	0	1
Variables contained in L_i						
ROSCAS	If borrower participates in rotating savings and credit association = 1	148	0.453	0.499	0	1
FORMALCREDIT	If borrower have received loans from institutional lenders = 1	148	0.054	0.227	0	1
MONEYLENDER	If borrower have received loans from moneylenders	148	0.095	0.294	0	1
Instrumental variables, Z_i						
DISTANCE	Distance from branch to place of residence or business (in minutes)	148	32.365	21.716	10	100
MEMBERSHIP	Years of membership	148	1.704	1.944	0	8
LGOPPORTCOSTPC	Logarithm of the opportunity cost of borrowing per credit cycle	148	3.880	3.204	0	8.006
LGCOSTBORROWPC	Logarithm of the cost of borrowing per credit cycle	148	3.973	3.267	0	8.006
Dependent variables, Y_i						
LGINCOMEPC	Logarithm of income per capita	148	7.296	0.594	5.438	8.868
LGINCOMEPAE1	Logarithm of income per adult equivalent 1	148	7.452	0.571	5.733	9.055
LGINCOMEPAE2	Logarithm of income per adult equivalent 2	148	7.724	0.545	6.114	9.315
LGINCOMEPAE3	Logarithm of income per adult equivalent 3	148	7.895	0.543	6.324	9.512
POORPL1	If household's income is below poverty line 1 = 1	148	0.068	0.252	0	1
POORPL2	If household's income is below poverty line 2 = 1	148	0.405	0.493	0	1
POORPL3	If household's income is below poverty line 3 = 1	148	0.581	0.495	0	1
POOR2US	If household's income is below US $2 a day = 1	148	0.047	0.213	0	1
LGPROFITSPM	Logarithm of profits per month	148	7.381	2.414	0	10.150

LABOUR	Number of household members engaged in self-employment plus employees	148	1.703	1.116	0	6
BUSASSETS	If household has purchased business assets =1	148	0.655	0.477	0	1
STABILITY	If financial situation is better = 2 If financial situation is unchanged = 1 If financial situation is worse = 3	141	1.539	0.692	1	3
IMPROVESTATE	If household has invested in housing improvements = 1	148	0.392	0.490	0	1
VEHICLE	If household has purchased vehicles = 1	148	0.270	0.446	0	1
ELECTRICAL	If household has purchased electrical appliances = 1	148	0.243	0.430	0	1
SCHOOLING	If household has stop sending children to school = 1	148	0.270	0.446	0	1
HEALTH	If health status is good = 1 If health status is regular = 2 If health status is bad = 3	148	1.547	0.621	1	3
LGWAGEXP	Logarithm of household expenditure on labour-hiring per month	148	1.107	2.672	0	8.556
LGHINCOME	Logarithm of household income per month	148	8.697	0.537	7.244	10.254
LGHOURSLABPM	Logarithm of hours of labour hired per month	22	4.645	0.415	4.094	5.075
LGAGHOURSPM	Logarithm of hours of labour invested in production, including labour hiring	148	5.169	1.653	0	7.352

Acronyms and abbreviations

ACCION	ACCION International
AIMS	Assessing the Impacts of Microenterprise Services
ASA	Association for Social Advancement
Banamex	National Bank of Mexico
Bancomext	National Bank of Foreign Trade
BancoSol	Banco Solidario
Banrural	National Bank for Rural Credit
BANSEFI	National Savings and Financial Services Bank
Banxico	Central Bank of Mexico
BRAC	Bangladesh Rural Advancement Committee
BRI	Bank Rakyat Indonesia
CAME	Centre for the Assistance of the Microenterpreneur
CANAFO	Caja Mexicana de Fomento
CAPs	Savings and Credit Co-operatives
CDs	Certificates of Deposit
CEMEX	Mexican Cements
CGAP	Consultative Group to Aid the Poorest
CNBV	National Banking and Securities Commission
COMACREP	Consejo Mexicano de Ahorro y Crédito Popular
CONDUSEF	National Commission for the Defence and Protection of Financial Services' Costumers
COPLAMAR	National Programme for Deprived Zones and Disadvantage Groups
DFID	Department for International Development
DOF	Diario Oficial de la Federación
ECLAC	United Nations Economic Commission for Latin America and the Caribbean
EEDC	Economic and Employment Development Centre
ENAMIN	National Survey on Microbusiness
ENIGH	Household Income and Expenditure Surveys
EZLN	Zapatista Army for National Liberation
FAC	Foundation for Community Assistance
FAO	Food and Agriculture Organisation

Finamerica	Commercial Financial Company Finamerica
FINCA	Foundation for International Community Assistance
Fincomun	Community Financial Services
FOBAPROA	National Deposit Insurance Authority
FONAES	Solidarity Enterprises National Fund
FONDESO	Fund for Social Development
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
HDI	Human Development Index
HPI	Human Poverty Index
IAE1	Income per adult equivalent 1
IAE2	Income per adult equivalent 2
IAE3	Income per adult equivalent 3
IC	Income per capita
ICESI	Instituto Ciudadano de Estudios sobre Inseguridad
ICP	International Comparison Program
IGGs	Income-Generating Groups
IMF	International Monetary Fund
INEGI	National Institute of Statistics, Geography and Informatics
IPAB	Institute for the Protection of Bank's Savings
LIBOR	London Inter-Bank Offer rate
Nafin	National Development Bank
NAFTA	North American Free Trade Agreement
NBBN	Normative Basket of Basic Needs
NGOs	Non-Governmental Organisations
OECD	Organisation for Economic Co-operation and Development
PAHNAL	National Savings Trust Fund
PEMEX	Mexican Petroleum
PL1	Food-based Poverty Line
PL2	Capability-based Poverty Line
PL3	Asset-based Poverty Line
PPP	Purchasing Power Parity
IRP	Institutional Revolutionary Party
PROCAPTE	Special Re-capitalisation Programme
Promujer	Programas para la Mujer

PRONAFIM	National Programme for Financing the Microenterpreneur
PROSHIKA	PROSHIKA Centre for Human Development
PULSE	Peri-Urban Lusaka Small Enterprise Project
ROSCAS	Rotating Savings and Credit Associations
SAPs	Savings and Credit Associations
SDI	Subsidy Dependence Index
Sedesol	Secretariat of Social Development
SIDA	Swedish International Development Cooperation Agency
TCPM	Technical Committee for Poverty Measurement
UBN	Unsatisfied Basic Needs
UNDP	United Nations Development Program
UNICREVA	Credit Union of the Mexican Valley
USAID	United States Agency for International Development
VB	Village Banks
WTO	World Trade Organisation

Chapter 1
Introduction

1.1 Context

This thesis is the outcome of a long intellectual journey that began in the aftermath of the Peso crisis of December 1994, when I was a brand new Economics graduate from the National Autonomous University of Mexico. At that time, the symptoms of the crisis had begun to be visible in the form of an increasing unemployment rate that quickly filled the streets around the cities with vendors that were desperately trying to make a living. Prior to the crisis, Mexico had been involved in a rapid macroeconomic reform, following the Washington Consensus[1] that transformed the country from a highly centralised economy, dominated by stated-owned enterprises, including development banks, to a market-led liberalised economy. In that process, the orthodoxy of financial liberalisation was the mainstream in the policy arena, and economic growth, *per se*, was expected, following the Kuznets´s hypothesis, to trickle-down to the poor[2]. The expectations about the country, domestically as well as internationally, were high and optimistic after a long period of economic recession following the Oil crisis of 1982.

It is important to point to the fact that during the period in which market liberalisation was fully implemented, i.e. from 1989 to 1994, the real GDP grew at the very modest average rate of 3%, and mostly benefiting the exporting manufacturing sector (Banco de Mexico 1995), and when the Peso crisis began, it put in evidence the structural disequilibria in the economy. The setback of -6.9% in real GDP in 1995 vanished the insignificant effects of the market liberalisation on the economy, leaving many workers unemployed, with no sources of funding to start a business, and with a collapsed local market that was increasingly invaded with cheap imported goods from abroad. The results from the promising economic reform, in terms of economic growth, employment, and well-being were truly disappointing, reflected in the incidence of poverty that soared from 29.4% just before the crisis in 1994 to 45.3% in 1996 (see Chapter 4 for a discussion).

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[1] The Washington Consensus was a list of recommendations that included fiscal policy discipline; tax reform; financial and capital markets liberalisation; market-based interest rates; trade liberalisation and competitive exchange rates; privatisation of state enterprises; and deregulation. See Williamson (2002) for a discussion.

[2] The Kuznets's hypothesis is based on the proposition that there is an inverted U-shaped relationship between economic growth and income inequality. For an exposition see Kuznets (1955), and also Galbraith (1996) and Aghion and Bolton (1997) for a critic.

The collapse of the banking and non-banking system, and the increasing number of impoverished households engaged in income generating activities, forced the government to turn the attention to an embryonic microfinance sector that included at the time a handful of organisations such as Financiera Compartamos, Servicios Financieros Comunitarios (Fincomun), and the Centro de Apoyo al Microempresario (CAME). Some development banking institutions, in particular the National Development Bank (Nafin) also introduced a pilot project, the Micro-entrepreneurial Development Programme (or *Programa Global de Apoyo a la Microempresa* in Spanish), aimed to improve the access of poor enterprising communities to credit, but without interest rate subsidisation. In that context, an event happened to be the turning point for the future expansion of the microfinance industry in Mexico. In early 1997, Vicente Fox, who was at that time governor of the State of Guanajuato, in central Mexico, came into contact with Mohamed Yunus who explained the way Grameen Bank operates. Highly impressed, Fox ordered a complete study of the Grameen model, and one year later, a credit programme, Santa Fe de Guanajuato, was established on the principles of group lending, and where organisational management and governance was independent from the local government. Three years later, in December 2000, Fox was elected President and with the advise of Yunus, the National Programme for Financing the Microentrepreneur (PRONAFIM), a revolving fund of US$ 100 million, was launched in 2001 with the aim of supporting, with *subsidised capital*, the expansion of the microfinance industry in Mexico.

1.2 The statement of the problem

Government interventions in credit markets have a long history in Mexico, from institutional ownership (like in the case of development banks) to the nationalisation of the banking system (like in 1982). In fact, charging below-market interest rate was an important component of these interventions that were pursued on the grounds of *selective targeting* at industries, regions and sectors which were considered "strategic" for economic growth, employment and in general, the process of development (Solis 1971). Credit allocation was to a large extent based on direct subsidisation of interest rates, what Vogel and Adams refer to as the direct

credit paradigm, which often caused fiscal outlays and led to market inefficiency and financial repression (see McKinnon 1973 for a critic).

This type of intervention came under severe criticism from the Ohio School (see e.g. Adams et al 1994, and Adams and von Pischke 1992) on the basis of two key problems: 1) the rates of loan default were very high; and 2) most of the recipients were not the intended beneficiaries, causing rent-seeking behaviour and political patronage[3]. These criticisms led, during the process of financial liberalisation in Mexico, to a drastic reform that restricted government intervention to a very few cases where market failure was clearly identified, perhaps the most obvious case in the context of rural credit markets, and on the basis of a distributional mechanism[4]. However, the role of institutional lenders goes beyond their distributional function of capital assets, and by expanding poor people's opportunities for productive and self-employment activities, they may well improve their living conditions by enhancing human capital for future generations through investments in children's education, or accumulating physical capital in the form of household and business assets.

Nonetheless, fragmented credit markets are not exclusive of rural areas, and in the urban context, the inaccessibility to institutional credit can be striking. A recent survey (Casley *et al* 2004) reports that only 1.8% of the population in the Metropolitan area of Mexico City has borrowed from institutional lenders. To a large extent this situation emerges due to the extensive use of collateral in traditional financial intermediation that highly restricts the access of low-income households to credit. This constraint can, as pointed out by Banerjee and Newman (1993), and Galor and Zeira (1993), perpetuate the poverty trap. Thus, *temporal* government interventions aimed to reduce the effects of externalities coming from incomplete information could facilitate the expansion of the microfinance industry, and improve the access to credit of those excluded from institutional financing

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[3] Vogel and Adams (1997:5) have also included six additional issues: 1) transaction costs for both borrowers and lenders were boosted; 2) subsidised credit was regressively distributed; deposit mobilisation was discouraged; financial structure was weakened; insignificant impact on production and investment decisions, and 6) evaluations of direct credit programmes were flawed.

[4] This was explicitly recognised by the inclusion of a credit component within a social safety net (initially known as *Solidaridad*) that became available to poor households living in rural communities. Under the President Zedillo's administration this programme was renamed as *Progresa*, and later on, as *Oportunidades*, under the Fox's administration.

(Greenwald and Stiglitz 1986). This could ultimately break down the poverty trap and foster, contrary to the mainstream orthodoxy of a trade-off between equity and efficiency[5], the development process (Bardhan and Undry 1999).

1.3 The aims of the study

In that perspective, PRONAFIM was launched to help microfinance organisations to absorb these externalities and expand the scope and outreach of the sector, through the provision of temporal *cheap capital*, assuming that access to credit, *per se* translates into poverty reduction. This assumption is based on two theoretical propositions that need to be tested to justify the intervention: 1) in fragmented credit markets, the demand for credit is rationed by the lender, and 2) credit is a *significant* determinant of increasing incomes and improving well-being. The former proposition appears to be true at least from an institutional point of view (see e.g. Stiglitz and Weiss 1981, and Braverman and Stiglitz 1989); however, the extent of the rationing may be less when indigenous financial agents such as moneylenders and rotating savings and credit associations (ROSCAS) actively operate in local markets (see e.g. Kochar 1997). Very few attempts (e.g. Diagne and Zeller 2001) have been made to examine the relationship between these agents and microfinance organisations, whilst controlling for their effects on well-being, what it is known as the *attribution* problem (see Hulme 2000). In Chapter 7 we present an econometric estimation procedure, which by including a vector of credit market characteristics, controls for the effects of informal credit agents on the outcomes of interest. In addition, we present narrative evidence from qualitative data in order to address the reasons of using such informal mechanisms when having access to credit from microfinance organisations.

In relation to the latter proposition, although there is an increasing consensus regarding the *positive* effect of credit on household income and well-being, the magnitude and significance of the impact remains inconclusive and methodologically contested, especially when considering the bottom-end of the income distribution. Most of the impact studies that we reviewed, and which are discussed in Chapter 2, focus on the rural context and suffer, with a few exceptions,

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[5] For a classic analysis of the equity-efficiency trade-off, see Okun (1975)

from endogeneity and selectivity problems, and those studies that successfully control for endogeneity and selection bias (e.g. Pitt and Khandker 1998a; 1998b; Coleman 1999) use methodological approaches that are difficult to replicate in the urban context, where many microfinance organisations in developing countries actually operate. For that reason, and with the purpose of addressing the selectivity and endogeneity constraints, we propose in Chapter 6 a *quasi-experimental* research methodology specifically designed to work in deprived and densely populated urban areas. We collected primary data at the household level (to reduce the fungibility problem), and from households participating at three microfinance organisations that employ different lending technologies:

1) Community Financial Services (Fincomun) employing a *minimalistic* credit-only *individual lending* approach, and operating in San Miguel Teotongo, a settlement of the Iztapalapa District, located to the Eastern periphery of Mexico City.

2) Centre for the Assistance of the Microenterpreneur (CAME) employing a *minimalistic* credit-only *village banking* approach, and operating in the Chalco Valley, one of the poorest municipalities of the State of Mexico, located to the Eastern periphery of the Metropolitan area of Mexico City.

3) Programs for women Mexico (Promujer) employing a *holistic* credit-plus *village banking approach* that combines credit with training, and operating in Tula City, an hour from Mexico City.

The econometric estimation procedure discussed in Chapter 7 enables us to test for the underlying assumptions of no selectivity bias and endogeneity problems. It is important to point out here that our analysis primarily focuses on credit as the impact variable despite the fact that the case-study organisations offer other services such as voluntary savings (like in the case of Fincomun), loan insurance (like in the case of CAME) and training programmes (like in the case of Promujer).

The structural nature of microfinance demands the use of several screening, incentive and enforcement devices that in substitution of collateral, deal with the problems of moral hazard and adverse selection, and reduce the informational costs

implicitly related to the process of lending to the poor (see Chapter 5 for a detailed discussion). However, these devices generate transaction and opportunity costs that are transferred to the borrower through the various mechanisms that characterise group-lending and individual-lending contracts (Stiglitz 1990). These costs can substantially increase the utility cost of borrowing and consequently, reduce the magnitude of the poverty impacts. This thesis documents the effects of the utility cost of borrowing in relation to household income and well-being, especially when group-lending and individual-lending models are compared, challenging the view that low rates of loan default is a sufficient indicator of programme effectiveness (see e.g. Remenyi 1991).

Microfinance organisations in Mexico and in the developing world commonly use, either due to organisational goals or donor conditionality, several *indirect* mechanisms such as interest rates above the market rate; the provision of small-size loans; and compulsory attendance to periodical group meetings, to reach the poor. However, in order measure the extent of the outreach and avoid under- or over-estimations of the magnitude and significance of the poverty impacts, it was crucial to identify appropriate thresholds of human deprivation for urban areas. In Chapter 4 we follow three poverty lines, derived from the Secretariat of Social Development's work (2002), which were adjusted by three equivalence scales, in order to take into account intra-household distribution of welfare. The results from the poverty impact analysis are presented in Chapter 7.

1.4 Outline of the thesis

In the chapters, which follow we present the way forward to investigate the objectives of this thesis. Chapter 2 reviews the recent empirical evidence, based on rigorous and scientific studies, of the impacts of credit on income poverty, labour and well-being, paying particular attention to the methodological constraints faced in impact evaluations and the research gaps found in the field. Chapter 3 briefly discuss the characteristics of the credit markets in Mexico in the context of the institutional reform that moved the system from financial repression to financial liberalisation, looking in particular at the recent expansion of the microfinance sector in the country. Since we are interested in examining the effects of credit on

poverty reduction, we need to answer the question of who is poor in the context of urban Mexico. We devote Chapter 4 to answer this question. In Chapter 5 we present the analytical framework that seeks to set up the theoretical foundations for the investigation of the impacts of credit. We introduce the notion of household capital endowments that are integrated by three separated but interrelated factors that are critical to access the labour and credit markets: human capital; physical capital, and social capital. In the same Chapter, we present the theoretical propositions that are tested in Chapters 7 and 8.

Chapter 6 presents the methodology and research design that we propose to control for the problems of selection bias and endogeneity in the impact study. Chapter 7 discuss the econometric estimation procedure that tests the underlying assumptions of no selection bias and endogeneity in the impact analysis. We also present in that chapter the empirical results regarding income and poverty impacts in connection with the utility cost of borrowing. In Chapter 8, we investigate other impacts beyond the income variable, looking in particular at business performance, physical capital accumulation, human capital enhancements, and labour. Chapter 9 summaries the main findings of the study, and concludes by identifying some policy recommendations for improving practice and increasing impact.

Chapter 2
Microfinance and impact assessments. An overview

Introduction

The implicit nature of fragmented credit markets, plagued with problems of imperfect information, has made it very difficult for institutional lenders such as banks to reduce the informational costs that are related to the process of lending to the poor, and the strong dependency on the use of conventional screening devices such as collateral has exacerbated the incidence of credit rationing in the market, particularly at the bottom-end of the income distribution, where households have low levels of physical capital endowments to back loan applications (see Stiglitz and Weiss 1981 and also chapter 5 for a detailed discussion on this issue).

In this Chapter we discuss the emergence of *microfinance*, which by the use of several screening, incentive and enforcement devices, has successfully reduced the problems of moral hazard and adverse selection, leaving the door of credit open to an important number of low-income households in the developing world. In that context, microfinance has become an instrument of social and economic development based on the general proposition that credit (as well as other financial services such as savings and insurance) have *positive* impacts on the poor. But to what extent does the empirical evidence confirm this proposition? What is the magnitude and significance of these impacts? What are the research gaps in the field? We conducted a review of the existing empirical evidence to answer these questions. Our attention primarily focuses on rigorous and scientific studies that often employ econometric techniques to assess poverty impacts, although we also refer to qualitative studies that have revealed important information for the purpose of our investigation.

This chapter is structured as follows: in section 2.1 we discuss different lending technologies used by microfinance organisations, which are divided for analytical purposes into three general models: group lending; village banking and individual lending. In the same section we discuss the role of indigenous agents such as moneylenders and rotating savings and credit associations in fragmented credit markets. In section 2.2 we examine the controversial issues of subsidisation and financial sustainability in the context of poverty impacts before moving onto section

2.3 that reviews the empirical evidence of the impacts of microfinance at the *micro-level*, looking in particular at the impacts on poverty and well-being; women; labour, and vulnerability. Section 2.4 concludes the chapter.

2.1 The emergence of microfinance in fragmented credit markets

The microfinance movement emerged in the early 1980s as a combination of screening, incentive and enforcement devices that increase lenders' ability to deal with the problems of moral hazard and adverse selection in the provision of financial services to the poor. Regularly, these devices take the form of *direct* and *indirect* mechanisms such as compulsory savings; periodical repayment schedules in compulsory meetings; social collateral in the form of joint liability in group-lending contracts; progressive lending; targeting at women, and trade-credit linkages[1] (see Hoff and Stiglitz 1990; Udry 1990; Bell 1990; Aleem 1990, and Stiglitz 1990). The structural characteristics and informational advantages of microfinance attracted the interest of the international development community, in a period when the *direct credit paradigm*, represented by a large number of credit projects that usually targeted agricultural and industrial sectors[2] under *quasi-Keynesian* principles of financial intermediation, were under severe criticisms from the Ohio School for failing to reach the intended beneficiaries. For example, Adams *et al* (1984) reported that loan repayment rates from direct credit programmes were below 50 percent, the costs of subsidies were frequently inflated, and credits were diverted to politically favoured groups. Nagarajan *et al* (1995) have also criticised credit schemes for allocating inefficiencies in credit markets and eroding *indigenous* lending practices such as moneylending (see also Shaw 1973; McKinnon 1973, and Adams and von Pischke 1992 for a critic against subsidised credit schemes).

Since the emergence of Grameen Bank in the 1983, more than 400 organisations operating in 66 countries in Africa, Asia, America and Europe have entirely or partially employed the principles of *solidarity groups* to reach low-income households (Latifee 2001). The Foundation for International Community Assistance

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[1] In Chapter 5 we discuss in more detail the characteristics of these mechanisms.

[2] Vogel and Adams (1997:14) have pointed out the fact that *"since the first agricultural credit project in Peru in 1955, the World Bank has financed about 700 other projects with major agricultural credit components in 94 countries,* [....] *involving more than US $16 billion*".

(FINCA) and its *village banking* subsidiaries are operating in more than 20 countries, with more than 500 thousand borrowers (FINCA 2006), whereas another village banking operator, Opportunity international (2005), has reported to work in 28 developing countries with more than 810 thousand active members, and an outstanding loan balance of almost 130 million US dollars. Similarly, ACCION International, one of the largest microfinance networks worldwide, reported to have reached in 2006 around 2.5 million households in 28 countries, 19 of which were in the Latin American region. The outstanding loan balance was in the order of 2 billion dollars with a portfolio of loans in arrears of just 3%. The largest microfinance organisations in Latin America (e.g. the Banco Solidario in Ecuador, BancoSol in Bolivia, MiBanco in Peru, and Compartamos in Mexico, the latter the largest microfinance bank in the Western hemisphere) are affiliates of the ACCION network (ACCION International 2006). The Women's World Banking Global Network has also reported to support 50 affiliates in 43 countries around the world that together have served over 23 million borrowers (WWB 2006).

One of the leading organisations in the cooperativist movement that embraces the *individual-lending* model is the Canadian *Developpement International Desjardins*. This corporation has provided technical assistance to organisations that reached in 2006 over 3.2 million households in 29 countries in Latin America, Africa, Asia and Eastern Europe. The network also reported an average loan size in the order of US $900 and an average savings on deposits of US $200 (DID 2006). Over the years, the microfinance industry has considerably expanded its outreach in the developing world. The Microcredit Summit campaigners have reported that 3164 organisations were reaching almost 92.3 million households, 68% of whom were below the World Bank's US $1 a day poverty line (see Daley-Harris 2005); even though they acknowledge, alike to what the United Nations Development Program (UNDP 1997) has pointed out, that despite of the important progress in scaling up the microfinance sector, only a small percentage (about 7.7%) of the 1.2 billion people in poverty worldwide have access to credit.

Although the concept of *microfinance* may include the provision of financial services such as *voluntary* savings, insurance and remittances, a wider portfolio of services beyond credit remains restricted to a small group of fully regulated organisations in

the developing world[3]. For this particular reason, the empirical impact analysis discussed later in Chapters 7 and 8 primarily focuses on credit as the main product offered by the case-study organisations that participated in our study[4]. Nonetheless, the microfinance sector has become a complex network of organisations embracing a wide range of lending technology[5], which for analytical purposes, we divide into three general models: 1) solidarity groups; 2) village banking, and 3) individual lending. Within each model, there are variations in technology and services, ranging from *minimalistic* credit-only programmes to *holistic* credit-plus organisations, whereas within organisations, there is an increasing tendency to employ more than one model to reach different market niches (see table 2.1).

Table 2. 1 Distribution of microfinance organisations by lending model

	1999	2000	2001	2002	2003	2004	2005
Individual	23	23	21	25	63	66	63
	24%	38%	35%	27%	32%	33%	32%
Individual/Solidarity groups	17	22	26	43	81	89	102
	17%	37%	43%	47%	41%	45%	51%
Solidarity groups	9	7	4	7	31	23	17
	9%	12%	7%	8%	16%	12%	9%
Village Banking	8	8	9	16	25	22	18
	8%	13%	15%	18%	13%	11%	9%
Total surveyed organisations	97	60	60	91	200	200	200
	100%	100%	100%	100%	100%	100%	100%

Source: MicroBanking Bulletin, various years

2.1.1 Solidarity groups

Solidarity groups are often related to the Grameen Bank's lending model in which loans are given to groups of 5 to 7 individuals that are clustered *voluntarily*. Although loans are received individually, the group is collectively responsible for loan repayment. Several groups meet on a weekly or fortnightly basis with credit officers to repay the loan over a period of 16 to 24 weeks. Some credit programmes

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[3] In the particular context of our impact study, only one organisation (Fincomun) out of three case-study organisations was authorised to receive deposits, although restricted to offer other financial products. For more details about the institutional characteristics of the case-study organisations, see Chapter 6.

[4] It is important to point out here the fact that 92.2% of treatment households interviewed said to have joined a credit programme in the first place with the purpose of getting a loan. For further details, see table A6.12 in the Appendix to Chapter 6.

[5] We refer to the concept of *lending technology* as the collection of techniques, methods, processes and skills that in the form of knowledge are used to satisfy market needs and solve existing constraints. For a theoretical discussion of the concept of technology, see Franklin (1989).

may offer longer *periodical repayment schedules*. By meeting regularly, the lender substantially reduces the probability of loan default, although as pointed out by Stiglitz (1990), increase the transaction costs to the borrower. Solidarity groups take advantage of local information disseminated through social interactions and *peer monitoring*, just as moneylenders and rotating savings and credit associations do (see Besley and Coate 1995), and where the homogeneity of group formation, through *peer-selection*, facilitates the enforcement process of loan repayment (see Ghatak 1999).

During compulsory meetings, loan instalments are made, and if a group member defaults the loan, the group as a whole will need to cover the missing instalment to avoid cancellation of subsequent loans and other sanctions. Groups with good records, on the contrary, are rewarded with the access to larger loans that progressively increase overtime. *Progressive lending* acts here as an incentive device that reduces the probability of loan default (see Morduch 1999; Hulme and Mosley 1996, and also chapter 5 for a detailed discussion). The model of solidarity groups has been replicated by many organisations worldwide, embracing either a *minimalistic* credit-only approach (e.g. Grameen Bank in Bangladesh; BancoSol in Bolivia, and Finamerica in Colombia) or a *holistic* credit-plus approach (e.g. BRAC and PROSHIKA in Bangadesh)[6]. Another model widely used in the provision of financial services to the poor is *village banking*.

2.1.2 Village banking

Village banking is often linked to the lending model developed by Foundation for International Community Assistance (FINCA) in the 1980s, in which a sponsoring agency makes an initial loan to a group of 30 to 50 members that previously met to deposit compulsory savings in a collective fund. The loan is then distributed to the members of the village bank conditional upon a minimum level of deposits of 10% of the loan size. Compulsory savings act as both a screening device, and an internal

[6] Whilst the minimalistic credit-only approach refers to organisations relying their operations on credit, and using compulsory savings and other services as complementary incentive and enforcement mechanisms, the holistic credit-plus approach refers to programmes that offer credit as part of a broader portfolio of services including basic education, health care, and training for productive activities.

fund for extra loans. Although interests on deposits are usually not paid, members are entitled to receive a share of the revenues generated from lending activities. The bank is managed by its members and controlled by rules that are voted collectively. As in solidarity groups, joint-liability applies in this case; however, in village banking, the group as a whole is responsible for loan repayment. To reduce the probability of loan default, loans are initially made on small amounts although they progressively increase.

Village banks, as well as solidarity groups, employ periodical repayment schedules as a screening device, which usually take place on a weekly basis over a period of 16 weeks. During those meetings, loan repayments and deposits to the internal fund are made. The initial loan from the sponsoring institution is kept in an external account (usually in a banking institution) whereas savings deposits to the village bank are held in an internal fund that can be withdrawn on weekly basis[7].

The village-banking model has been embraced by organisations working in Central America; Sub-Sahara Africa and Central Asia, employing either a minimalistic approach (e.g. FINCA; CAME and Compartamos), or a holistic perspective (e.g. Promujer and Freedom from Hunger). Armendariz de Aghion and Gollier (2000), and Morduch (1999) suggest that group-lending contracts, including solidarity groups and village banking, have a comparative advantage vis-à-vis individual lending contracts specially when targeting the poor, since the former models, particularly in rural credit markets, are better positioned to mitigate informational constraints emerging from the problems of adverse selection and moral hazard .

2.1.3 Individual lending

However, individual lending organisations have proved that high levels of loan repayment can be achieved amongst the poor, through the combination of screening, enforcement and in particular, incentive devices such as progressive lending and refunds for on-time repayments that reduce the probability of loan default. Amongst the best-known individual-lending organisations are the *Unit*

[7] For a detailed discussion on the village banking model see Morduch (1999), and the information available at www.villagebanking.org

Desa System of the Bank Rakyat Indonesia (BRI); the Canadian *Developpement International Desjardins*, and the credit unions movement in Latin America and Africa, which unlike group-lending programmes, require physical collateral and guarantees. As in solidarity groups and village banking, loans are made in small amounts conditional upon minimum savings, and often repaid periodically on a weekly basis for period that ranges from 4 to 12 months. However, in individual lending contracts, credit officers play a fundamental role in screening loan applications and monitoring borrowers that progressively receive larger loans based on good records of loan repayment. Individual lending organisations normally embrace a minimalistic credit-only approach, keeping interest rates at levels needed to achieve financial self-sufficiency (Otero and Rhyne 1994). McGuire (1998) and Yaron *et al* (1998) have also drawn attention to the ability of individual lending programmes such as the BRI to maintain high loan repayment rates, even during the Asian financial crisis of 1997.

Several of the pioneering organisations in microfinance (e.g. Grameen Bank in Bangladesh; BancoSol in Bolivia, Bank Rakyat in Indonesia and FINCA in Central America) have proved that credit, savings and other financial services can be offered to households at the bottom-end of the income distribution, under a market-oriented approach, and achieve at the same time, high rates of loan repayment (see e.g. Morduch 1999; Hulme and Mosley 1996). In practice, microfinance organisations have taken advantage of economies of scale, just as banking organisations do, in combination with mechanisms widely used by indigenous agents such as moneylenders and rotating savings and credit associations, to reduce the informational costs found in fragmented credit markets. Keeping interest rates low relative to moneylenders (although high relative to banks) is critical for microfinance organisations, not only to justify a social mission (and then to be eligible to receive donations), but more importantly, to be able to compete with local moneylenders and ROSCAS. Moneylenders, in particular, have been widely criticised for using interest rates and other enforcement and "exploitative" mechanisms to induce default to take over borrowers´ undervalued assets that play the role of collateral (see e.g. Bhaduri 1977 and also the critic to Bhaduri´s model in Ghose 1980 and Mojan Rao 1980).

2.1.4 The role of moneylenders in fragmented credit markets

The view of usury as an exploitative practice, with repugnant distributional consequences, can be traced back to 12th Century Europe. In the oldest-recorded Spanish epic sonnet, the *Cantar del Mio Cid*, moneylenders represented by *Raquel* and *Vidas*, are portrayed as two wealthy, avaricious and dishonest individuals who tried to take advantage of the honest and heroic *Cid Campeador* (see Aizenberg 1980, and Dunn 1970). William Shakespeare also unsympathetically portrayed, in the *Merchant of Venice*, the role of moneylenders during the *Renaissance*, a period of high economic development in Europe. Shylock, the wealthy usurer, is the depicted subject of hatred shading and humiliation for his "immoral" behaviour (Draper 1935). The question of moral and legal validation of moneylending has been under scrutiny ever since, but it became increasingly evident during the transition from feudal societies to modern capitalism[8] (see also Mannan 1970, and Mawdudi 1961, in the context of Islamic societies).

Nevertheless, it was perhaps this entrepreneurial spirit and financial ability to take risks under adverse environments that helped moneylenders (many of them Jews, as in the case of *Shylock, Raquel* and *Vidas*) to take important steps towards the emergence of the banking system in countries such as England[9]. Malcolm Harper (1987:3) has actually pointed out that this risk-taking and hard-working behaviour is often characteristic of communities that have faced *"hardship and the need to start again"*. However, the high interest rates and the monopolistic role of traditional moneylenders came under scrutiny by governments of many developing countries as they became independent during the 1940s, 1950s and 1960s (for the case of India, see Bell 1990), and established state-led organisations explicitly designed to sideline moneylenders.

This critical view of moneylenders has also been developed from an academic perspective. Bolnick (1992) for example, has suggested that high interest rates charged by moneylenders relative to the cost of lending are the immediate outcome of monopolistic practices in rural markets. As a result, new entries could improve

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[8] In the 1540s England, all former legislation against usury was abolished, and in 1570 Queen Elizabeth legalised a 10 per cent interest rate.

market competition and reduce the price of capital. High interest rates have also been linked to the *risk hypothesis* associated to the process of lending to the poor (see Bottomley 1975), and to the *endogenous informational-costs hypothesis*, which is related to screening, incentive and enforcement activities (see e.g. Aleem 1990; Williamson 1987, and Stiglitz 1990). Under the latter hypothesis, Hoff and Stiglitz (1998) argue that subsidised credit from donors may actually have adverse effects in the form of increasing interest rates, given the characteristics of monopolistically competitive credit markets where moneylenders usually operate. Chaudhuri and Gupta (1996) have also argued that inefficiencies in subsidised credit schemes, which often appear in loan delays, can potentially increase the equilibrium interest rate through bribing and other corrupting practices.

Nonetheless, the World Bank (1983) even in the 1980s pointed out that the role of institutional lenders in fragmented credit markets should be seen as *complementary* rather than a *substitute* to moneylenders. More recently, it has become increasingly clear that there are aspects of moneylenders' practices, especially the low cost and the knowledge of the borrower, which microfinance organisations could, with advantage, emulate. Varghese (2005) also argue that in the context of market liberalisation, institutional lenders could reduce the informational constraints through the linkage with local moneylenders. In that process, borrowers could obtain loans from a moneylender, where the latter would act as an intermediary, improving the accessibility to credit. Whilst moneylenders have primarily exploited their informational advantage to operate in local credit markets, rotating savings and credit associations (ROSCAS) have exploited, as microfinance organisations do, screening and monitoring devices to make possible group formation.

2.1.5 Rotating savings and credit associations

A rotating savings and credit association (ROSCAS) is usually organised by a group of individuals who voluntary agree to contribute to a fund, which is created with periodical and fixed instalments collected by the fund organiser. The instalments, which are usually made on weekly or fortnightly basis, last for a period that is determined by the number of participants. In Mexico, for instance, ROSCAS usually

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[9] See Richards (1929) for a historical discussion on the early financial system in England.

last for 16 weeks after 15 group members and the fund organiser have received the fund in turn, in accordance with a predetermined list or lottery. Once group members have received the fund, the group is dispersed or regroup to repeat the process. Group size is usually small in order to reduce monitoring costs, and deposits are rarely made on long-period intervals, to reduce the risks of non-payments, particularly in the last rounds when most of the group members have already received the collective fund.

A fundamental factor that helps the formation of ROSCAS, similar to the process observed in group-lending contracts in microfinance, is the level of homogeneity amongst group members (see Nagarajan *et al* 1999). However, it is the process of self-selection that leads to a homogenous matching within the group, which increases the probability of loan repayment (see Ghatak 1999). But because self-selection acts as a screening device, it may also exclude the poorest members of the community from group participation. Variations in the characteristics and functions of ROSCAS as well as the level of participation have been reported to be high across the developing world (see e.g. Bouman 1995). The role of ROSCAS has been examined from different perspectives. For example, as a random and bidding mechanism to allocate indivisible goods in fragmented credit markets (Besley *et al* 1993; 1994); and as a form of insurance in that bidding process (Calomiris and Rajaraman 1998).

ROSCAS have also been analysed as a form of insurance that works as an *ex-ante* protective and *ex-post* risk-coping mechanism against events associated to both idiosyncratic income variability and transitory external shocks (see e.g. Besley 1995, and Dercon 2000). It is due to the active participation of these indigenous mechanisms that we decided to include in the econometric estimation (see Chapters 7 and 8), a vector of credit market characteristics that controls for the effects of moneylenders and ROSCAS in the analysis of the impact of microfinance. This enables us, as briefly discussed in section 2.3 and in greater detail in Chapter 6, to reduce the potential problems of attribution in the impact analysis, and to examine, as it is discussed in section 7.3, the interaction between these indigenous agents and the selected case-study organisations participating in our study.

2.2 Subsidisation of microfinance through cheap capital

To a certain extent, what it has made microfinance such an important instrument for social and economic development, is the general proposition that credit, savings and other financial products such as insurance have *positive* impacts on people's well-being. In that context, although *cheap credit* is no longer seen as a good practice, the provision of *cheap capital* for scaling up microfinance organisations is still a widely used practice[10]. Hulme and Mosley (1996:5) have pointed out that cheap capital is valid *"for paying an equal in value to externalities, which would bring the rate of investment to its socially optimal level"*. A subsidy, they argue, *"is only valid during the period when a lending institution's costs are falling sharply, during which period the benefit generated by financing additional good projects (...) is likely to outweigh the costs incurred by taking on new projects which are not socially beneficial"*. Morduch (1999b) has also suggested that subsidies could be justified if they target the bottom-end of the income distribution where the poorest households are clustered.

Multilateral donors such as the World Bank through the Consultative Group to Aid the Poorest (CGAP) and national governmental agencies such as the US Agency for International Development (USAID); the UK Department for International Development (DFID), and the Swedish International Development Cooperation Agency (SIDA) have played an important role in expanding the microfinance industry, which is often seen as a powerful instrument and a preferred vehicle, in substitution of state governments, to put into operation developmental programmes in the developing world. In that process, non-governmental organisations, and in general *the civil society movement* has been, perhaps, the greatest beneficiary (see e.g. Edwards and Hulme 1998; Toye 1987; Bebbington and Mitlin 1996).

In the context of impact analysis, Hulme (2000) has identified two major schools of thoughts that embrace different analytical frameworks: 1) the *intended beneficiary school*, and 2) the *intermediary school*. One the one hand, the intended beneficiary school is built on the assumptions that the impacts of programme interventions are observed at different levels (e.g. individual, household, enterprise, village, country,

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[10] See Chapter 3 for a discussion of the provision of cheap capital in Mexico, through the National Programme for Financing the Microenterpreneur (PRONAFIM).

etc), and can vary according to both *endogenous* factors such individual abilities, effort, entrepreneurship, attitudes towards risks, etc, and *exogenous* elements that are related to the lending technology, market characteristics, local infrastructure, costs of inputs; security, etc. Consequently, impact analysis under the intended beneficiary school investigates the impacts of credit programmes as far as possible, paying special attention to the demand side, although a linkage to the supply side is always desirable if *improving practice* is a goal in the analysis.

On the other hand, the intermediary school, which is linked in the Hulme's paper to the Ohio School, focuses on the supply side, looking in particular at two main institutional indicators that measure the effectiveness of credit programmes: *financial self-sufficiency* and *outreach*. Financial self-sufficiency is achieved through the generation of sufficient revenues (excluding subsidies) to cover operational costs, including payments of interest on deposits and borrowed capital. In addition, a self-sufficient institution must be able to honour its contractual obligations and adopt a structure of incentives to guarantee the full execution of these obligations overtime (see Gonzalez-Vega *et al* 1997). There are other measures of financial performance such as the Financial Self-sufficiency Index used by the MicroBanking Bulletin and the Subsidy Dependence Index (SDI)[11] introduced by Yaron (1992a; 1992b).

Yaron *et al* (1997) have proposed the concept of *outreach* to assess the extent to which credit programmes reach the target group, i.e. the poor and poorest. *Outreach* can be measured by indicators such as the average loan size and the number of borrowers whose income is below the poverty line. The range of services offered to the poor, the level of transaction costs transferred to poor, and the client satisfaction with respect to the financial services can be used to assess the *quality of outreach* (Gozalez-Vega *et al* 1997). Schreiner (2002) has also proposed a framework that measures six aspects of outreach: worth, costs, depth, breadth, length and scope. Under the intermediary approach, if both financial self-sufficiency and outreach are achieved, then positive impacts are implicitly assumed, based on the general proposition that

11 The SDI measures the extent to which the lending interest rate would have to be raised to cover all operating costs if all subsidies received by a credit programme were stripped away.

expanding people's choices in fragmented credit markets lead to improvements in household well-being (see e.g. Yaron *et al* 1998 and Gonzalez-Vega *et al* 1997).

Savings deposits play a fundamental role in helping microfinance organisations to be financially sustainable. In fact, savings-led organisations such as the Bank Rakyat in Indonesia and the cooperative and credit union sectors in South Asia, and Latin America have shown that the demand curve for savings often exceeds the one for credit (see e.g. Robinson 2001, and Richardson 2000). Additionally, secure and *flexible* voluntary savings products can be powerful instruments that help the poor to deal in a better position with external shocks (Rutherford 1999). A major constraint arises through the restrictions that financial regulatory authorities impose on savings deposits. Meeting these regulations can be very costly for a large percentage of credit programmes in the developing world, which often choose to continue operating as subsidy recipients than become fully regulated intermediaries (Morduch 1999b). A recent survey (see Balkenhol 2005) reports that 100% of a sample of 45 microfinance organisations was receiving donor subsidies ranging from less than 10% to 100%, measured as a percentage of total liabilities.

The MicroBanking Bulletin (2007) has recently reported that in 2005, about 70% of 200 microfinance organisations that participated in a survey were financially self-sufficient, relative to 63% in 2003. This result has improved the expectations of an increasing number of organisations that could eventually achieve financial self-sufficiency, including those programmes that target at the *low-end* of the credit market[12]. However, those 200 credit programmes represent only 6.3% of the overall microfinance industry, estimated in more than 3160 organisations worldwide (Daley-Harris 2005). Morduch (2000) has actually suggested that only a very small percentage of all credit programmes (about 5%) will become self-sufficient. In order to do so, many organisations would need to raise interest rates as high as needed to cover operational costs. However, this could only exacerbate the problems of credit rationing in fragmented credit markets.

[12] *The MicroBanking Bulletin* (2007) refers to microfinance organisations that target at the low-end of the credit market as those organisations that report an average loan balance equal to US $150 or <20% of the Gross National Income per capita

2.2.1 Financial self-sufficiency *vs.* poverty impact

Since many credit programmes are actually subsidised on the grounds of achieving a great *outreach* amongst the poor, they may actually compromise the objective of achieving financial self-sufficiency. Hulme and Mosley (1996:206) have pointed out that credit programmes working with the poorest would experience a *trade-off* with the goal of achieving financial self-sufficiency. They argue that *"at a given point in time* [microfinance organisations] *can either go for growth and put their resources into underpinning the success of established and rapidly growing institutions, or go for poverty impact [...] and put their resources into poverty-focused operations with a higher risk of failure and a lower expected return"*. The Consultative Group to Assist the Poorest (2000) has also suggested that lending to the poorest involves lending very small loans and higher costs, making it more difficult to achieve financial self-sufficiency.

In contrast to this view, Gibbons (1998) and Gibbons and Meehan (2000) argue that there is no necessarily a *trade off* between reaching the poor and achieving financial self-sufficiency in the long run, as even the poorest borrowers take advantage of *progressive lending* to increase the average loan size overtime. Others (e.g. Christen 1997; Christen *et al* 1995; Gulli 1998) also argue that this trade-off could be avoided by the use of well-designed lending technology. Balkenhol (2005) and the latest survey data from the MicroBanking Bulletin (2007) suggest that there is not clear evidence to support the proposition of an inverse relationship between reaching the poor and financial self-sufficiency; however there is still an ongoing debate on this issue.

The ability to achieve financial self-sufficiency has also been linked to the type of lending technology, i.e. solidarity groups, village banking, or individual lending as well as to the approach embraced by the organisation, e.g. a *minimalistic* credit-only versus a *holistic* credit-plus approach (Hulme and Mosley 1996). We are particularly interested in examining the potential links between poverty impacts and lending technology, taking into account the transaction costs for the borrower. We discuss this issue in Chapters 7 and 8.

2.2.2 Beyond financial self-sufficiency and outreach

Although achieving financial self-sufficiency and great outreach amongst the poor has its own merit, it neither directly translates into positive impacts nor provides information on the interaction between credit programmes and other indigenous agents operating in credit markets. For example, Mayoux (1999; 2000) has reported marginal women impacts from credit programmes with good records in terms of outreach and financial self-sufficiency, and in some cases, women actually ended up disempowered. From the beginning of the expansion of microfinance, sceptics (e.g. Wood and Sharif 1997; Rahman 1999) have questioned the effectiveness of microfinance as an instrument of poverty reduction, given that investment opportunities for the poor are usually exhausted after a short period of time, and the scope for further expansions is therefore very limited. The assumption of financial self-sufficiency, as a precondition for a sustainable financial system, can be also questioned, as discussed earlier in section 2.1, on the grounds of informational asymmetries that cause credit rationing in fragmented credit markets (Stiglitz and Weiss 1981).

But even non self-sufficient credit programmes that reach the poor could potentially generate social benefits that could exceed the costs of programme subsidisation (Hulme and Mosley 1996). Morduch (2000) has also pointed out that too much emphasis on financial sustainability could compromise long-run development patterns, by pushing borrowers into activities with high profit margins that facilitate loan repayment, but produce low added value. Furthermore, organisations that achieve financial self-sufficiency and report a great outreach may still report insignificant poverty impacts due to e.g. high transaction costs to the borrower coming from rigid screening and monitoring devices such as periodical repayment schedules.

Although microfinance institutions have become one of the preferred subsidy-recipients of donors and governmental agencies, the hypothesis that they achieve impacts on poverty reduction and well-being has not been adequately tested in most of the cases, particularly in the urban context where our study was conducted,

with a few exceptions in rural credit markets (see e.g. Hulme and Mosley 1996; Pitt and Khandker 1998a and 1998b, and Coleman 1999, see also the reviews by Morduch and Haley 2002; Goldberg 2005, and Weiss et al 2003). In our view, it is essential to examine the impacts of microfinance on various dimensions, but linking the analysis to the supply side, through the analysis of e.g. the screening, incentive and enforcement devices that are exploited by credit programmes, and the transaction costs that such devices cause to the borrower. In this way, we believe impact analyses can be beneficial for both the lender and borrower.

However, in order to test the hypothesis of *positive* impacts of credit, we need to answer first the following questions: what methodological problems do threaten the internal validity of impacts studies? and how can we control for such constraints? We devote Chapter 6 to answer these questions, where we propose a methodological research strategy designed to control for the problems of *selection bias; non-random programme placement; attribution,* and *fungibility.*

Due to analytical complexities, impact studies that control for these potential methodological problems remain limited to a very few cases, and largely concentrated in the rural context. Most of these studies look at the micro-level, i.e. individuals, enterprises and households (see e.g. Remenyi and Quinones (2000) for empirical evidence reported from several impact studies conducted in 11 countries in the Asia-Pacific region), although some attempts have been made to examine the impacts of microfinance at the macro-level (see e.g. Marconi and Mosley 2006).

Zeller and Meyer (2002) have recently pointed out that the empirical evidence of poverty impacts of microfinance remains inconclusive and often methodologically contested. Nonetheless, credit is more likely to report significant increases in welfare when basic infrastructure and access to inputs and local markets is available (Sharma 2000). Since the scope of our research primarily focuses at the household level we concentrate in the following section on empirical studies that are based on micro data.

2.3 Empirical evidence of the impact of microfinance at the micro-level

Sebstad and Chen (1996) have reviewed more than 30 impact reports, most of them of a descriptive nature that suffer from selection bias. For example, MkNelly and Watertip (1993) report evidence from a study in rural Thailand that use as control groups, households living in villages that do not have access to credit. This methodological approach suffers from problems of self-selection and programme placement that can potentially bias the results. Similarly, the study conducted in Guatemala by Wydick (1995) has not paid sufficient attention to the problems of selection bias, reducing the internal validity of the study. Amongst other studies suffering from methodological problems are Hossain (1988); Barnes *et al* (1998), Mustafa *et al* (1996), and some of the impact evaluations sponsored by the USAID, using the Assessing the Impacts of Microenterprise Services (AIMS) methodological tools[13].

For example, Copestake *et al* (2001) interview borrowers from the Peri-Urban Lusaka Small Enterprise Project (PULSE) operating in Zambia, and as control groups, borrowers that had just joined a credit programme by the time the study was conducted. Although the authors were able to control for self-selection, they may still encounter problems coming from unobservable factors related to non-programme placement. Disappointedly, no hypothesis testing was conducted for the underlining assumption of no-selectivity. The authors, however, combined *quantitative* data with *qualitative* questioning to strengthen the validity of the findings. The authors report, similarly to our findings reported in Chapter 7, a negative relationship between the rigidity of group lending methodologies and poverty impacts.

In most *quantitative* impact studies, a *positive* change in income or consumption expenditure amongst the poor is used as an indicator of poverty reduction although other indicators such as asset accumulation, children schooling and labour intensity are used as proxies of household well-being. For example, the Pitt and Khandker (1998a; 1998b) study is perhaps the first attempt to systematically control for the problems of selection bias and non-random programme placement, through the

design of a quasi-experiment, in which interviews were conducted with borrowers and non-borrowers from the same village, and randomly selected households from villages without accessibility to a credit programme. In the econometric estimation procedure, the authors employ a village fixed effects estimation procedure to control for unobserved differences between villages, and using as a proxy of programme eligibility, an upper limit of land-holding.

Notice that this methodological approach is more likely to work in the rural context where land-holding is a reliable indicator of well-being; however, most credit programmes, in particular those operating in the urban context, do not use land as eligibility criteria, making difficult to replicate this approach. In the subsections to follow, we review the existing empirical evidence of the impact of programme participation on poverty, well-being; women; labour and vulnerability.

2.3.1 Impacts on poverty and well-being

Pitt and Khandker use household expenditure to estimate the effects of credit on poverty reduction. In the study, which includes three major credit programmes in Bangladesh (Grameen Bank; Bangladesh Rural Advancement Committee (BRAC), and Rural Development RD-12 Programme of the Bangladesh Rural Development Board), Pitt and Khandker report significant and higher impacts from female borrowers than from male borrowers. They found that households headed by women had a higher propensity to participate in a credit programmes relative to households headed by men. Khandker *et al* (1998) also report positive credit impacts on income, production and employment amongst rural households engaged in non-farming activities. Using the same data, Morduch (1998) has challenged the Pitt and Khandker results on the grounds of the instrument used to separate the poor from the non-poor, although he confirms significant and positive effects on consumption-smoothing across seasons that could potentially reduce household *vulnerability*.

More recently, Pitt *et al* (2003) have reported that credit to women (unlike to men) has a large and statistically significant impact on two out of three measures of children health status in Bangladesh: arm circumference and height for the

[13] For a critic of the AIMS tools, see Alexander-Tedeschi and Karlan (2006)

corresponding age for both girls and boys. They did not find though evidence of significant impacts on the Body Mass Index. In a similar way, Marcus *et al* (1999) report from a study in Mali, Vietnam and Honduras, positive impacts of credit, particularly on children's well-being, by reducing the propensity of children to work.

In the context of rural Bangladesh, but using a sample survey collected from programme participants at the Association for Social Advancement (ASA) and BRAC, Zeller *et al* (2001) found significant and strong impacts of credit on income; health status; children's education, and on the quantity and quality of food consumption. In the econometric estimation procedure, the authors measure not only the impact of the actual levels of borrowing, as it is done by Pitt and Khandker (1998a; 1998b) and Khandker *et al* (1998), but also the impact of the *accessibility to credit*, even if a household is not currently borrowing from the credit programme. They found significant effects on a decrease in distress sales, and an increase in risk-bearing capacity.

In perhaps one of the most influential impact studies, Hulme and Mosley (1996) surveyed two types of households participating in 12 microfinance organisations and operating in 7 developing countries, to estimate poverty impacts: 1) households actively borrowing from credit programmes, as treatment groups, 2) households that were accepted by the lender (or group) but still waiting to receive the first loan, as control groups. By following this approach, the authors assumed to control for the *self-selection* problem (but not the programme placement problem), although no hypothesis testing was conducted to confirm this assumption. The study reports that credit programmes were more likely to achieve positive and significant poverty impacts amongst households closer to, and above the poverty line, with the poorest being more likely to report insignificant and even *negative* effects from borrowing.

This was in part, Hulme and Mosley argue, due to low human and physical capital endowments, as well as risk-averse behaviour that restricted the poorest from taking advantage of business opportunities that could potentially yield high returns. These results are confirmed by Mosley (2001) in another study that follows a similar methodological approach, involving 4 credit programmes operating in Bolivia.

Mosley reports positive impacts on income and household assets, although negatively correlating with low-risk investments, particularly amongst the poorest, and because poorer households are highly restricted in their coping strategies, microfinance is argued to augment poor households vulnerability.

Coleman (1999) has proposed an alternative methodological approach to control for selection bias and non-programme random placement in the context of rural Thailand, by sampling households members and non-members of credit programmes four times over a period of one year. The author uses as control groups villages that were about to receive support from a credit programme, allowing households to self-select, and employs a village fixed effects estimation procedure to control for potential problems of endogeneity. In the study, Coleman finds no evidence of positive effects from programme participation, challenging the widespread proposition of positive impacts from microfinance.

The highly time-demanding methodological approach as well as the need for prior and detailed information from credit programmes, in terms of future geographical expansions, restricts the replication of the Coleman's study in other countries, particularly in the context of urban markets, where organisations usually exhaust large local markets before exploring other areas.

Other empirical studies have also reported insignificant poverty impacts from microfinance. For example, Diagne and Zeller (2001) report in the context of rural credit markets in Malawi, a *negative* impact (although statistically insignificant) of credit on household welfare measured by net crop income; food security and nutritional status. They argue that this is in part due to an ineffective institutional design that fails to include important determinants of credit coming from external factors such as seasonality.

2.3.2 Impacts on women

Many credit programmes target women under the assumption that women are more reliable borrowers than men. This could help; it is argued, to achieve the objective of financial self-sufficiency (Morduch 1999; Hulme and Mosley 1996).

Some scholars (see e.g. Amin *et al* 1998) suggest that by improving women's social interaction and networking, credit programme participation has become an effective mechanism to empower women and change gender relations in traditional societies. Pitt and Khandker (1998b) have also reported significant effects of targeting women on non-land assets accumulation; calories intake for both girls and boys, and children schooling (especially for boys), although they report no significant effects on labour supply. In the same way, Schuler and Hashemi (1994) find significant impacts of credit on the use of contraceptive methods as a proxy of women's empowerment, although Khandker (1998) report a decline in this practice.

In contrast, Goetz and Gupta (1996) and Hashemi *et al* (1996) point out that although women may receive loans, men are actually in control of investment decisions, and this situation could potentially cause adverse effects such as intra-household violence. Goetz and Gupta, and also Osmani (1998), and Rahman (1999) also argue that many credit programmes are *de facto* exploiting the disadvantage position of women in traditional socio-cultural environments to reduce the enforcement problem in the process of lending. In Bangladesh, for instance, the patriarchal system or *purdah*[14] interacts in a way that confines women to the homestead or to the area immediately surrounding, and the contacts they have with the world outside of the family are extremely limited.

It appears, as pointed out by Kabeer (2001) that the primary source of controversy amongst gender studies comes from important differences in the analytical frameworks employed in the examination of intra-household power relations. In our view, intra-household relations should be seen in the context of a cooperative process of resource allocation, where family members dynamically interact to achieve the best possible outcome, in the form of a *Nash equilibrium* (McElroy and Horney 1981). Clearly, the socio-cultural environment is an important determinant that should be included in the analysis, but only in exceptional circumstances e.g. imminent divorce or intra-household violence, the cooperative equilibrium can be threatened (see e.g. Manser and Brown 1980, and Lundberg and Pollak (1993). However, since we are primarily interested in examining the impacts of credit at the

[14] *Purdah* is the practice of secluding and protecting women to uphold social standards of modesty and morality.

household level, the analysis of gender relations and women's empowerment is beyond the scope of this study[15].

2.3.3 Impacts on labour

The effects of credit on labour largely depend on the degree of technology and physical capital endowments involved in the production function. Pitt and Khandker (1998a) have actually pointed out that microfinance is unlikely to increase the level of *capital intensity*, at least in the short-run. Thus, if technology remains constant, then an overall increase in production, after an injection of capital from a microcredit, could lead to an increase in *labour intensity*.

Khandker *et al* (1998) for example, report an increase in self-employment in rural markets in Bangladesh as a *direct effect* from programme participation, although they also find a reduction in waged employment. Wages remained unchanged, they argue, due to an excess supply of unemployed labourers that rapidly fill the gaps in the market. Many poor households are actually engaged in rudimentary income-generating activities that are labour intensive, and rarely involve workers outside the household[16].

Dasgupta and Ray (1986) argue that this is because at low levels of income, enterprising households can only afford to hire unskilled and malnourished labourers with very low *productivity*. Informational constraints may also increase the cost of *efficiency labour* due to the lack of information about labourers' skills, behaviour or moral integrity. In the end, the enterprising household may simply decide to self-employ. However, if the supply of labour from household members reaches a *maximum*, then employment generation, in the form of *labour-hiring*, could be observed (see Chapter 5 for a theoretical discussion). Khandker (2005), for instance, reports that at the village level, the access to credit will have larger impacts

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[15] It is important to draw attention to the fact that, unlike many rural traditional societies, women in urban Mexico actively participate in income generating activities, although in waged labour markets their participation (43%) is lower vis-à-vis men (83%) (World Bank 2006). Consequently, self-employment has become, especially for women, as a fundamental source of household income. In fact, to go shopping to local markets in the metropolitan area of Mexico City means to buy, very often, from enterprising women.

[16] For a theoretical discussion on this issue see Chapter 5

on extreme poverty than on moderate poverty, given the spillover effects observed through labour markets. Mosley and Rock (2004) also report *indirect impacts* of credit on poor labourers who are hired by enterprising households borrowing from credit programmes operating in Africa, and since many of those households enjoyed income levels beyond the poverty line, the results show that targeting at the poorest may actually diminish the potential indirect poverty impacts from microfinance (see also Chapter 8 for a similar conclusion).

2.3.4 Impacts on vulnerability

Zaman (1999) has examined the effects of credit on consumption smoothing, asset accumulation and the use of loans in emergency situations as proxies of vulnerability in the context of Bangladesh. The study concludes that credit programmes are more likely to achieve a positive impact on vulnerability than on poverty reduction, although with a cross-sectional data survey, the study remains limited in the findings. However, when panel data is available, then the effects of credit on household vulnerability can be appropriately analysed.

For example, Khandker (2005) has used data collected in 1991/92 and 1998/98 in rural Bangladesh to measure the long-term effects of credit on poverty, and aggregate impacts beyond participation. Khandker finds significant and positive impacts on consumption per capita (mainly on non-food items) that increase the probability for programme participants of getting out of poverty. Spillover effects were also found at the village level, where the poorest were more likely to be benefited from programme participation, perhaps through the labour markets.

In contrast to Khandker's results, Amin *et al* (2003) have used a panel dataset collected from rural villages in Northern Bangladesh to find that although credit programmes achieve outreach amongst the poor, they often fail to reach the vulnerable poor that are more likely to suffer from idiosyncratic risks and external shocks, questioning the ability of microfinance as an antipoverty strategy. Although panel data offers important comparative advantages for econometric modelling, it remains highly restricted to a very small number of databases in the developing world.

Table 2. 2 Selected impact studies in microfinance

Authors	Outcomes of interest (dependent variables)	Demographic and geographical coverage	Main findings
Copestake *et al* (2001)	Profitability; business diversification and household income	Semi-urban areas in Zambia	Significant increases in profits and household incomes. However, qualitative evidence revealed some borrowers made worse off as a result of the rigidity of screening and enforcement devices used by group lending programmes.
Pitt and Khandker (1998a; 1998b)	Consumption expenditure; children's schooling and calories intake; non-land assets, and labour supply	Mainly rural areas in Bangladesh	Significant and higher impacts from female than male borrowers on household expenditure; boy's education, and propensity to borrow. Male borrowers reported higher impacts on labour supply.
Khandker et al (1998)	Household income; production and employment	Non-farming rural households in Bangladesh	Significant impacts on income per capita, production and employment amongst rural households engaged in non-farming activities
Pitt et al (2003)	Arm circumference and height of boys and girls as a proxy of human capital	Rural Bangladesh	Credit to women has a large and significant impact on children health status, although insignificant impact on the Body Mass Index
Marcus et al (1999)	Child labour	Rural areas in Mali, Vietnam and Honduras	Significant and *negative* effects on the propensity for children to work
Zeller et al (2001)	Income per capita, health status; children's schooling and calorie intake	Rural Bangladesh	Significant and positive effects on household income; health status; children's education and quality of food intake. Also significant impacts on risk-bearing capacity.
Hulme and Mosley (1996)	Household income; employment; poverty reduction; vulnerability	Rural and urban areas in Bolivia, Indonesia, India, Bangladesh, Sri Lanka, Kenya and Malawi	Significant effects on lowering monopolistic interest rate from moneylenders. Positive effects on employment and technology but varying according to income groups. Material and income poverty was reduced although credit did not report significant effects on vulnerability.
Mosley (2001)	Household income and assets	Rural and semi-urban areas of Bolivia	Significant and positive impacts on income and household assets, although negatively correlated with the severity of poverty due to low-risk investments
Coleman (1999)	Physical assets, savings, debt, production, sales, expenses, labour, health and education	Rural Thailand	Insignificant impacts on most of the dependent variables, except women's high interest debt; and household medical expenses, in particular made for men
Diagne and Zeller (2001)	Net crop income; food security and nutritional status	Rural Malawi	*Negative* although insignificant impacts on household well-being due to ineffective institutional design that fails to reduce the effects of seasonality.
Khandker (2003)	Household income and labour	Rural Bangladesh	At the village level, larger and significant impacts on extreme poverty than on moderate poverty, due to spill-over effects through labour markets.
Rock and Mosley (2004)	Household income; labour expenditure; education and health	Rural areas in Kenya, Cameroon, Uganda, Zimbabwe, South Africa	Significant impacts on poverty reduction on both borrowers and low-income labourers
Zaman (1999)	Consumption expenditure, asset accumulation and the use of loans	Rural Bangladesh	Credit is more likely to report positive impacts on vulnerability than on poverty reduction, through the use of loans in emergency situations
Khandker (2005)	Consumption expenditure, and labour	Rural Bangladesh	With the use of panel data, it was reported positive and significant impacts on consumption per capita on non-food items and spill-over effects at the village level being the poorest more likely to benefit, through labour markets, from programme intervention

2.4 Concluding remarks

Although most of the empirical evidence discussed above, and which is summarised in table 2.2, leads to *positive* effects on households' well-being, the magnitude and significance of these effects remains inconclusive and often methodologically contested. Some of the research gaps that we identified in most of the impact studies are related to the strong theoretical assumption that the demand for credit is rationed by the lender (Stiglitz and Weiss 1981). The validity of this assumption appears to be true, at least from an institutional point of view (see e.g. Eswaran and Kotwal 1989; and Braverman and Stiglitz, 1989) although the extent of the rationing may be less than what has been conventionally assumed, particularly when informal agents such moneylenders and rotating savings and credit associations actively compete in fragmented credit markets (see e.g. Kochar 1997 in the context of India).

Surprisingly, very few attempts have been made to control for the potential effects of these *indigenous* agents in impact analysis (see Diagne and Zeller 2001 for an exceptional case). For that reason, and in attempt to fill this research gap, we include in the econometric estimation equation derived in Chapters 7 and 8, a vector of credit market characteristics, L_i, that controls for the effects of informal credit agents on the outcomes of interest. Additionally, we have analysed narrative evidence obtained from *qualitative questioning* to explore the reasons of using such informal mechanisms of funding when having access to credit from microfinance organisations.

To our knowledge, there are very few attempts to examine the impacts of microfinance looking at different lending models (see e.g. Hulme and Mosley 1996 for an exceptional case). This is particularly relevant under the theoretical assumption that the informational costs, substantially reduced by the use of screening, incentive and enforcement devices, are passed onto the borrower (Stiglitz 1990). If for example, solidarity groups or village banking methodologies exacerbate the utility cost of borrowing, then the magnitude of the poverty impacts could be diminished. In order to investigate this issue, we have included in our impact study three organisations employing different lending technologies, but operating in

urban settlements with similar socio-economic and demographic characteristics. These organisations are: 1) Community Financial Services or *Servicios Financieros Comunitarios*, in Spanish (Fincomun) employing a minimalistic credit-only individual lending approach; 2) the Centre for the Assistance of the Microenterpreneur or *Centro de Apoyo al Microempresario* in Spanish (CAME) employing a minimalistic credit-only village banking approach, and 3) Programs for Women or *Programas para la Mujer* in Spanish (Promujer) employing a holistic credit-plus village banking approach that combines credit with training[17].

Perhaps the influential ability of some pioneering microfinance organisations to attract the interest of the international community has also contributed to the high concentration of impact studies that focus on a small number of countries, following methodological approaches that work in the rural context. This situation has made it very difficult to replicate these studies in the urban context, where many microfinance organisations actually operate. This is particularly important for Mexico and most of the Latin American countries, since 60% of the poor in the region (about 113 million people) live in urban settlements, and it is estimated that this proportion will increase up to two-thirds by 2015 (Fay 2005).

For that reason, we propose a research methodology specifically designed to work in deprived and densely populated urban areas to address the potential endogeneity problems in impact evaluations. This research strategy (which is presented in Chapter 6) can be easily replicated by other microfinance organisations. We follow in Chapter 7 an appropriate econometric estimation procedure in order to test for the underlying assumptions of no selectivity bias. In the following Chapter 3, we analyse the characteristics of credit markets and the microfinance sector as a whole in the context of Mexico.

[17] In Chapter 6 we discuss in detail the institutional characteristics of these organisations.

Chapter 3
Credit markets and financial institutions in Mexico

Introduction

In this chapter we discuss the characteristics of credit markets in Mexico, looking at recent institutional reforms that have moved the system from a framework of financial repression to another of financial liberalisation, into which the microfinance industry has been incorporated. Since the mid 1950s until early 1980s, financial policies were characterised by subsidised credit schemes that targeted at *strategic* sectors such as agriculture and large-scale industries. Under that *direct credit paradigm* (see e.g. Vogel and Adams 1997) development banks such as the National Bank for Rural Credit (Banrural); the National Development Bank (Nafin); and the National Bank for International Trade (Bancomext) were the main instruments of state interventions in credit markets. These policies created heavy fiscal outlays, estimated only for the agricultural sector in the order of US $28.5 billion in the period 1983-1992, that represented, on annual basis, 13% of agricultural Gross Domestic Product (GDP), 81% of which (about US $23 billion) was associated with subsidised interest rates (World Bank 2002).

After the oil price crisis of 1982, the overall framework of financial intermediation began to move towards a more marked-based system. But it was not until the 1990s that the system began to transform into a free-market system. These reforms, which are analysed in section 3.1, included the privatisation of the banking sector, which had been nationalised in the 1980s; the elimination of price controls and subsidies; the liberalisation of interest rates and, in general, the abolition of financial repression. Later in sections 3.1.4, 3.1.5 and 3.1.6 we discuss the immediate consequences of the financial liberalisation policies and the reforms that followed after the peso crisis of December of 1994.

Section 3.2 analyses the structure of the non-banking sector that operates under a new legal framework (the Popular Savings and Credit Law), and which includes organisations such as savings and credit co-operatives and popular financial associations. These organisations potentially represent the main institutional competitors of microfinance organisations. It is in that particular context that we discuss in section 3.3 the process in which the microfinance industry has been incorporated into a wider framework of financial intermediation, paying particular

attention to characteristics of the market where these organisations operate, and the external factors that have contributed to the expansion of the system. Finally, section 3.4 concludes.

3.1 Historical background of the Mexican financial system

The process of integrating what we refer here to as the Mexican Financial System goes back to 1925, a few years after the end of the Mexican Revolution, when a new law was passed by the Congress to establish the foundations of the actual financial system, which is integrated by the following institutions: 1) Banco de Mexico (Central Bank of Mexico); 2) commercial banks; 3) auxiliary financial institutions (e.g. insurance companies, warehouses, and *financieras*, investment banks that captured long-term savings), and 4) development banks (Ortiz-Mena 1947).

The system began to be heavily and increasingly regulated between the 1930s and 1970s, especially during the implementation of the *Import Substitution Industrialisation* model that was put into practice from 1956 to late 1970s. The Mexican government employed three instruments to control the system: 1) legal reserve requirements; 2) direct credit to *strategic sectors*, and 3) lending at interest rates that were fixed by the government. The stock market played a very limited role in the system, and monetary policies were carried out through public sector financing and fluctuations in reserve requirements. The principles of imposing such requirements were generally accepted by academics and policy makers as a precondition to develop regions and strategic sectors. Leopoldo Solis, an influential economist during that period summarised this view as follows:

> *Some economic sectors that had not been considered attractive credit risks, despite being key sectors for development, can now obtain credit through the mediation of the monetary authorities, who have resorted to diverse mechanisms in order to facilitate their access to credit. The natural resistance of the commercial banking sector, which normally wants to invest in activities that constitute a low risk or of which it has previous knowledge, has thus been overcome* (Solis 1971:8).

Despite of the apparent *financial repression*, the system continued operating during the period of *Stabilising Development* (or *Desarrollo Estabilizador*), in part due to low levels of public sector dependency on monetary financing (Gonzalez-Anaya and Marrufo 2001). However, during the 1970s and after a series of legal reforms, banks were allowed to increase their range of operations with the aim of developing the capital and money markets. But in times of increasing inflation, this policy increased the vulnerability of the financial sector to external shocks, which became clear during the oil-prices crisis of 1982.

As Gruben and McComb (1997) have pointed out, the deficit of the public sector reduced the margins to regulate the quantity of money, and a fixed exchange rate, with high levels of inflation, put pressure on the real exchange rate and the balance of payments. And because interest rates were not market-based, a significant capital outflow was registered. The process ended in September 1, 1982 when President Lopez-Portillo announced the nationalisation of the banking system. The crisis of 1982 was the first collapse of the economy since 1932.

3.1.1 The nationalisation of the banking system

Thus, Mexico became a classical case of financial repression: forcing banks to lend to the government, keeping interest rate ceilings, and dictating lending quotas to specific economic sectors that crowded out private investment (see Adams *et al* 1984; Vogel and Adams 1997, and Von Pischke et al 1983, for a critic). The heavy reserve requirements on lending were reflected on more than 60 percent of the net banking credit going to the government by the end of 1986 (OECD 1992).

In order to enforce the nationalisation of the banking system, President Lopez-Portillo issued a law as a constitutional mandate, and which was passed by the Congress, that included banking institutions as part of the nation's assets, although the system was suffering from instability in the exchange rate as a direct effect of the falling international oil prices. After a restructuring and capitalisation process, only 18 out of the existing 58 banks remained in the system by the end of 1990 (Banco de Mexico 1992).

3.1.2 Financial liberalisation in the 1980s

A critical move towards financial liberalisation, after President de la Madrid took office in the end of 1982, was the government's decision to increase the non-banking intermediation. The new government began to sell brokerage houses, insurance companies and other financial institutions, although leaving the newly nationalised banks intact, given the constitutional veto. In fact, the assets of financial institutions in relation to the assets of the financial system as a whole increased from 9.1 percent in 1982 to 32.1 percent in 1988 (Gruben and McComb 1997). That decision was the first step to end financial repression. Another crucial decision was to join the General Agreement on Tariffs and Trade (GATT) in 1986, which put pressure on the government to initiate reforms to remove trade and investment barriers that led to the complete liberalisation of the banking system in the early 1990s (WTO 2002).

Furthermore, a rapid development of securities markets in the country that was aimed to create a market for government's debt separated from the banking system, and which was reflected in the increasing volume of short-term government debt certificates or *Cetes*, relative to the US Treasury Bills, also contributed to the process of financial liberalisation. Cetes began to be issued in 1978, but it was not until the de la Madrid administration that these instruments became a major source of funding for the government. By the late 1980s, the money market became liquid, and in the early 1990s, the government no longer financially depended on banking institutions (Banco de Mexico 1992).

Aspe (1993) has actually pointed out that the period 1988-89 was crucial for the process of financial liberalisation in Mexico. In that period, important policies were put in place; for example, the freeing of interest rates, the elimination of priority lending quotas, and the removal of both reserve requirements and liquidity coefficients. The role of development banking institutions also changed. For example, whilst in 1987 *Nacional Financiera*, the largest development bank in Mexico, allocated 94 percent of its credit portfolio to large-scale and state-owned enterprises, in 1991 the institution allocated to that sector only 6 percent of the total loan portfolio.

3.1.3 The privatisation of the banking system

By the beginning of 1990s, and under the administration of President Salinas de Gortari, the Mexican Congress amended the Constitution to allow the privatisation of the banking system. The new law organised the system into a model of universal banking, which is common in Europe and Japan, but prohibited in the United States. In this model, a single financial group controls a bank, and insurance company, a brokerage house, a leasing company, a factoring company, a mutual funds management company, a currency exchange broker, and a warehousing company (see Canals 1997 for a discussion).

The Mexican government sold 18 banks in fourteen months, from June 1991 to July 1992, at a price 3.49 times the book value. Lopez de Silares and Zamarripa (1995) suggest that high prices were paid for the very limited competition in the market. In fact, the market was highly concentrated: three banking institutions controlled 60% of the overall market. Furthermore, the net returns on assets from Mexican banks were in the order of 1.45 percent, vis-à-vis 0.91 percent from US banks.

However, despite of the increasing ability to attract funds and generate profits, low efficiency persisted in the system. Gruben and McComb (1996) have reported that in the end of 1991, the ratio of non-interest expenses to assets was in the order of 5.3 percent in Mexico compared with 3.6 percent in the United States. Moreover, the new banks showed no interest in improving the depth and coverage of the system. In 1991 Mexico had one bank branch per 18,000 inhabitants, and this figure slightly improved to 7760 inhabitants by the end of 2004. However, the penetration of the banking system remains very low relative to the progress reported in other countries. In fact, whilst about 75% of the payments in countries such as the US, Canada and France are made by means of cheques and credit cards, and 55% in the United Kingdom and Germany are made by electronic transfers, in Mexico 86% are made in cash (see table 3.1).

Gelos and Werner (1999) have pointed out that given the obsolete lending technology during the process of financial liberalisation, the banking system made use of *collateral* as the main screening and enforcement devices to ensure loan

repayment, which reduced the ability of microenterprises and low-income households to access institutional financing. Gruben and McComb (1997) have shown that in particular this factor helps to explain the low degree of financial penetration in Mexico, measured by M4 as a percentage of the GDP[1]. By 1992, this percentage was in the order of 46.1 percent, relative to 97 percent in Canada, 93 percent in the US and 71 percent in Italy.

Before the privatisation of the banking system, the only foreign bank operating as a deposit taking and lending institution was Citibank. However, in 1994, new banking regulations were introduced after Canada, the US and Mexico launched the North American Free Trade Agreement (NAFTA), allowing foreign-owned banks to operate in Mexico. The NAFTA put pressure on the domestic financial system that in combination of other structural factors triggered the peso crisis of 1994. We discuss these factors in the following sections.

3.1.4 The *prelude* of the peso crisis of 1994

As part of the efforts to reduce the hyperinflation of the 1980s, the government decided to follow an inflation stabilisation policy that was complemented with a crawling-peg regime, in which the depreciation of the peso against the dollar was lower than the differential between the two countries' inflation rates (see e.g. Aspe 1993 and Gil-Diaz 1998). The consequences of such policies began to be evident, as pointed out by Gruben and McComb (1997), with an increasing real exchange rate that together with the opening up to international trade, discouraged producers of tradeable goods, that began to face foreign competition, from raising domestic prices. However, when those sectors with little foreign competition such as services, real state and construction-related industries raised their prices, they imposed a pressure between costs and selling prices of tradeable-goods producers in particular the manufacturing sector.

The exchange rate policy had an impact on the Current Account of the Balance of Payments, and in order to maintain the levels of international reserves that

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[1] M4 is measured here as currency, checking accounts and other short-term deposits, bankers' acceptance, long-term bank deposits and government bonds held by the public.

supported the appreciation of the exchange rate, the central bank held the interest rates high enough to generate capital inflows to offset the outflows from increasing imports. But high real interest rates put a lot of pressure on domestic producers that had been borrowing from the newly privatised and inexperienced banks. There is strong evidence to suggest that after the privatisation of the banking system, credit institutions began to expand *consumer credit* despite the limited information on the creditworthiness of applicants. In fact, over the period 1991-1994, loan portfolio grew at an annual average rate of 23.7 percent, more than eight times the annual average rate of real GDP (Kalter and Ribas 1999).

Furthermore, loans to the private sector were given under weak regulatory and supervisory standards[2], and deficient screening and monitoring devices, which in a period of high expectations about the economy, made difficult to deal with the moral hazard and adverse selection problems (see. e.g. Hausmann and Gavin 1995; Gonzalez-Hermosillo *et al* 1996; McKinnon and Pill 1996). This effect was observed afterwards in the portfolio of loans in arrears that jumped from 2% in 1990 to 8.7% in the end of 1994, just before the crisis began (see figure 3.1).

Regarding the regulatory and supervisory standards, important problems emerged from the existing *universal banking* model, which surprisingly did not require consolidated accounting reports until 1995, making it difficult to establish limits on self-lending within financial groups. Additionally, regulations did not impose risk-sharing mechanisms to control the moral hazard problem. For example, banks' shareholders were allowed to retain equity interests after a merger or acquisition, and savings and other assets from the public were protected by a guarantee provided by the government in case of bankruptcy. The problem was that no limits on the value of such assets were clearly defined, and the government ended up protecting bankers and shareholders´ assets, exacerbating the moral hazard problem (see e.g. Hufbauer and Schott 2005, and Lopez de Salines and Zamarripa 1995)[3].

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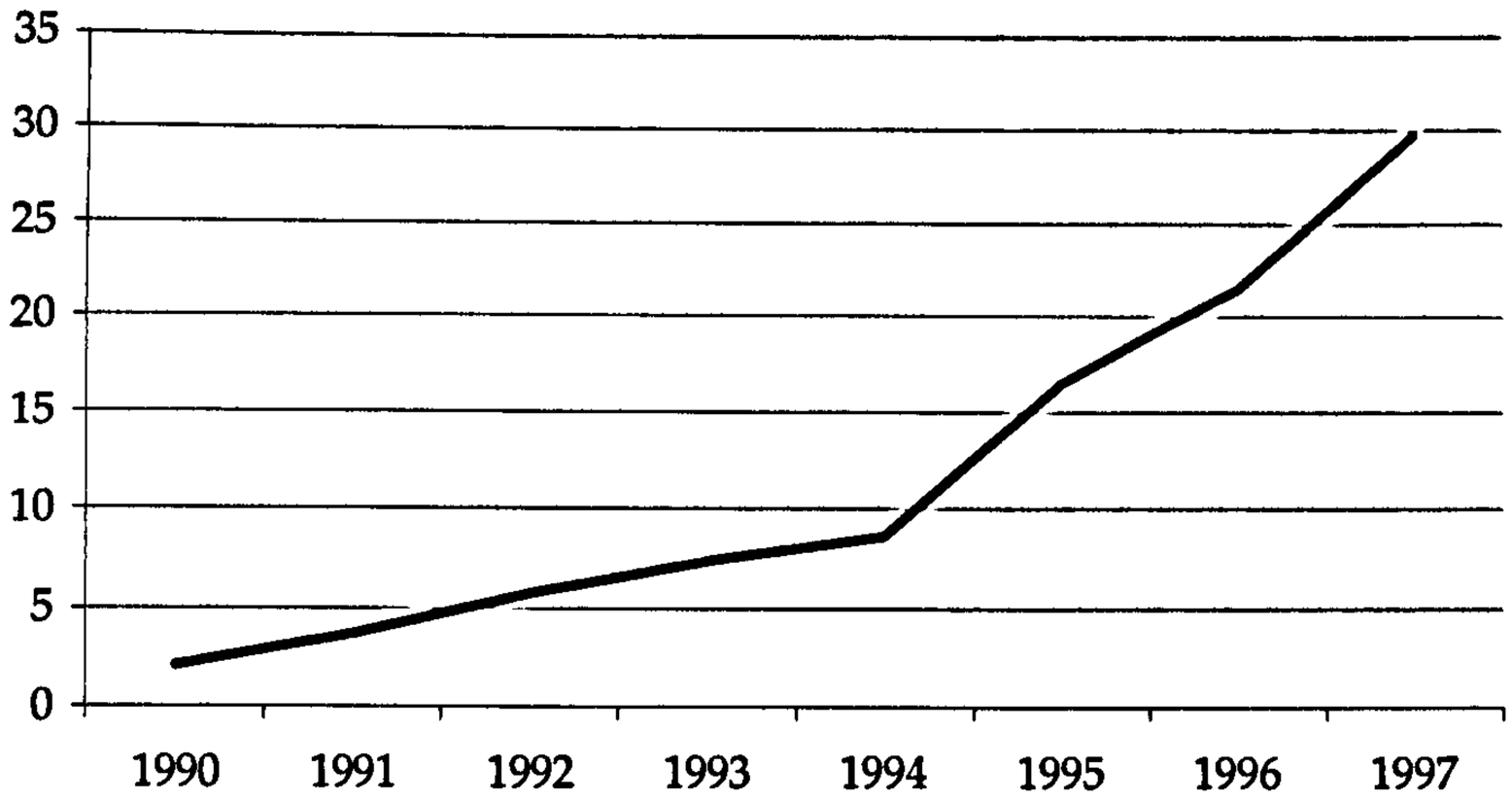
[2] Financial regulation and supervisory activities were based on 6 laws that controlled capital requirements and valuation, accounting and provision practices: 1) The Law of Credit Institutions; 2) the Law of Insurance Institutions; 3) The Law of Leasing Institutions; the Law of Auxiliary Credit Institutions; 5) the Law of the Stock Market, and 6) the Investment Banking Law. For further details, see DOF (1995).

Figure 3. 1 Loan in arrears as a % of loan portfolio



Source: National Banking and Securities Commission

3.1.4.1 Non-economic factors

As discussed earlier, during the Salinas administration, the rationalisation of the Mexico's fiscal, monetary, and trade policies, together with high real interest rates relative to the rates in the United States, precipitated large inflows of foreign capital into the country. The government began to use the increasing reserves of foreign currency to back the appreciation of the peso. By the first quarter of 1994, foreign currency reserves were approaching US $30 billion, after having fallen below US $5 billion in March 1990.

International optimism about Mexico's policies was so high that when the *Zapatista Army for National Liberation* (or EZLN) occupied the town of San Cristobal de las Casas, in the southern state of Chiapas in January 1994, the markets although surprised by the event, continued pouring capital investment into the country. However, the euphoria for Mexico was coming to an end. The presidential election was going to take place in August 1994, but when the candidate of the official Institutional Revolutionary Party (or PRI in Spanish), Luis Donaldo Colosio, was assassinated in March, the killing triggered massive capital outflows. Foreign currency reserves fell from US $29.3 billion in February to US $16.5 billion in June (Banco de Mexico 1996).

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[3] For a discussion of the inconsistencies of the regulatory system, see also Mackey (1999).

From June 1994, international reserves were reported with small fluctuations until October, when Carlos Francisco Ruiz Massieu, head of the official PRI was assassinated. International reserves began to fall rapidly from US $17.66 billion to 12.88 billion by the end of November. After the election, and once the new administration came to office, the new Finance Secretary, Jaime Serra Puche, announced on December 20 that the peso would devalue from 3.47 pesos per dollar to 3.99. Serra Puche stated: "*this was not a change in exchange rate regime, it was just an adjustment, and the crawling-peg regime would remain in place*" (*El Financiero*, December 21, 1994).

However, investors knew that the outstanding balance of *tesobonos*[4] alone was in the order of US $28 billion, 17 billion of which were held by foreign mutual funds and other investors scheduled to mature in the first semester of 1995 (*Wall street Journal*, 13 January 1995). International reserves had not been that high for more than one month and market participants precipitated a run on the peso. Two days after, on December 22, the government announced that the peso would float. As a result, the peso was devalued by about 54 percent. Reserves fell from US $12.88 billion at the end of November to 6.27 billion by the end of December and to only 4.44 billion in the end of January 1995 (Banco de Mexico 1996). In that context, although the Peso crisis of December 1994 had a political trigger, it originated from financial disequilibria, including the maintenance of a fixed nominal exchange rate in the face of a boom in international transactions (see Gil-Diaz and Carstens 1996).

3.1.5 The impact of the crisis on the financial system

In order to reduce the inflationary pressures, the Central Bank of Mexico imposed restricting credit and monetary policies, having a significant impact on the credit markets. For example, interest rates on mortgages that had been in the order of 22 percent in November 1994 raised up to 74 percent in early March 1995 whereas the interest rates on inter-bank loans jumped up to 114 percent. As a consequence, the rate of non-performing loans soared from an average rate of 8.7 in 1994 to 16.4% in

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[4] Tesobonos were a Mexican government bond denominated in pesos, with coupons and principal indexed to US dollars in effect at issuance.

1995 and 21.4% in 1996 (Banco de Mexico 1996). These figures are reported using Mexican accounting standards. Using international accounting principles, the figures have been estimated as much as 10 percent higher (WTO 2002).

With international support, Mexico was able to meet external obligations with investors and convert debt into long-term and more manageable debt. The Mexican financial rescue of 1995 actually represents the most extensive rescue ever undertaken by the international financial community. The US Treasurer made available a 20 billion dollar loan to Mexico through the Exchange Stabilization Fund, and Mexico's maximum drawings peaked at US $11.5 billion, all of which were paid by January 1997.

The country's drawings under the *standby* agreement with the International Monetary Fund (IMF) reached a maximum of US $13 billion in December 1995 raising Mexico's total debt with the organisation to US$ 16 billion. Some advance repayments were made to reduce the outstanding balance to 8.4 billion in December 1998. Separately, the World Bank and the Inter-American Development Bank announced a credit line of 2.25 billion dollars to stabilise and strengthen the banking system in addition to another billion to support social sector programmes (see Maskooki 2002 for a detailed review of the rescue).

Regarding the banking system, the Mexican government took steps forwards facilitating foreign investment in the system. In February 1995, a new law was passed by the Congress that allowed foreign banks to buy domestic institutions. This process contributed to increase the already highly concentrated market (see e.g. Gruben and McComb 1997). In 1994, the five largest banks in Mexico concentrated 65 percent of the credit markets. By 2000, this percentage increased up to 76 percent. However, it has been estimated that this figure jumped to 82 percent after the largest Mexican-owned bank, National Bank of Mexico (Banamex), was acquired by the American Citicorp in 2001 (see IMF 2001 and Condusef 2004).

3.1.5.1 The rescue of the banking system

In order to cope with the crisis in the banking system, the government designed a special re-capitalisation programme known as PROCAPTE. Under PROCAPTE, troubled banks were allowed to raise capital by selling subordinated convertible debentures to the National Deposit Insurance Authority (FOBAPROA). The government set criteria to convert the debentures into equity, in cases of insolvency and poor management. These criteria transformed the government *de facto* into banks' shareholders. In March 1995, five banks received support from PROCAPTE and the value of convertible debentures reached 7 billion pesos (about 1.4 billion dollars) in May, although this amount was reduced to 3.2 billion pesos by the end of December, after some banks paid back the subordinated debt (see Banco de México 1996 and McQuerry 1999 for a detailed discussion).

The Mexican government also introduced a programme, in which banks were allowed to transform past due private debt into a bond-like instrument known as UDIS (or Unidades de Inversión, in Spanish). An important characteristic of these instruments was that their nominal value was indexed to the inflation rate. In fact, the value of the UDIS reflected the movements in the Consumer Price Index, with a short lag (Banco de Mexico 1996). Consequently, once a credit was converted into UDIS, the value of both the principal and interest rate remained constant, in real terms. Although the programme was in a sense simply trade of two instruments, it spread the impact of currency losses over time. The plan permitted troubled banks to restructure short-term past due loans to a range of five to twelve years (see Gonzalez-Anaya and Marrufo 2001). Since 1995, FOBAPROA (today transformed by the Congress into the Institute for the Protection of Banks' Savings or IPAB) has purchased a large share of overdue loans in exchange of government certificates that represented in 2002 a fiscal cost of about 8.5 percent of the GDP (IPAB 2002).

Although the international financial community initially linked the peso crisis of 1994 to the oil crisis of 1982, important differences became evident. For example, the government rescued the troubled banks through the rescheduling and securitization of their loan portfolio, without nationalising the system; and with the agreement of the US Treasury, Mexico was also able, in contrast to the crisis of 1982, to return to

the international financial markets almost immediately. On 24 April 1995, for instance, Nafin was able to borrow US $170 million from a European bank at 6% points above the London Inter-Bank Offer Rate (LIBOR), and by the end of that year, the Mexican government and its development banks had borrowed US $5 billion on the Eurobond market at maturities of 5 years (see Maskooki 2002).

3.1.6 The impact of the crisis on the economy

Although the devaluation of the Peso aggravated the crisis in the banking system[5], it had a more positive effect on the exporting manufacturing sector. The devaluation increased the *comparative advantage* of large manufacturing enterprises that were already competing in international markets. However, the effects of the crisis severely hit the middle-income and low-income households that were engaged in domestic-market-related microenterprises and income-generating activities. With no funding from the banking system, and a collapsed local market with growing levels of unemployment, these enterprising households were forced to compete in an increasingly open market.

Real GDP fell by more than 6 percent in 1995, and the rate of unemployment doubled to 7.4 percent. Average household income, measured in 1994 prices, fell 31 percent between 1994 and 1996, and household consumption dropped 25 percent in the same period. Real wages in the manufacturing sector fell 13.5 percent in 1995 and another 11 percent in 1996. By the end of 1996, real wages had fallen below levels of 1990 (Maskooki 2002).

Baldacci *et al* (2002) have reported that the crisis hit urban households harder than rural communities, despite the fact that the incidence of poverty is higher in rural areas (see chapter 4 for a detailed discussion on poverty in Mexico). The authors argue that this was because higher unemployment and soaring inflation had a stronger impact on the living conditions of the urban poor. The rural poor were less affected, partly because they had no links with the industrial and financial sectors, and were more dependent on self-production of food and other basic items.

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[5] After reaching 40 percent of GDP in 1994 assets of the banking system amounted only to 24 percent in 1999, a proportion lower than the international average of 52.6 percent.

Despite of the boom of credit flows to the private sector prior to the Peso crisis, loans actually went to the non-tradeable-goods sectors (Kalter and Ribas 1999). In fact, credits to tradeable-goods sectors fell from 55 percent of the total portfolio in 1987 to 25 percent in 1994. The manufacturing sector, for example, represented 21 percent of GDP in 1987 and accounted for more than 25 percent of the total outstanding loan portfolio. By the end of 1994, the contribution of manufacturing industries to the GDP remained at the same level but accounted for only 15 percent of the total loan portfolio. The credit to the private sector has remained hitherto very low, with levels just above 16%, in contrast with the levels reported in other countries that actively compete in the Mexican market, such as the US (249%) and Canada (69%) (see table 3.1).

The high dependency of institutional lending on collateral also reduced the ability of microenterprises to access institutional financing (Gelos and Werner 1999). Moreover, real interest rates were much lower for the non-tradeable-goods sectors. The average real interest rate for the non-tradeable-goods sectors was about 6 percent a year whereas that for the tradeable-goods sectors was about 15 percent (Glaessner and Oks 1998).

The privatisation and internationalisation of the banking system did not bring more efficiency and competitiveness to the credit markets either. In fact, fee revenues as a percentage of the financial margin[6] have increased since the financial liberalisation process, despite the fact that interest revenues as a percentage of total net revenues have gone down considerably (see table 3.2). The head of the Mexican anti-monopolies bureau, (Comisión Federal de Competencia in Spanish) as well as the governor of the Central Bank of Mexico have recently raised their concerns in relation to the inefficiency of the credit markets and the monopolistic environment in which the banking system is currently operating (see e.g. *Reuters* 24 April 2007, *El Universal* 25 April, 2007, and *Dow Jones*, 15 March, 2007).

[6] Financial margin is defined here as operating revenues minus financial expenditure, i.e. the difference between interest rates on active and passive transactions

Table 3. 1 Financial infrastructure and market characteristics by selected countries

	Population (in millions)	GDP per capita	Branches *	ATM *	Transactions at ATMs per capita per year	Means of payments	Fees revenues as % of financial revenue 1/	Credit to the private sector as % of GDP
US	280	37610	411	991	109,1	Cheques and credit cards (65% - 75%)	44	249
Canada	30	23930	457	1187	49,7		n.a.	69
France	58,4	24770	439	637	20,1		33	87
Spain	39,3	16990	916	1230	21,1	Debit cards 60%	30	111
Greece	10,3	13720	304	464	18		n.a.	78,6
United Kingdom	58,7	28350	299	690	38	Electronic transfers (55%)	36	142
Germany	81,9	25250	831	612	20,1		n.a.	119
Mexico	103,1	6230	129	173	11,3	Cash (86%)	39	16

Sources: Condusef (2004) and World Development Indicators (2006)

* Per million of inhabitants

1/ Financial revenue measured as total of revenue from loan portfolio and other financial assets, as well as other financial revenue from financial services

Note: ATM stands for Asynchronous Transfer Mode, commonly known as cash points

Table 3. 2 Efficiency in the banking system

	1991-1995	1996-2000	2001-2004
Fees revenue as % of interest revenue	3,4	6,1	19
Fees revenue as % of financial margin	14,6	43,6	48,8
Fees revenue as % of operating revenue	9,7	20,7	29,6
Interest revenue as % of net revenue	414,2	340	174

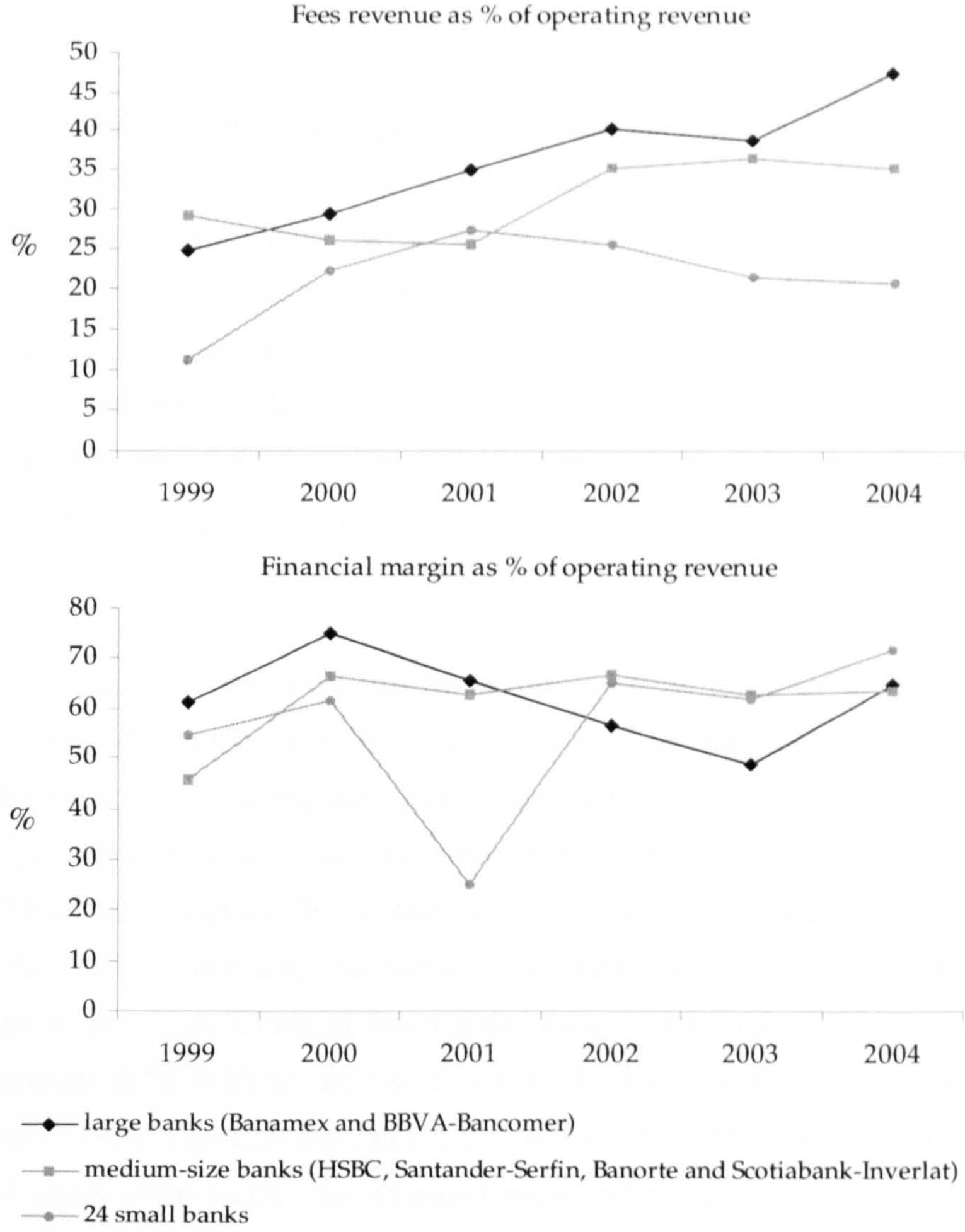
Source: Condusef (2004)

For example, the two largest banks operating in the country, Banamex (owned by the American Citicorp) and Bancomer (owned buy the Spanish BBVA), which received 50% of total deposits; 59% of fixed-time deposits, and had about 40% of the branches of the banking system, reported that 48% of their operating revenues in 2004 came from fees and other commissions, twice as much as the share reported in 1999 (Condusef 2004). Other medium-size banks (e.g. HSBC, Santander-Serfin, Banorte and ScotiaBank-Inverlat) have reported an average ratio of 35.3% whereas 24 small-size banks reported a smaller figure, in the order of 21% (see figure 3.2).

Fees and other costs related to the use of financial products from banking institutions have been considerably high, but they have been proportionally higher for micro and small enterprises related to the tradeable-goods sectors and low-income households engaged in income-generating activities. These costs could actually be a factor that has constrained the demand for savings and credit products in the banking sector, particularly from the population subgroup at the bottom-end of the income distribution.

We discuss this issue below in chapter 7. In that context, the role of non-banking institutions in financing the tradeable-goods sectors and micro and small enterprises was fundamental in understanding the levels of manufacturing production during the period of financial market liberalisation. In section 3.2 we analyse the non-banking system in the context of its reorganization into a new framework of financial intermediation.

Figure 3. 2 Components of operating revenues in the banking system by size of institution



Source: Condusef (2004)

3.2 The non-banking system in Mexico

We refer to the non-banking system as the group of institutions that include a range of regulated and unregulated organisations that mobilise deposits and lend capital primarily to micro and small enterprises. Credit unions and saving and credit associations or SAPs, are amongst those organisations regulated by the National Banking and Securities Commission (CNBV), whereas savings and credit co-operatives, solidarity associations and popular associations are unregulated by the Mexican regulatory authorities.

3.2.1 Credit Unions

Credit unions have formally operated in Mexico since the creation of the National Banking Commission in 1924 (CNBV 2006). The original objective of those organisations was to form syndicates of producers and small firms in order to distribute direct credits, technical assistance and other benefits from development banks and other governmental agencies. During the financial liberalisation, credit unions received substantial support from the government to scale up their operations. Nacional Financiera, for example, increased its second-tier banking operations through credit unions by more than 60 times in only 6 years (see Villalpando-Benitez and Gonzalez-Vega 1998).

In principle, the government decided to support the sector of credit unions in order to counterbalance the fall in loanable funds from the banking system in the early 1990s. However, weak regulatory and supervisory standards were not exclusive of the banking system, and when the peso crisis began in December 1994, the sector of credit unions collapsed. By the end of 1995, several credit unions were intervened by the National Banking and Securities Commission for white-collar frauds. For example, the Credit Union of the Mexican Valley or *Unión de Crédito Valle de México* in Spanish (UNICREVA) alone was demand by Nacional Development Bank for a fraud of more than US$ 240 million (see Nafin 1996; 1997). The overall cost of the bankruptcy of the sector was estimated in the order of US $4.4 billion by the end of 2000 (*La Jornada*, July 29, 2001).

After a restructuring process, only 32 credit unions were authorised to operate in the country, with a market share of less than 1%, and a loan portfolio of 95 million dollars distributed between 19 thousand members (see table 3.3). Despite the evidence that some credit unions (e.g. Fincomun[7]) began to use microfinance technology, the sector largely employs traditional methods of financial intermediation.

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[7] FINCOMUN is a credit union that operates, employing individual lending, in poor neighbourhoods of the Metropolitan area of Mexico City. For further details see Chapter 6.

3.2.2 Savings and credit associations and savings and credit co-operatives

Other types of non-banking institutions that operate in the country are savings and credit associations (SAPs), and savings and credit co-operatives (CAPs). On the one hand, the SAPs are defined as non-profit organisations with open membership. As in the case of credit unions, financial operations within SAPs are constrained to receive deposits and give credits to their members. One of the first authorised SAPs was the *Caja Mexicana de Fomento* (CANAFO). This organisation achieved a rapid expansion and scale of its operations. During the first two years the organisation received deposits from more than 70,000 members with only 98 branches (Boutielle, 1993).

On the other hand, the CAPs are organisations that work under a set of simple principles: 1) one person, one vote; 2) no returns on capital, and 3) the use of profit for social purposes. CAPs usually operate in rural and semi-urban areas, and often unregulated by the CNBV. In fact, Villalpando-Benitez and Gonzalez-Vega (1998) have reported more than 300 CAPs that were unregulated by the time the Peso crisis began. One of the largest CAPs in the country, the *Caja Popular Mexicana*, reported 333 branches with more than 970,000 members by the end of 2006 (Caja Popular Mexicana 2006). CAPs concentrate their operations in the central and southern regions of Mexico (see e.g. SHCP 1993; Chaves 1994).

In a recent survey, reported in Gavito (2002), it was estimated that the non-banking sector was integrated by 630 institutions that provided saving and credit services to 2.3 million clients (see table 3.3) that represented 6 percent of the working population in the country. Those organisations reported assets with a value in the order of US $1.6 billion that corresponded to approximately one percent of the overall assets of the banking sector (see Skertchly 2001 and Gavito 2002).

The average loan size varied according to type of institution. For example, credit unions reported an average outstanding loan balance in the order of US $5,000, whereas SAPs and CAPs reported an average value of 540 dollars. Solidarity Associations and Popular Associations appeared to target low-income households,

with an average outstanding loan balance of approximately 120 dollars (CNBV 2006).

Despite the negative effect of the crisis of 1994, the Central Bank of Mexico (quoted in IMF 2001) reported that the amount of credit from non-banking institutions represented 53% of the total credit given to the private sector in 2000. This amount represented an increase of 27% relative to the amount reported in 1994.

Table 3. 3 Structure of traditional non-banking institutions

Non-banking institutions 1/	Institutions	Members (Thousands)	Market share (%)	Total Assets (US$ million)	Loan portfolio (US$ million)
Credit Unions 2/	32	19	0,82	148,0	94,6
Savings and Credit Associations (SAPs)	11	675	29,23	647,7	362,7
Savings and Credit Co-operatives (CAPs)	157	1081	46,82	692,8	457,2
Solidarity Associations	210	190	8,23	69,9	Unknown
Popular Associations	220	344	14,90	Unknown	Unknown
Total	630	2309	100,00	1558,4	914,5

1/ Data on SAPs are to June 2000, and on Credit Unions and CAPs, to December 1999
2/ It is estimated that only 32 of 266 credit unions in Mexico mobilise deposits
Sources: Gavito (2002) and CNBV (2006)

The experience of non-banking organisations in other Latin American countries reflects the potential development of this sector relative to the microfinance industry. In Bolivia, for example, saving and credit co-operatives tripled the number of microfinance organisations, and absorb more than 50% of the total assets, including loan portfolio of the overall microfinance sector, whereas in Peru, SAPs alone represent about 81 percent of the microfinance sector (see Skertchly 2001).

In Mexico, many non-banking organisations, in particular SAPs and CAPs are fully dependent on deposits to support the loan operations, and it is actually due to this characteristic that these organisations were not severely affected by the Peso crisis, as they had virtually no liabilities in foreign currency. In fact, savings requirements from those non-banking institutions acted as an advantage vis-à-vis the banking system, as the former were able to continue lending in a period of a drastic reduction in loanable funds from banks. To some extent, as pointed out by Skertchly

(2001), this deposit-based lending technology enabled some SAPs and CAPs to scale up in size when most of the banking institutions were shrinking.

Although some of these non-banking organisations showed an ability to cope with the effects of the crisis, the absence of an effective regulatory and supervisory framework exposed the public, as discussed earlier in relation to the sector of credit unions, to significant risks (see table 3.4). In order to modernise the non-banking sector, the government through the Secretariat of Finance and Public Credit, the CNBV and the Central Bank of Mexico, decided to develop a new regulatory and supervisory framework for the non-banking system as a whole, including, although not explicitly, the microfinance sector. The Popular Savings and Credit Law (see CNBV 2001) that was passed by the Mexican Congress on April 30 2001, and became effective on June 4, is discussed in the following section.

Table 3. 4 Non-banking institutions by their legal status

Type of institution	Authorised to receive deposits?	Under regulation and supervision of the CNBV?
Saving and Credit Associations	Yes	Yes
Credit Unions	Yes	Yes
Savings and Credit Co-operatives	Yes	No
Solidarity Associations	No	No
Non-Profit Organisations	No	No

Source: Gavito (2002)

3.2.3 The Popular Savings and Credit Law

The Popular Savings and Credit Law (or *Ley de Ahorro y Crédito Popular*, in Spanish) was part of a wider reform of the financial system in Mexico that took place in 2001, after the Mexican Congress amended several laws including the Credit Institutions Law; the Financial Groups Law; the National Savings and Public Bank Services Law; the Securities Market Law; the National Banking and Securities Commission Law, the Mutual Funds Law, and the General Law on Ancillary Activities and Organisations of Credit. Most of the amendments focused on eliminated legal hurdles for monitoring and supervising financial intermediaries (see table 3.5 for a summary).

The new Popular Savings and Credit Law identified two types of institutions legally authorised to receive deposits: 1) Savings and Credit Co-operatives (*Cooperativas de Ahorro y Préstamo*), and 2) Popular Financial Associations (*Sociedades Financieras Populares*). After a transition period of two years, beginning from June 2001, only those organisations that managed to transform into one of the two types of institutions were subjected to supervision and regulation, and thus authorised to operate as a formal financial intermediary.

Table 3. 5 Main objectives of the reform of the financial system in Mexico

1. Enhancing supervisory practices by the CNBV, particularly lifting bank secrecy provisions to allow financial supervisory from external auditors, and enable the CNBV to establish regulations for financial conglomerates. The reform also introduced a system of corrective actions to deal with troubled organisations in a more transparent and efficient manner.
2. Increasing the catalogue of banking operations. The reform also included lifting the ban on back-to-back operations, and eased direct bill payments to expand banking services.
3. The National Savings Trust Fund (PAHNAL) was transformed into a development bank, the National Savings and Financial Services Bank (BANSEFI) in order to develop the sector of savings and credit amongst low-income households.
4. Covering gaps on corporate governance, in order to develop equity markets. The reform created auditing committees, introducing provisions to avoid conflict of interests amongst board members and senior managers, and to prevent abusive practices from shareholders.
5. Providing an appropriate structure to develop the sector of mutual funds. The reform permitted a wide variety of investment instruments, with different risk profiles.

Source: IMF (2001)

Regulatory and supervisory activities were put into practice at four different levels, depending on the following indicators: 1) liabilities and assets; 2) number of shareholders and clients; 3) number of branches; 4) geographic coverage; and 5) operational and technical capacity. Although more developed institutions were authorised to operate a greater range of services, they were also subjected to tighter regulations (CNBV 2001). In this process, the CNBV was the only regulatory and supervisory authority responsible for, *inter alia*, liquidity, accountability, reserves requirements and risk management of the non-banking sector.

The new law also required non-banking institutions to affiliate in federations, which were responsible for external monitoring and supervision of the affiliated

organisations. Similarly, federations were grouped in confederations, upper-level bodies that control a *protection fund,* created with compulsory contributions from individual organisations, to protect savings and other deposits from the public. Individual contributions to the fund are made on annual basis, based on the volume of deposits. Since capital loses in the fund are covered collectively, the fund acts as an incentive device that enhances peer monitoring, and reduces the moral hazard problem.

One of these confederations, the *Consejo Mexicano de Ahorro y Crédito Popular* (COMACREP), has grouped all major second-level organisations such as the *Asociación Mexicana de Sociedades de Ahorro y Préstamo* that integrate savings and credit associations; the *Asociación Mexicana de Uniones de Crédito* that integrates credit unions; and *Prodesarrollo* that group non-traditional microfinance organisations.

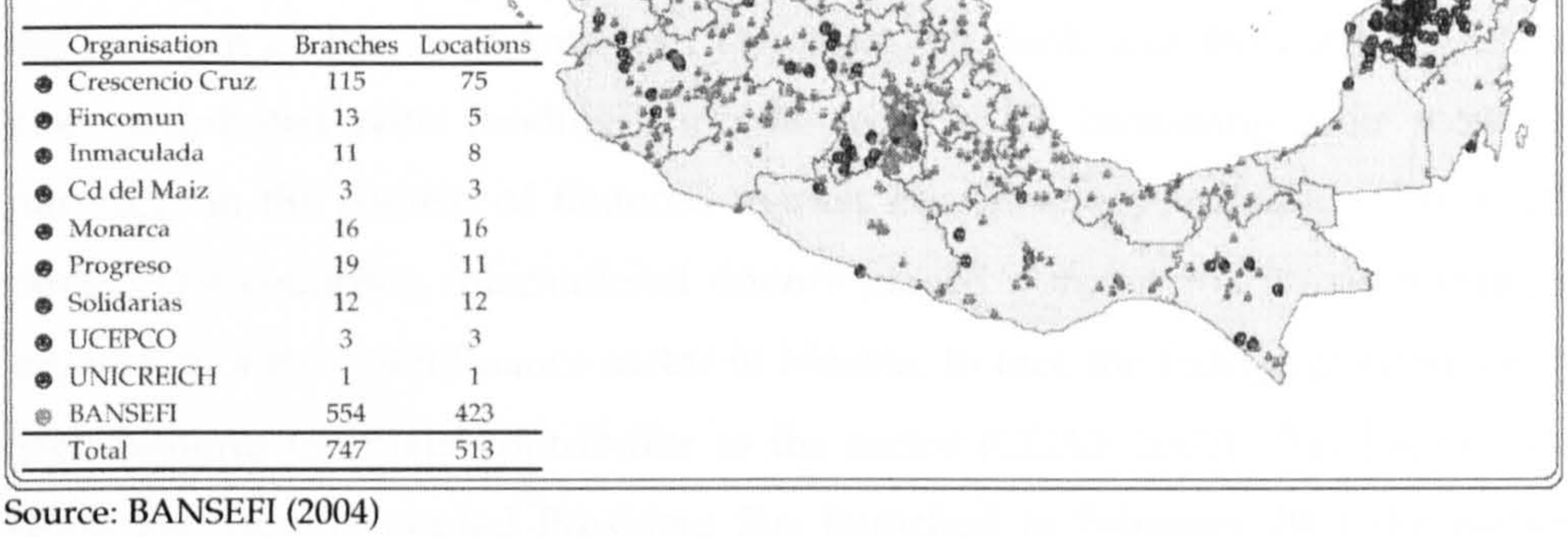
3.2.3.1 The role of BANSEFI

Whilst the CNBV is responsible for monitoring and supervisory activities, the recently created National Savings and Financial Services Bank (BANSEFI) is in charged of developing and integrating the non-banking sector. BANSEFI, which was transformed into a bank from the former National Savings Trust Fund (PANHAL), also assisted in the formation and supervision of federations, and continued offering savings products to low-income households through 950 branches, 50% of which are located in rural areas (see figure 3.3). By the end of 2005, BANSEFI reported 3.2 million savings accounts, with an average deposit of 1,700 pesos (around 150 dollars) (Bansefi 2004).

Recently, Gavito (2002) estimated that about 365 non-banking organisations, with more than 1.7 million members, participated in the process of incorporation to the new legal framework. This estimate excluded solidarity associations, which were expected to have difficulties to meet the minimum capital requirements to be incorporated into the system. In fact, around 56 percent of non-banking organisations (mostly solidarity associations) reported assets of less than 500 thousand dollars, whereas 32 percent, had assets of less than 5 million dollars. Only

one large institution, the *Caja Popular Mexicana*, reported assets of more than 400 million dollars.

Figure 3. 3 Regional concentration of the non-banking sector in Mexico



Organisation	Branches	Locations
Crescencio Cruz	115	75
Fincomun	13	5
Inmaculada	11	8
Cd del Maiz	3	3
Monarca	16	16
Progreso	19	11
Solidarias	12	12
UCEPCO	3	3
UNICREICH	1	1
BANSEFI	554	423
Total	747	513

Source: BANSEFI (2004)

It is important to point out that under the new legal framework, microfinance programmes were not explicitly defined. In fact, only those organisations that decided to transform into a fully regulated institution, were authorised to receive deposits and offer a wider range of financial products. Experiences in other countries (see e.g. the Bolivian *Ley de Propiedad y Crédito Popular* of 1998[8]) have shown that microfinance operations can be incorporated into the banking regulatory framework. In the following section, and given the scope of our research, we analyse the microfinance sector in more detail, looking in particular at the system that operates in urban areas in Mexico.

[8] Details regarding this Law are available at: www.spvs.gov.bo

3.3 The microfinance sector in urban Mexico

A small group of credit programmes that today operate savings and credit services in Mexico were non-governmental organisations (NGOs) originally established to support vulnerable groups that suffered from the devastating effects of an earthquake that hit Mexico City in October 1985. Some years later, those NGOs began piloting development projects to provide savings and credit products to poor enterprising households that were engaged in income-generating activities. Amongst those organisations were the Centro de Apoyo al Microempresario (CAME) and COMPARTAMOS (see Villalpando-Benitez and Gonzalez-Vega 1998).

The initial funds to back such pilot projects came from a small group of private corporations and religious groups linked to the Catholic Church[9], although other donors such as the Inter-American Development Bank and the Ford Foundation, also contributed with funding with the purpose of increasing their scope and outreach. In the context of financial market liberalisation, and unlike many other developing countries, international donors played a minor role in supporting the expansion of the microfinance sector in Mexico. In fact, the federal government has been hitherto the main contributor to the sector (CGAP 2002). This became clear when the recently elected President Fox launched in February 2001 the National Programme for Financing the Microentrepreneur (PRONAFIM), a public revolving fund established with US$ 100 million to support, with seed capital, and subsidised credits, the foundation of new credit programmes, as well as the expansion of already existing organisations (Diaz 2001).

3.3.1 The National Programme for Financing the Microentrepreneur

The role of PRONAFIM in developing an infant microfinance industry was seen as complementary of a wider reform of the financial system that was implemented, as discussed earlier, in 2001 under a market-oriented policy approach. It is important to mention the fact that Mohammed Yunus was a central figure that encouraged the

[9] It is important to point out the influence of religious groups in the expansion of the microfinance sector in Mexico. Religious groups such as the Archdiocese of Mexico and Secours Catholique were supporters of the Centro de Apoyo al Microempresario (CAME), whereas the Juan Diego Foundation was a founder member of Fincomun. For further details, see Chapter 6.

Fox administration to support a small microfinance industry, through the subsidisation of *capital* and technical assistance (Presidency of the Republic 2003).

Table 3. 6 The largest microfinance organisations in Mexico by the end of 2000

	Members	Active loan portfolio (US$)	Average outstanding loan	Outstanding loan balance as % of GDP per capita
Santa Fe Guanajuato	1 544	120 432	78,0	2,0
Los Emprendedores	2 185	289 913	133,0	4,0
ADMIC Nancional	2 870	545 000	190,0	6,0
Finca Mexico	3 650	351 807	96,0	3,0
CAME	7 000	500 000	71,0	2,0
Fincomun	10 000	1 100 000	110,0	3,0
Compartamos	40 000	4 400 000	110,0	3,0
Total Mexico	67 249	7 307 152	109,0	3,3

Source: Peck (2000)

In an early survey (see Peck 2000) the microfinance sector was integrated by a small group of organisations that operated in monopolistic markets, markedly differentiated in terms of number of clients and loan portfolio (see table 3.6).

After five years of operation, in the period 2001-06, PRONAFIM reported a growing number of microfinance organisations currently receiving subsidised credits from the federal government (see table 3.7).

Table 3. 7 Microfinance organisations that have received financial support from PRONAFIM

Year	Number of recipient organisations	Subsidised credits 1/	Growth rate of recipient organisations
2001	11	7,91	
2002	39	11,75	254,55
2003	58	15,38	48,72
2004	71	27,75	22,41
2005	80	26,38	12,68

Source: Arellano *et al* (2006) and Mexican Congress (2005)
1/ Figures in millions of US dollars

Many of the recipient organisations are clustered in a confederation integrated by 52 credit programmes (see Prodesarrollo 2006) that recently reported to have allocated more than 1.2 million microcredits to low-income households. The average loan size

was in the order of 4,831 pesos (about US $440), in the case of female borrowers, compared to 6,227 (about US $566), in the case of male borrowers. Amongst those organisations supported by PRONAFIM were Fincomun, CAME and Promujer, the credit programmes that participated in our study (see chapter 6 for more details about these organisations). In fact, these organisations have received financial support to expand the scope of their operations.

For example, in 2005 alone, CAME received subsidised credits for almost 4.8 million pesos (about 436,000 dollars) to open 20 new branches; whereas Fincomun received 2.9 million pesos, and Promujer 240,000 pesos to open 12 and 1 branches, respectively. Amongst the 12 organisations that received subsidised credits from PRONAFIM, CAME absorbed almost 50% of the 12.4 million pesos (about US $1.12 million) that were distributed in 2005 (see table 3.8).

Table 3. 8 Subsidised credits to open new branches in 2005
Figures in thousands of pesos

	New branches		Subsidised Credits		Percentage share
	Projected	Opened	Approved	Spent	
CAME	20	20	4798	4564,6	48,81
FINCOMUN	12	7	2878,8	1557,8	16,66
PROMUJER-Mexico	1	0	239,9	0	0,00
Finca Mexico	5	4	1199,5	795,1	8,50
Grupo Crediexpress	5	4	1199,5	461,5	4,93
Capacitacion y Desarrollo Microempresarial	1	1	239,9	130,4	1,39
Grameen Trust Chiapas	3	3	719,7	847,1	9,06
Consultoria de Servicios Rurales	1	1	239,9	145,6	1,56
Desarrollo Empresarial la Victoria	1	1	239,9	130,7	1,40
FINAPRO	1	1	239,9	239,9	2,57
Fondo 5 de mayo	2	2	479,8	479,8	5,13
Total	52	44	12474,8	9352,5	100,00

Source: Mexican Congress (2005)

The provision of subsidies that materialise in the form of *capital* can be an important factor to help the microfinance industry to internalise, particularly in the short-term, negative externalities that are implicitly related to the process of lending to the poor. These subsidies could also facilitate the conduction of research aimed at, for instance, improving lending technologies that reduce the informational costs for both, the lender and borrower, thus having important effects on the efficiency of the credit markets (see e.g. Hulme and Mosley 1996, and Morduch 1999). PRONAFIM,

however, has mainly concentrated on expanding the industry's outreach, assuming that access to credit, *per se*, leads to poverty reduction. We investigate this assumption later in Chapter 7.

It is important to point out; however, that *equality* in the distribution of such subsidies is a necessary condition to develop competitive markets. Some concerns have recently emerged regarding the highly concentrated portfolio of subsidised credits that are allocated amongst credit programmes operating in Mexico. In a recent document, the division of the Mexican Congress responsible for auditing government expenditure, reported that in 2005 the government distributed amongst 69 organisations subsidised credits for 290.1 million pesos, about US $26.38 millions (see table 3.7); however, only two microfinance organisations (Fincomun and Desarrolladora de Emprendedores) received almost one third (32.5%) of the subsidised credits.

The concentration of the loan portfolio was also high in 2004 (34%); 2003 (18% only with Fincomun as borrower); 2002 (39.8%), and 2001 (33.8% only with Fincomun as borrower) (Mexican Congress 2005). This situation could actually deteriorate the monopolistic environment in which credit programmes operate, and increase the loan portfolio at risk of the public fund that PRONAFIM administrate. In the following section, we briefly analyse other *direct credit schemes* that have recently emerged in the country.

3.3.2 Other credit schemes

The microcredit programme operated through the Fund for Social Development (FONDESO), which is administered by the local government of Mexico City, is an example of some direct credit schemes operating in the country. The programme works under the principles of joint liability, using group-lending methodologies for disbursement and loan repayment. Repayment schedules are on weekly basis, over a period of 16 weeks, and at a fixed monthly interest rate of 3 percent. By the end of 2002, the local government had given 12,500 loans that represented more than US$5 million, with an average loan size of 400 dollars per borrower (SEDECO 2002). However, the programme reported a 10% of arrears in the loan portfolio, which is

considerably high, relative to the average of 2.7% reported in the sector as a whole (see e.g. MicroBanking Bulletin 2006).

Another credit programme that has been operating in poor areas across the country is the Solidarity Enterprises National Fund (FONAES). This programme allocates subsidised credits and monitor and supervises about 210 solidarity associations with more than 200 thousand members (Gavito 2002). Solidarity associations are governed by a general assembly, and usually employ a co-operative-based lending methodology. Despite the fact that during the reform of 2001 these organisations received technical assistance from the Canadian *Développement International Desjardins* to strengthen their institutional capacity, it was estimated that only a small group of these associations were eligible to become fully regulated. Villalpando-Benitez and Gonzalez-Vega (1998) have also pointed out the potential problems that could emerge from rent-seeking behaviour amongst government officials that control such direct credit schemes. Furthermore, political intervention through subsidisation has also caused concerns regarding good governance and self-sufficiency. There are two important factors that could determine the future expansion of the microfinance system in Mexico, independently of the restrictions that the *Popular Savings and Credit Law* has imposed to receive deposits: 1) the potential market for the sector, and 2) the level of transaction costs involved in the process of lending to the poor.

3.3.3 The potential market for the microfinance sector

The banking system has historically reported a low penetration in the country. In the early 2000s, it was estimated (Labarthe 2001) that about 80% of the population had no access to the banking system. In the particular case of the Metropolitan area of Mexico City, where our study took place, (Casley *et al* 2004) have reported that 24% of the population had a savings account in a bank; but only a very small percentage, 1.8% actually borrowed from an institutional lender. The paper does not identify whether the credits were for production or consumption expenditure. In order to explore the potential market for the microfinance sector in urban Mexico, we examined the National Survey on Microbusiness (ENAMIN) (INEGI 1999),

where more 4.2 million microenterprises[10] were reported to be operating in urban areas with more than 100 thousand inhabitants. We find that about 83.66% of those microenterprises (3.52 million) were family businesses, 94.14% of which had no more than 2 employees. The survey also showed that 80.61% of the microenterprise sector reported to have been credit-constrained by the time they started their own business.

Table 3. 9 Sources of funding for microenterprises in Mexico

Sources for starting enterprises	Microenterprises	(%)
Commercial Banks	26 894	0,79
Non-banking organisations	41 786	1,23
Friends and Relatives	532 350	15,70
Moneylenders	88 636	2,61
Own savings	2 313 845	68,26
Severance payments	214 888	6,34
Credits from suppliers	74 349	2,19
Other	97 111	2,86
Total	3 389 859	100,00
Sources for established enterprises		
Commercial Banks	50 123	15,50
Development Banks	7 486	2,32
Credit Unions	6 766	2,09
Financial Associations	5 364	1,66
Savings and credit co-operatives	50 091	15,49
Moneylenders	48 538	15,01
Friends and relatives	125 319	38,77
Others	28 904	8,94
No specified	686	0,21
Total	323 277	100,00

Source: INEGI (1999)

In fact, 74.6% of those microentrepreneurs that recently started an income-generating activity financed their ventures with their own assets, mainly with savings and severance payments from previous jobs, whereas 18.31 percent used credits from informal financial agents such as moneylenders, and relatives and friends. In relation to those businesses that were already established by the time the survey was conducted, 39% reported to have received credits from relatives and friends; 15.5% from savings and credit co-operatives and in a similar level (15%)

[10] Microenterprises are identified, according to the classification in the INEGI's National Survey of Microenterprises (INEGI 1999), as those businesses with no more than six employees, including the owner, in the building, commerce, services and transport industries. In the manufacturing sector, they may have 15 employees.

from moneylenders (see table 3.9). Martinez and Espinosa (2001) have estimated that the microfinance industry in Mexico could scale up in between 832 thousands and 2 million transactions in 4 years. The loan portfolio could reach one billion dollars, with an average loan size between 500 and 1,200 dollars, representing one percent of the overall assets of the banking sector[11].

Commercial banks have recently explored the credit market at the bottom-end of the income distribution. For example, the Elektra Group, a retail company that offered in-store credits and money transfer services from the US, established in October 2002 the Aztec Bank, the first intermediary in the country that targets middle and low-income households, by offering savings products from a minimum of 50 pesos (about 4.5 dollars), and *individual* loans from 10 thousand pesos (about 910 dollars). After 18 months of operation, by the end of 2003, the organisation had received US $747 million in savings from more than 3 million depositors, and had reported a loan portfolio of US 450 millions that had grown at an impressive percentage rate of 382% relative to 2002 (Banco Azteca 2003).

Other banks have introduced different financial services that target at low-income households. HSBC, for example, has adapted the methodology used by rotating savings and credit associations (ROSCAS) in order to offer savings products with a minimum deposit of US $25 that can be accumulated over a period of six months (see table 3.10). The BANAMEX and BBVA-Bancomer, the two largest banks in the country, have begun targeting low-income households by offering, in partnership with US telegraph companies such as Western Union and the Money Gram Payment Systems, electronic money transfers from the US (Villalpando-Benitez and Gonzalez-Vega 1998).

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[11] This is according to data from the CNBV available at: www.cnbv.org.mx

Table 3. 10 Savings and credit products from selected financial institutions
Figures in pesos of 2004

	Savings				Credits			
Bank	Required amount to open account	Minimum balance	Administrative fees (annual)	Fees to replace card	Amount	Requirements	Interest rate	Period
Banamex	500	Not required	10 + extra fee for savings balance below 500	100	From 550,000	Guarantees and financial information (e.g. financial statements and balance sheets)	TIIE + 12 points a/	No specified
Banorte	750	750 required to received interests	75	75	From 100,000 to 11.2 million	Collateral and guarantees		Revolving, from 1 to 3 years
BBVA-Bancomer	750	750	182	75	From 10,000 to 400,000	Financial information (e.g. financial statements and balance sheets). Collateral and guarantees are not compulsory	24%	12 months
HSBC	250	250	50	No card offered	From 400,000 to 1.5 million		19%	18 months
Scotiabank-Inverlat	500	Not required	Not available	75	From 100,000 to 900,000 UDIS	Guarantees and collateral	TIIE + 8.4 points	Open
Banco Azteca	50	50	10	25	From 10,000 to 60,000	Collateral and financial information (e.g. financial statements and balance sheets)	4% per month	24 months
Fincomun	10	At least 10% of the loan	No fees	no card offered	From 500 to 35,000	Compulsory savings, guarantees and collateral	6% per month	16 to 24 weeks
CAME	No authorised to receive deposits; however, groups can save in accounts held at other intermediaries	At least 10% of the loan	No fees	75	From 500 to 20,000	Compulsory savings and social collateral	5 % per month	16 weeks
Promujer		At least 10% of the loan	No fees	no card offered	From 500 to 6000		6% per month	16 weeks to 24 weeks

Source: Condusef (2006). In the case of Fincomun, CAME and Promujer, with information from the corresponding organisations
a/ The Interbank Equilibrium Interest Rate (or TIIE) was in the order of 7.5% by the end of 2006

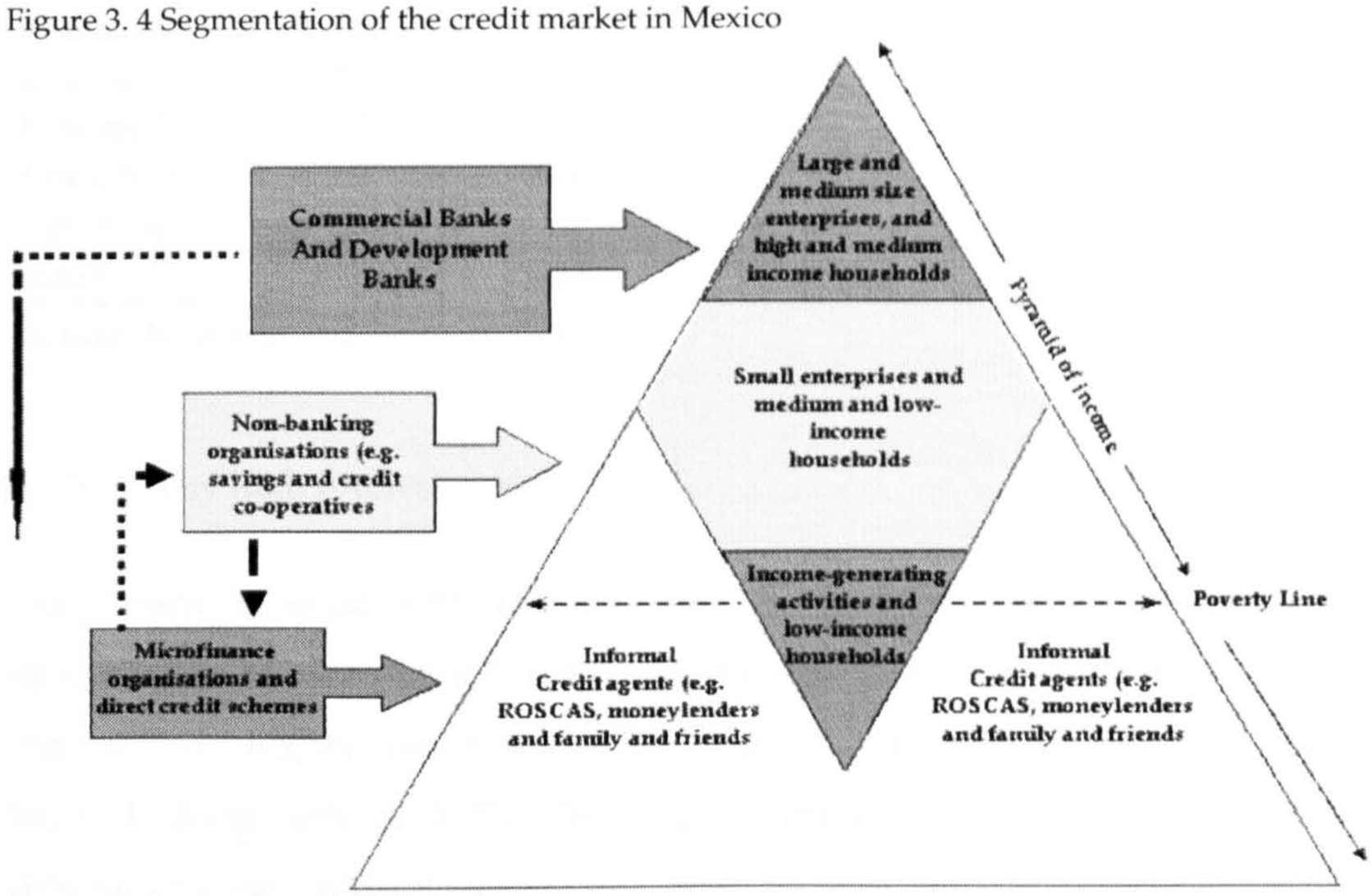
In fact, the significant amount of remittances sent by Mexican labourers working in the US has been an important factor that has contributed to the increasing interest of commercial banks to enter the financial markets for low-income households. The amount of remittances in 2006 was in the order of US $23,054 millions, 15% more than in 2005, and they accumulated about US $98,380 millions in the period 2000-2006, with an average of 340 dollars per transfer. By the end of 2006, these flows were larger than the Foreign Direct Investment, and represented 71% of the country total oil-exports, and 2.6% of the GDP. The growing levels of remittances, which are comparable to the levels in countries such as India and China (see World Bank 2006), are highly concentrated across the country. Only 5 federal states (Michoacán, Guanajuato, Jalisco, State of Mexico, and the Federal District or Mexico City) received 46% of the overall transfers in 2005 (Bank of Mexico 2005).

There are two important factors that explain these money transfers: the first is related to the increasing levels of migration to the US. It is estimated that around 11 million Mexicans of working age are currently living in the US. This number represents about 24% of the working population in the country (INEGI 2005). The second factor is related to the reduction in the average cost of remittances, as a result of increasing competition in the market, and a growing use of electronic transfers. In fact, a large percentage of these remittances (88%) were sent by electronic means, whereas 10% used money orders and only 2% cash and in kind transfers (Banco de Mexico 2005). It is important to mention here that the market for remittances is restricted to organisations that are authorised to receive deposits. This restriction reduces the number of microfinance organisations that are able to offer money transfers to a small group of intermediaries.

The structure of the credit markets in Mexico can be graphically represented by a pyramid segmented in three sub-groups of households: high and high-medium-income households, which are at the top of the income distribution, are targeted by commercial and development banks; low-medium and low-income households, which are in the middle of the income pyramid, are targeted by non-banking organisations such as savings and credit co-operatives and popular financial associations, whereas low-income households, usually engaged in income-generating activities, are targeted by microfinance organisations and informal credit

agents such as moneylenders and ROSCAS (see figure 3.4). An important factor that determines the segmentation of the credit markets is the transaction costs involved in the process of lending to the poor.

Figure 3. 4 Segmentation of the credit market in Mexico



Source: Adapted from Gavito (2002)

3.3.4 Transaction costs

Martinez and Espinosa (2001) have reported that microfinance organisations, through the implementation of group-lending methodologies, were able to reduce the level of transaction costs, particularly in activities related to the monitoring, evaluation and contracting processes, relative to organisations that employed traditional lending technologies (see table 3.11). In this sense, group-lending was seen as a mechanism that could encourage traditional lenders to adopt microcredit methodologies. Even though group lending could reduce transaction costs for the lender, these costs, particularly related to monitoring and enforcement devices are transferred to the borrower (see e.g. Besley and Coate 1995 and Stiglitz 1990). To our knowledge, there is no empirical examination of the effects of transactions costs (and opportunity costs) coming from screening, monitoring and enforcement devices on households' well-being in the context of Mexico. For that reason, we examine this particular issue later in chapter 7 and 8.

Table 3. 11 Transaction costs of microcredit operations (figures in %)

Activity	Microcredit	Traditional lending	As part of the monthly interest rate	
			Microcredit	Traditional lending
Promotion	38,4	15,8	1,516	1,516
Application	9,4	3,9	0,372	0,372
Evaluation	11,6	25,5	0,457	2,44
Operation	35,1	14,5	1,388	1,388
Contracting	0,9	38,4	0,037	3,679
Collection	2,2	0,9	0,088	0,088
Recovery	2,3	1,0	0,092	0,092
Total	100,0	100,0	3,95	9,58

Source: Martinez and Espinosa (2001)

3.3.5 Why high interest rates?

As shown in table 3.10, interest rates charged by microfinance organisations operating in Mexico are above the threshold of 70 percent on annum basis, a rate substantially higher than the median value (about 31%) for MFIs worldwide (see MicroBanking Bulletin 2007). High interest rates in Mexico can be linked to three different but interrelated factors:

1) A process of financial markets liberalisation that began in the 1980s with several structural reforms, including the removal of interest ceilings. After the oil price crisis of 1982, and in order to reduce the hyperinflation, the government followed a crawling-peg regime that was backed by high interest rates to attract foreign capitals and offset the deficit in the Current Account of the Balance of Payments. However, the high interest rates policy led later on to volatility in the exchange rate and in the end, to the peso crisis of 1994 (see section 3.1.4 for more details)[12]. In the aftermath of the Peso crisis of 1994, and with a heavy devaluation and a booming inflation, Fincomun, CAME and a small number of microfinance organisations that operated at that time, were forced to increase the interest rates in order to cover operational expenses adjusted to the inflation rate.

2) However, when the inflation and interbank interest rate began to fall, the managers of these organisations decided to leave their interest rates unchanged,

[12] The connection between high interest rates and exchange rate volatility has been examined by Chen (2006).

taking advantage of their monopoly power. In fact, the lack of competition in credit markets in Mexico has allowed microfinance organisations to keep interest rate at very high levels with the apparent objective of generating enough operating revenues to finance a rapid scaling up process and achieve a greater outreach. This strategy has actually helped organisations such as Fincomun and CAME to finance a rapid institutional growth in a period of scarce sources of funding (see figures 6.2 and 6.3 in Chapter 6)[13].

Donors such as CGAP and commercial-led organisations such as ACCION International have also backed this strategy on the grounds of achieving the goal of financial self-sufficiency and greater outreach[14]. In addition, the Mexican government has been supporting with capital subsidisation, through PRONAFIM, the expansion of the microfinance industry[15]. However, given the monopolistic characteristics of the credit market, and the small number of suitable recipients for such funds, we fear that the PRONAFIM as well as other donors supporting outreach expansion may be actually enhancing the monopoly power of a small number of microfinance organisations operating in the country, which could consequently diminish market competition and the prospects of lower interest rates[16]. In this sense, more research will be needed to investigate this issue in more detail.

3) High transactions costs are the third factor driving up interest rates. Capital, and in particular labour, are expensive in Mexico, and operational and risk-associated costs, linked to a small average loan size, and monitoring, and enforcement activities, affect the interest rate. For example, it has been recently estimated (see

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[13] For instance, Rosenberg (2007) has estimated that Compartamos financed 41% of the expanding outreach through retained profits.

[14] A recent Initial Public Offering (IPO) of 30% ownership of the largest microfinance organisation operating in Mexico (Compartamos) was able to generate a huge interest amongst mainstream private investors. Those investors knew that high interest rates were generating supernormal profits. Eventually, those IPO shareholders received in a second offering US $450 million, which represented more than 12 times the book value of the IPO. There is an ongoing debate about the consistency of high-interests-for-outreach policies with the social mission of microfinance. For more details about this discussion, see Microcredit Summit (2007).

[15] See section 3.3.1 for more details about PRONAFIM

[16] A recent IMF country report (IMF 2007) as well as the governor of the Central Bank of Mexico have recently raised their concerns regarding the monopolistic environment in which lending organisations currently operate in the country. For more details see section 3.1.6 in Chapter 3.

Rosenberg 2007) that microfinance organisations such as Compartamos spend more than 35% of its revenues to cover operational costs vis-à-vis a mean value of 15% for microfinance organisations worldwide; however, one-fourth of the rate of interest represented the profit margin. This profit margin actually reflects the monopolistic environment in which microfinance organisations operate.

3.4 Concluding remarks

Although credit markets, and in general the system of financial intermediation in Mexico, have moved from a direct-credit paradigm to market-based model, the system as a whole remains highly inefficient, with low levels of penetration, and operating in monopolistic markets. The dependency of banks on collateral and other traditional screening and enforcement devices, as well as the costs involved in the process of lending, can explain the low banking penetration at the bottom-end of the income distribution.

The emergence of the microfinance industry in Mexico, and the strong support received from the government, through PRONAFIM and other public funds, to expand the industry's coverage and outreach, should be seen in that context, where a new legal framework has defined regulatory and supervisory measures to reduce potential moral hazard and adverse selection problems. Hitherto, it is not clear how many microfinance organisations will manage to transform themselves into fully regulated organisations; but just a few (e.g. Fincomun and COMPARTAMOS), have successfully completed the process.

Although the microfinance sector has received substantial support, recent evidence suggests that the allocation of subsidised *capital*, in particular from the PRONAFIM, has been highly concentrated in a small group of intermediaries. This could deteriorate the functioning of the market, which is already highly inefficiency.

Although subsidised capital, materialised in the form of new branches, can be an important factor to improve the access of poor people to credit, this action does not convert into poverty impacts *per se*. Other subsidised components could also have important effects on poor people's well-being. For example, subsidies aimed to

develop financial technology could reduce the costs of peer monitoring in group-lending contracts. These costs could be high enough to diminish the potentially impacts of microfinance on poverty reduction and households' well-being. To our knowledge there is no empirical evidence of the link between these costs and poverty impacts in the context of urban Mexico. We discuss this issue in Chapters 7 and 8.

Chapter 4

Poverty in Mexico

Introduction

Failures in credit markets, which originate from the problems of moral hazard and adverse selection, are widely regarded as one the critical factors that exacerbate poverty in developing countries[1]. It is apparent that expanding access to credit could help the poor to get out of poverty by e.g. engaging in income generating activities that yield higher returns. However, to what extent credit programmes have an impact on poverty reduction is a question that we investigate in Chapter 7.

Since we are particularly interested in examining the effects of credit on poverty reduction, we need to answer a major question: who is poor in the context of urban Mexico? In order to answer this question, we devote this chapter to the analysis and identification of poverty estimates as well as well-established poverty measurements for the impact analysis. The chapter is structured as follows: Section 4.1, briefly discusses the main theoretical conceptualisations of poverty, paying particular attention to the *relativist* versus *absolutist* controversy, before dividing the analysis of poverty measures into two sections: *multidimensional* (4.2) and *monetary* (4.3). Section 4.4 reviews the main poverty studies that have been recently conducted in Mexico, before examining, in section 4.5, the selected poverty lines that we use in the impact analysis.

4.1 The notion of poverty

Poverty, evident in various forms of human deprivation, is a problem that has caught the interest of scholars and philosophers since the time of ancient societies. In his famous dialogue with Adeimantus, and reproduced in Plato (1901:422), Socrates was already aware of the pervasive effects of indiscriminate wealth and poverty in deteriorating peace and order in a state society. In his view, wealth was *"the parent of luxury and indolence, and the other* (poverty) *of meanness and viciousness, and both of discontent"*. Similarly, and under the influence of Plato, Aristotle (1954:1379a) saw in poverty a source of conflict and anger: *"People who are afflicted by sickness or poverty [...] or any other unsatisfied desires are prone to anger and easily roused,*

especially against those who slight their present distress. Thus a sick man is angered by disregard of his illness, a poor man by disregard of his poverty..."

In that context, state governments were seen as fundamental instruments for justice and social equality that facilitated peace and prosperity. This is particularly illustrated in the Plato's *Republic*. The importance of state governments in reducing human deprivation and suffering was not exclusive of Western societies. In a conversation with Hsien, one of his disciples, Confucius (1979:XIV, verse 1) gives us an idea about the views of Ancient Asian civilisations: *"When a country is well governed, poverty and mean condition are things to be ashamed of. When a country is poorly governed, riches and honour are things to be ashamed of."*

It is apparent though that the notion of poverty was seen in relation to what the *other*, the better off, possessed. This *relativist* perception of poverty has been influential ever since. Adam Smith (1995), for example, paid a great deal of attention to the relative notion of deprivation, conditional upon local *necessities* and *customs*. Writing on consumable commodities, in *"An Inquiry into the Nature and Causes of the Wealth of Nations"*, chapter II, Book V, he stated:

"By necessaries I understand not only the commodities which are indispensably necessary for the support of life, but whatever the custom of the country renders it indecent for creditable people, even of the lowest order, to be without. A linen shirt, for example, is, strictly speaking, not a necessity of life. The Greeks and Romans lived, I suppose, very comfortably though they had no linen. But in the present times, through the greater part of Europe, a creditable day-labourer would be ashamed to appear in public without a linen shirt, the want of which would be supposed to denote that disgraceful degree of poverty which, it is presumed, nobody can well fall into without extreme bad conduct. Custom, in the same manner, has rendered leather shoes a necessary of life in England. The poorest creditable person of either sex would be ashamed to appear in public without them. [...] Under necessaries, therefore, I comprehend not only those things which nature, but those things, which the established rules of decency have rendered necessary to the lowest rank of people".

In that view, well-being was a condition not only dependent on goods (e.g. food) *"necessary for the support of life"*, but also on to two important and dynamic factors: *time* and *space* that shaped the norms and traditions in a social context. In similar

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[1] We discuss this particular issue in Chapter 5

fashion, Karl Marx (2004:35) pointed to the relative characteristic of poverty in his *Wage labour and capital*:

> *"A house may be large or small; as long as the neighbouring houses are likewise small, it satisfies all social requirements for a residence. But let there arise next to the little house a palace, and the little house shrinks to a hut. The little house now makes it clear that its inmate has no social position at all to maintain, or but a very insignificant one; and however high it may shoot up in the course of civilization, if the neighbouring palace rises in equal of even in greater measure, the occupant of the relatively little house will always find himself more uncomfortable, more dissatisfied, more cramped within his four walls..."*

More recently, the relativist view of poverty has been led by sociologist Peter Townsend, and captured by his widely cited opus magnum *Poverty in the United Kingdom*, although in a much earlier paper (1962:225) he already defined his position regarding the notion of poverty in this way: *"poverty is not an absolute state. It is relative deprivation. Society itself is continuously changing and thrusting new obligations on its members. They in turn develop new needs. They are rich or poor according to their share of the resources that are available to all [...] Our general theory, then should be that individuals and families whose resources, over time, fall seriously short of the resources commanded by the average individual or family in the community in which they live, whether that community is a local, national or international one, are in poverty.*

Fundamental concerns have emerged through regarding the distributional characteristics of the relativist conceptualisation of poverty, particularly in relation to the potential problems of underestimating the *absolute* degree of deprivation. Sen (1985) for example, has pointed out that: *"poverty is not just a matter of being relatively poorer than others in the society, but of not having some basic opportunities of material wellbeing, the failure to have certain minimum "capabilities". The criteria of minimum capabilities are absolute, not in the sense that they must not vary from society to society, [...] or over time [...], but people's deprivations are judge absolutely and not simply in comparison with the deprivations of others in that society".*

Although there is an ongoing discussion over the relativist notion of poverty versus its absolute dimension (see e.g. Sen 1985a; 1983, and also the debate on his paper in Townsend 1985 and Sen 1985b), there is an increasing consensus on its multidimensional nature. For example, the World Bank (2000:15) has defined

poverty as *"a pronounced deprivation in well-being"*, in terms of economic opportunity, education, health and nutrition, as well as lack of employment and security. Similarly, the United Nations Development Programme (1990) introduced two relevant concepts under the influence of the work of Professor Sen[2]: *human development*, defined as a process that enlarges people's choices including freedom, dignity, self-respect, and social status, and *human poverty*, meaning deprivation of essential capabilities, such as a long and healthy life, knowledge, economic resources and community participation.

Despite these recent efforts of including multidimensional indicators of well-being in poverty estimates, data on income and expenditure continues to be widely used as welfare indicator (see e.g. World Bank 1990). This is in part due to the difficulty of capturing well-being by a set of indicators such as child mortality, illiteracy rate or malnutrition. However, given the variety of analytical approaches to measure poverty, we devote the following sections to analyse and select poverty estimates that will be used in the formulation and test of hypotheses regarding the impact of credit on poverty reduction in the context of urban Mexico. For analytical simplification, we divide poverty estimates into two general approaches that can be absolute or relative in nature: a) multidimensional, and b) monetary. Additionally, we divide the reviewed poverty studies by their *objective* or *subjective* source of measurement (see figure 4.1 below).

4.2 Multidimensional approaches

There are several possible approaches to aggregate multidimensional measures of poverty and well-being. For example, it is possible to use a *welfare function* that includes various dimensions of well-being and then defines poor as those below a minimum threshold, which is usually arbitrary (see e.g. Tsui and Weymark 1997; Tsui 2002, and Bourguignon and Chakravarty 1998). However, as pointed out by Atkinson (2003), a major problem that can emerge from multidimensional welfare

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[2] The methodology and measurement of the Human Development Index is derived in Anand and Sen (1994)

functions is related to the interactions between the components that integrate such well-being indicators.

4.2.1 Human Development Index

Perhaps the work of Anand and Sen (1994), and which was first presented in the Human Development Report 1990, as the Human Development Index (HDI), is the most influential *multidimensional*, *absolute* and *objective* measurement of well-being in a global scale. This index is built in terms of *attainments* of three separate components[3]: 1) longevity, measured by life expectancy at birth, and defined here as X_1; 2) educational attainment, defined as X_2, and measured by a combination of adult literacy X_{2a}, (with a two-thirds weight), and combined primary, secondary and tertiary enrolment rations X_{2b}, (with a one-third weight), and 3) standard of living, measured by real income per capita in purchasing power parity (PPP$), and defined as X_3. The index I_{ij}, is a deprivation indicator for country j, with respect to variable X_i, and is derived in the Anand and Sen paper as follows:

$$I_{ij} = \frac{\max_k\{X_{ik}\} - X_{ij}}{\max_k\{X_{ik}\} - \min_k\{X_{ik}\}} \qquad (4.1)$$

where each deprivation indicator lies between 0 and 1, and the deprivation index I_j, with its three components i, is derived as an unweighted average of the I_{ij} as follows:

$$I_j = \frac{1}{3}\sum_{i=1}^{3} I_{ij} \qquad (4.2)$$

In this respect, a *shortfall* in the HDI for country j, represented here by H_j, can be derived as $1 - H_j = I_j$, where

$$H_j = 1 - I_j \qquad (4.3)$$

[3] For a calculation of the percentage contribution of the individual components of such an index to the overall achievement, see the generalised index proposed by (Chakravarty 2003).

Note that the HDI can also be expressed in terms of *attainments* by following (4.2) and (4.3) to get $H_j = 1 - \frac{1}{3}\sum_{i=1}^{3} I_{ij}$ and $H_j = \frac{1}{3}\sum_{i=1}^{3}(1 - I_{ij})$ which follows:

$$H_j = \frac{1}{3}\sum_{i=1}^{3}\left[1 - \frac{\max_k\{X_{ik}\} - X_{ij}}{\max_k\{X_{ik}\} - \min_k\{X_{ik}\}}\right] \tag{4.4}$$

$$= \frac{1}{3}\sum_{i=1}^{3}\frac{X_{ij} - \min_k\{X_{ik}\}}{\max_k\{X_{ik}\} - \min_k\{X_{ik}\}} \tag{4.5}$$

$$= \frac{1}{3}\sum_{i=1}^{3} H_{ij} \tag{4.6}$$

where

$$H_{ij} = \frac{X_{ij} - \min_k\{X_{ik}\}}{\max_k\{X_{ik}\} - \min_k\{X_{ik}\}} \tag{4.7}$$

is the i^{th} variable's contribution to the HDI for country j. For the construction of the index, fixed minimum and maximum values were given to each welfare indicator. For example, the minimum level for life expectancy at birth was set at 25 years whilst its maximum value was projected at 85 years in the year 2050. In this sense, the lower and upper limits of X_1 were fixed at those endpoints.

The second variable, the educational attainment index, was calculated by combining two indicators: 1) the adult literacy index, derived from a 0-100 min-max interval (with a two-thirds weight), and 2) the combined primary, secondary and tertiary enrolment ratio index with a 0-100 min-max interval, with a one-third weight. The final component of the HDI is the logarithm of real GDP per capita in US dollars for 2000 at purchasing power parity (PPP$). The logarithmic transformation of income reflects the diminishing returns to transforming income into *human capabilities*

(UNDP 2002). The upper limit of the min-max interval of the income variable has been set at the log value of US $40,000, whilst the lower limit has been set at the log value of US $100, both at (PPP$).

Following the *attainment approach* from equation (4.7), it is possible to compute population subgroups for each of the components of the HDI at country or local level. In 1993 the UNDP began to calculate the HDI for Mexico and a few states across the country, but it was not until 2002 when the HDI was finally computed for the 32 states that constitute the country (UNDP 2002). In this respect, the HDI for Mexico *(Mex)* was derived by computing the *life expectancy index* as $= I_{1Mex} = \frac{75.3-25}{85-25} = 0.838$, where the actual X_{1Mex} value, i.e. life expectancy at birth in Mexico was estimated at 75.3 years.

The first indicator of the educational attainment index, i.e. the a*dult literacy index,* was computed as $= I_{2aMex} \frac{90.45-0}{100-0} = 0.905$ where the actual X_{2aMex} value, i.e. adult literacy in Mexico was estimated at 90.45 percent. The second component of the educational attainment index, i.e. the *combined enrolment ratio index* was computed as $= I_{2bMex} \frac{64.54-0}{100-0} = 0.645$, where the actual X_{2bMex} value, i.e. the combined enrolment ratio was estimated at 64.54 percent. The sum of the *adult literacy index* and the *combined enrolment ratio index,* with their respective weights (two-thirds and one-third, respectively), resulted in the *educational attainment index*: $I_{2Mex} \frac{2}{3}(0.905) + \frac{1}{3}(0.645) = 0.818$.

Finally, the standard of living in Mexico was estimated by computing the *adjusted real GDP per capital index* as: $I_{3Mex} = \frac{\log(8831)-\log(100)}{\log(40000)-\log(100)} = 0.748$, where the actual X_{3Mex} value, i.e. the real income GDP per capita for Mexico (in PPP$) was estimated at 8831 US dollars. As derived in (4.7), the HDI for Mexico was computed as the arithmetic sum of its equally weighted components as follows:

$HDI_{Mex} = \frac{1}{3}(0.838) + \frac{1}{3}(0.818) + \frac{1}{3}(0.748) = 0.801$. The HDI was also estimated by the UNDP (2002) for individual states in Mexico. The resulting indexes showed important regional inequalities across the country. For example, whilst the life expectancy index for Mexico City was 10 percent above the index reported for the Southern state of Chiapas, the gap between the two states increases up to 23.5% and 52% when educational attainment and GDP per capita were measured, respectively.

Table 4. 1 Components of the Human Development Index by selected areas

	Life expectancy at birth (years) 1/	Adult literacy rate (%)	Combined enrolment ratio (%)	Real income per capita (PPP$) 2/
Chalco Valley	76.3	93.48	59.06	1,841.7
State of Mexico	76.3	93.54	61.53	6,724.0
San Miguel Teotongo	77.2	89.09	53.48	2,171.5
Mexico City	77.2	96.97	75.30	22,816.0
Tula City	74.2	93.62	64.54	1,667.5
State of Hidalgo	74.2	85.20	67.38	5,050.0
Mexico	75.3	90.45	64.54	8,831.0

1/ Values for life expectancy at birth were given to the subjects in the experimental sample according to the average values computed at local level. In this sense, we assumed that individuals living in the Chalco Valley could have a life expectancy similar to those living in the State of Mexico given that the Chalco Valley is a municipality of the State of Mexico.
2/ Given that income data was collected between January and May 2004, we used the Consumer Price Index to deflate income levels at prices of December 2000, and the FIX exchange rate peso-dollar for the same period.
Source: Author's sample survey and UNDP (2002) for data on life expectancy at birth

In a global perspective, the level of regional inequality across the country becomes clear when the GDP per capita is compared with other countries. For example, whilst Mexico City reported a GDP per capita in the order of US $22,815 at 2001 purchasing power parity (PPP), similar to countries such as Spain, Greece and Honk Kong, the poorest state in the country, Chiapas, reported a GDP per capita in the order of US $3,549, similar to countries such as El Salvador or Guyana. As pointed out by the UNDP, the level of regional inequality appears to be related to regional concentration as well. Five states (Mexico City, Mexico, Nuevo Leon, Jalisco and Chihuahua) absorbed 51.09 percent of the national GDP.

Despite the fact that the HDI is an important measure of well-being, it does not solve the problem of giving reliable values to each component of the welfare function (see Ravallion 1992 for a critique). However, although the index does not

provide criteria on identifying who is and who is not poor, it can be useful as a comparative tool to map the level of deprivation in the areas where our study was conducted. With that specific purpose, we used primary data collected from the quasi-experiment that was operationalised in the areas where the case-study microfinance organisations operate[4]: Fincomun in San Miguel Teotongo, in the Iztapalapa District in Mexico City; CAME in the Chalco Valley, in the state of Mexico, and Promujer in Tula City, in the State of Hidalgo. The results from the estimation of the HDI are presented in table 4.2.

Table 4. 2 The Human Development Index by selected areas

	Life expectancy index	Educational attainment index	Adjusted income per capital (PPP$) index	HDI
Chalco Valley	0.855	0.820	0.486	0.7204
State of Mexico	0.855	0.829	0.702	0.7954
San Miguel Teotongo	0.870	0.772	0.514	0.7187
Mexico City	0.870	0.897	0.906	0.8913
Tula City	0.820	0.839	0.470	0.7096
State of Hidalgo	0.820	0.791	0.655	0.7557
Mexico	0.838	0.818	0.748	0.8014

Source: Author's sample survey and UNDP (2002) for data on life expectancy at birth

We computed the values of the adult literacy rate, the combined enrolment ratio and the real income per capita with primary data; however, for the computation of the life expectancy at birth, we assigned the sampled households, a mean value according to the place of residence, which was previously estimated by the UNDP (2002). In this sense, members of a household living in, say, San Miguel Teotongo, in the Iztapalapa District of Mexico City, were assumed to have a life expectancy in the same order to the average reported in Mexico City. Similarly, a household living in the Chalco Valley were assumed to have a similar life expectancy than households living in the state of Mexico (see table 4.1). We are aware of the potential problems of overestimating this factor; however by using data at local level, we narrowed the probable gaps between the estimated and actual value of this variable. Moreover, the computation of the HDI is with the explicit purpose of showing a preliminary picture of the level of human deprivation in the areas under study, rather than using the index as a poverty measure in the impact analysis.

[4] For a discussion on the characteristics of the sample survey, see chapter 6.

Table 4. 3 The Human Development Index and its non-monetary components (percentages)

	Sample size	FINCOMUN		CAME		PROMUJER	
		Control	Treated	Control	Treated	Control	Treated
Overall	148	34,5	65,5	39,1	60,9	44,7	55,3
HDI							
(%) below the local level a/	145	100	97,2	94,4	96,4	100	100
(%) below the country level b/	139	100	86,1	83,3	96,4	100	100
Life expectancy index	148	0,870	0,870	0,855	0,855	0,820	0,820
Life expectancy at birth (years)	148	77,2	77,2	76,3	76,3	74,2	74,2
Educational attainment index	148	0,675	0,823	0,849	0,802	0,922	0,798
Adult literacy index	148	0,789	0,944	0,944	0,929	1,0	0,923
Combined enrolment index	148	0,447	0,581	0,657	0,548	0,766	0,548
Educational attainment idex							
(%) below the local level d/	51	73,7	55,6	22,2	21,4	4,8	23,1
(%) below the country level e/	33	31,6	27,8	22,2	21,4	4,8	23,1
Adult literacy rate							
(%) below the local level a/	11	21,1	5,6	5,6	7,1	0	7,7
Combined enrolment rate							
(%) below the local level b/	98	100	83,3	61,1	60,7	23,8	61.5**
(%) below the country level c/	81	68,4	52,8	61	60,7	23,8	61.5**

The statistically significant association in the cross-tabulations are indicated by the Chi-square values for the cell as a whole at 0.001 (*); 0.01 (**); 0.05 (***); and 0.1 (****) levels of significance.
a/ The HDI was estimated at 0.891, 0.795 and 0.755 points for Mexico City, the state of Mexico and the state of Hidalgo, respectivelly
b/ The HDI was estimated at 0.801 points for the country as a whole
c/ The combined enrolment rate was estimated at 64.54% for the country as a whole
d/ The educational attainment index was estimated at 0.897, 0.829 and 0.791 for Mexico City, the state of Mexico and the state of Hidalgo, respectivelly
Sources: UNDP (2002) and the author's sample survey

The computed HDI and its disaggregated components show interesting information. For example, whilst Tula City and the Chalco Valley reported an educational attainment index in the order of 0.839 and 0.820, respectively, households living in San Miguel Teotongo reported the lowest mean value: 0.772. However, when we examined the same index by dividing the sample in treated and control households, we found that in San Miguel Teotongo almost 74% of control groups, relative to 56% of treatment households, were below the educational attainment index reported at the local level. Similarly, we find a statistical significant association at the 0.01 levels between treated and control groups but from households living in Tula City, in relation to the first component of the educational attainment index, i.e. the combined enrolment rate (see table 4.3).

The apparent, although statistically insignificant, heterogeneity found in the educational attainment index between the three areas under examination disappeared when the adjusted income per capita index was analysed. We also found a degree of homogeneity in the level of income deprivation that was well below the mean values of the corresponding regions. For example, whilst the Chalco Valley, San Miguel Teotongo and Tula City reported an income per capital index in the order of 0.486, 0.514 and 0.470, respectively, the corresponding municipalities reported considerably larger values: 0.702, 0.906 and 0.655, for the State of Mexico, Mexico City and the State of Hidalgo, respectively (see table 4.2). In fact, all the sampled households, treatment as well as control, reported income levels below the regional average. The degree of income deprivation was actually below the average values computed for the poorest states in the country, e.g. Chiapas (0.596), Oaxaca (0.603) and Guerrero (0.646). In Chapter 7 we discuss in detail the use of *income* as the welfare indicator for the impact analysis.

Although the Human Development Index computed for the Chalco Valley (0.7204), San Miguel Teotongo (0.7187), and Tula City (0.7096) showed, as expected, low *attainments* levels for both treatment and control households, relative to indexes reported at the local and country level (see table 4.3), it does not give us criteria to define a threshold to divide the poor from the non-poor. In order to identify a deprivation indicator we explored the Human Poverty Index.

4.2.2 Human Poverty Index

The Human Poverty Index (HPI), which was presented in the Human Development Report (UNDP 1997), is a composite index of three different factors that constitute a welfare function: a) longevity, b) knowledge and c) decent living standard. The first component relates to the probability of death at an early age, and is captured by the percentage of the population expected to die before the age of 40. The second component captures the exclusion from education and knowledge, and is measured by the percentage of illiterate adults. The third and final component of the HPI is related to what is referred in the Human Development Report as a decent standard of living, and which is measured by a vector of three separate variables: 1) the

percentage of the population with access to health care institutions, 2) the percentage of population with access to safe drinking water, and 3) the percentage of malnourished children under five[5].

Note that whilst the HPI focuses on the *welfare status* of the poor, the HDI focuses on the *welfare attainments* of the overall population. In this sense, the HPI can be useful in first evaluating the degree of deprivation of the poor, and then monitoring the progress in improving such conditions overtime. Although the HPI offers an interesting approach, it does not solve the problem of identifying a threshold for human poverty. This is particularly important given the apparent weak relationship between the incidence of income poverty and the HPI (World Bank 1997).

Furthermore, from a practical perspective, the structural characteristics of the HPI impose a constraint to our study, mostly in relation to the nature of the required data. Although we collected information on some of the components that integrate the HPI (e.g. adult illiterate rate, access to health care institutions, and access to safe drinking water), we were unable to estimate the probability of death before age 40, and the percentage of malnourished children under five. For that reason, the HPI was dropped from the poverty measures to be used in the impact analysis.

4.2.3 Other multidimensional studies

Other multidimensional poverty measures have been proposed in ethnographic and sociological studies on the basis of *subjective* criteria. For example, Narajan et al (2000) used qualitative participatory techniques to collect information on people's perceptions about minimum standards of living, and based on that collective judgement, a *relativist* poverty measure was constructed. Self-reported measures of well-being have the quality of complementing econometric analysis on income poverty that improves the reliability of the results. In fact, we have collected in our sample survey *subjective* and *qualitative* information on household well-being to strengthen the internal validity of our study (see Chapter 6). However, the use of

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[5] Note that the unlike the HDI, the HPI excludes the income variable as one of its components. For a discussion on this issue, see the Human Development Report (1997).

participatory techniques alone contain important limitations: first, relativist subjective and self-reported measures of well-being can fail to capture social constraints and thus, reproduce existing discrimination and exclusion patterns in a particular social context; second, self-reported measures of well-being suffer from the same distributional problems that characterise *relativist* and *objective* poverty measures. This is simply because in a sample of poor households, a group can be relatively wealthier than the average; however they are still, in *absolute* terms, poor independently that they are perceived by the community as better off. We discuss this issue below in section 4.3.2. Another multidimensional and dynamic concept of deprivation, which has been increasingly explored in the literature of poverty analysis, is the one of *vulnerability*.

4.2.3.1 Vulnerability

Vulnerability is related to the exposure of households to observe risks that can deepen the existing levels of poverty and deprivation (Dercon 2002). As pointed out by Coundouel et al (2000), vulnerability can emerge from various sources at the macro, and micro levels. Whilst examples of the former are financial crises, natural disasters such as flooding, earthquakes or droughts, and social phenomena such as crime, street violence and war, examples of the latter are idiosyncratic events such as ill-health, accidents and death.

In earlier studies, income variability (or consumption expenditure variability) were used as a proxy of vulnerability. For example, Ravallion (1988) has derived an *expected poverty function* using data on household consumption to examine the dynamics of poverty, in terms of *persistent* and *transient* deprivation. Regarding the effects of aggregate shocks, Glewwe and Hall (1998) analyse how different socio-economic groups respond to macro shocks, looking in particular at welfare declines during macroeconomic crises, using panel data from Peru. Freeman *et al* (2003) have also explored the risks associated to natural disasters as important constraints of economic development and poverty reduction in developing countries.

Kamanou and Morduch (2002) have estimated a vulnerability measure, which is derived as a function of the expected distribution of future expenditure, for

individual households using panel data from Côte d'Ivoire. Similarly, Amin *et al* (2003) have identified households, whose consumption levels vary with income, after controlling for aggregate variation in mean consumption and employing a fixed effects estimation, using panel data from Bangladesh.

Although vulnerability has been associated with income variability, it may also be related to the inability of the poor to cope with external shocks. This inability may emerge, as pointed out by Moser (1997, 1998), from low stocks of human capital, physical capital and social capital; from inefficiencies in both labour and credit markets, and from inequality in intra-household resource allocation. Regarding the inefficiencies in credit markets, Dercon (2002) has reported that although poor households use risk-coping mechanisms such as savings and informal insurance to deal with external shocks, their effectiveness is limited. This is because, he argues, lumpiness limits the use of assets as insurance, entry constraints limit the effectiveness of income diversification, and informal risk-sharing provides limited protection to the poor.

In relation to inefficiencies in intra-household resource allocation, Dercon and Krishnan (2000) analyse, using panel data from Ethiopia, the ability of household members to keep consumption smooth over time, relative to other members of the household. They find that households do not engage in complete risk sharing, being women the more vulnerable.

More recently, Dutta et al (2007) use the von-Neumann-Morgenstern framework of decision making under uncertainty to derive a measure of vulnerability that takes into account the depth and the incidence of external shocks. Under a similar welfare theoretical approach Ligon and Schechter (2003) have derived a vulnerability measure that quantifies the welfare loss associated with poverty and the loss associated with uncertainty, using panel data from Bulgaria. Their findings point to larger effects of aggregate macro shocks than idiosyncratic events on welfare variability, with poverty and risk being equally important in the welfare loss.

Table 4. 4 External shocks and coping strategies
(Figures in percentages)

		FINCOMUN		CAME		PROMUJER		Pooled sample	
	Sample size	Control	Treated	Control	Treated	Control	Treated	Control	Treated
Overall	148	34,5	65,5	39,1	60,9	44,7	55,3	39,2	60,8
External shocks	97	47,4	66,7	66,7	85,7	61,9	57,7	58,6	70
Type of shock									
Death, illness or accident	65	66,7	41,7	66,7	83,3	84,6	66,7	73,5	63,5
Robbery, burglary or assault	52	66,7	70,8	75****	45,8	23,1	40	52,9	54
Natural disaster	3	0	0	0	4,2	0	13,3	0	4,8
Destabilising factors									
Losing source of income	42	15,8	27,8	33,3	32,1	33,3	26,9	27,6	28,9
Ill-health	114	84,2	69,4	72,2	75	81	84,6	79,3	75,6
Crime and delinquency	40	26,3	36,1	61.1***	28,6	0	11,5	27,6	26,7
Coping strategies									
Borrowing from moneylender	10	5,3	8,3	0	10,7	9,5	3,8	5,2	7,8
Borrowing from relatives and friends	124	68,4	97,2	88,9	67,9	90,5	84,5	82,8	84,4
Use credit from MFI	22	0	11,1	0	57.1*	0	7,7	0	24.4*
Use of informal savings	67	42,1	50	50	39,3	38,1	50	43,1	46,7
Work more hours	4	5,3	2,8	0	3,6	4,8	0	3,4	2,2
Sold physical assets	17	5,3	19,4	11,1	7,1	9,5	11,5	8,6	13,3

The statistically significant association in the cross-tabulations are indicated by the Chi-square values for the cell as a whole at 0.001 (*); 0.01 (**); 0.05 (***); and 0.1 (****) levels of significance.

Sources: Author's sample survey

Although vulnerability measures provide important information about the dynamics of human deprivation, their measurement is restricted to panel data. It is particularly due to this constraint that we were unable to examine the impacts of credit on household vulnerability. We managed however, to collect information from our quasi-experiment on the type of shocks that poor households are exposed to, and the kind of strategies that are followed to cope with such events (see table 4.4). We find, for example, that about 65% of programme participants reported to have experienced an external shock by the time the quasi-experiment was operationalised. Two types of shocks where most commonly reported: the first were idiosyncratic events such as ill-health, accidents and death. The second were shocks related to crime and street violence. The second type of shock, in particular, was not surprising in the cases of households living in San Miguel Teotongo (and borrowing from Fincomun) and the Chalco Valley (borrowing from CAME), given the high levels of criminality that characterise the Eastern periphery of the Metropolitan area of Mexico City.

In relation to coping strategies, we find that borrowing from relatives and friends remains the immediate and most common coping mechanism used by poor households after experiencing an external shock. This mechanism, however, was not exclusive. We also find that households use savings, and credit lines from microfinance programmes to deal with such events. And when these options were not available, the poor even considered borrowing from the local moneylender. Although borrowing from moneylenders could be seen as a short run coping mechanism, this choice could actually reduce the probability of asset accumulation that exacerbate the vulnerability of the poor in the longer run, as we discuss later in chapter 8. In the following section we turn our attention to the second general approach for poverty estimates: monetary.

4.3 Monetary approaches

Conventionally, *monetary poverty estimates* are based on minimum levels of income (or expenditure), needed to satisfy nutritional, material and social requirements that enable individuals to be part of their community. This approach usually employs data from household surveys that allows statistical analysis on the characteristics and dynamics of human deprivation.

There is an ongoing debate on the advantages and disadvantages of using data on household *income* or *expenditure* for poverty estimates. Household expenditure, on the one hand, is argued to be a better indicator when the household is exposed to high levels of income variability, either due to seasonality or external shocks such as droughts, floodings or financial crises (see e.g. Hentschel and Lanjouw 1996; Adelman 1993; Glewwe and van der Gaag 1988). The income variable, on the other hand, is a preferred indicator when a clear distinction of income sources such as waged labour and income-generating activities, is needed in the investigation (see e.g. Chaudhuri and Ravallion 1994; Anand and Harris 1989; Atkinson 1989).

However, what it is relevant for us is that poverty estimates employing the income (or expenditure) variable allows the identification of *poverty lines*, in the form of thresholds that distinguish the poor from the non-poor, and which make possible

the measurement of incidence and depth of deprivation in, say, the Chalco Valley[6]. In this sense, the identification of poverty lines can be important instruments for statistical analysis of the impact of programme interventions such as microfinance. It is important to point out that poverty lines can be derived under *absolutist* or *relativist* approaches[7]:

4.3.1 The *absolutist monetary* approach

A poverty line z, under an *absolutist monetary approach*, is an aggregate *cut-off* for a population subgroup whose levels of e.g. consumption expenditure or income are insufficient to satisfy a minimum of basic needs (or utility), which is estimated based upon the cost of a set nutritional requirements or basic food basket, z^F, which usually contains the Food and Agriculture Organisation (FAO)'s criteria of a daily intake of 2,100 calories per person for a healthy living (FAO 1957), and which varies from country to country depending on factors such as customs and seasonality. The basket may also include a non-food component z^{NF}, that captures items such as housing, clothing and cooking (Ravallion 2002). In this sense, the poverty line can be derived as $z = z^F + z^{NF}$.

For poverty estimates across countries, organisations such as the Work Bank (1990) have derived a fixed *absolute* and *objective* threshold of human deprivation, using the purchasing power parity (PPP) of 1993, based on prices generated by the International Comparison Program (ICP), which covers 110 countries. As a result, a line was obtained at the median of the 10 lowest poverty lines. That line was equal to US $1.08 a day in 1993 PPP terms and is widely referred to as the World Bank's US $1 a day poverty line. An upper poverty line, commonly referred to as the World Bank's US $2 a day poverty line, was estimated by doubling the amount of the lower poverty line to reflect living standards in middle-income countries such as Mexico.

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[6] For applications of *monetary poverty lines* see e.g. Ravallion (1994); Bidani and Ravallion (1994), and Atkinson (1993)
[7] For a comprehensive analysis on this issue, see Foster (1998).

These standardised absolutist poverty lines have been widely used in the context of global poverty analysis (see e.g. the World Development Reports 1990 and 2000); however, increasing concerns have emerged regarding the inappropriate methodology used to specify the deprivation thresholds that are likely to understate the extent of global income poverty (Reddy and Pogge 2005). This criterion of defining a minimum threshold for a standard of living is particularly inappropriate on a country basis. These lines are too low for the existing domestic prices in Mexico, which lead to underestimation of the magnitude and severity of poverty. This becomes evident below in section 4.4, where we discuss domestic poverty estimates in Mexico.

4.3.1.1 Intra-household adjustments

Households of different structure have different needs that reflect the age, gender and activities of each member. A household with 2 adults and 2 children for example, is expected to report smaller consumption expenditure on food than a household with 4 adults. Similarly, household size should be expected to reduce the cost, in per capita terms, of items such as gas, electricity and housing. Although there is a general consensus in relation to intra-household differences, there is still an ongoing debate about the weights that should be given to individual household members (World Bank 2005).

The most common and extended approach for intra-household adjustments is the *per capita* method that consists in assigning equal weights to household members in the distribution of income. In this sense, in a household with two adults and two children, an equal weight is given to each member. The main constraint of the per capita approach is that it gives equal weights to adults and children, as well as young and elderly, independently of their needs.

An alternative is the method of adult equivalence scales that consists in giving children a fraction of the adults' weight in the distribution of income. The use of equivalence factors is generally justified given the fact that children report lower consumption expenditure than adults (see e.g. Lanjouw and Ravallion 1995, and Deaton 1987). Other studies (e.g. Drèze and Srinivasan 1997) have suggested that

additional adults should be weighed less than the first adult after taking into account economies of scale. In his pioneering work, Rothbarth (1943) proposed an equivalence factor that assigned weights to household members as follows:

$$e_h = (A_h + \Phi K_h)^{\theta} \qquad (4.8)$$

where e_h is the equivalence factor for household h, A_h is the number of adults (from age 18 to 65) and K_h is the number of children in household h. The parameter θ is equal to 1 and Φ has different values corresponding to the age and sex of every child. As a result, boys in the range 0-5 years have a Φ value of 0.661 while girls have one of 0.609; boys in the range of 6 to 12 years have a parameter Φ of 0.750 whereas girls, 0.664; young men in the range of 13 to 18 years have a parameter of 0.633 whilst young women in the same range of age, 0.635. Finally elderly men and women (65 years of age and older) were assigned values of 0.553 and 0.570, respectively. We refer to the Rothbarth factor as the equivalence factor 1 or IAE1.

Wagstaff and van Doorslaer (1998) have also proposed equivalence factors that give the parameters Φ and θ in equation (4.8) a value equal to 0.75 where children are defined as those aged less than 14 years. We refer to this measurement as the equivalence factor 2 or IAE2. The OECD have also used a modified equivalence scale based on the work of Hagenarrs *et al*, (1998), which weights the first adult with 1, additional adults with 0.5 and children aged 14 and less with 0.3. We refer to this equivalence factor as the equivalence factor 3 or IAE3.

There have been recent attempts to incorporate intra-household adjustments to the distribution of income in developing countries. For example, May *et al* (1995) in the context of South Africa, and Hentschel and Lanjouw (1995) in the context of Ecuador. However, in the particular case of Mexico, there is no clear consensus on the most appropriate approach that should be followed (Sedesol 2002). For that reason, we have estimated income values for households participating in our quasi-experiment, employing the equivalence factors mentioned above, in addition to the per capita method (see table 4.5). After adjusting for intra-household distribution of welfare, we observed that the income variable considerably varied from one method

to another. For example, in the case of programme participants at Fincomun, the mean value of individual income computed for control households, as the percentage of the income of treatment groups, changed from 59% using income per capita, to 54% using income per adult equivalent 3.

Table 4. 5 Intra-household distribution of income by equivalent factors

Mean values per month (Figures in pesos of 2004)	FINCOMUN		CAME		PROMUJER	
	Treated	Control	Treated	Control	Treated	Control
Household income	9,899	4,831	6,567	5,219	6,339	6,663
As a % of treatment group	100	49	100	79	100	105
Income per capita (IC)	2,338	1,372	1,707	1,473	1,711	1,503
IC as a % of treatment group	100	59	100	86	100	88
IAE1 a/	2,684	1,533	1,963	1,699	2,010	1,766
IAE1 as a % of treatment group	100	57	100	87	100	88
IAE2 b/	3,545	1,945	2,524	2,106	2,546	2,364
IAE2 as a % of treatment group	100	55	100	83	100	93
IAE3 c/	4,208	2,271	2,982	2,474	3,040	2,836
IAE3 as a % of treatment group	100	54	100	83	100	93

a/ Income per adult equivalent 1 follows the approach developed by Rothbarth (1943),
B/ Income per adult equivalent 2 follows Wagstaff and van Doorslaer (1998).
c/ Income per adult equivalent 3 follows the OECD modified equivalence scale based on Hagenarrs et. al, (1998).
Source: Author's sample survey

However, using the same equivalence factors for programme participants at Promujer, we find an opposite result in the distribution, which could be explained by differences in household composition in the two regions. Consequently, impact analysis, and in particular the conclusions on programme interventions, can be sensitive to the intra-household distribution of welfare. We discuss this particular issue in chapter 7, where we estimate the impact of credit, using those equivalence factors, including the per capita approach.

4.3.1.2 Poverty measures

Once an *absolute* poverty line has been defined, the aggregated estimation of the *incidence of poverty* is straightforward. This is simply the share of the sample population below the defined poverty line, expressed as the head-count ratio, $HC = \frac{n_p}{n}$, where n_p is the number of individuals below the poverty line, and n is the total sampled population. The virtue of this poverty measure is that it allows us

to construct a poverty index in the form: $HC = \frac{1}{n}\sum_{i=1}^{n} I(y_i < z)$, where $I(\cdot)$ takes the value 1 if household members report individual levels of income y, (either from the income per capita method or from equivalence factors) below the poverty line z, and zero, otherwise. This index, also known as *the headcount index*, facilitates the analysis of poverty and is easy to construct; however, fails to capture the depth and severity of deprivation.

This constraint however can be addressed by deriving a *poverty gap index*. This measure captures the mean aggregate income shortfall relative to the poverty line across the population, and is expressed as the percentage of the poverty line, in the following form: $PG = \frac{1}{n}\sum_{i=1}^{n} \frac{G_i}{z}$, where the poverty gap is $G_i = (z - y_i)\left[I(y_i < z)\right]$. In this sense, the poverty gap index shows the amount of resources needed, in terms of e.g. income, to bring the poor to the poverty line and above (Coudouel *et al* 2000). The squared poverty gap (PS) has been used elsewhere (e.g. World Bank 2000) to measure the severity of deprivation, taking into account the degree of inequality among poor. This measure is from the same family of the FGT index discussed in section 4.2.1.4.

Depth and incidence are fundamental elements in the poverty impact analysis of programme interventions such as microfinance. For example, there could be the case of credit programmes reporting significant impacts on the incidence of poverty, i.e. being effective in reducing the number of poor borrowers, but just by lifting those who were closest to the poverty line, with insignificant impacts on the poverty gap. Alternatively, there could be the case of a credit programme being effective in targeting the very poor and thus reporting significant impacts on the poverty gap; however, by doing so, they may report insignificant impacts on the overall incidence. We investigate this particular issue later in chapter 7.

4.3.2 The *relativist monetary* approach

A poverty line $z = \alpha s(\mathbf{x})$, under a relativist monetary approach, is based upon the standard of living $s(\mathbf{x})$, for the overall income distribution $\mathbf{x}$, of a given society. The parameter α can arbitrarily set at different levels, e.g. 50% of the mean country income. As discussed above in section 4.1, the *objective relativist* notion of poverty was developed by Peter Townsend (1979), who defined an *"orthodox poverty line"* with the levels of sufficient *real income* needed to satisfy the consumption of goods and services, including the obligations that individuals have with their community. This relativist approach is commonly employed for the measurement of poverty in developed economies. For example, the European Commission derived for country members, a poverty line set at $\alpha = 0.5$ of the country's mean income, based on the work of O'Higgins and Jenkins (1990).

Similarly, Atkinson (1998) has proposed a relative *"intermediate poverty line"* that is derived using relative weights on the European Union average income Y_{EU}, and the average income for country i, in the following form: $0.5(Y_{EU}{}^{\theta} Y_i^{1-\theta})$, where θ is a proxy of converge at regional and country level. Chen and Ravallion (2001) have also estimated an objective relativist poverty line, in comparison to the standard World Bank's US $ 1 a day poverty line, using one third of a country's average consumption level at 1993 purchasing power parity (PPP). The use of relative poverty lines resulted in higher poverty estimates in countries with high average consumption but great inequality. The opposite effect, i.e. a reduction in relative poverty, was reported from countries with low inequality.

However, an improved income distribution does not necessarily lead to improvements in well-being. In fact, such distribution-sensitive characteristic of the *relativist* approach have raised important questions about the consistency of relative poverty estimates (see e.g. Sen 1981; 1992, and Atkinson 1990). With the purpose of addressing the distributional issue, Sen (1976) proposed a poverty measure that incorporated the Gini coefficient, as a measure of income inequality, to the incidence and depth of poverty.

Thus, the Sen index S, was derived as $S = HC\left[1-\left(1-G^{p}\right)\frac{\overline{y}_{p}}{z}\right]$, where HC is the headcount ratio derived above, G^{p} is the Gini coefficient of the income distribution amongst the poor and $\frac{\overline{y}_{p}}{z}$ is the poverty gap. One of the main constraints of the Sen index, as pointed out by Foster *et al* (1984) and Deaton (1997), is that it cannot be used in the decomposition of poverty into distributions from different population subgroups.

Foster *et al* (1984) address the structural constraints of the Sen index by deriving a poverty measure, $FGT = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{z-y}{z}\right)^{\alpha} f(y)\mathrm{d}(y)$, that is decomposable for a living standard indicator y, say income, with weights for population subgroups that are distributed with a density $f(y)\mathrm{d}(y)$. The notion of the poverty line is captured by z. The distributional problem is reduced by the coefficient of variation $\alpha \geq 0$. Once α increases, the *FGT* index becomes progressively more sensitive to the income levels of the population subgroups at the bottom end of the distribution. In this sense, for $\alpha = 0$, the $FGT = HC$, whereas for $\alpha = 1$ and $\alpha = 2$, the $FGT = PG$ and $FGT = PS$, respectively. For that reason, the parameter α has been referred elsewhere (Giovanni and Liberati 2005) as a *poverty aversion* indicator. The problem with the *FGT* measure is that gives no answer to the question of what is the best value for α.

Other generalised poverty measures have been proposed, following the work of Sen (1976), which take the distributional problem into account. For example Kakwani (1980) has derived an index that gives weights to the poor relative to the poverty gap. In this case, the larger the poverty gap, i.e. the poorer an individual is, the more weight is given to him. Similarly, Thon (1979) has proposed an index that, as in the case of the Kakwani index, is derived from the Sen Index. The main difference from the Kakwani index is that Thon assigns weights, relative to the poverty gap, conditional upon the distribution of the overall sample population and not just of the distribution of poor individuals.

In the particular context of impact analysis of microfinance, several *poverty assessment tools* have been proposed in an attempt to address the interest of donors and governments to document the poverty impacts of credit programmes that are often subsidised with public funds. Most of these tools, e.g. the Poverty Assessment Tool proposed by CGAP; the Client Impact Monitoring System proposed by Opportunity International; the Housing Index proposed by CASHPOR, ASA and AIM; the Food Security Scales proposed by Freedom from Hunger, and the Scorecard developed by PRIZMA are built based on a relativist poverty approach that employing income, expenditure or a set of well-being indicators that are derived from a sample of households that usually participate in a credit programme[8]. The problem with these tools is that they suffer from the same distributional constraints of the relativist poverty measures and thus, are likely to bias the estimations about incidence, depth and poverty impacts.

4.3.3 Alternative poverty estimates

Recent attempts have been made to combine absolute and relative poverty lines. Madden (2000), for example, employs a measure that takes into account inequality and the relative position of the household whilst recognising the absolute value of a set of items needed for a minimum living standard. Under this approach, *qualitative* information serves for the assignment of specific weights to such items. Pradhan and Ravallion (2000) have proposed the construction of *subjective* poverty lines from survey data for Jamaica and Nepal using qualitative questioning on whether households expenditure on food, housing and other items are adequate for their needs. Pradhan and Ravallion report robust results from subjective poverty lines close to the lines derived from objective measures.

Similarly, Goedhart *et al* (1977) use subjective questioning about the minimal income level required to satisfy household needs. They find a log-linear relationship between the minimum amount required and the actual income and household size. Figure 4.1 provides a summary of selected poverty estimates and their measurement.

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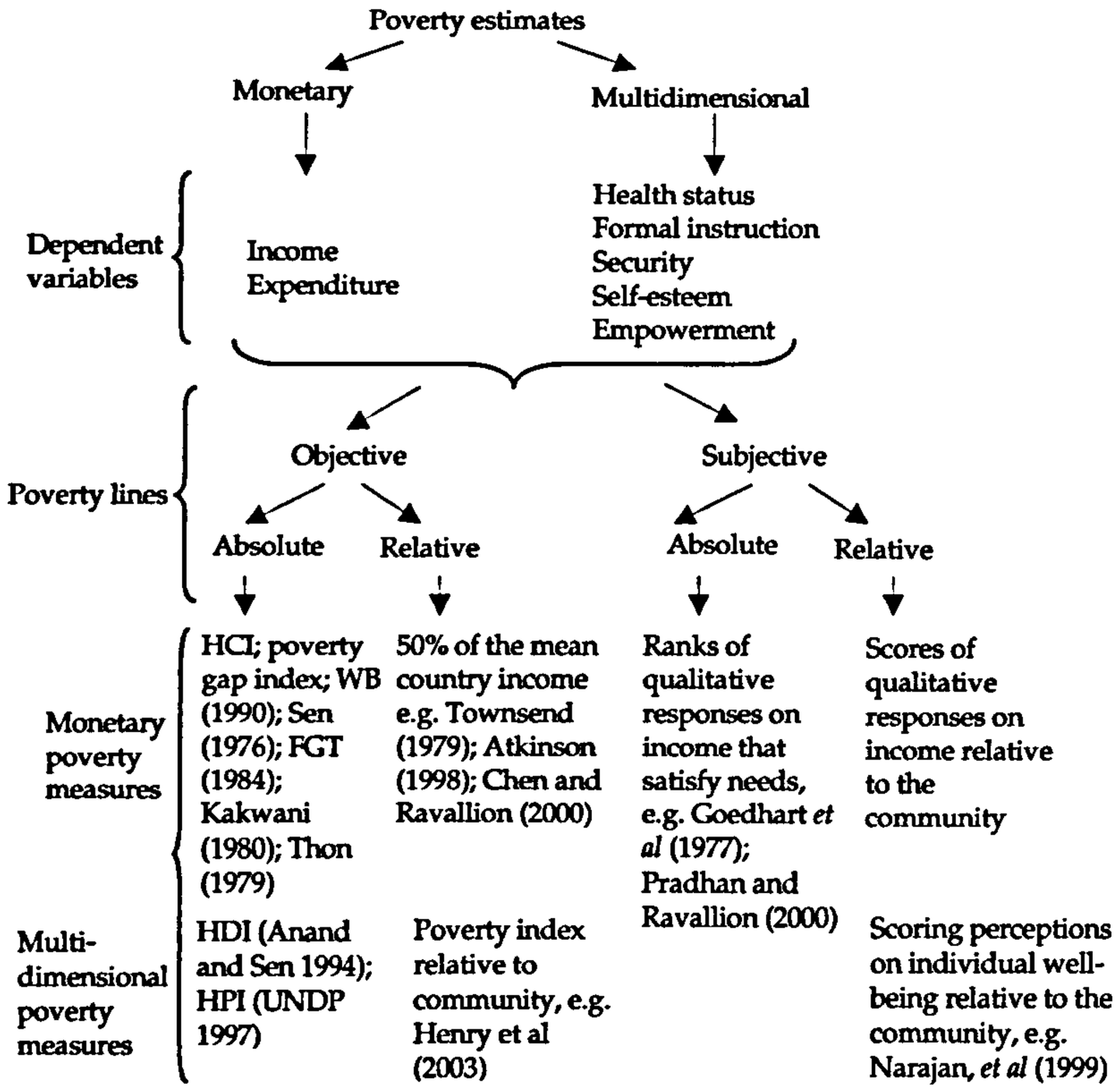
[8] For a comprehensive review of these poverty assessment tools, see Zeller (2004)

Figure 4. 1. Tree of poverty estimates and their measures



4.4 Monetary poverty estimates in Mexico

In Mexico, two major studies have given monetary values to basic food baskets, specifically constructed to define absolute and objective poverty lines. The seminal work of the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) in the early 1980s was the point of departure for the conceptualisation of a *basic food basket* that was used by the National Programme for Deprived Zones and Disadvantage Groups (or Coordinación General del Plan Nacional de Zonas Deprimidas y Grupos Marginados in Spanish), Coplamar (1982) as the methodological foundation for the construction of the first poverty line in Mexico. The second study was jointly carried out in 1993 by the National Institute of Statistics, Geography and Informatics (INEGI) in collaboration with ECLAC[9]. In the following sections we briefly describe the two baskets.

[9] For a summary of the content and characteristics of such baskets, see table 4.6

4.4.1 The Coplamar study

In the Coplamar study, an *absolute* dimension of human deprivation was the leading conceptualisation for the construction of a *basic food basket* that identified the minimum nutritional requirements needed to enjoy a healthy living in Mexico. That basket was based on criteria recommended by the United Nations Commission for Food and Agriculture; the World Health Organisation, and the United Nations University.

In addition to the food items in the basket, Coplamar included other goods and services that were considered important in a social context. For example, expenditure on clothing, education, health care, housing and public transport as well as access to piped water, electricity and drainage. The resulting basket was defined as the *Normative Basket of Basic Needs* (NBBN), in which monetary values were assigned in per capita terms, based on an average household size of 4.9 members at constant prices of 1981. This set of items served for the definition of a threshold of human deprivation that was referred to as the *unsatisfied basic needs* indicator (UBN).

A major problem with the UBN indicator is that it fails to provide information on the quality of the items contained in the basket. For example, although a household living in the Chalco Valley, to the Eastern periphery of Mexico City, may have access to piped water and electricity, the quality of such services can be rather deficient. Contaminated water usually forces households living in that region to *buy* drinking water, whereas power cuts often damage refrigerators, TVs and other electrical appliances. Another problem emerging from the UBN indicator is related to its subjective criteria of defining a minimum requirement to satisfy human needs. This problem, however, can be addressed, as suggested by Desai and Shah (1998), by constructing aggregated measures, using mean values and giving equal weights to each input variable. However, perhaps the major constraint of the UBN indicator is related to the NBBN itself, which at the present time fails to reflect the existing patterns of consumption expenditure that have changed over the last decades.

4.4.2 The INEGI-ECLAC study

In order to address the UBN constraints, the INEGI-ECLAC (1993) proposed in the early 1990s a *basic food basket* that was adjusted from the initial NBBN to reflect the new patterns of consumption expenditure in the country, in both the urban and rural context[10]. The basket used annual data from the Household Income and Expenditure Surveys (ENIGH) of the years 1984, 1989 and 1992. Monetary values were given to the items included in the basket at the prices of the corresponding years. There are two important advantages of the INEGI-ECLAC basket over the Coplamar basket: 1) it allows poverty analysis in both urban settlements and rural communities, and 2) it is decomposable for population subgroups.

However, a major constraint of the INEGI-ECLAC basket emerges from the structural characteristics of the ENIGH survey, and which is based on sample data collected at the country level. In other words, poverty analysis is restricted to aggregate levels, excluding the possibility of conducting evaluations by state or municipality. Additionally, due to the fact that the ENIGH is a cross-sectional sample survey, it does not allow dynamic poverty analysis.

Table 4. 6 Characteristics of the main *basic food baskets* in Mexico

Basket	*Characteristics*	*Parameters of reference*	*Cost*
Normative basket of food (Coplamar 1982)	Integrated by 34 products considered essential to satisfy a daily intake of 2,082 calories and 35.1 grams of protein per adult for a healthy living	It is unable to differentiate rural from urban areas. It is based on a mean household size of 4.9 members, where 2.77 are adults, 1.66 children from the age of 3 to 14 years, and 0.47 babies.	Monthly cost of 522.15 pesos per individual (approximately US $52) at constant prices of 2001.
Basic food basket (INEGI-ECLAC 1993)	Constructed based upon international criteria of 2,220 calories and 40 grams of proteins a day per adult for urban areas and 2,180 calories and 37 grams of proteins for rural areas.	It differentiates rural from urban areas. It gives different weights according to age, sex and occupation.	Monthly cost of 485.71 pesos per individual (approximately US $48) for rural areas, and 652.57 pesos (US $65) for urban areas, at constant prices of 2000.

Source: Sedesol 2002

[10] The INEGI define urban areas as those municipalities with more than 15 thousand inhabitants, whereas rural areas as those municipalities with less than 14.9 thousand inhabitants.

4.4.3 Poverty studies in Mexico

Over the last 20 years, an important number of poverty studies have derived poverty lines, using different methodologies (see table 4.8). Levy (1991) and Hernández-Laos (1990), for example, derived a threshold for moderate poverty based on Coplamar´s (1982) *Normative Basket of Basic Needs* that included, as mentioned earlier, food and non-food items. Levy, however, followed Lipton (1983) by assigning more weights to non-food items within household expenditure to define an *ultra-poverty* line, which reflected insufficient income levels to buy the Coplamar´s *basic food basket*. In that case, the cost of such basket was multiplied by a factor $\alpha = 1.25$.

In another study, ECLAC (1990) derived a moderate poverty line based on an *adjusted basic food basket*. The cost of the food component was estimated using a standard measure of nutritional requirements needed in both urban and rural areas. In order to include non-food items, the ECLAC study estimated that the total household consumption expenditure was twice the cost of the basic food basket in urban areas, and 75% of the same basket in rural areas. As a result, the ECLAC was able to derive an *ultra-poverty line* that only included the cost of the *basic food basket*. A few years later, the INEGI-ECLAC (1993) estimated, using the INEGI-ECLAC *basic food basket*, that in 1992, 16.1% of households in Mexico, 9.6% living in urban areas, and 25.7%, in rural areas, were living in *extreme poverty*. The estimations also included moderate poverty, which was computed using non-food items. The results showed that 44% of the households in Mexico were *moderately poor*, with substantial differences between urban (36.7%) and rural (55%) areas.

Table 4. 7 Mixed poverty matrix

	Poverty line Poor	Poverty line Non-poor	$\sum$ UBN
UBN Poor	55.1%	21.7%	76.8%
UBN Non poor	3.8%	19.4%	23.2%
$\sum$ Poverty line	58.9	41.1%	100%

Source: Boltvinik (1999)

Boltvinik (1999) has estimated the incidence of poverty by combining monetary and multidimensional measures of deprivation. This mixed approach used a poverty line and the UBN indicator to construct poverty matrices. As a result, Boltvinik reported that in 1989, 55.1% of households in Mexico were living in *extreme poverty*, whereas almost 81% were in *moderate poverty*. This method has generated controversy, particularly over the results showed in the cells where households are classified as poor by the UBN but as non-poor by the poverty line (see table 4.7).

Table 4. 8. Selected poverty studies in Mexico

Study	*Poverty measures*	*Type of basket*	*Endogenous variable*	*Methodological adjustments*
Raygoza (1999)	Monetary	Coplamar	Consumption	
ECLAC (2001)	Monetary	INEGI-ECLAC	Income	Inputting missing prices crossing results with national account matrix
INEGI-ECLAC (1993)	Monetary	Adjusted basket based on the initial NBBN with data from the ENIGH	Income	Rural and urban; Crossing results with national account matrix
OECD (1995)	Monetary	Relative mean (considered as poor those below 50% of median)	Disposable income	Adult equivalent scales and scale economies
Lustig and Székely (1999)	Monetary	INEGI-ECLAC	Income and consumption	Crossing results with national account matrix
Lustig (1996)	Mixed approach (monetary and UBN)		Current income and consumption	
Levy (1994)	Monetary	Coplamar	Consumption	
Hernández Laos (2000)	Monetary	INEGI-ECLAC	Income	Crossing results with national account matrix Equivalent scales to adult Economies of scale Inputting missing prices
Hernández Laos and Velázquez (2002)	Monetary	INEGI-ECLAC	Income	Crossing results with national account matrix Inputting missing prices
De la Torre (1997)	Monetary		Income	
Coplamar (1982)	UBN	NBBN based on a basic food basket	Income	Weighted means to capture sector variability
Pánuco-Laguette and Székely (1997)	Monetary	Coplamar	Income per capita	
Boltvinik (1999)	Mixed approach	Coplamar	Income	Adult equivalent scales Per capita analysis Adjustment by age, sex and type of activity
Székely et al (2000)	Monetary	Coplamar	Consumption	Per capita analysis
Sedesol (2002)	Monetary	INEGI-ECLAC	Income	Per capita analysis Rural and urban Crossing results with national account matrix

Source: Sedesol (2002)

Other studies, based on the INEGI-ECLAC *basic food basket*, have reported different results. For example, Pánuco-Laguette and Székely (1997) estimated that in 1994, 27.8% of households in Mexico lived in extreme poverty, whereas Lustig and

Székely (1999), using the same data, estimated that 15.5% were in that level of extreme deprivation. In the Raygoza (1999) study for 1996, 38.4% of population was estimated to be in extreme poverty, whereas Székely *et al* (2000) estimated that 21.2% of the population was under the same threshold of human deprivation. More recently, Hernández-Laos and Velázquez (2002) estimated that 30.1% and 50.1% of the population was in extreme and moderate poverty, respectively whereas the ECLAC (2001) estimated that 9.7% of the urban population in the country lived in extreme poverty compared to 58.5% in rural communities (see table 4.8). The World Bank (2000) has also reported poverty estimates for Mexico, employing standard absolute poverty lines. According to the bank, in 1995 approximately 17.9% of the population lived on less than US $1 a day, whereas 42.5% lived on less than US $2 a day. Similarly, the OECD (2006) has estimated the level of deprivation in the country by using a relativist income poverty approach based on 2002 data. The organisation reported that around 20% of the population had an *equivalised* disposable income of less than 50% of the median income, whereas one quarter of the population had less than 60% of such level.

4.4.4 Official poverty lines in Mexico

Despite the fact that there are an important number of studies that propose different poverty lines (see table 4.8), it was not until 2000 when the Mexican government called for the formation of a panel of experts, the Technical Committee for Poverty Measurement (TCPM), with the explicit purpose of deriving the first official poverty lines in the country. Academics and government officials, the latter with no voting rights on methodological issues, integrate the panel of experts. During the first year of the Fox administration, the panel worked in the methodological and analytical framework that served as the foundation for the estimation of poverty in the country. This section is based on a document circulated by Sedesol (2002). According to the TCPM, the main ingredients considered in the estimation of the poverty lines were: 1) data availability, 2) the selection of a *basic food basket*, and 3) theoretical and methodological consistency in deriving poverty measures.

In relation to the first aspect, the panel identified the Household Income and Expenditure Survey and the corresponding rounds for 1984, 1989, 1992, 1994, 1996, 1998, 2000 and 2002 as the source of data on *current household income* as the indicator of well-being, weighted in *per capita* terms for intra-household distribution of welfare. Household income was derived from the sum of monetary income (from e.g. wages, earnings from business activities, remittances, capital income, and so on), and non-monetary income (from e.g. payments in-kind, gifts, and estimates of self-consumption and housing rent, etc). The resulting dataset was normalised on monthly basis in prices of August of the corresponding year and deflated using the Consumer Price Index (Sedesol 2002).

In relation to the last two aspects, the panel decided to use the INEGI-ECLAC (1993) basic food basket **B**, that measures, in monetary terms, the minimum nutritional requirements for a healthy living, and from which a line of *extreme poverty* was derived. This bottom-end and *food-based* threshold of human deprivation z_1, (referred hereafter as poverty line 1 or PL1) was derived by the estimation of the income levels required, in per capita terms, to purchase such a basket in both the urban and rural context. This was possible by computing the share of food expenditure φ, relative to total household expenditure E_i, using information from the ENIGH surveys as follows: $\varphi = \frac{E_i^F}{E_i}$, where E_i^F is the food expenditure of household i, and $\varphi \leq 1$. Note that when $E_i^F = E_i$, the share of food expenditure $\varphi = 1$. Let us refer to this equality as φ^*.

Then all sampled households in the ENIGH were ranked by E_i and matched with φ. Once a group of households reported the equality φ^*, it was possible to derive the poverty line 1 as follows: $z_1 = \mathbf{B}(\varphi^*)$. In this sense, the incidence of extreme poverty could be computed by the estimation of the *headcount index*. In order to derive an upper-end poverty line that captures a moderate degree of human deprivation, z_3, (referred hereafter as poverty line 3 or PL3), a mean value of the non-food expenditure component of the poverty line was estimated as follows:

$z^{NF} = z_3[1 - EC(z_3)]$, where $EC(z_3)$ is the Engel coefficient for household i with income levels equal to the poverty line. Note that $z_3 = \frac{z_1}{EC(z_3)}$, where the Engel coefficient was computed with a mean value EC_p for the group of households with income levels below $p = 10$, i.e. 10 percentiles. As a result, z_3 was computed by multiplying the inverse of the Engel coefficient by the poverty line 1, as follows: $z_3 = z_1 \frac{1}{EC_p}$[11]. This threshold was identified in the Sedesol study as an *asset-based poverty line.*

Taking into consideration that the Engel method may include non-food items that are not strictly necessary in a social context, the TCPM added to the basic food basket $\mathbf{B}$, a non-food expenditure component E_{2i}^{NF}, that only included expenditure on clothing, housing, health care, formal instruction and public transport, $E_{2i} = \mathbf{B} + E_{2i}^{NF}$. The ratio of the two components relative to the total household expenditure E_i, is $\varphi_2 = \frac{E_{2i}}{E_i}$, where $\varphi_2 \leq 1$. Note that when $E_{2i} = E_i$, $\varphi_2 = 1$. We refer to this equality as φ_2^*.

Once a group of households reported a φ_2^*, it was possible to derive the adjusted poverty line z_2, (refer hereafter as poverty line 2 or PL2) as follows: $z_2 = E_{2i}(\varphi_2^*)$. This threshold is defined in the Sedesol study as a *capability-based poverty line,* where $z_3 > z_2 > z_1$. As a result, the Technical Committee for Poverty Measurement was able to set the poverty line 1, which measures *extreme poverty,* at 626 pesos per capita per month in prices of August 2000 for urban areas, and at 462.9 pesos per capita per month for rural areas.

In relation to poverty line 2, it was set at 767.7 pesos per capita per month for urban areas, and at 548.4 pesos for rural areas. Finally, the poverty line 3, which measures moderate poverty, was set at 1,225.3 pesos per capita per month for urban areas and

[11] For a discussion of the Engel coefficient, see Fisher (1992) and Houthakker (1957).

at 842.6 pesos for rural areas. The resulting estimations of the headcount index showed that about 24% of the population (18.6% of households) were below the *food-based* poverty line 1 in 2000. Similarly, and using the capabilities-based poverty line 2, the incidence of poverty showed that 31.9% of the population (25.3% of households) were below that threshold of deprivation, whereas 54.7% of the population (45.9% of households) were below the asset-based poverty line 3 that measures moderate poverty (see table 4.9).

Table 4. 9. Poverty estimates for 2000

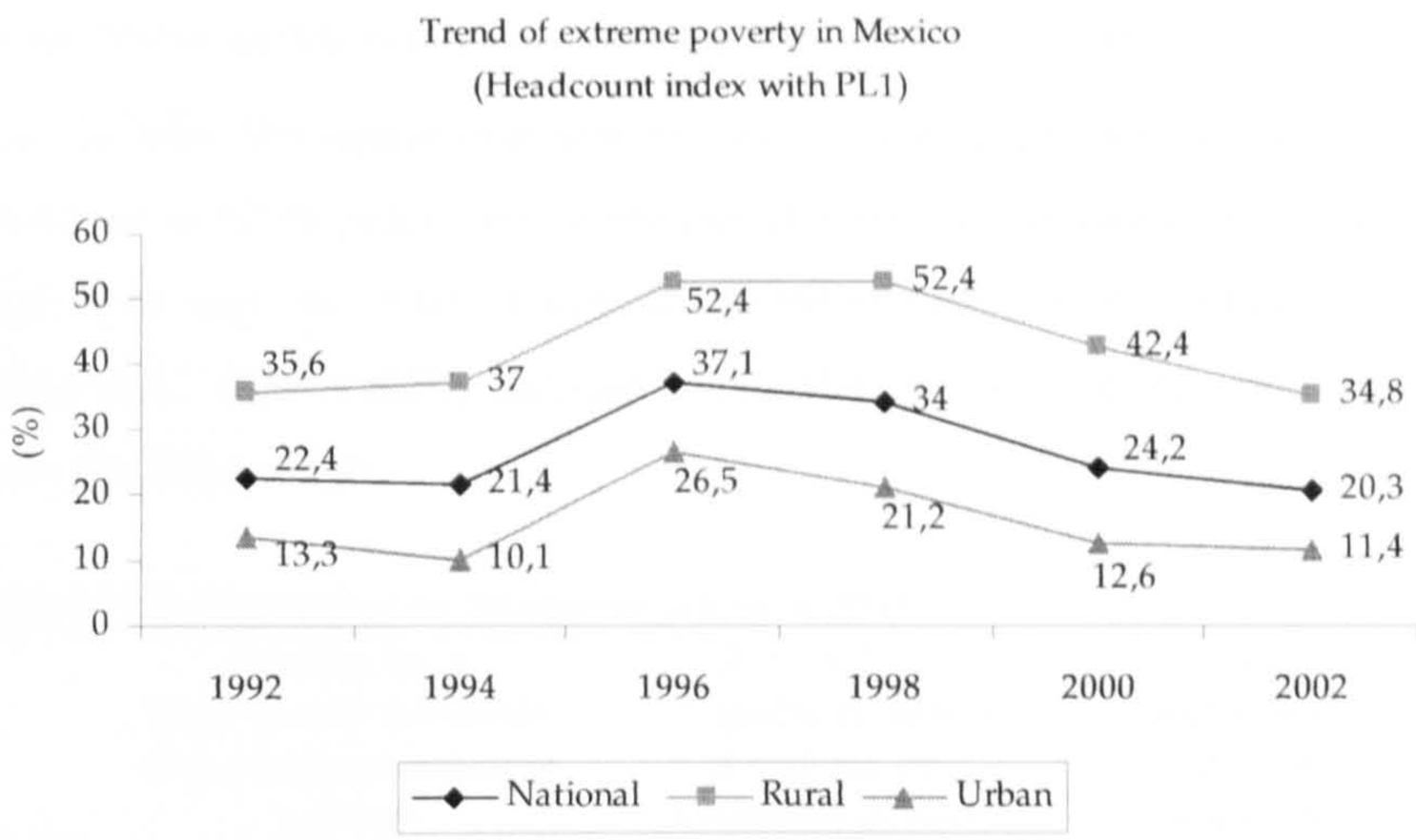
	Urban areas (in pesos *per capita* per month)	Rural areas (in pesos *per capita* per month)	Individuals below z (%)	Households below z (%)
Food-based poverty line 1	626	426.9	24.2	18.6
Capabilities-based poverty line 2	767.7	548.4	31.9	25.3
Assets-based poverty line 3	1,225.3	842.6	53.7	45.9

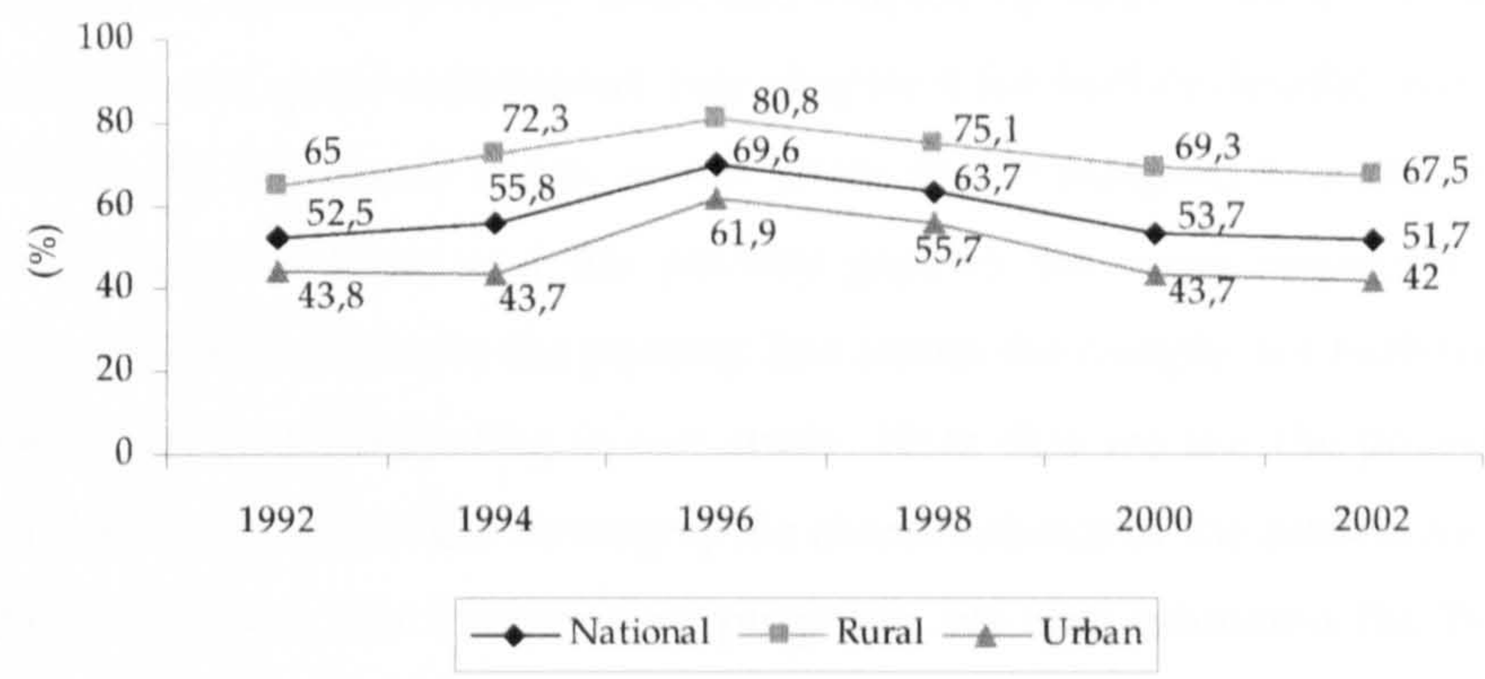
Source: Sedesol (2002)

A debate emerged in the academic community in Mexico, particularly in relation to the potential bias from the use of the Engel coefficient in the estimation of the non-food component of the poverty line (see also Ravallion and Bidani 1994). Additionally, there have been some concerns about, e.g. the choice of using household income rather than household expenditure; the selection of income per capita rather than using adult equivalence scales and economies scales for intra-household distribution of welfare; the exclusion of multidimensional variables of human deprivation, and controls for price variations across the country (World Bank 2005).

Despite constraints, these poverty lines offer the possibility of separating urban areas from rural communities (see figure 4.2), which is crucial for our study, and including other equivalence factors for intra-household distribution of welfare. Furthermore, it allows us to conduct well-established poverty measures such as the headcount index and the poverty gap in the poverty analysis, (which are presented later in chapter 7), and make our results comparable with the standard criteria of poverty measurement in the country.

Figure 4. 2 Poverty trends in Mexico





Source: Sedesol (2002)

4.5 Concluding remarks

By using the Consumer Price Index to deflate the levels of prices in 2004, we were able to estimate the food-based poverty line 1 for the period January-May 2004, when our quasi-experiment was conducted. The PL1 was set at 26.15 pesos per capita per day for urban areas, and at 19.44 pesos per capita per capita for rural areas. In other words, a person living in the Metropolitan area of Mexico City with a monthly income of $y_i \leq 784.5$, was considered to be extremely poor. In relation to

poverty line 2, we estimated this threshold at 50.25 pesos per capita per day for urban areas, and at 33.78 pesos per capita per day for rural areas. In this respect, a person living in Mexico City, with income levels $y_i \leq 1507.5$, was considered to be poor. Finally, the upper-end poverty line 3, which measures *moderate poverty*, was estimated at 62.70 pesos per capita per day for urban areas, and at 41.97 pesos per capita per day for rural areas. In consequence, an individual living in urban settlements with monthly income below 1881 pesos was regarded as a moderately poor. (See table 4.10)

Table 4. 10 Poverty lines for Mexico in prices of 2004

	Poverty line 1 Food-based threshold that measures extreme poverty	*Poverty line 2* Capability-based threshold that measures poverty	*Poverty line 3* Asset-based threshold that measures moderate poverty
Urban	784.5	1507.5	1881.0
Rural	583.2	1013.4	1259.0

Using these updated poverty lines, and employing data collected at the household level from our quasi-experiment, (see chapter 6 for further details), we were able to estimate the headcount index, as the share of the sampled households below the selected poverty lines, and the poverty gap, as the mean aggregate income per capita shortfall relative to the poverty line across the sample, for both treatment and control groups participating in our study. Note that we use the poverty estimates for urban areas, given the demographic characteristics of the settlements where our study took place. For comparative purposes, we also estimated the World Bank's poverty line of US$2 a day (see table 4.11).

Taking for example, poverty line 3 as a point of reference, we observed a large incidence of poverty amongst treatment and control groups living in the neighbourhoods where the case-study organisations operate, relative to the mean value reported for urban areas in the country (about 40%). However, only In the case of Fincomun we find a statistically significant association, at the 0.05 levels, between treatment and control groups in relation to the incidence of poverty. Similar results were found when the poverty line 2 was used. More precisely, the empirical evidence suggests a significant relationship between programme participation and poverty reduction in the case of Fincomun. We discuss this

particular issue in more detail in chapter 7, where the impact of credit on income poverty is examined. In the following Chapter we present the analytical framework for the investigation of the impacts of credit on income poverty, labour and well-being.

Table 4. 11 Poverty and human deprivation amongst programme participants
Figures in percentages

Concept	Sample size	FINCOMUN		CAME		PROMUJER	
		Control	Treated	Control	Treated	Control	Treated
Overall	148	34.5	65.5	39.1	60.9	44.7	55.3
Incidence of extreme poverty (PL1) c/							
≤ 784.5 pesos per month	10	15.8	11.1	11.2	0	0	3.9
Poverty gap		43.4	28.2	13.5	0	0	5.1
Depth of poverty (in pesos)		341	221	106	0	0	43
Incidence of poverty (PL2)							
≤ 1507.5 pesos per month	60	63.2***	27.8	50.0	42.9	33.3	38.5
Poverty gap		38.1	36.2	35.0	20.2	17.5	21.2
Depth of poverty (in pesos)		574	545	527	304	263	319
Incidence of moderate poverty (PL3)							
≤ 1881 pesos per month	87	73.7**	36.1	77.8	67.9	61.9	53.9
Poverty gap		44.8	39.3	34.1	25.4	23.3	30.6
Depth of poverty (in pesos)		842	738	642	477	439	576
World Bank's poverty line							
≤ US$ 2 a day	7	15.8	8.3	5.6	0	0	0
Poverty gap		33.6	23.7	1.1	0	0	0
Depth of poverty (in pesos)		225	159	7	0	0	0

The statistically significant association in the cross-tabulations are indicated by the Chi-square values for the cell as a whole at 0.001 (*); 0.01 (**); 0.05 (***); and 0.1 (****) levels of significance.
c/ Poverty lines are derived in prices of 2004, following Sedesol (2002)
Source: Author's sample survey

Chapter 5
Analytical framework

Introduction

In this chapter we propose an analytical framework that seeks to set up the theoretical foundations for the investigation of the impacts of credit on various aspects of household well-being in the context of fragmented credit markets. We employ an approach that focuses on the connection between the direct and indirect mechanisms that microfinance organisations exploit to reduce the problems of moral hazard and adverse selection, and enable low-income enterprising households to access institutional financing. And it is precisely through the decision of borrowing that we investigate its effects on various aspects of households' wellbeing.

In the analytical framework we also introduce the notion of *household capital endowments*, which are integrated by a set of three separate but interrelated factors of production: physical capital, human capital, and social capital. These factors of production are central in our impact analysis. The analytical framework is devised from the relationship between capital endowments and the key markets: labour and credit. The chapter is organised as follows: in section 5.1 we briefly discuss the effects of informational asymmetries on credit markets, and the direct and indirect mechanisms that microfinance organisations exploit to reduce such constraints. Section 5.2 presents the analytical framework in which the notion of *household capital endowments* is introduced. In the same section we analyse the relationship between capital endowments and the access to the labour and credit markets, whereas in section 5.3 we briefly discuss the theoretical propositions to be tested in relation to the impacts of credit on household well-being.

5.1 The problems of fragmented credit markets

Over the last three decades, important theoretical contributions have improved our understanding of the principles under which fragmented credit markets operated. In particular, the pioneering work of Arrow (1963); Akerlof (1970) and Stiglitz and Weiss (1981) led to subsequent studies e.g. Besley and Coate (1995); Stiglitz (1990), Hoff and Stiglitz (1990) amongst others, that examine the effects of *moral hazard* and

adverse selection on credit markets with asymmetric (or imperfect) information. The emergence of the *information paradigm* (Stiglitz 2001) has challenged the foundations of the competitive equilibrium analysis, in which financial market liberalisation has been the mainstream rationale[1]. In an effort of analytical simplification, we arbitrarily divide the analysis of the effects of moral hazard and adverse selection in two separate sections (5.1.1 and 5.1.2), although they simultaneously and dynamically interact with each other.

5.1.1 The problem of moral hazard

To begin with a comprehensive account of the effects of imperfect credit markets, let us assume that an enterprising household i has a business opportunity at the fixed cost C^f, which we normalise at $C^f = 1$. The decision of investing in that business will yield a return $R = 0$ if the venture fails, and $R > 1$, otherwise. The predicted probability of business success, denoted here by the function $\pi(a)$, heavily depends on unobservable factors, contained in a vector a, that are *endogenously* related to the efforts and abilities that the enterprising household put into practice, and which affect the outcome R (see Varian 1984). We also assume that the expected utility function of the household's actions, $EU(a)$, is affected by both the utility cost of working $C^u(a)$, and the opportunity cost of staying in business, which is represented by alternative employment opportunities, W. Note that $W = w(L) - C^u(L)$, where $w(L)$ and $C^u(L)$, are the wage rate, and utility cost of waged labour, respectively. In this sense, the decision of staying in business is constrained by $EU(a) = \pi(a)R - C^u(a) \geq W$.

Suppose now that the enterprising household considers borrowing from a lender, say a microfinance organisation, at an interest rate (r) that together with the principal (P) constitutes the interest factor $i = P(1+r)$. Under that condition, the expected return to the lender (i) is conditional upon the probability of business success, $\pi(a)$, and the opportunity cost of investment funds in the capital market, ρ. Note that $\pi(a)$ is inversely related to the rate of loan default, d, i.e.

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[1] For advocates of the competitive equilibrium analysis, see Adams et al (1984); Vogel and Adams (1997) and Von Pischke et al (1983).

$\pi(a)=1-d$, whereas ρ is simply a function of the interest rate paid by the lender to external sources of funding, F, i.e. $\rho=F(1+r)$. Assuming zero subsidisation from external donors, the lender will need to derive the following rate of interest to breakeven:

$$r=\frac{\rho+\alpha(d)+\varsigma}{1-d} \tag{5.1}$$

where $\alpha(d)$ and ς are the share of the principal conditional upon the expected rate of loan default, and the informational costs from screening, incentive and enforcement devices, respectively (Hulme and Mosley 1996). In a risk-neutral situation, the household will take the loan *iff* the expected return to the investment satisfy the condition $i \leq R$. If that was the case, then the returns to the lender and borrower yield the outcomes represented in the upper row of the following representation[2]:

	Borrower	Lender
Sucess	$R-i-C^{u}(a)$	i
Failure	$C^{u}(a)$	0

where both the borrower's and lender's utility functions find the optimal equilibrium at $\underset{i,a}{\text{Max}}\ \pi(a)(R-i)-C^{u}(a)\geq W$ in the case of the former, and $\underset{i,a}{\text{Max}}\ \pi(a)i\geq\rho$ in the case of the latter. However, due to imperfect information, the actions contained in (a) are unknown and difficult to monitor from the lender's point of view. In order words, the lender finds it difficult to know whether the actions taken by the borrower are sufficient to achieve a successful (or failure) outcome, i.e. $\forall a\in\{0,1\}$. This is a dilemma that Kenneth Arrow (1963) identifies as the *moral hazard* problem. In order to induce borrowers to take the *morally correct* actions to succeed in the business, the lender will require borrowers to offer collateral (c) in the form of household assets or guarantees with a value greater than *R*. In this sense, equilibrium will be set at the level where borrowers achieve

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[2] We have borrowed this matrix representation from Bardhan and Udry (1999).

$$\underset{i,a,c}{\text{Max}}\ \pi(a)(R-i)-[1-\pi(a)]c-C^{u}(a)\geq \text{W} \qquad (5.2)$$

and lenders,

$$\underset{i,a,c}{\text{Max}}\ \pi(a)i+[1-\pi(a)]c\geq \rho\,. \qquad (5.3)$$

A fundamental problem emerges when the actions a, taken by the borrower are driven by a risk-averse behaviour (Arrow 1971; Pratt 1964). In situations of uncertainty, risk aversion will affect borrowers' willingness to absorb the entire risk of taking a loan (through the use of collateral) and ultimately will aggravate the adverse selection problem. Additionally, the effect of risk aversion can exacerbate the problems of credit rationing in the market.

5.1.2 The problem of adverse selection

To illustrate this problem, let us assume that in a population (p) there are two types of enterprising households: type 1 households are risk-averse, so they are engaged in projects that are more likely to succeed but yielding low returns. Type 2 households are risk-lovers, so they are usually engaged in riskier businesses that are more likely to fail, but they yield high returns when successful. In other words, the predicted probability of success is greater for risk-averters, i.e. $\pi(1)>\pi(2)$, whereas the expected returns to borrowers investments are larger for risk-lovers, i.e. $R(1)<R(2)$.

At the interest rate i, the expected utility function for enterprising households, $EU(i,t)$, is given by the restriction $\pi(t)[R(t)-i]\geq \text{W}$ where the two types of households are contained in a set $t\in\{1,2\}$. Due to differences in risk sensitivity, we assume that $\pi(1)[R(1)-i]<\pi(2)[R(2)-i]$, i.e. the expected utility functions for the two types of borrowers are $EU(i,1)<EU(i,2)$.

A major problem emerges from the lender's point of view, and which is related to the nature of credit markets with incomplete information that makes difficult to differentiate between the two types of borrowers. Since the returns to the lender are

restricted to $\pi(t)i \geq \rho$, where ρ denotes the opportunity cost of funds, then the expected returns to the lender will be greater if loans are given to secure applicants, i.e. $\pi(1)t > \pi(2)t$.

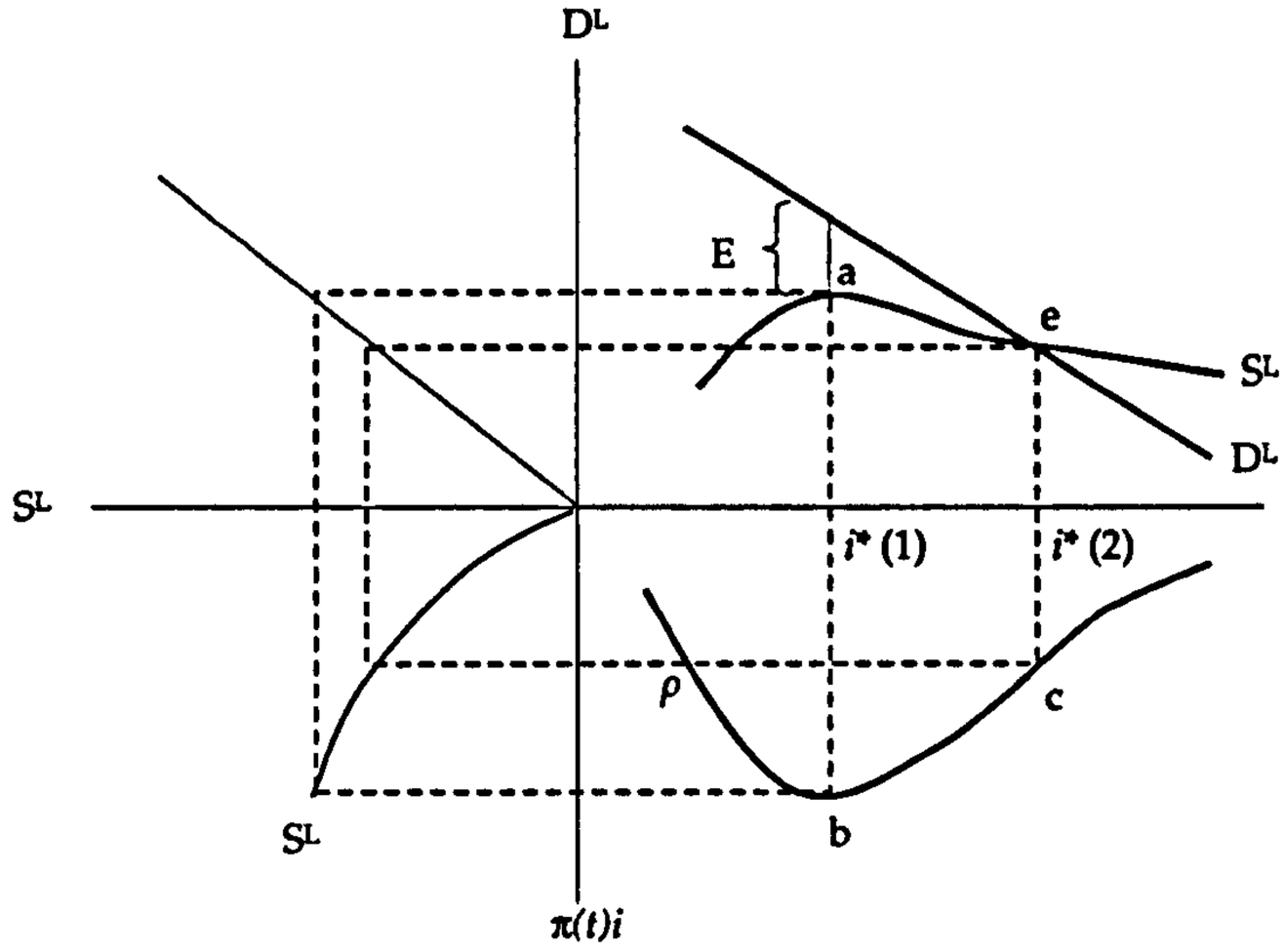
For a discussion of the problems that emerge from the difficulty of identifying the two type of borrowers, we follow the work of Stiglitz and Weiss (1981) and consider the case where type 1 borrowers will be willing to borrow up to the highest rate of interest $i^*(1)$, level at which $\pi(1)\left[R(1)-i^*\right]$=W. At an interest rate higher than $i^*(1)$, type 1 borrowers will dropout or simply not borrow in the first place. Type 2 borrowers are willing to take higher risks and borrow up to the rate of interest $i^*(2)$, level at which $\pi(2)\left[R(2)-i^*\right]$=W. At a rate higher than $i^*(2)$ type 2 borrowers will stop demanding loans.

Since $i^*(1) < i^*(2)$, at the interest rate below $i^*(1)$, i.e. $i \leq i^*(1)$, the two types of applicants in the population will demand loans, and the lender will receive increasing returns conditional upon $\pi(t)i = \mathrm{p}(1)\pi(1)i + \left[1-\mathrm{p}(1)\right]\pi(2)i$. This is shown by the distance from ρ to b in the lower-right quadrant of figure 5.1. However, if the lender increases the interest rate beyond $i^*(1)$, i.e. $i^*(1) < i \leq i^*(2)$, anticipating higher returns, he soon realises that only risky applicants take loans, i.e. $\pi(t)i = \pi(2)i$. As a consequence, the expected probability of loan default (d) increases, and the returns to the lender begin to fall. This is illustrated by the distance from b to c in the lower-right quadrant of figure 5.1, where the vertical axis represents the returns to the lender $\pi(t)i$ conditional upon the borrower's risk-taking, whereas i shows the interest rate charged by the lender. If the lender continues increasing the rate of interest, he will continue losing money until the point $i \geq i^*(2)$, where no household will apply for a loan and the lender will make zero profits. Note that zero profits denote the opportunity cost of funds, i.e. $\pi(t)i = 0 = \rho$.

This is what Stiglitz and Weiss (1981) have identified as the *adverse selection* problem in credit markets. A crucial condition pointed out in the Stiglitz and Weiss paper is that the equilibrium interest rate i will not be at the level where the supply of funds

cleans the demand for loans (point *e* in the upper-right quadrant of figure 5.1), but where the lender minimises losing money, i.e. point *a* in the upper-right quadrant where the vertical axis shows the demand for loans D^L. The lower-left quadrant shows the supply of funds as a function of the cost of those funds, ρ. In this sense, the lender will set the interest rate at the level where profit maximisation is achieved, i.e. $\underset{i,t}{\text{Max}}\ \pi(t)i$, subject to $\rho < \pi(t)i^*$ for a given number of *i*th type of borrowers, i.e. at the rate $i = i^*(1)$. Clearly, the consequence of adverse selection leads to *credit rationing* with equilibrium. This is shown in figure 5.1 by the areas covered with the capital letter E, representing the excess demand for loanable funds.

Figure 5. 1. Market equilibrium with rationing (from Stiglitz and Weiss 1981)



As in the case of moral hazard, lenders usually deal with the adverse selection problem with the use of *collateral*. But because borrowers differ in the likelihood of loan default, the use of collateral can only mitigate but not eliminate the problems of moral hazard and adverse selection. This restriction causes the lender informational costs that Hoff and Stiglitz (1990:237) have referred to as 1) the *screening problem*, because it is costly to determine the risk of loan default; 2) *the incentive problem*, because it is costly to ensure that borrowers take the correct actions to increase the likelihood of repayment, and 3) the *enforcement problem*, because it is costly to force borrowers to repay the loan. In developing countries, informational costs can vary considerably according to infrastructure and local

prices. However, the cost of screening applicants can be reduced by the use of information from residents of the same neighbourhood. This is actually the way indigenous agents such as moneylenders exploit their informational advantage relative to outside uninformed lenders (Hoff and Stiglitz 1998)[3].

An important number of devices have been exploited by microfinance organisations, and increasingly examined in the literature (see e.g. Stiglitz 1990; Besley and Coate 1995; Ghatak 1999; van Tassel 1999; Laffont 2003; Armendariz de Aghion and Gollier 2000). These devices deal with the screening, incentive and enforcement problems; however, as pointed out by Stiglitz 1990, they can be costly substitutes for collateral, in particular to the borrower. We discuss this issue later in Chapter 7, when the costs of peer monitoring in group-lending contracts are analysed in more detail. Following the Hoff and Stiglitz (1990) categorisation of *direct* and *indirect* mechanisms, we briefly examine some of these devices.

5.1.3 Direct mechanisms

Direct mechanisms have been conceptualised in the Hoff and Stiglitz paper as those devices that *directly* deal with the costs of screening applications, and enforcing repayment. Generally used by banks and other traditional non-banking institutions, *collateral* in the form of land, assets or guarantees, remains the most common *direct* screening device in traditional lending. However, in deprived social environments, where microfinance organisations usually operate, potential borrowers (often in poverty) do not have enough assets to back a loan application, and for that reason they are also likely to be risk averse (Ravallion 1988; Sinha and Lipton 1999). These attitudes towards risk considerably restrict, as discussed above, the effectiveness of collateral as screening device.

Lenders in fragmented markets have explored other direct mechanisms. For example, Bell and Srinivasan (1989) showed that *trade-credit linkages* between suppliers (or dealers) and lenders can considerably reduce the informational

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[3] In chapter 6 we discuss the strategy of data collection in which we surveyed households living in the same neighbourhood and borrowing from microfinance organisations operating in the area. This helped us to keep constant informational costs and other factors such as input costs, local prices and infrastructure characteristics that could affect the estimation of credit impacts.

asymmetry and reduce the enforcement problem that affect the expected default rate (d), and the informational costs (ς) in equation 5.1. But Bell (1990) have also reported in the context of India that trade-credit linkages can exacerbate informational asymmetries *between lenders*, since those with linkages with suppliers exploit their informational advantage over those with no connections, leading to monopolistic practices.

The screening process between lenders and borrowers may also create *trust*, a process that can be linked to the concept of social capital (Putnam *et al* 1993; Becker 1996). Aleem (1990), for instance, found in the context of Pakistan that the screening process from moneylenders creates "relationship-specific" that are likely to reduce the screening and enforcement costs overtime. In this sense, once borrowers shift from one lender to another, they would need to build up creditworthiness with the new lender. Dowla (2005) in a recent paper reported the creation of social capital from the lending process between Grameen Bank and programme participants. In this sense, collective action through horizontal and vertical networks allow poor households to access credit markets. Similarly, Van Bastelaer (1999) has examined the role of *social capital* in reducing the screening and enforcement problems and its effects on market efficiency. We discuss the importance of social capital in the process of accessing credit in section 5.2.2

Compulsory savings, playing the role of loan insurance, is another direct mechanism exploited by lenders to reduce the moral hazard and adverse selection problems that emerge from the process of lending with no collateral. The device consists in periodic deposits usually set as a percentage of loan instalments, and which take place on a regular basis often simultaneously to loan repayments. Compulsory savings help lenders to reduce the expected default rate (d), the informational costs (ς) and the components in ρ related to interest rate paid by the lender to external sources of funding, $i = F(1+r)$. Savings and credit co-operatives, and credit unions have largely used the device since the 19th Century, in countries such as Germany, England, Italy and Canada[4]. Nonetheless, the role of compulsory savings in group-lending contracts has been at the centre of recent discussions that advocates for the

[4] For comprehensive historical reviews of loan funds and credit co-operatives in Europe, see Hollis and Sweetman (1998), and in the case of credit unions, see MacPherson (1999).

introduction of more flexible mechanisms of deposits in microfinance (see e.g. Robinson 1997). However, international experiences[5] have shown the importance of preventive and protective regulatory systems to safeguard small depositors against the implicit risks associated with financial instability (Chaves and Gonzalez-Vega 1994).

Compulsory savings as well as loan repayments are arranged in *periodical repayment schedules*. In traditional group-lending models, periodical repayment schedules act as *direct* screening and enforcement devices to reduce the expected default rate and informational costs. This is through the obligation of group members to attend *compulsory meetings* that take place on a weekly, fortnightly or monthly basis, where *peer monitoring* (as *indirect* device) take place, and loan repayments are made. Group lending contracts, based on either solidarity groups (e.g. Grameen Bank in Bangladesh and BancoSol in Bolivia) or village banking (e.g. FINCA and its country partners), take advantage of the informational flows that emerge from *peer monitoring* during group meetings in order to screen out irregular borrowers and prevent future defaults.

Although periodical repayment schedules are important for the lender, given the nature of joint liability that characterise group-lending models, the rigidity of these devices can cause distortions in credit markets with adverse effects to the borrower. For example, in communities with seasonal income, the probability of observing a mismatch between inflows of household income and the scheduled loan repayments increases. This can force households to borrow below the optimum level.

5.1.4 Indirect mechanisms

The use of joint liability in group lending contracts, in what Besley and Coate (1995) have referred to as *social collateral,* acts as an *indirect*[6] mechanism that substitutes

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[5] For example, in Chapter 2 the catastrophic effects of the Mexican financial crisis of December 1994 on small depositors were discussed. McDonald and Ledgerwood (1999) have also discussed the effects of financial crises in the context of Eastern Europe in the 1990s when many small depositors lost their savings.

[66] Hoff and Stiglitz (1990) refer to *indirect* mechanisms as those devices that the lender use to ensure that the borrower takes appropriate actions to reduce the likelihood of loan default.

physical collateral. In this sense, group lending contracts help lenders to reduce the components d and ς of equation 5.1. Ghatak (1999) has shown that the effectiveness of group lending is in part due to *self-selection*, which leads to a homogenous matching within group formation, resulting in an improvement in the pool of applicants with an increasing probability of loan repayment. But because self-selection is exploited as a screening device, those risk-averse members of the community (usually the poorest) are often excluded from institutional lending. This is precisely one of the reasons why lenders using group lending contracts may still encounter problems of adverse selection (Morduch 1999).

Group lending contracts treat group members as defaulting borrowers if a single member fails to repay the loan. This is one of the reasons why Besley and Coate (1995) have suggested that *social collateral* is more likely to work in communities with high degree of social cohesion, where social sanctions are hard enough to persuade borrowers to repay the loan. Good informational flows in small communities can also improve the functioning of credit contracts by reducing *peer-monitoring* costs where the use of collateral has been reported as absent (Udry 1990). Clearly, *peer monitoring* play a central role for the success of these contracts; however, Stiglitz (1990) has pointed out the fact that the cost associated to these transactions are actually passed onto the borrower. The transfer of these costs can also affect the way in which defaulting borrowers, particularly women, are subjected to social sanctions.

Some scholars (e.g. Goetz and Sen Gupta 1996; Osmani 1998, and Rahman 1999) have suggested that institutional lenders *targeting women* are actually exploiting rigid socio-cultural norms that govern women's behaviour in traditional socio-cultural environments. Hashemi, Schuler *et al* (1996) for example, have reported increasing intra-household violence that emerges from the struggle of power relations originated from credit contracts. Contrary to this view is the Amin, Becker *et al* (1998) argument supporting the view of credit transactions as instruments of women's empowerment that reduce gender inequality.

Another important *indirect* mechanism acting as an *incentive* device is what Hulme and Mosley (1996) have referred to as *progressive lending*. Progressive lending

consists of lenders giving borrowers small loans in the beginning of the loan relationship, accompanied by a promise of progressively larger loans if and only if repayment is satisfactory; however, if defaults persist, credit lines may be cancelled. Progressive lending is an effective device not only in testing borrower's creditworthiness and helping lenders to screen out defaulters before loan size has increased (i.e. reduces the component d in equation 5.1), but when loan size expands, the informational costs ς, are also reduced.

Progressive lending may also facilitate the formation of long-term relationships between lenders and borrowers based on *trust* with potentially positive effects on market efficiency[7] (Stiglitz and Weiss 1983) and social capital. As pointed out by Morduch (1999), the success of progressive lending as an incentive device largely depends on the interest rate charged by the microfinance organisation relative to other local lenders. To some extent, this explains why credit programmes, although charging higher interest rates than banks, keep the rate well below the levels of moneylenders. Narrative evidence from rural credit markets in Bangladesh also suggests that the power of progressive lending may be diminished in competitive markets where the price-elasticity of demand for loans becomes more *elastic* (Niño-Zarazúa 2002). In that context, the interest rate becomes an important screening device (Hoff and Stiglitz 1990). Morduch (1999) also suggests that progressive lending is likely to work effectively in rural communities with low mobility. But, targeting rural areas does not ensure the effectiveness of progressive lending. High levels of migration in poor communities can diminish its power as incentive device.

Furthermore, the effectiveness of progressive lending can be reduced by the imposition of upper limits of credit. The problem is that these upper limits cause *micro-rationing*[8], which mostly affects *experienced* (and generally excellent) borrowers. Once these borrowers reach the *maximum*, they are forced to search for other sources of funding often from the local moneylender or continue borrowing at a suboptimal level that will cause under-investment and under-allocation of effort

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[7] We refer to the concept of market efficiency in the context of *constrained Pareto efficiency*, after taking into account informational constraints. Therefore, under inefficiency, we allow for constrained Pareto improvements in allocation of credit. For a discussion see Dixit (1987) and Besley (1994).

[8] *Micro-rationing* reflects a situation in which even those with access to credit are still credit constrained.

(see Ghosh *et al* (2000). Although group-lending contracts in microfinance have received much of the attention in the literature of credit impacts (e.g. Pitt and Khandker 1998a, 1998b; Coleman 1999; Hulme and Mosley 1996), there are an increasing number of programmes combining group lending with individual contracts.

For example, Huppi and Feder (1990) have reported a type of contract in which individuals are responsible for loan repayment. Group formation in that context plays the role of providing information about the applicants as well as supporting other groups. Bhatt and Tang (1998) have described a similar schedule implemented by the Economic and Employment Development Centre (EEDC) in Los Angeles, California where the Asian minority was targeted as beneficiaries. This methodology is likely to succeed in communities where groups share social characteristics or backgrounds and where there is an increasing benefit from the creation of social networks. Individual lending contracts have also been adapted to the characteristics of social settings in which credit programmes operate. For example, Armendariz de Aghion and Morduch (2000) have reported comparative advantages of individual lending contracts in the context of Russia and Eastern Europe, where the use of collateral, progressive lending and other mechanisms serve as screening, incentive and enforcement devices against the expected rate of default.

Direct and indirect mechanisms are likely to reduce the problems of moral hazard and adverse selection in different magnitudes (see table 5.1); however, they also generate different transaction costs, which as mentioned by Stiglitz (1990) are transferred totally or partially to the borrower through the mechanisms that characterise group-lending contracts. Transaction costs to the borrower can emerge from time-intensive activities, relative to e.g. peer monitoring and enforcement activities that usually take place in compulsory group meetings. Other costs can also emerge from the time spent travelling to the branch as well as from the opportunity cost of attending such meetings. All these factors contribute to increasing the utility cost of borrowing.

Table 5. 1 Screening, incentive and enforcement devices that reduce the moral hazard and adverse selection problems in microfinance

Direct mechanisms		Indirect mechanisms	
Periodical repayment schedules	Through *peer monitoring*, they deal with the screening and enforcement problems by reducing the components d and ς in equation 5.1, but increasing the transaction and opportunity costs to the borrower. They can also cause distortions in the credit market	Group-lending contracts	Based on *joint liability*, they substitute collateral and deal with the screening and enforcement problems by reducing the components d and ς in equation 5.1 but increasing the transaction and opportunity costs to the borrower
Compulsory savings	Reduces the problem of moral hazard by reducing d, ς and the components in ρ related to the interest rate paid by the lender to external sources of funding $i = F(1 + r)$	Progressive lending	Based on *trust*, it works as an incentive device that reduces d in equation 5.1, and when loan size expands, the informational costs ς. It can also facilitate the formation of social capital through long-term relationships between lenders and borrowers
Trade-credit linkages	Deal with the screening problem by reducing components d and ς in equation 5.1. However, this device can also create local monopolistic practices.	Targeting at women	It woks as screening and incentive that reduces the components d and ς in equation 5.1. This device can be effective in specific socio-cultural environments; however, adverse effects can also emerge from intra-household violence and social sanctions to defaulters.

It is important to point out here to the fact that the utility cost of borrowing will gradually increase once the expected returns to the borrower increase. This is simply because the borrower will need to forgo increasing revenues for attending compulsory group meetings. To our knowledge there are very few attempts to examine the impacts of the utility costs of borrowing on household welfare, especially when group lending and individual lending models are compared, and other factors such as prices, infrastructure and selection problems are appropriately controlled for in the impact estimation.

5.2 The interaction of the household with the key markets

In order to examine the interaction of enterprising households with the key markets, i.e. labour and credit, we follow a modified model based on the work of McElroy and Horney (1981) where the utility function for each member of the household is achieved as the consequence of a bargaining process of resource

allocation that leads to a Nash cooperative equilibrium[9]. Resource allocation within the household is assumed to be, as suggested by Chiappori (1988) and Browning *et al* (1994) Pareto-efficient. Therefore, utility maximisation of the efficient household is achieved by

$$\text{Max} \sum_i \lambda_i U_i [g_i, l_i] \tag{5.4}$$

where individual members i of the household cooperate and bargain for the consumption of goods g, and leisure l, weighted by an equivalence factor $\lambda > 0$, and subjected to budget constraints. Let us now assume that the household decides to engaged in an income generating activity to produce a market good y, base upon a Cobb-Douglas-type production function $y = f(L,K)^{\alpha}$, where L and K are the quantity of labour and capital, respectively, and α is a parameter of technology in the production of y. As pointed out by Pitt and Khandker (1998a), it is very unlikely that at the bottom end of the income distribution α will change, at least in the short-term. For that reason, we assume that technology remains constant, i.e. $\alpha = 1$.

5.2.1 Labour as factor of production

In the production of y, the enterprising household will supply the amount of labour L^H, restricted to a *maximum* of hours-work, h, conditional upon the number N of household members of working age i, in the form of $L^H \geq \underset{i,h}{\text{Max}}\, \text{N}[i(h)]$. In this sense, under self-employment, $L = L^H$. Since we assume that α remains constant, an overall increase in the level of output, after an injection of capital from a microcredit, will lead to an increase in *labour intensity*. However, if in the production of y the enterprising household reaches its maximum capacity of labour supply, then they will need to hire workers, L^h. In that context, the quantity of labour involved in the production of y will be given by $L = L^h + L^H$, where labour hiring is the result of increasing levels of production.

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[9] Manser and Brown (1980), and Lundberg and Pollak (1993) have pointed out that in exceptional circumstances such as imminent divorce and intra-household conflicts, the cooperative equilibrium can be threatened.

Note that the demand for labour outside the household is not only a function of household income but also of the *cost of labour*. As pointed out by Leibenstein (1957); Mazumdar (1959) and Dasgupta (1993), *labour efficiency* is conditional upon factors such nutrition, abilities and efforts that determine *labour productivity*. Informational asymmetries can also play an important role in the demand for hired labour (see e.g. Foster and Rosenzweig 1996, and Bardhan and Rudra 1986). Dasgupta and Ray (1986) have pointed out that at low levels of household income, even if enterprising households want to hire labour, they soon realise that they can only afford to hire unskilled and malnourished labourers with very low productivity. They may also perceive it to be very risky to employ workers for not having enough information about their skills, behaviour or moral integrity. In the end, the enterprising household may simply decide to self-employ.

Households will only consider hiring labour when they have reached a certain level of income, $\bar{Y}$, where the cost of an efficiency unit of labour, $\bar{\mu}$ is at its maximum[10], i.e. $\bar{\mu} = \max[w/\lambda(w)]$. The cost of buying an efficiency unit of labour is measured by $w/\lambda(w)$, where w is the wage rate, and $\lambda(w)$ captures labour efficiency. Note that $\lim_{w/\lambda(w)\to\infty} f(\lambda) = 0$. The quantity of labour hired is measured by the expenditure on efficiency labour, $L^h\lambda(w)$, where L^h is the number of units of labour hired in hours.

At very low levels of household earnings, from 0 to $\bar{Y}$ in the upper quadrant of Figure 5.2, no household hires workers given the high cost of buying an efficiency unit of labour (the area above $\bar{\mu}$) and they will remain self-employed, (from 0 to L^H in the lower quadrant). However, once the household reaches the level of earnings $\bar{Y}$, as a result of higher production, they can consider hiring labourers with a minimum level of skills, abilities, and so on, that represent a maximum cost of efficiency labour, $\bar{\mu}$, that the household is willing to absorb. Thus, if $\bar{\mu}$ is affordable, $L^h > 0$ and then $L = L^H + L^h$. Note that the further the distance from $\bar{Y}$ to Y, i.e. the higher the income levels of household *i*, the higher the probability of hiring productive labourers, and thus, the lower the cost of buying additional

efficiency units of labour μ. As a result, enterprising households begin to increase labour expenditure, $L^h\lambda(w)$.

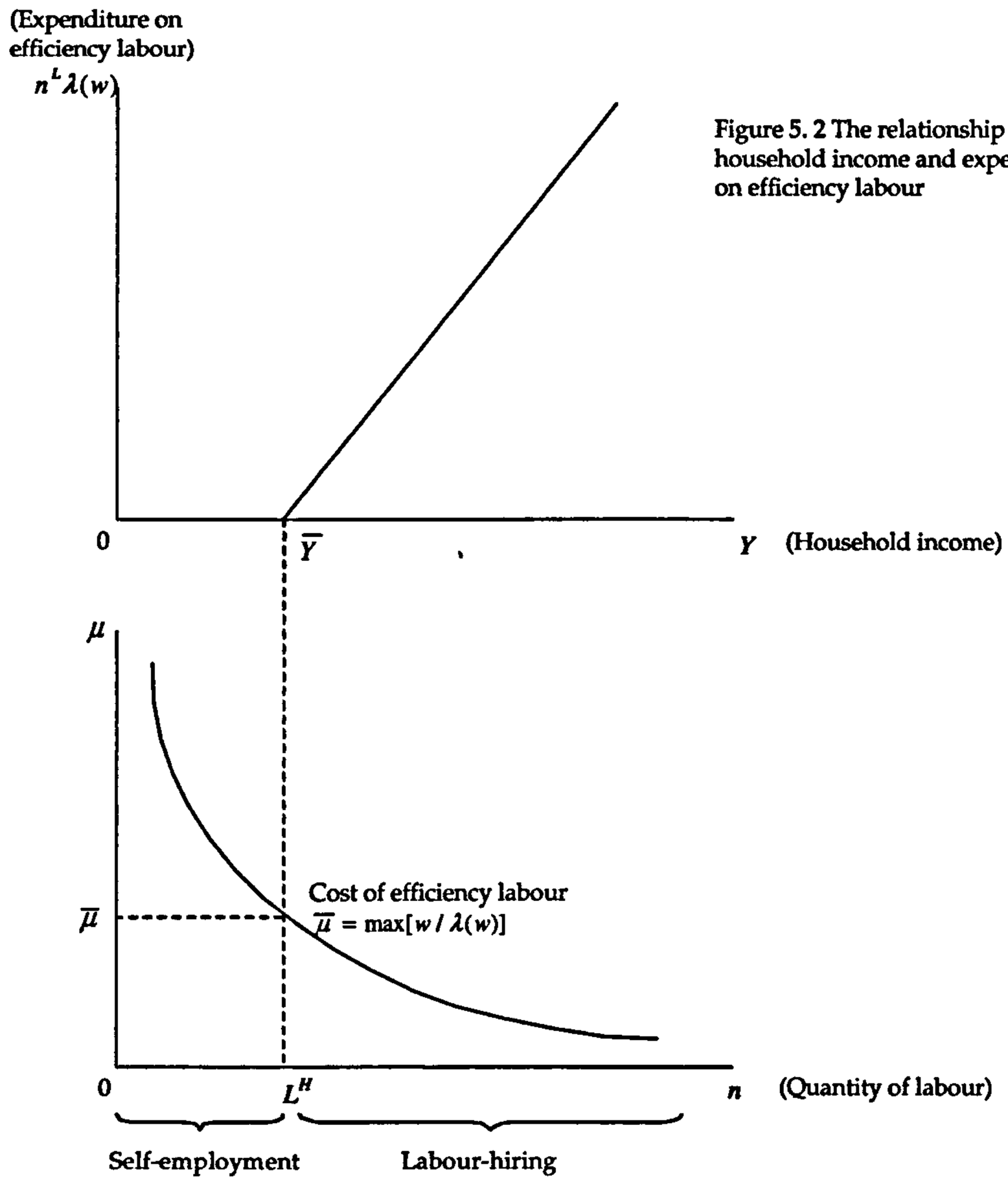

Figure 5. 2 The relationship between household income and expenditure on efficiency labour

Source: Adapted from Dasgupta and Ray (1986)

If for example, the choice of borrowing from a microfinance organisation increases the probability of an income rise, then we may observe an *indirect* effect of credit on the quantity of labour hiring. The impacts of credit could be observed on poor labourers whose skills and nutrition levels are improved by the fact of being employed by the enterprising household. This could potentially lead to improvements in *labour efficiency*.

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[10] This *maximum* is the upper limit of the cost of buying an efficiency unit of labour that an enterprising household is willing to pay.

5.2.2 The notion of *household capital endowments* as factors of production

Note that the production of y can be operated at low levels of *capital intensity* relative to labour. However, although these products are said to be *labour intensive*, a minimum level of capital endowments $K_{\min y}$, is needed. In this sense, if $y = f(L,K)^{\alpha}$ was to be positive, then $K \geq K_{\min y}$. We introduce the notion of household capital endowments K into the model, which is integrated by a set of three separate but interrelated factors: physical capital (P^K), human capital (H^K) and social capital (S^K).

The concept of *physical capital* goes beyond the traditional conceptualisation of physical infrastructure that the classic growth theory developed during the 1940s (e.g. Rosenstein-Rodan 1943). The physical capital concept not only includes the availability of piped water, electricity, telephone lines, paved roads or railways that improve household well-being, but also incorporates other factors such as housing conditions and household assets that are important in the production process as well as coping mechanisms against external shocks (Deaton 1989; Moser 1997; 1998; Chen and Dunn 1996). The functioning of asset markets and their value are important considerations that need to be addressed in the impact analysis.

The importance of including the concept of *human capital* comes from the general consensus about the strong relationship between education and health, as components of human capital, and people's well-being (Becker 1993). Human capital poses special properties since it correlates to both physical capital and social capital as well as to the key markets: labour and credit. For example, educated and healthy individuals can adapt more easily as economic circumstances change, using physical capital more effectively, accessing more easily the credit markets and exploiting social arrangements and income opportunities more quickly (Schultz 1975). The incorporation of human capital becomes even more important in the context of fragmented credit markets, where education and health are important determinants of increasing future levels of labour productivity and income (see Schultz 1988 and Spence 1973 for the effects of education, and Strauss and Thomas 1995, for the effects of health).

The concept of *social capital* has been increasingly recognised as a crucial factor in the development process (see e.g. Coleman 1988, 1990 and Portes 1998 in the sociology discipline; Putnam *et al* 1993; Putnam 2000 in politics, and Becker 1996 in economics). As pointed out by Putnam (2000), social capital can emerge in the form of informal and organised reciprocal networks of trust and norms embedded in vertical and horizontal social organisations. For example, social capital can materialise in occupation-based groups of mutual help such as rotating saving and credit associations (Cox 1987) or in group-based lending programmes such as Grameen Bank (Dowla 2005). Since the household uses social capital as part of their portfolio of possibilities, it is important to consider it in our analysis.

5.2.3 The household utility function

The utility maximisation of the efficient enterprising household in equation (5.4) can expressed as a reduced unitary model (Gorman 1953) by equalising

$$\text{Max}\sum_i \lambda_i U_i[g_i, l_i] = \text{Max}\, U(g, l) \qquad (5.5)$$

where the household utility function $\mathrm{U}(g,l)$ is restricted to:

$$p(g) + w(L^h) + v(K^h) \leq F(L,K) + w(L^m) + v(K^m) \qquad (5.6)$$

where p, w and v are the price of goods g, the wage rate of labour L, and the value of units of capital endowments K, respectively, whereas the superscripts ^{h} and ^{m} denote hired and market, respectively. Accordingly, $w(L^m)$ represents household income from waged labour, whilst $v(K^m)$, represents rents from household capital endowments. It is pertinent to note here that v is determined in terms of prices and endowments. For example, $v(K^h)$ could emerge in terms of *prices* from the rent of a premise, machinery or equipment for the production of y. In this particular case, $v(K^h) = v(P^K)$. Alternatively, $v(K^h)$ could emerge in terms of endowments after joining a group-lending programme. In this case, $v(K^h) = v(S^K)$, i.e. social capital *endowments* are used to access the credit market and produce y, which, as a result, will correspond to a social obligation to their peers in the form of

joint liability. Equation (5.6) can be seen as the conventional budget constraint where expenditures on consumption, hired labour and capital endowments cannot exceed revenues from production, waged labour and capital. By weighting leisure time l, with the wage rate w, and assuming that $w(L^h) = w(L^m) = w(L)$ and $v(K^h) = v(K^m) = v(K)$, we can rewrite equation (5.6) as follows:

$$p(g) + w(l) \leq F(L,K) - w(L) - v(K) \qquad (5.7)$$

where the utility maximisation of the efficient enterprising household is given by the product

$$\prod(w,v) = \underset{L,K}{\text{Max}}\, F(L,K) - w(L) - v(K) \qquad (5.8)$$

In this sense, household decisions regarding production will be motivated by the utility maximisation conditional upon labour, capital and the corresponding prices and endowments for each factor of production. This can be represented by equalising equation (5.8) to the returns to household R, as follows:

$$\prod(w,v) = \text{Max}\, R \qquad (5.9)$$

A fundamental problem emerges here, which is related to the increasing evidence pointing to the fact that households' decisions under uncertainty are driven by risk-averse behaviour, particularly at low levels of income (Ravallion 1988; Sinha and Lipton 1999). Some scholars have explained this phenomenon as the consequence of diminishing marginal utility of wealth (see e.g. Arrow 1971; Pratt and Zeckhauser 1987; Segal and Spivak 1990). To briefly illustrate this problem, consider the case where the household has a pair of choices, a_1 and a_2. Both $\{a_1, a_2\} \in a$; however, choice a_1 corresponds to a set of actions for a business project with low returns but involving a certainty outcome R_1, whereas choice a_2 corresponds to a business project with high returns but involving a gamble between R_1 and R_n, with the predicted probabilities p_i and $1- p_i$, respectively. In other words, $a_1 \equiv R_1$ and

$a_2 \equiv [R_1, p_i; R_n, 1-p_i]$. If $p_i \approx 0$, then $a_1 \succ a_2$. On the other hand, if $p_i \approx 1$ then $a_1 \prec a_2$.

In the context of choices involving risky prospects, it is clear that the magnitude of utility reflects the household attitudes towards risk (Sandmo 1971; Tversky and Kahneman 1991; Starmer 2000). However, since the household finds it hard to predict the probability of the final outcome R, then choice a_1 will be selected. This assumption implies that, as suggested by Kahneman and Tversky (1979); Grether and Plott (1979); Camerer (1989; 1995), and Machina (1987), when faced with two choices involving only the best and the worst possible outcome, the household will prefer the choice with the highest probability of success. This is particularly true at low levels of income, where the poor are highly sensitive to income falls. As Rabin (2000:1281) has pointed out: *"a dollar that helps us avoid poverty is more valuable that a dollar that helps us become very rich"*.

In this case, R is not only conditional upon household decisions contained in a set of actions a, but also upon factors π, that are related to the prevailing *state of the world* that affect the probability of achieving the expected outcome R. These factors can be linked to events such as accidents, robberies, death, or seasonal weather. Note that the actions in a are *finite*, restricted to capital endowments (or stocks) hold by the household at the time the decision is made. In the following section, it is presented the analytical framework that we devised from the relationship between household capital endowments and the key markets.

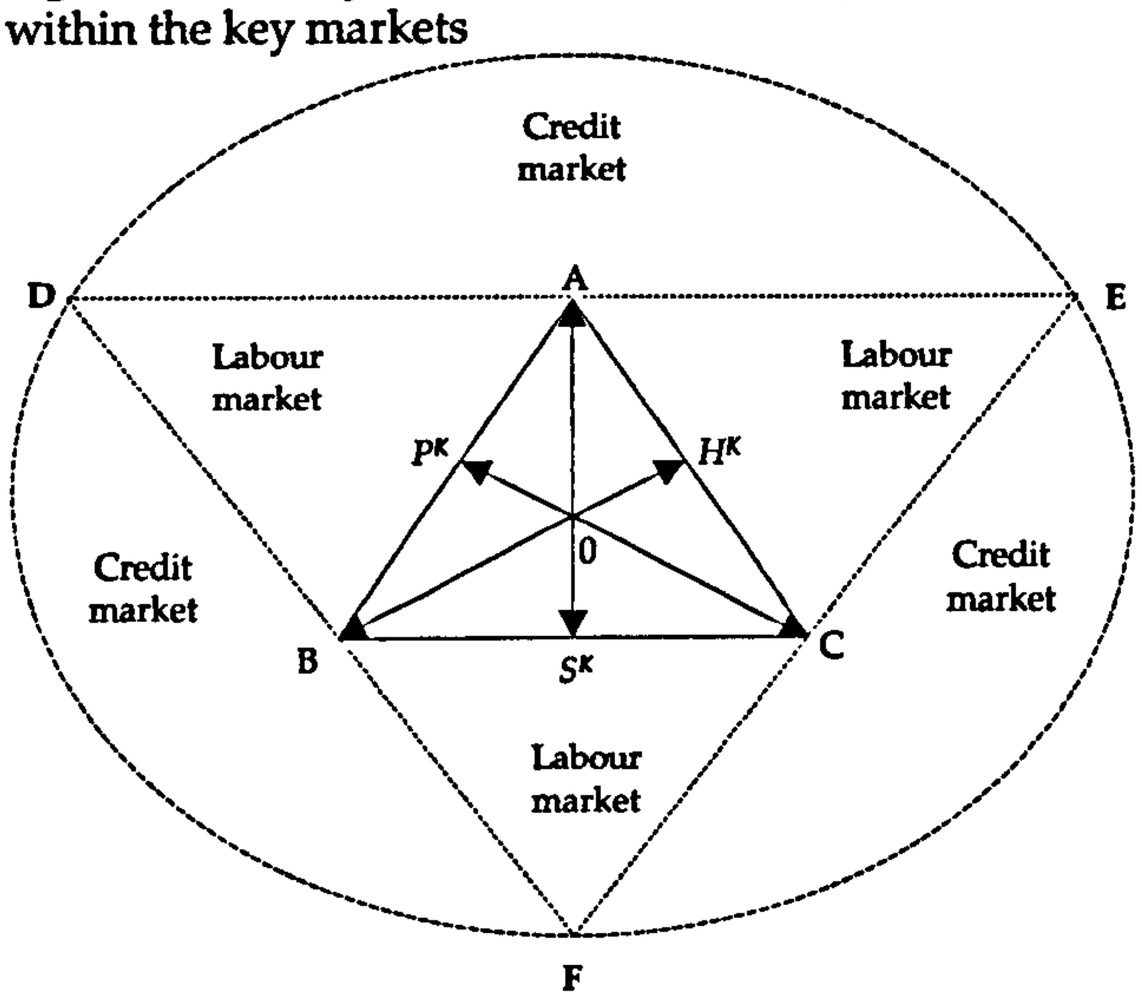
5.2.4 The relation between capital endowments and the key markets

As an illustrative example, let us suppose that the enterprising household choose a set of actions a, to increase the probability of business success in order to remain self-employed in the labour market. The alternative *combinations* of actions a are represented by points A, B and C of the smallest triangle in figure 5.3[11]. The three heights of triangle ABC meet at zero, representing the point at which the household holds *zero* capital endowments. Points $\{A,B,C\} \in a$ where $(A,B,C) > 0$. Height is

[11] We have borrowed from Schrödinger (1958) the geometrical representation of figure 5.3

the perpendicular, dropped from a corner to the side opposite to it, represented by household capital endowments: physical (P^K), human (H^K), and social (S^K). Consequently, the greater the height of triangle ABC, the larger the capital endowments held by the household, and the higher the probability for the household to have the minimum level of capital $K_{min\,y}$, required to engage in income generating activities and produce y.

Figure 5. 3 The dynamics of household capital endowments within the key markets



At points A, B and C, there are different combinations of capital endowments that the enterprising household use to access the labour market, which is represented by the inner area of the bigger triangle DEF. Labour, *L*, is the *key factor* that enables the household to create value through the production function (5.8) and maximise returns. For simplicity, let us assume that the fraction of one capital is equal to the fraction of another one, both used in the production of y, that is

$$A = \frac{1}{2}P^K + \frac{1}{2}H^K \tag{5.10}$$

$$B = \frac{1}{2}P^K + \frac{1}{2}S^K \tag{5.11}$$

$$C = \frac{1}{2}H^K + \frac{1}{2}S^K \tag{5.12}$$

where $(A,B,C)>0$. By choosing point *A*, for example, the enterprising household will access the labour market, with the use of a fraction of physical capital endowments, which are materialised in the form of tools, machinery and other assets needed in the production of y, and another fraction of human capital endowments, which can be represented by the level of education, expertise or skills of the enterprising household.

Similarly, by choosing point C, the household will use a fraction of human capital endowments, and another of social capital through, for example, a local trade cooperative or a network of mutual help that increases the probability of business success $\pi(a)$. Note that households having very low levels of physical capital, human capital and social capital (the distance from zero to points A, B, C), will not have the minimum capital endowments required to produce y and will remain out of enterprising activities, employed perhaps as low-paid workers.

Now, the larger triangle DEF is drawn through the corners of triangle ABC, by the corresponding lines running to the opposite sides that intersect with the interlined elliptical outer area, which represents the credit market. The three heights of ABC are the symmetry lines of triangle DEF, which are erected in the middle of its sides. In point D for example, there is a *hypothetical* equal distance (or combination of capital endowments) from point B as from point A, whereas in point E and F, there are equal amounts of capital endowments from points A and C, as well as from points B and C, respectively. Therefore:

$$D=(A+B)=P^{K}+\frac{1}{2}H^{K}+\frac{1}{2}S^{K} \qquad (5.13)$$

$$E=(A+C)=H^{K}+\frac{1}{2}P^{K}+\frac{1}{2}S^{K} \qquad (5.14)$$

$$F=(B+C)=S^{K}+\frac{1}{2}H^{K}+\frac{1}{2}P^{K} \qquad (5.15)$$

where $\{D,E,F\} \in a$ [12]. In the interaction of capital endowments with the credit market, a fundamental element emerges from the household's point of view, and which is related to an action, contained in the set a, that the household can take to affect the expected utility function $EU = \pi(a)R$: *borrowing*. In traditional financial intermediation such as banking, the household's ability to enter the credit market is highly contingent on two key elements: 1) the predicted probability of achieving the expected outcome (e.g. business success), and 2) capital endowments, in particular physical, which works as collateral to back loan applications. This is shown in point D of figure 5.3.

But even if an enterprising household has enough capital endowments to enter the labour market (either at points ABC) and produce y, the stock of *physical capital* will be insufficient, as collateral, to access the credit market. This is a problem that has traditionally confined the poor to stay out of institutional credit markets even if they manage to access the labour market and produce y (see e.g. Stiglitz and Weiss 1981). In this sense, joint liability in the form of social collateral helps enterprising households to enter the credit market through point F in figure 5.3, where *social capital* endowments work as a substitute for *physical collateral*, and play the role of *linkage* between labour and credit markets (see e.g. Cassar et al 2007, and Karlan 2007). Thus, social capital in the form of social collateral helps to reduce credit rationing in the market with potential positive impacts on income and wellbeing.

To illustrate this, consider the case of a group of *homogenous* enterprising households living in a perimeter x that represents the community market where a pioneering microfinance organisation operates. Let us assume that the organisation competes in a monopolistic competitive market (Chamberlin 1933; Robinson 1933) with n number of informal agents such as moneylenders and ROSCAS.

The microfinance organisation will initially face high short-term average costs (SAC^0) related to the screening, incentive and enforcement problems discussed

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[12] The conceptualisation of household capital endowments allows us to introduce an index that captures the level of such endowments. We present this index in the Appendix to Chapter 5, which served as an initial measurement of the degree of deprivation beyond the income variable. The index is built on primary data collected at the household level from

earlier in section 5.1.2. For those reasons, the organisation will need to charge the interest rate i to breakeven. Other competitors such as moneylenders charge the rate of interest $\bar{i}$.

Now assume that the enterprising household is willing to borrow capital I, at the maximum interest rate i^*. If the enterprising household wants to get a loan from the organisation, they will need to travel a distance d, to the branch, at the cost c, that together represent the transaction cost to the borrower, $\mathrm{c}\cdot\mathrm{d}$. If the transaction cost from borrowing from the microfinance organisation is equal to the transaction cost from borrowing from, say, a moneylender, then the decision of borrowing will be conditional upon the rate of interest and the terms of the loan contract. In consequence, the potential market for the microfinance organisation is restricted to the number of households H, within the distance d, willing to take the cost of borrowing, $\mathrm{c}\cdot\mathrm{d}+i\leq i^*$ relative to interest rate charged by moneylenders, $\bar{i}$.

Therefore, the demand curve for credit facing the microfinance organisation is given by $\mathrm{D}^{\mathrm{L}}(i)=\min\left[\frac{\mathrm{H}}{\mathrm{c}}(\bar{i}+\frac{\mathrm{c}}{n}-i)\right]$, where D^{L} depends on the magnitude of $\bar{i}$ and n, respectively. Note that if $\bar{i} > i$ or n is very small, then the microfinance organisation will operate as monopoly; however, once moneylenders reduce the rate of interest or modify the terms of conditions of loan contracts, the microfinance organisation will need to exploit different screening, incentive and enforcement devices, such as joint liability and progressive lending, to reduce the components d and ς in equation 5.1, and shift downwards the average cost curve. A reduction in the average cost of lending, as shown by the distance from $\mathrm{SAC}^0=\mathrm{A}$ to $\mathrm{SAC}^1=\mathrm{B}$ in the upper diagram of figure 5.4, will enable the organisation to reduce the interest rate from i^0 to i^1.

As mentioned by Hulme and Mosley (1996), at the new point B, there is a gain not only in the marginal efficiency of household capital endowments, but also in the number of new enterprising households entering the credit market (represented by

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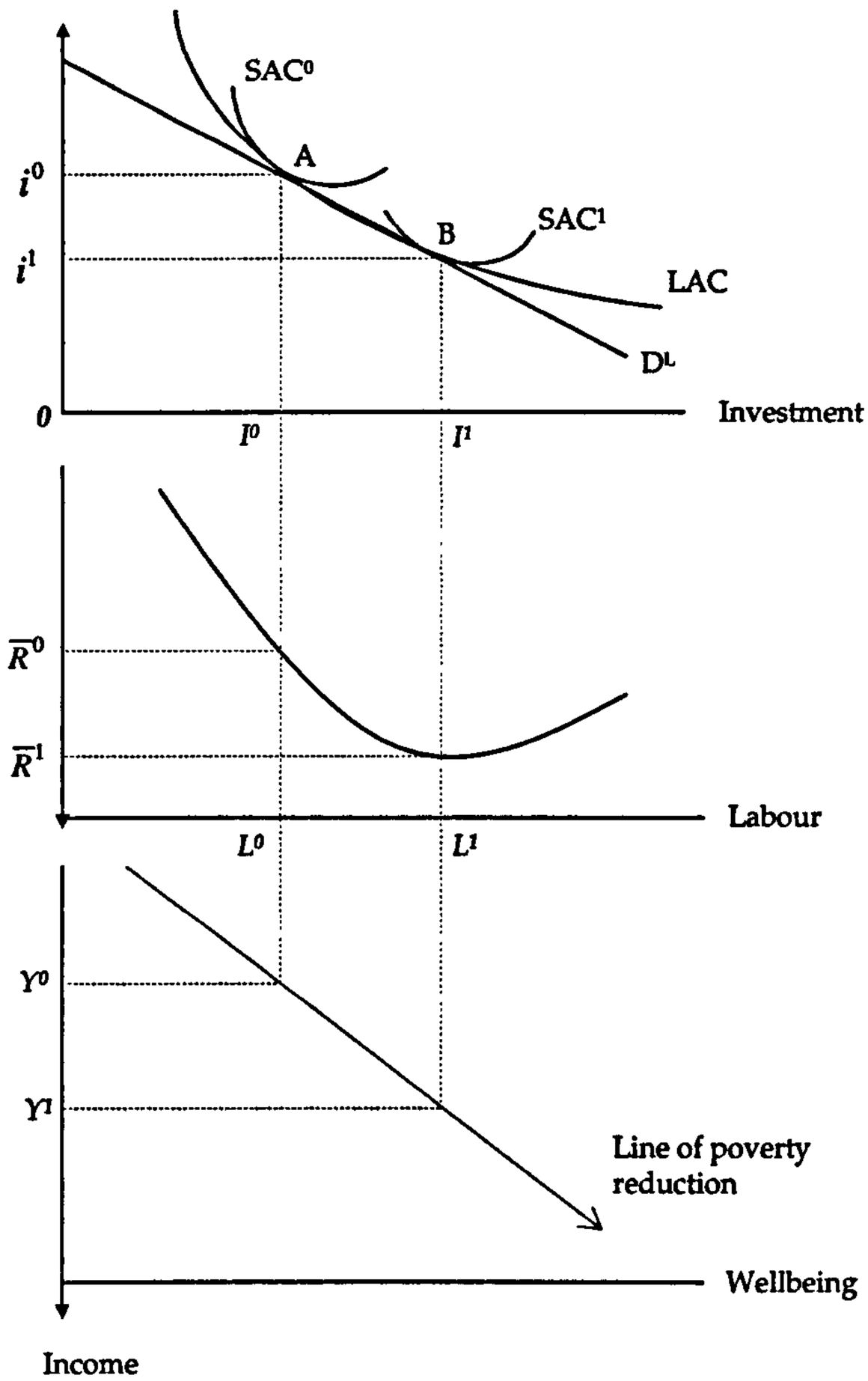
three urban settlements in the surroundings of the Metropolitan area of Mexico City where the case-study microfinance organisations operate.

the distance from I^0 to I^1). This could potentially have *positive* impacts on the poor. However, as pointed out by Stiglitz (1990) the use of screening, incentive and enforcements devices such as periodical repayment schedules and peer monitoring activities transfer the informational costs to the borrower that can potentially exacerbate the transaction and opportunity costs to the borrower, particularly when programme participants have to forgo income to attend periodical group meetings that often last for several hours. This situation can be particularly distressing for the urban poor who often travel long distances in search of sources of livelihood. In this sense, the utility cost of borrowing emerging from rigid and inefficient devices could undermine the potential positive impacts of credit on poverty reduction.

Figure 5. 4 The impact of credit on household's income and wellbeing



5.2.5 Time and space in the impact analysis

The impacts of credit, however, should be also linked to the *length* of programme intervention. *Length* contains two important dimensions: *time* and *space*. Time can be associated to the notion of *before* and *after*, which resides on the *cause* and *effect* relationship, whereas space can be associated to the physical dimension of the relationship between the credit programme and the local market, i.e. the area of its influence. However, although the effects of the credit programme could be observed on different dimensions of well-being, there will always be an upper limit to its effects conditional upon a geographical setting.

In this sense, the effects of credit on the outcomes of interest Y, e.g. income and household assets, will depend not only on a set (or vector) of household characteristics, but also on the interaction of the household with the credit programme in a given geographical area. This can be captured by information on the distance d, (and time t), from the place of residence of the enterprising household to the branch of the credit programme. Other factors such as local prices and infrastructure characteristics should be controlled for in the impact estimation procedure.

Time can be measured in terms of months or years of programme participation in the microfinance organisation. In this sense, a household with 5 years of programme participation in a group-lending programme is *on the average* more likely to report greater impacts on e.g. income or housing improvements than a household with only one year of programme participation. It is simply due to factors such as cumulative wealth, experience and informational flows that can improve the predicted probability of business success and the returns to the borrower. We are particularly interested in examining the potential impacts of credit on poverty reduction, labour and wellbeing. In that context, we wish to consider several hypotheses that are stated as propositions, which in an effort of analytical simplification, are divided into several sections: 1) functioning of credit markets; 2) labour; 3) business performance; 4) income and poverty reduction; 4) physical capital, and 5) human capital (see table 5.2 for a summary of these hypotheses).

5.3 Hypotheses to be tested in relation to the impacts of credit

In relation to the functioning of credit markets:

1. The informational costs, which are reduced by the use of screening, incentive and enforcements devices (the shift in the average cost curve from SAC^0 to SAC^1 in the upper diagram of figure 5.4) exacerbate the utility cost of borrowing, and this cost increases once household income raise.

2. Utility cost of borrowing is a significant determinant of the demand for credit, and it varies from group lending to individual lending contracts.

3. Screening, incentive and enforcement devices such as periodical repayment schedules and progressive lending create *micro-rationing* and market inefficiency.

In relation to the impacts on labour:

4. Access to credit is a significant determinant of the demand for labour (from L0 and L1 in the diagram at the centre of figure 5.4) with effects on labour intensity and labour efficiency.

5. Labour hiring, in the form of labour expenditure, is a function of household income, and it becomes positive after a minimum level beyond the poverty line.

In relation to the impacts at the business level:

6. Access to credit is a significant determinant of higher returns to the borrower, represented by the distance from $\overline{R}^0$ to $\overline{R}^1$ in the diagram at the centre of figure 5.4.

7. Access to credit is a significant determinant of the accumulation of business assets.

8. Access to credit is a significant determinant of the propensity towards financial stability.

9. Access to credit is a significant determinant of business generation.

In relation to the impacts on income and poverty reduction:

10. Access to credit is a significant determinant of an income rise.

11. The gain in household income from the access to credit (the distance from Y^0 to Y^1 in the lower diagram of figure 5.4) is a significant determinant of poverty reduction.

12. The magnitude of the poverty impacts, in terms of incidence and depth, varies from group lending to individual lending contracts.

In relation to the impacts on physical capital:

13. Access to credit is a significant determinant of housing improvements.

14. Access to credit is a significant determinant of vehicle purchases.

15. Access to credit is a significant determinant of the accumulation of electrical appliances and other household assets.

In relation to the impacts on human capital:

16. Access to credit is a significant determinant of children's schooling.

17. Access to credit is a significant determinant of the propensity of having a good health status.

Given the potential problems in estimating the impacts of credit, we discuss in Chapter 6 the methodology and research strategy followed to control for selection bias and endogeneity problems.

Table 5. 2 Hypotheses to be tested during the investigation

Propositions	Sections where the propositions are analysed
Regarding the functioning of credit markets	
1. Screening, incentive and enforcement devices such as periodical repayment schedules exacerbate the utility cost of borrowers, and this cost increases once the returns to the borrower have raised.	Chapter 7, section 7.2.1
2. Utility cost of borrowing is a significant determinant of the demand for credit and it vary from group lending to individual lending contracts.	Chapter 7, section 7.2
3. Screening and incentive devices such as progressive lending create micro-rationing and market inefficiency.	Chapter 7, section 7.2.3

	Regarding labour	
4.	Access to credit is a significant determinant of the demand for labour, with effects on labour intensity and labour efficiency	Chapter 8, section 8.4.2
5.	Labour expenditure is a function of household income, and it becomes positive above the poverty line.	Chapter 8, section 8.4.1
	Regarding business performance	
6.	Access to credit is a significant determinant of higher returns to the borrower	Chapter 8, section 8.1.1
7.	Access to the credit is a significant determinant of the accumulation of business assets	Chapter 8, section 8.1.2
8.	Access to credit is a significant determinant of the propensity towards financial stability	Chapter 8, section 8.1.4
9.	Access to the credit is a significant determinant of business generation	Chapter 8, section 8.1.4.
	Regarding household income and poverty reduction	
10.	Access to credit is a significant determinant of a rise in household income.	Chapter 7, section 7.3
11.	Access to credit is a significant determinant of poverty reduction	Chapter 7, section 7.4
12.	The magnitude of poverty impacts vary from group lending to individual lending contracts	Chapter 7, section 7.4
	Regarding physical capital	
13.	Access to credit is a significant determinant of housing improvements	Chapter 8, section 8.2.1
14.	Access to credit is a significant determinant of vehicle purchases	Chapter 8, section 8.2.2
15.	Access to credit is a significant determinant of the accumulation of electrical appliances	Chapter 8, section 8.2.2
	Regarding human capital	
16.	Access to credit is a significant determinant of children's schooling	Chapter 8, section 8.3.1
17.	Access to credit is a significant determinant of having a good health status	Chapter 8, section 8.3.3

Chapter 6
Methodology and research design

Introduction

In this Chapter, we discuss the quasi-experimental research design that was operationalised to investigate the impacts of credit on household income and wellbeing in the context of urban poverty in Mexico. An appropriate research strategy was required to control for several potential problems that are implicitly related to the choice of borrowing: 1) selection bias; 2) non-random programme placement; 3) attribution, and 4) fungibility. Section 6.1 introduces the reader to the methodological constraints in impact analysis; section 6.2 presents the quasi-experimental research design; section 6.3 discusses the strategy followed to control for selection bias; sections 6.4 present the selected case-study organisations; section 6.5 discusses the strategy followed to control for non-random programme placement and describes the settlements where the protocol of data collection was conducted. Sections 6.6, 6.7 and 6.8 discuss the instruments of data collection, the content areas of the interview, and the process of data entry and analysis, respectively.

6.1 Methodological constraints in impact analysis

One of the main constraints in impact analysis is the problem of selection bias. It usually emerges from unobservable factors related to individual efforts, abilities preferences and attitudes towards risks that affect the choice of borrowing (see Mosley 1997, and also Heckman 1974; Cogan 1980 and Lee 1978 in the context of fragmented labour markets). As a consequence, the predicted probability of an increase in, say, income could be higher amongst those who are *risk-loving* relative to those *risk-averse*. Similarly, those households with the ability to engage in income-generating activities are potentially more likely to improve their incomes than those households simply employed as unskilled labourers. Another potential bias can emerge from the structural characteristics of fragmented credit markets where the demand for credit is commonly rationed by the lender (see e.g. Stiglitz and Weiss 1981). For instance, lenders may screen out applicants who are not engaged in income-generating activities, or live faraway from the area where the credit programme operates, given the high screening and monitoring costs that such applicants cause to the lender.

A major problem in impact analysis, and which is linked to the cause-effect relationship, is the *attribution* of specific outcomes e.g. an income rise, or asset accumulation to programme intervention (Hulme 2000). *Attribution* can be potentially serious in markets with several credit programmes competing for poor borrowers, or where informal agents such as moneylenders and rotating savings and credit associations actively participate. If in the econometric estimation we do not control for the potential effects of competing credit agents, we could wrongly attribute positive effects to a microfinance organisation when in fact they come from e.g. the participation in rotating savings and credit associations. For that reason, we collected primary data about the access that both treatment and control groups had to other sources of funding such as institutional lenders, moneylenders and ROSCAS, and the use of such financial resources. This information allowed us to include in the econometric estimation equation (derived in Chapter 7, section 7.1) a vector of credit market characteristics that control for the potential effects of such agents in the impact analysis.

In the past, a great deal of attention has been paid to the *fungibility* problem, which is related to the use of loans by someone other than the borrower, particularly in gender studies when the credit programme targets women (see e.g. Osmani 1998; Rahman 1999, Goetz and Gupta 1996), or when the loan is not used for the purpose for which it was given in first place. This may be in particular relevant in impact studies that focus on the enterprise level (see e.g. Copestake *et al* 2001); however, it remains difficult even to detect fungibility. Malcolm Harper in a recent group discussion used the cow and the TV example to illustrate the problem: *"A lady wants first a TV and then a cow. Both cost $50 and she has $50 in cash. A* [microfinance organisation] *comes along with 'loans for productive purposes' so she borrows $50 and buys the cow and the TV. What did she use the loan for?"*

Mosley (1998) has suggested that the use of *qualitative* research methods for crosschecking could be used to detect possible "leakages", although the fungibility problem may be irrelevant when the household is at the centre of the analysis. As pointed out by Hulme (2000:85) *"the best investment returns may be on 'consumption' (in terms of developing or maintaining human capital through school fees and doctors' bills,*

or buying food at a time of crisis when the credit terms on 'in-kind' borrowing from traders may be exceptionally high) [...] attempting to control for fungibility (to prove impact) has failed to recognise that fungibility is a process to be encouraged (to improve impact)! "[1].

Placement heterogeneity in terms of infrastructure, costs of inputs and local prices could also bias the results of impact analysis. If credit programmes are deliberately placed in poor areas, then the comparison between borrowers living in deprived areas and control groups living in richer locations could cause a downward bias result. Pitt and Khandker (1998a) have proposed the use of a *village fixed effects* estimation procedure that controls for the potential problems of programme placement in the rural context. However, this approach remains limited for studies that look at the impacts of credit in urban areas. In the following section, we present a quasi-experimental research methodology that was particularly designed to investigate the impacts of credit in densely populated areas.

6.2 The quasi-experimental research design

The implicit characteristics and requirements of our research project demanded the collection of information from two groups of households: 1) one with access to institutional lending and actively borrowing from the organisation; and 2) another with access to institutional lending but not borrowing from the organisation. Hereafter, the former is referred to as *treatment group* and the latter, as the *control group*. As mentioned in other studies e.g. Hulme and Mosley 1996; Pitt and Khandker 1998; Coleman 1999, the inclusion of a control group in the study is essential to evaluate the impacts of credit on the outcomes of interest, e.g. income.

In this sense, and due to methodological requirements, we decided to design a type of quasi-experiment that is often referred to as *a non-equivalent, post test-only quasi-experiment* (Gribbons and Herman 1997; Trochim 2006; Cook and Campbell 1979), where a *convenient sample* (Creswell 1994), was collected, taking the following form:

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[1] Although we followed a qualitative questioning strategy to crosscheck the answers regarding the use of credit and detect potential problems of fungibility, we acknowledge the possibility of still having some "leakages" in the data. However, since we focus the analysis on the household, we believe, as suggested by Hume (2000) to have reduced the magnitude of this problem.

Treatment group	$N \rightarrow X \rightarrow O$
Control group	$N \rightarrow \quad \rightarrow O$

where N refers to a *non-random assignment*; X represents the exposure of a group of households to a treatment, i.e. the use of credit, the effects of which we were interested to measure; and O represents the outcome of interest, i.e. income, household assets, children schooling and so on (Campbell and Stanley 1966).

6.3 Controlling for selection bias

A major problem that emerges with the *non-equivalent, post test only quasi-experiment*, referred hereafter as simply *quasi-experiment*, is that the two groups, treatment and control, may differ in important ways that influence the individual decision of borrowing and thus, the outcome of interest. In other words, there might be unobservable factors related to e.g. individual efforts, abilities, preferences and attitudes towards risk that could affect the internal validity of the study. For example, it could be expected that enterprising households are more likely to take higher risks, and therefore self-select to participate in a credit programme, than those households with no business activities. A fundamental assumption here is that participation in a credit programme is *always* voluntary. As a consequence, the probability of an income rise should be expected to be higher for the former group. We refer to this potential problem as a *demand-related bias*.

Another potential selection problem could emerge from structural characteristics of underdeveloped financial markets, where the demand for credit is traditionally rationed by the lender (Stiglitz and Weiss 1981). Even if we had a control group of enterprising households willing to take risks and borrow from, say, a microfinance organisation, we may still face *selectivity discrimination* made by the lender, which could screen out applicants who, for example, are not residents of the neighbourhood where the branch is located, or who are not considered to be poor, a practice commonly found amongst credit programmes that target low-income households. We refer to this potential problem as a *supply-related bias*. In this sense, the selection process, $\mathbf{I}_i$, is defined by two components: 1) the decision of a household of whether or not to participate in a credit programme, I_1^*; and 2) the

decision of the lender (or group members) of whether or not to accept the applicant, I_2^* (see figure 6.1).

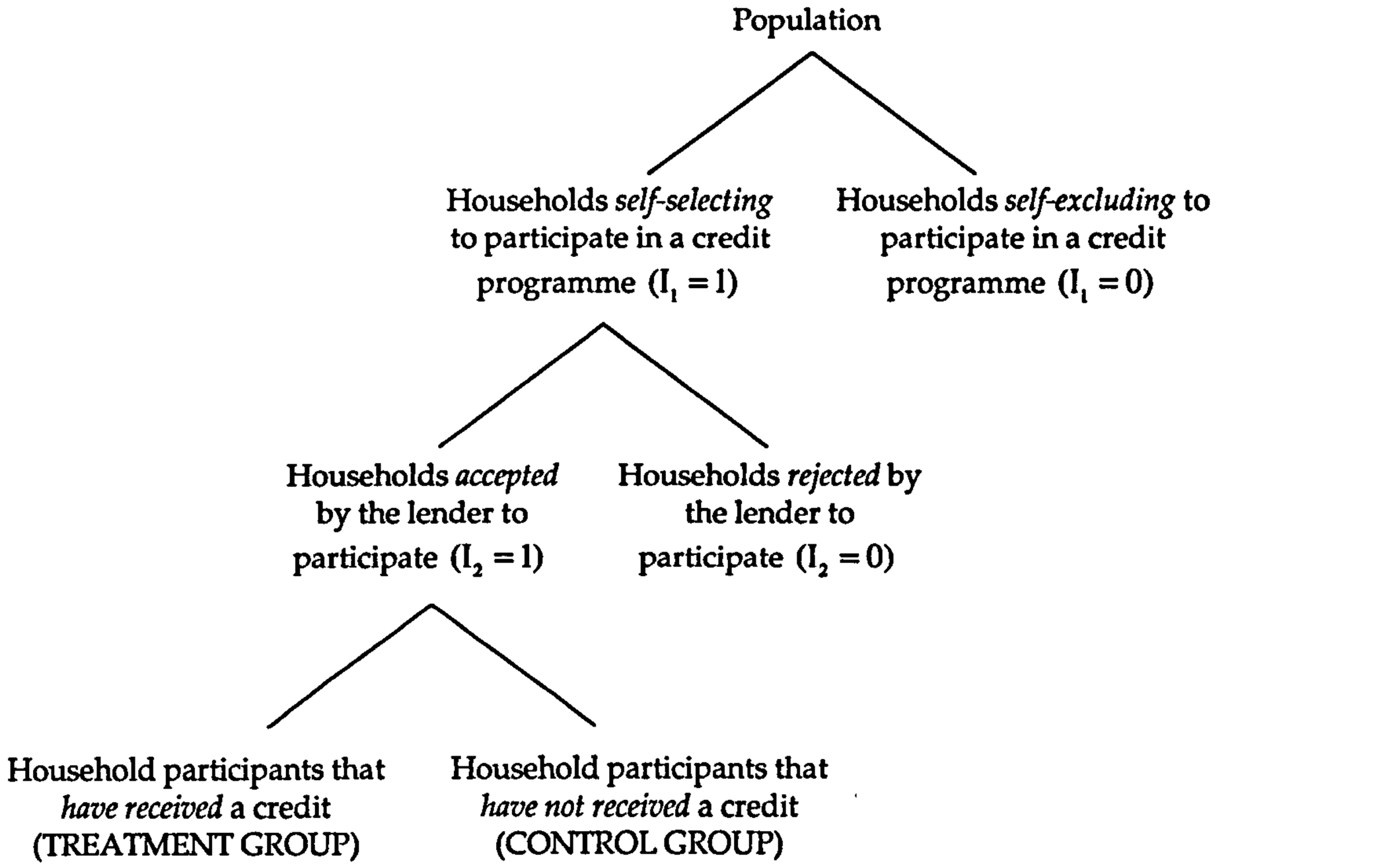

Figure 6. 1 The selection process for programme participation. Adapted from Maddala (1999)

Although we cannot observe households that choose either to participate or not, and households that are either accepted or rejected by the lender, i.e. $I = I_1 + I_2$, we can specify the distribution of households that have self-selected to participate in the credit programme, and have been accepted by the lender, i.e. $I = I_1 \cdot I_2$, with a time-variance difference that accounts for the length of membership. Consequently, those households who had self-selected to participate in a credit programme and had been accepted by the lender, and therefore were actively participating in the credit programme were eligible to be sampled as members of the *treatment group*.

Similarly, those households who had self-selected to participate in a credit programme and had been accepted by the lender, but had not received a loan by the time the quasi-experiment was conducted, were eligible to be sampled as the members of the *control group*. In this sense, *selection bias* and potential *Hawthorne*

effects[2] were assumed to be substantially reduced through the process of data collection itself. We test for the underlying assumption of no self-selection in the econometric procedure presented in section 7.1.1.

6.4 Selecting the case-study organisations

After identifying the appropriate design for the quasi-experiment, we began to identify microfinance organisations that were operating in the metropolitan area of Mexico City. Mexico City was selected as the geographical point of departure for the investigation for two reasons: 1) the largest microfinance organisations in the country operate in the region, and 2) since I was living at the time in a suburb of Mexico City, it was convenient for me to conduct the quasi-experiment in the region, taking into consideration transaction costs and mobility constraints to conduct the study. Once an initial contact was made with organisations that operated in the region, we selected three institutions willing to participate in the study, and which employed different lending technologies. The selected *case-study* organisations are the following: 1) Community Financial Services or Servicios Financieros Comunitarios in Spanish (*Fincomun*); 2) Centre for the Assistance of the Microenterpreneur, or Centro de Apoyo al Microempresario in Spanish (*CAME*), and 3) Programs for Women, or Programas para la Mujer Mexico in Spanish (*Promujer*).

6.4.1 Community Financial Services (Fincomun)

Community Financial Services (*Fincomun*) is a credit union founded as an initiative of the Juan Diego Foundation just a few months before the financial crisis of December 1994 started. Shortly, the institution faced the challenge of increasing the scope of its operations with a devaluation of the peso-dollar parity of 40.25 percent just in one month, and which mounted up to 94.86 percent by the end of 1995. The devaluation of the Mexican currency had an immediate impact on the Consumer Price Index that pushed inflation up from 7 percent in December of 1994 to 52

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[2] The *Hawthorne effect* refers to the phenomenon of people changing temporarily behaviour as a result of being under observation. The term gets its name from a factory called the Hawthorne Works, where Roethlisberger and Dickson (1939) conducted a series of experiments between 1924 and 1932.

percent in the end of 1995 (Banco de Mexico 1996). Fincomun, as a credit union, was authorised by the National Banking and Securities Commission (CNBV) to offer three financial products: savings, certificates of deposit (CDs) and microcredits[3].

The institution decided to begin operations in modest-looking branches with the idea of encouraging potential low-income borrowers and savers to join the institution. Branches are coordinated by a manager who deals with loan applications and deposits with a team of two financial advisors and a cashier. Four or five credit officers are responsible for searching new clients, screening up loan applications and monitoring the loan portfolio. Fincomun put in place an aggressive policy of expansion in the metropolitan area of Mexico City that helped the institution to increase substantially the deposits and loan portfolio. In 1995, the organisation operated in San Miguel Teotongo with 3 staff members and 237 clients. By 2000, the organisation had increased the number of branches to 11, with 84 employees and 12,830 clients, and by the end of 2005, it had 34 branches in Mexico City, with more than 450 staff members and more than 80,000 clients (see table 6.1).

Table 6. 1 Institutional growth

	Number of personnel	Δ (%)	Branches (accumulated)	Δ (%)	Clients	Δ (%)
1994	2		1		12	
1995	3	50	2	100	237	1875
1996	10	233	4	100	2470	942
1997	17	70	5	25	3644	48
1998	34	100	10	100	3575	-2
1999	73	115	11	10	8120	127
2000	84	15	11	0	12830	58
2001	130	55	12	9	11557	-10
2002	178	37	14	17	24900	115
2003	227	28	18	29	38368	54
2004	337	48	27	50	61385	60
2005	450	34	34	26	80000	30

Source: Fincomun

3 As discussed earlier in Chapter 3, on April 30 2001, the Mexican Congress passed a new law *"Ley de Ahorro y Crédito Popular"* that recognises two types of intermediaries: 1) Savings and Credit Co-operatives; and 2) Popular Savings Associations. As a response, Fincomun began a long process of institutional transformation that ended in October 2005, when the National Banking and Securities Commission authorised it to operate as a Popular Savings Association. Under this new institutional framework, Fincomun will not only be subjected to strong regulation and supervision, but will also be entitled to offer other financial products such as debit and credit cards, housing credits, remittances and insurance.

6.4.1.1. Savings products

Small-scale savings and certificates of deposit are important products offered by the institution. Small-scale savings accounts, known as *libreta de ahorros*, can be opened with 10 pesos (around US $1) with no minimum amounts required to keep the account. Clients can withdraw their savings at any time; there is no cost of membership and the interest rate paid on deposits is above the market rate (paid by banks). These conditions are particularly competitive in a market with monopolistic characteristics. For example, *Banco Azteca*, an institution of recent creation that targets low and low-middle income households, requires a minimum of 50 pesos (US $5) to open a savings account, and charges an annual fee of 10 pesos to cover administrative costs. Nevertheless, commercial banks normally require an average of 500 pesos to open a savings account and to keep minimum balance to avoid extra fees and administrative costs (see table 6.2). The comparative advantage of Fincomun has helped the institution to increase the number of small-scale savers from 3,200 in 1998 to 33,477 in 2004, with an annual growth rate of 56.9% and average deposits of US $98.

Table 6. 2 Fees and other costs to open savings accounts in Mexico. Selected financial institutions Figures in pesos of 2004

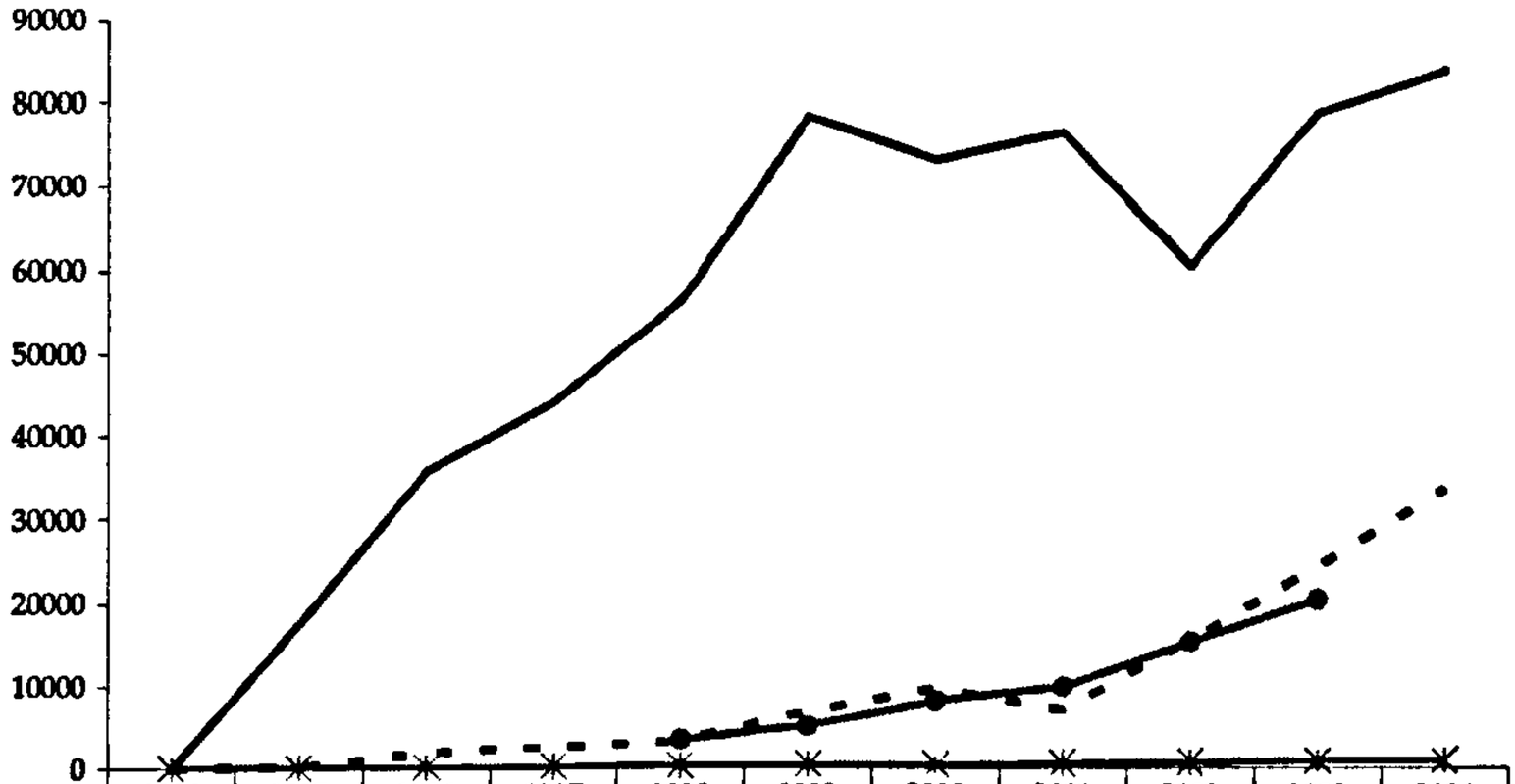
Bank	Initial amount required	Minimum balance	Administrative fees (annual)	Fees to replace debit card
Fincomun	10	Not required	No fees	No card offered
Banamex	500	Not required	10 + another fee when savings balance is below 500	100
Banca Afirme	500	500	50	50
Banco Azteca	50	50	10	25
Banorte	1000	1200 required to received interests	80	75
BBVA-Bancomer	750	750	182	75
HSBC	250	250	50	No card offered
HSBC	500	1800	44	75
Scotiabank Inverlat	500	Not required	Not available	75

Source: Condusef (2005) and Fincomun

Certificates of Deposits (CDs), known as *Invermax*, is another important product offered to middle and high-income households. Clients can invest in this instrument

with a minimum of 1000 pesos (US $100) for periods of 28, 60 and 90 days. The portfolio of investments in CDs as well as the number of investors has significantly increased during the last years. In 1995, in the beginning of its operations, the organisation received investment funds for 17.5 million pesos, and by the end of 2004, the deposits from trust funds and private companies represented almost 84 million pesos (See figure 6.2). Furthermore, by issuing CDs the organisation was able to strengthen the financial operation without depending heavily on donor funding and governmental subsidies. In fact, the institution became self-sufficient in part due to the rapid growth of investment in CDs. For further details see the Appendix to Chapter 6.

Figure 6. 2 Savings and Investment products
* Figures in thousands of pesos



	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Savers*	7	197	1820	2444	3200	6786	9500	6974	15336	24187	33477
Small-scale savings					3386	5075	8050	9772	15132	20254	
Investors	30	70	120	175	292	420	425	585	743	884	934
Investment in CDs*	0,36	17500	35700	44000	56000	78000	72900	76030	60200	78600	83800

Source: Fincomun

6.4.1.2. The credit product

Despite the fact that Fincomun has been operating with two credit methodologies (individual lending and solidarity groups), the institution heavily relies upon *individual lending*. The organisation charges a 6% interest rate on monthly basis (72% per annum), upon outstanding loan balances[4]. Loan repayments are paid on fixed

[4] Fincomun calculates the rate of interest taking into account several variables: financial, operational and administrative costs; the portfolio at risk; the level of arrears; the expected

weekly or fortnightly instalments that can be made at any of the branches that the institution has in Mexico City or alternatively, by a direct deposit in an account that the institution has in the HSBC Bank. The institution has adopted various screening, incentives and enforcement devices to deal with the problems of adverse selection and moral hazard (see table 6.3).

6.4.2 Centre for the Assistance of the Microenterpreneur (CAME)

In 1985, Mexico City was severely hit by an earthquake that badly damaged many residential buildings, particularly at the heart of the old city where many poor families were irregularly living. In that context, the Archdiocese of Mexico established Foundation for Community Assistance or *Fundación de Apoyo a la Comunidad* (FAC) with the aim of receiving donations from the public to support a large population that suddenly found themselves homeless. In 1990, FAC established *Emprendedores* Foundation that was originally visualized to facilitate job-formation on the basis of income-generation activities amongst those poor households that lost their home and job. Months later, in 1991, Centre for the Assistance of the Microenterpreneur (*CAME*) was born with the task of complementing, with training and technical assistance, the activities that Emprendedores Foundation was carried out.

In 1992 the Managing directors of CAME and *Emprendedores* came into contact with Maria O'Keefe from FINCA to receive technical assistance and supervision to transform CAME into a village-banking operator. As a result, and with financial donations and subsidised credits from Ford Foundation, Secours Catholique, Inter-American Foundation, Inter-American Development Bank, and the Mexican Government, CAME began operations in August 1993, constituted as a Trust Fund, in one the poorest settlements of the Metropolitan area of Mexico City: the Chalco Valley.

During the beginning of its operation, and in particular after the financial crisis of December of 1994, CAME put into practice some strategies to reduce the effects of

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level of capitalisation; the legal reserve fund; the rate of interest charged by the competition, and the period and loan size.

the crisis and to ensure the survival of the organisation. Amongst those strategies, it is worth to mentioning the following: 1) keeping the interest rate as high as necessary to cover operational costs; 2) basing most of the lending operation on compulsory savings and revolving funds resulting from the lending process itself in order to avoid borrowing from commercial sources of funding; and 3) maintaining a constant number of personnel and branches without embarking in any attempt or ambition to grow rapidly to other areas.

Consequently, during the *crisis period*, CAME experienced a modest growth in terms of the number of active members that reached its lowest point (2.8%) in 1996. Despite this poor performance, the loan portfolio and savings continued growing at an average rate of 49.7% and 80.9%, respectively in the period 1995-96. Incentive and enforcement devices such as progressive lending and compulsory savings helped the institution to achieve these figures despite the low rate of membership.

Furthermore, by being particularly careful in operating under consistent and transparent rules, CAME was able to build trust amongst its members at the time where financial institutions had a terrible reputation and were blamed to be largely responsible for deepening the crisis. All these elements were fundamental for CAME to build the foundations for future expansions in the coming years.

By the end of 1996, CAME began to increase the number of personnel, in particular the number of credit officers to back the expansion of its operations. This expansion took place not only in the Chalco Valley but also in other municipalities of the surrounding areas such as Ixtapaluca, Los Reyes, La Paz and Tlahuac. The rapid growth however, required more funds to fulfil the increasing demand for credits that the institution was facing at the time; but commercial sources of funding were expensive; local and external donors, including the government, were irregular and given the particular context of financial volatility in the country, the organisation decided to modify its lending methodology.

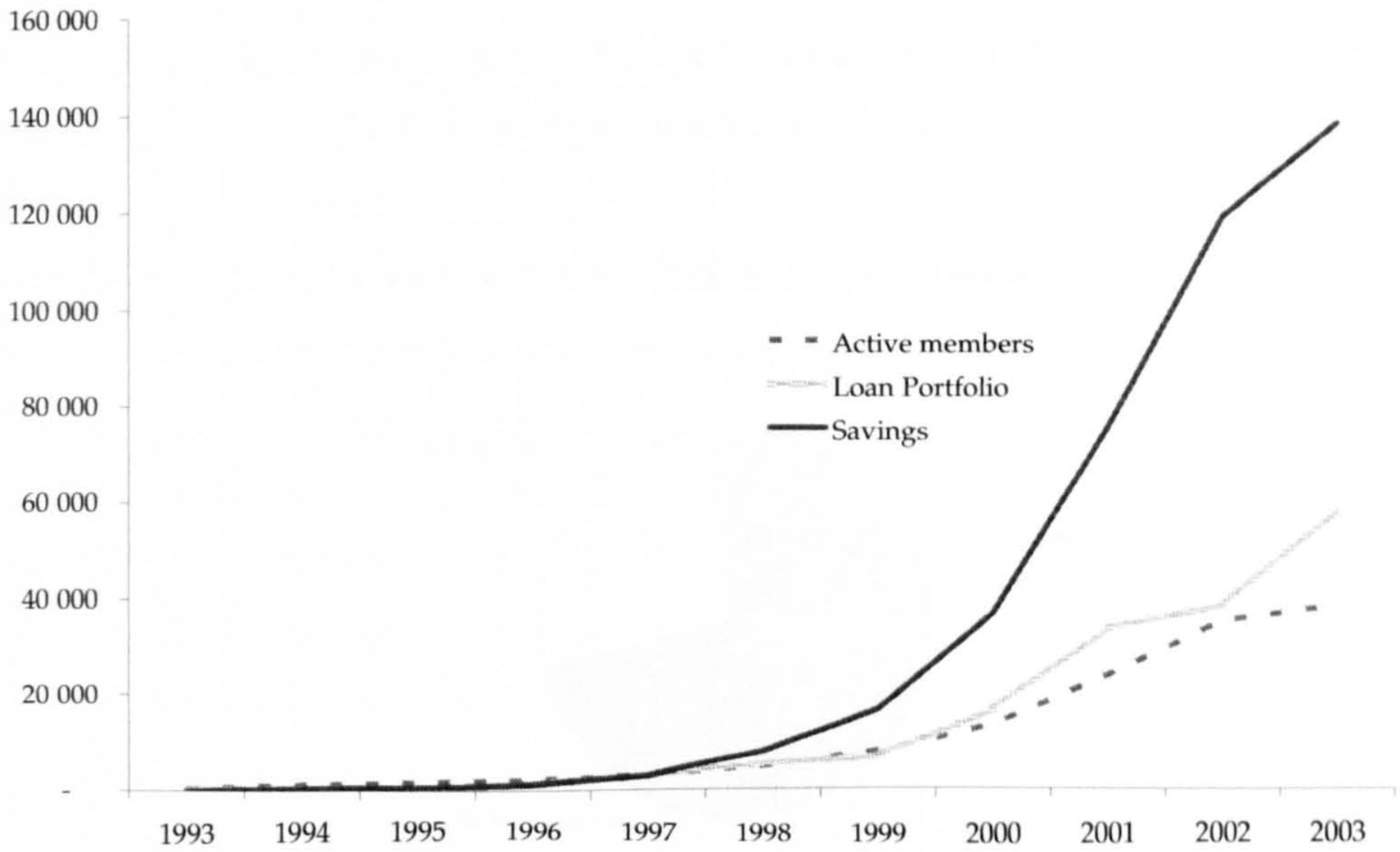
Table 6. 3 Mechanisms employed by Fincomun to deal with moral hazard and adverse selection

Direct mechanisms		Indirect mechanisms	
Guarantees	Deals with the problems of moral hazard and adverse selection, and reduces the expected rate of default. It helps to reduce monitoring and supervisory costs. When defaults occur, it increases enforcement costs	Having an income-generating activity or microenterprise for a period of at least one year	Deals with the problem of moral hazard and helps to reduce the expected default rate
Collateral with a value of two times the amount borrowed	Deals with the problem of moral hazard and adverse selection; reduces the expected rate of default. It also helps reducing monitoring and supervisory costs. When defaults occur, it increases enforcement costs	Loan applicants living or having business in close proximity to the branch	Diminishes informational costs related to screening, monitoring and supervision
Penalties that range from 30 to 150 pesos depending on the defaulted amount, and interest in arrears	Combats moral hazard and gives incentives to reduce the expected default rate. It also increases total revenues from loan portfolio	Progressive lending, with additional loans for a maximum of 50% of the previous credit	Creates incentives to expand loan size and reduces in the long run operational costs by diminishing asymmetrical information. It also helps to reduce the expected default rate
Compulsory savings for a value of 10% of the amount borrowed.	Combats the problem of moral hazard and reduces monitoring and supervisory costs. It also helps to reduce the default rate and the share of the principal paid to external sources of funding.	Periodical repayment schedules (weekly or fortnightly)	Deals with the screening problem and reduces the expected default rate, but increases the costs of monitoring and supervision
Certificate of Deposits for middle and high-income investors.	Reduces the cost of borrowing from external sources of funding, and helps to improve financial performance	The use of palm pilots	Reduces the screening, monitoring and supervisory costs and helps to diminish the expected default rate

Source: Fincomun
For further details, see the Appendix to Chapter 6

A fundamental change was made in 1998 to reduce potential problems of liquidity that could affect the expected rate of institutional growth: the periodical repayment schedules, originally designed for eight fortnightly instalments were modified to a 16-weeks schedule. This strategic change together with a reduction in operational costs, allowed CAME to increase the cash flow and improve its position towards achieving operational self-sufficiency (Zapata et al 2002). In fact, the loans-to-savings ratio was substantially reduced from high levels just before the reform (103% in 1997) to a 65% a year after. This ratio continued falling to 42% in the end of 2003[5]. After this institutional reform, the organisation enjoyed a sustained and high rate of growth not only in the number of active members, that averaged 65.2% in the period 1998-2002 but also in the loan portfolio and savings, that averaged 75.7% and 117.8%, respectively, in the same period (see figure 6.3).

Figure 6. 3 CAME: Institutional growth
Figures in thousands of pesos (excluding active members)



Source: CAME

This institutional expansion however, remained highly concentrated in the Chalco Valley, which absorbed in 2002 almost 50% of the number of active IGGs (see figure 6.4). By the end of 2003, CAME had more than 40 thousand active members,

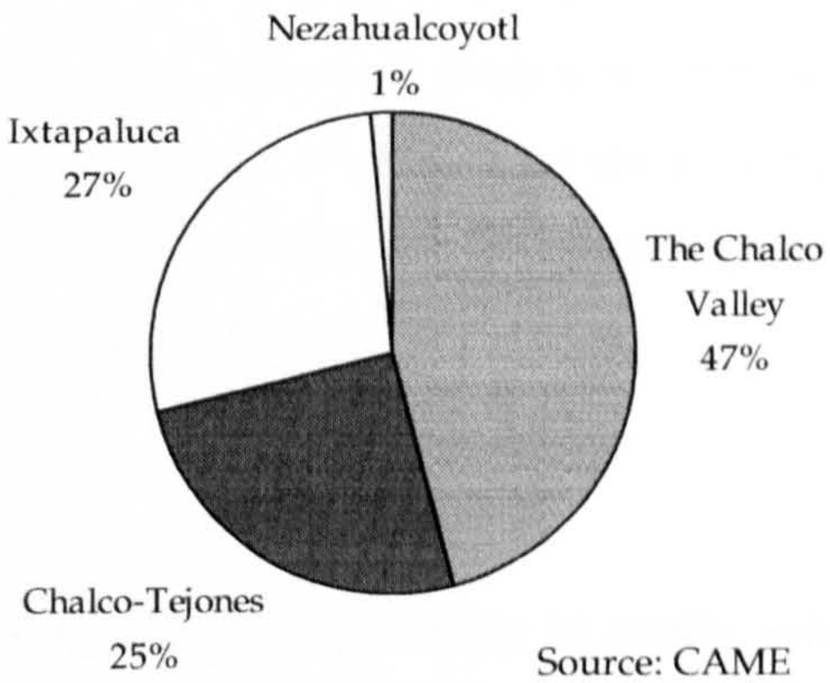
[5] For further details see the Appendix to Chapter 6

grouped in 1600 Income-Generation Groups (IGGs). These groups were normally integrated by 25 members who were predominantly women (80%).

Credit officers play a fundamental role in the operation of CAME, since they are responsible of promotion, group-formation, and supervision of (IGGs). Promotion takes place in public places such as outdoor markets (known in Mexico as *tianguis*), schools, and hospitals, or by door-to-door tactics in the neighbourhood. Once an IGG is formed, the corresponding credit officer is responsible for monitoring the good functioning of the IGG. He or she will attend weekly meetings where deposits from members and loan repayments to CAME and the Revolving Fund (known amongst members as *fondo interno*) are collected[6].

An essential task for the credit officer is to disseminate amongst group members basic principles of financial accounting that are needed to calculate *inter alia*, minimum deposits, loan repayments, interest rates on arrears, revenue sharing from the revolving fund, and so on, which are fundamental for the operation of the group. IGG is governed by collective rules that are voted democratically, signed individually, and explicitly captured in a document known as *Reglamento Interno*.

Figure 6. 4 Distribution of IGGs by local branch



Source: CAME

The Reglamento specifies, for example, the name of the IGG; the day, hour and place where group meetings take place; penalties for absence or delays; interest

[6] The general characteristics of the Revolving Fund, as an incentive device, are discussed in the Appendix to Chapter 6.

rates on loans from the revolving fund; interests in arrears and minimum compulsory deposits. Although the Reglamento´s rules can be modified in the end of each credit cycle, the core principles for group operation e.g. periodical repayment schedules, compulsory attendance to periodical meetings, and compulsory savings, are unalterable.

6.4.2.1. The savings component

Income-Generation Groups began with individual deposits that can be as small as five pesos, i.e. around US $0.5. During four weeks, group members will attend weekly meetings where savings are deposited and training is given on principles of financial accounting and the model developed by CAME. When the IGG has finally grouped 25 members and completed the training, the group is formally opened. Savings is a key component in the methodology developed by CAME. Without minimum savings, group members cannot receive loans either from CAME or from the revolving fund. During the first credit cycle, group members are required to deposit savings on weekly basis, relative to the credit borrowed that range from 10% to 12% depending on the loan size. A member that borrows, for example 5000 pesos, will be required to deposit at least 38 pesos every week in order to be eligible to larger loans in the consecutive credit cycle[7]. By requiring increasing amounts of savings, the organisation has reduced potential problems of moral hazard, the expected rate of default, and the loans-to-savings ratio that helps diminishing the share of the principal paid to external sources of funding. Compulsory savings also help group members to reduce the risk that is collectively and equally absorbed when borrowers fail to repay the credit.

6.4.2.2. Credit products

The IGG receives a single loan from CAME every 16 weeks, where loan repayment is guaranteed by a promissory note backed by the group as a whole. Social collateral in the form of joint liability acts as the main enforcement device to secure that credits are fully repaid in time. As soon as group members fail to pay back their instalments, the justice committee uses several mechanisms such as penalties,

collection of physical collateral and even legal actions to persuade defaulters to pay back the loans. When the IGG receives a credit from CAME, it is distributed according to the amount requested by individual group members. Credit officers calculate loan instalments for each member as well as minimum deposits to be made during group meetings. IGGs are responsible for loan collection and repayment to CAME. These payments are made in an account that the organisation has in the National Savings and Financial Services Bank (BANSEFI), one of the few institutions operating in the Chalco Valley. The organisation employs several screening, incentive and enforcement devices to deal with problems of moral hazard and transaction costs (see table 6.4).

6.4.3 Programs for Women (Promujer)

Programs for women Mexico (Promujer) is a non-governmental organisation that began operations in Bolivia targeting poor women. Since its foundation in 1990, it has expanded to other countries in Latin America, including Peru, Nicaragua and recently Argentina. In November 2001, the organisation started operations in Tula City and the surrounding areas in the state of Hidalgo, one of the poorest in Mexico, with financial support from the Mexican federal and state governments as well as from private donors such as Citibank, JP Morgan Chase and Unitus. In fact, it was due to the initial support from the governor of Hidalgo that Promujer was able to initiate operations in the locality.

Promujer employs the methodology of village banks, which embraces a holistic approach that combines group lending, and training as the main services provided. By the end of 2004, Promujer had managed to open 21 branches in Tula City and the surrounding areas that covered 489 village banks, with almost 12,000 active borrowers. Between 2003 and 2004, the gross loan portfolio grew at a rate of 118%, reaching over 1,2 million dollars, with a portfolio at risk for more than 30 days in the order of only 0.6%. Despite the institutional growth, the loans to savings ratio still remained considerably high (222%) (See table 6.5).

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[7] Compulsory savings are calculated as: $s = \frac{L * 0.12}{16}$ where L is the amount borrowed.

Table 6. 4 Mechanisms employed by CAME to deal with moral hazard and adverse selection

Direct mechanisms		Indirect mechanisms	
Guarantees to back loans from the revolving fund	Deals with the problem of moral hazard and adverse selection, and reduces the expected rate of default. When defaults occur, it increases the enforcement costs.	Group lending contracts	Based on joint liability, they work to reduce the problems of monitoring and supervisory costs as well as the expected rate of default.
Periodical repayment schedules during compulsory group meetings (weekly)	Deals with the screening problem and reduces the expected default rate; however, increases the opportunity costs of borrowing for members	Loan applicants living or having a business near the branch	Diminishes informational costs related to monitoring and supervision activities
Penalties on absences and delays as well as interests on loans in arrears are imposed discretionally by IGGs individually.	Combats moral hazard and gives incentives to reduce the expected default rate. It also increases revenues to the revolving fund.	Progressive lending, with additional loans depending on individual deposits. Upper limits of credit at 20,000 pesos.	Creates incentives to expand loan size and reduce the long-term operational costs. It also helps to reduce the expected default rate.
Compulsory savings for a value of 10% to 12% of the loan size.	Combats the problem of moral hazard and reduces the expected rate of default. It also helps to reduce the loans-to-savings ratio and the share of the principal paid to external sources of funding. It also helps group members to reduce the risk of absorbing the cost of default.	Revolving Fund	As incentive device, combats moral hazard and reduce the expected rate of default. It also helps increasing the number of memberships. However, the fund increases operational costs and has become the main competitor for CAME.

Source: CAME
For more details, see the Appendix to Chapter 6

As a consequence, the organisation reported only 45% of financial self-sufficiency by the end of 2003, with a high financial dependency on state subsidies and private donors[8]. Village banks, referred hereafter as VBs, are integrated by 25 women organised in 5 solidarity groups. VBs are independently governed and democratically voted in issues of collective interest. The VB has a credit committee, formed by the heads of solidarity groups, which are in charge of the screening, monitoring and enforcement mechanisms. Credit officers play an important role in the operation of Promujer. They are responsible for promotion, group formation and supervision of the VBs.

Table 6. 5 Promujer: Institutional growth
* Figures in thousands of US dollars

	2002	2003	2004
Number of active members	2567	6596	11872
Δ %	-	156,95	79,99
Number of Village Banks	93	252	489
Δ %	-	170,97	94,05
Credit officers	15	28	45
Δ %)	-	86,67	60,71
Gross Loan Portfolio *	231	574	1249
Δ %	-	148,34	117,59
Client Savings *	231	574	1249
Δ %	-	334,61	172,95
Loans to savings ratio	487,89	278,78	222,24

Source: Promujer

6.4.3.1. The savings component

Compulsory savings are an essential component in the methodology employed by Promujer, which require a minimum deposit of 10 to 15% depending on the loan size. Savings are deposited in a collective account with the signatures of the VB´s treasurer and the credit officer in order to avoid delinquency. Borrowers can only withdraw their savings when they dropout the programme at the end of the credit cycle.

Recently, the organisation extended its model to a voluntary savings component that enables borrowers to deposit additional amounts of savings that can be

[8] By the end of 2004, Promujer had received subsidised credits from PRONAFIM for more than 5 million pesos.

withdrawn every week during the periodical group meetings. By the end of 2003, Promujer has received more than 275 thousand pesos in voluntary savings that represented 12% of the portfolio of total deposits.

6.4.3.2. Credit products

Like any other group lending model, Promujer exploits social collateral in the form of joint liability, as the main enforcement device to secure repayment. Each VB receives a single loan from Promujer in the beginning of the credit cycle to be repaid within 3, 4 or 6 months, depending on the loan size. Loans are distributed according to the amount requested by individual members clustered in solidarity groups. Credit officers calculate loan instalments as well as minimum deposits for each member according to the periodical repayment schedule. Loan repayment is guaranteed by a promissory note backed by the VB. As soon as group members fail to pay back their instalments, the credit committee employs several mechanisms such as penalties, collection of physical collateral and even legal actions to persuade defaulters to payback the loans (see table 6.6).

Selecting distinctive microfinance organisations was important in order to capture possible impact differences according to lending technology. These organisations operate in the urban context, in densely populated deprived communities, where the market for credit has been traditionally rationalised by the banking sector. We present in table 6.7 a summary of the nature and main characteristics of the three organisations whose clients participated in our study. The areas where the quasi-experiment was operationalised are described below in section 6.5.

Table 6. 6 Mechanisms employed by Promujer to deal with moral hazard and adverse selection

Direct mechanisms		Indirect mechanisms	
Periodical repayment schedules during compulsory group meetings (weekly and fortnightly)	Deals with the screening problem and reduces moral hazard, adverse selection and the expected default rate; however, increases the opportunity costs of borrowing for group members	Group lending contracts	Based on joint liability, solidarity groups reduce the problems of screening, monitoring and supervisory costs as well as the expected rate of default.
Penalties on absences and delays. Peer pressure and legal actions.	Penalties are imposed discretionally by VBs and collective sanctions and legal actions are imposed to defaulting borrowers. They combat moral hazard and gives incentives to reduce the expected default rate.	Loan applicants living near the branch	Diminishes informational costs related to monitoring and supervision activities
Compulsory savings for a value of 10% to 15% of the loan size.	Combats the problem of moral hazard and reduces the expected rate of default. It also helps to reduce the loans-to-savings ratio and the share of the principal paid to external sources of funding.	Progressive lending, with additional loans depending on individual deposits.	Creates incentives to expand loan size and reduce the long-term operational costs. As an incentive device, it also helps to reduce the expected rate of default..
Periodical reports on assistance to group meetings, business revenues and costs	Peer-monitoring device that helps reducing fungibility and potential problems of moral hazard and adverse selection. It also reduces the expected rate of default	Training in credit management, business skills and health care	It helps borrowers to plan business activities including loan repayment and reduces the expected rate of default. It also acts as incentive device

Source: Promujer
For further details, see the Appendix to Chapter 6

Table 6. 7. Summary of the nature and main characteristics of the case-study organisations Information corresponding to 2004

Institutional	FINCOMUN	CAME	PROMUJER
Type of organisation	Credit Union	Non-Governmental Organisation	Non-Governmental Organisation
Year of establishment	1994	1991	2001
Founders	Juan Diego Foundation, a catholic group	Foundation for Community Assistance, belonging to the Archdiocese of Mexico	Pro-Mujer International
Main donors	Private investors; PRONAFIM	Ford Foundation, Secours Catholique, Inter-American Foundation, and IADB	USAID; JP Morgan Chase, Unitus, government of Hidalgo and PRONAFIM.
Area of influence	Iztapalapa and other municipalities of the metropolitan area of Mexico City	The Chalco Valley and a few other municipalities of the metropolitan area of Mexico City	Tula City and the surrounding areas in the state of Hidalgo
No of branches	27	5	21
Personnel	339	580	45
Lending methodology	Individual lending	Credit-only village-banking	Credit-plus village-banking
Repayment schedules	16 to 24 weekly instalments at Fincomun officers or HSBC branches	16 weekly instalments in compulsory group meetings.	12 to 24 weekly or fortnightly instalments in compulsory group meetings
Interest rate (per annum)	72%	72%	60%
Savings as % of loan	10	10-12	10-12
Physical collateral	Yes	No	No
Guarantees	Yes, two guarantees	Yes, through joint liability	Yes, through joint liability
Other services	Voluntary savings products and certificates of deposits	Life Insurance to cover loan balance. Extra-loans from the internal revolving fund	Training in financial literacy, business development and health care
Borrowers (000)	25.8	40	11.8
Women borrowers (%)	60	80	100
Gross loan portfolio (000 MEX$)	169,725	58,000	13,739
Average outstanding loan (000 MEX$)	6.6	1.5	2.1
Loan loss reserve ratio (%)	2.7	1.8	2.9

6.5 Controlling for non-random programme placement

In order to strengthen the internal validity of the study, it was important to follow a *geographical criterion*, i.e. to operationalise the quasi-experiment amongst households living in the same district, in areas with a minimum level of socio-economic and cultural homogeneity, where a comparison between treatment and control groups could be reasonable[9]. In this sense, by following a geographical criterion, it was possible to hold constant factors such as infrastructure, costs of inputs, and local prices that could otherwise cause a bias from a *non-random programme placement*. If credit programmes are deliberately placed in e.g. deprived areas with poor infrastructure, then the comparison of borrowers living in those poor areas with control groups living in "better off" neighbourhoods could cause a downward bias result in the impact estimation.

The densely populated areas under investigation made possible to follow this approach. Additionally, it was also important to follow a *temporal criterion*, i.e. to select an area where the case-study organisations had achieved a certain level of market penetration, where the effects of credit on the outcomes of interest could be more likely to be observed. In this sense, to have access to institutional information on market and households characteristics was crucial to identify the areas where the study could be conducted[10].

In order to capture the physical and socio-economic characteristics of potential areas where the study could be conducted, we analysed *secondary* sources of information (Creswell 1994) such as public documents, (e.g. reports from local governments and statistics on demographic characteristics) as well as private documents provided by the case-study organisations (e.g. financial statements, balance sheets and internal reports). See table 6.8 for further details.

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[9] Bawden and Sonenstein (1992) have suggested that the use of eligible control groups from the same community is possible when selection bias has been controlled and adequately tested for. In chapter 7, we discussed in more detail the econometric procedures to test for potential problems of selectivity.

Table 6. 8 Type and source of secondary data

Organisation and area of interest	Public	Private
a. Fincomun in San Miguel Teotongo	1. Local statistics Notebook from INEGI (2000) 2. Socio Economic information from IDFM (2003) 3. Institutional website 4. Reports at the MixMarket website 5. Leaflets 6. Journalistic articles	7. Annual Reports; Financial Statements and Balance Sheets, various years 8. Report from Kellee (2005) 9. Project proposal from Union de Colonos (2005) 10. Credit Officers' Handbook
b. CAME in the Chalco Valley	1. Information on local infrastructure from National Commission on Water Resources 2. Socio Economic information from IDFM (2003) 3. Governmental reports and urban development plans 4. Local statistics Notebook from the INEGI (2000) 5. Monographs and photos from the local library and museum 6. Leaflets 7. Journalistic articles	8. Financial Statements and Balance Sheets, various years 9. Internal Rules for IGGs (Reglamento Interno) 10. Credit Officers' Handbook 11. Report on Impact Evaluation from CAME-CP (2002) 12. Institutional monograph, various authors
c. Promujer in Tula City	1. Local statistics Notebook from the INEGI (2000) 2. Socio Economic information from INDFM (2003) 3. Institutional website 4. Reports at the MixMarket website 5. Leaflets	6. Annual Reports; Financial Statements and Balance Sheets, various years 7. Credit and Training Officers' Handbook 8. Internal Rules for Village banks 9. Report on Impact Evaluation from Reddy (2003) 10. Market research project from de Sousa and Hall (2001)

Note: For further details, see the Bibliography

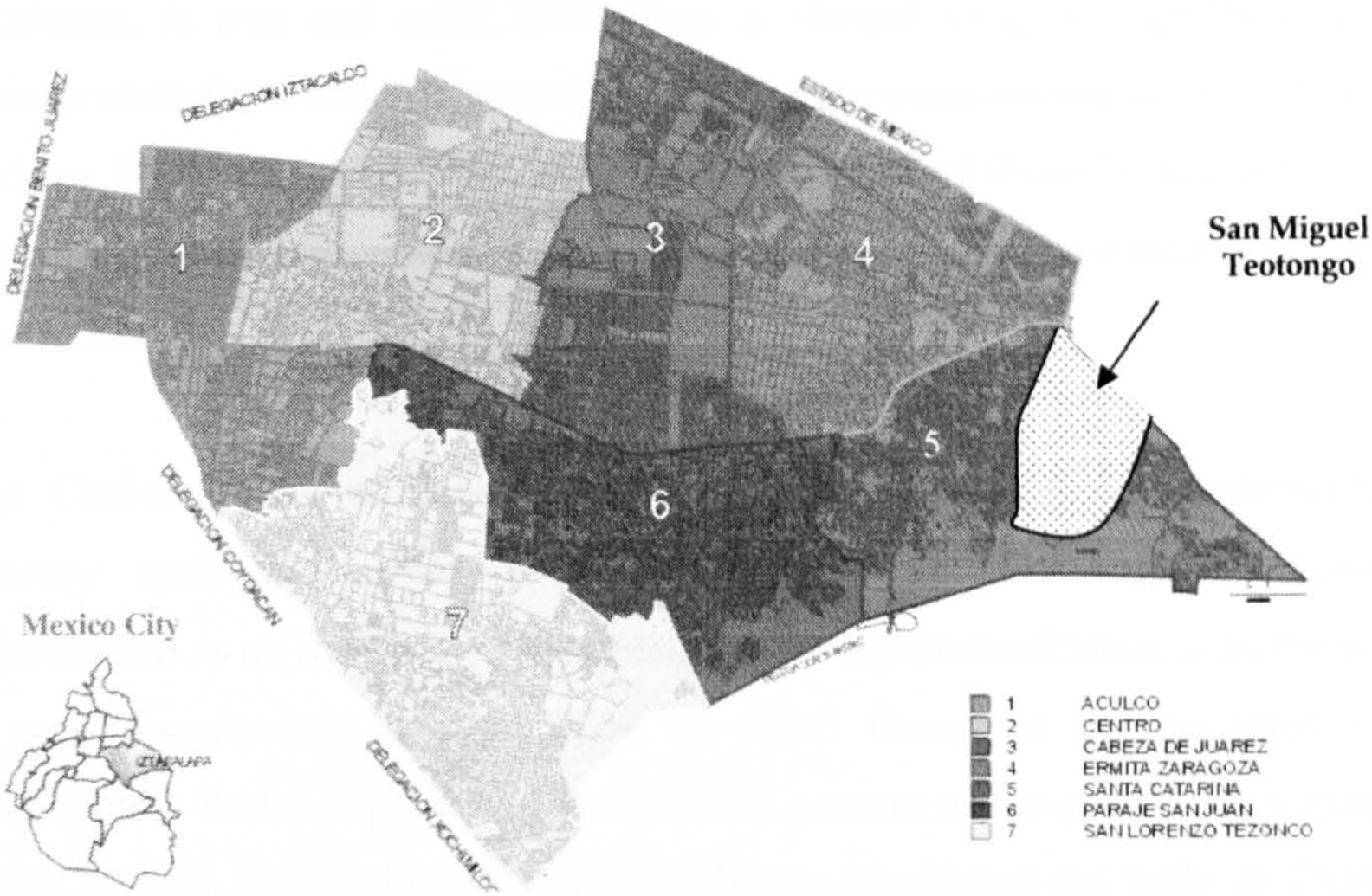
I also travel several times to those neighbourhoods following an *observational protocol* (Bogdan and Biklen 1992) that helped me to have a firsthand experience about the level of households' deprivation in the areas, and ensure that any possible difference was not significant. During these journeys, we were able to confirm the homogeneity of deprivation of these communities. In the end, three geographical settings were chosen, one for each case-study organisation: 1) San Miguel Teotongo for the case of Fincomun; 2) The Chalco Valley for the case of CAME, and 3) Tula City, for the case of Promujer[11].

[10] My gratitude to Vicente Fenoll, Alfredo Ubard, and Armando Laborde, Managing directors of Fincomun, CAME and Promujer, respectively, for providing me with the information that I needed to select the areas under examination.

6.5.1 San Miguel Teotongo

The settlement of San Miguel Teotongo, located in the Iztapalapa District to the Eastern periphery of Mexico City, is one of poorest of the metropolitan area (see figure 6.5). Poor families that migrated from Central and Southern Mexico settled San Miguel Teotongo in 1972. It started growing rapidly up to a population that has been estimated at 80,000 inhabitants (Heredia and Purcell 1995). Despite the fact that San Miguel Teotongo has not experienced a substantial growth since the late 1980s, the surrounding areas have grown substantially in recent years to a level of 300,000 inhabitants.

Figure 6. 5 The Iztapalapa District and its territories



San Miguel Teotongo is densely populated, with two or more families living in the same house. On average, between six and eight members integrate a household. Single mothers in the range of 15 to 22 years of age constitute 15 percent of the population. The adult illiteracy rate is 11.7 percent, significantly higher than the regional rate (3%) for Mexico City. Given the deprived labour markets in the region, San Miguel Teotongo has become a dormitory town, where some 85 percent of the working population take on average a two-hours journey every day to reach their

[11] For a statistical overview of the selected areas, see the Appendix to Chapter 6.

workplace, and around 52 percent is employed in the industry, and 40 percent in the commerce sector (Union de Colonos 2005).

6.5.2 The Chalco Valley

The Chalco Valley is a municipality of the State of Mexico located in the Eastern periphery of the Metropolitan area of Mexico City (see figure 6.6). It started in 1978 as an irregular settlement in communal land (known in Mexico as *Ejidos*) on what once upon a time some 120 years ago was the Chalco Lake[12].

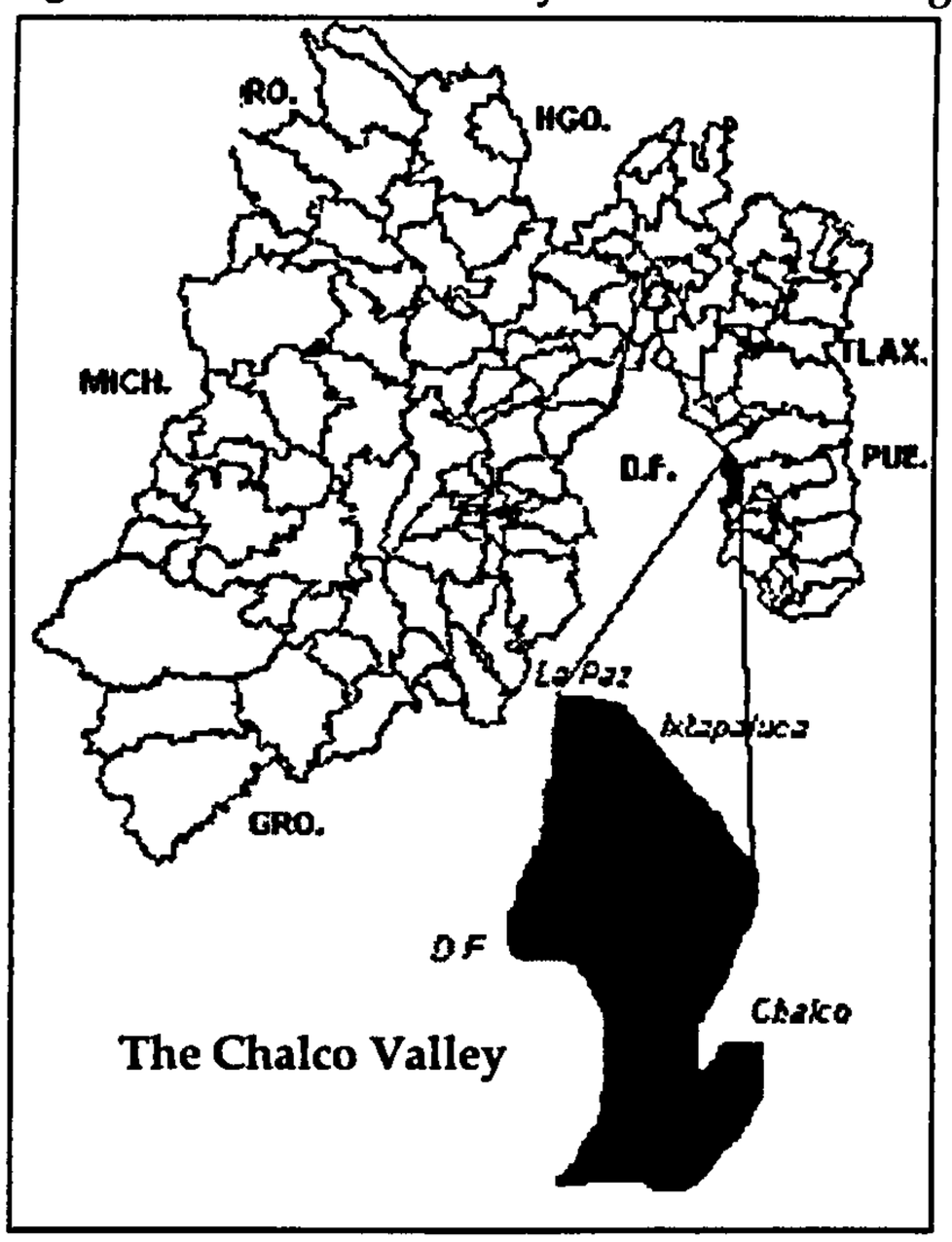
The municipality was established by poor immigrants from Central and South East Mexico who in the search for better job opportunities migrated to the capital. However, it was not until 1985 when it started to grow rapidly due to high immigration from other deprived districts in the surrounding areas of Mexico City such as Nezahualcoyotl City and Iztapalapa. Most of those immigrants were poor families who were attracted by cheap land and who could not afford to buy land or rent in Mexico City.

The Chalco Valley remained as one of the largest irregular settlements in the country until November 1994, when the Mexican Congress approved its constitution as an independent municipality of the State of Mexico. In the year 2000, it was documented a population of 323.5 thousand people (69.6 thousand households) that had grown at a rate of 5.3 percent in the period 1995-2000 (INEGI 2000). In 2003, the local government (Gobierno Municipal del Valle de Chalco 2005) estimated a population of 406.5 thousands inhabitants that given its territory, situated the Chalco Valley as the seventh most densely populated municipality in the country. As many other deprived localities in the region, the Chalco Valley suffers from deficient public services such as water piped, electric power and

12 The Chalco Lake was located in what is known as the Mexican basin. The lake was a fresh water hydrologic structure. Together with other Mexican great lakes such as Texcoco, Zumpango, Xaltocan and Xochimilco formed the ancient Mexico Lake Basin, which was the home of many ancient civilisations such as the Aztecs. In the late years of the Nineteenth Century, the dictator Porfirio Diaz authorised Iñigo Noriega, a Spanish cacique (landlord) to drain the lake for agricultural purposes (Tortolero 1993). Understandingly, nowadays the region suffers from problems of flooding.

drainage. Only 88.84% of households enjoy these public services together and almost 25% is still with no water piped inside the residence[13].

Figure 6. 6 The Chalco Valley and its surroundings



Residences are gradually built. One fourth of the properties are constituted by only two rooms and kitchen (excluding bathroom) and on average five members integrate each household. Most of the properties are constructed with rough blocks and roofed with cement (59%), cardboard sheets (19%) and asbestos sheets (17%) that give the landscape a peculiar grey colour. The municipality is located next to a canal (La Compañía) that carries sewage water from other municipalities of Mexico City. Frequently during the rain season, this canal overflows its banks, causing soil and water pollution, and during the dry season, given the flat geographical characteristic of the Valley, clouds of dust often cover the area, causing significant health problems for the population.

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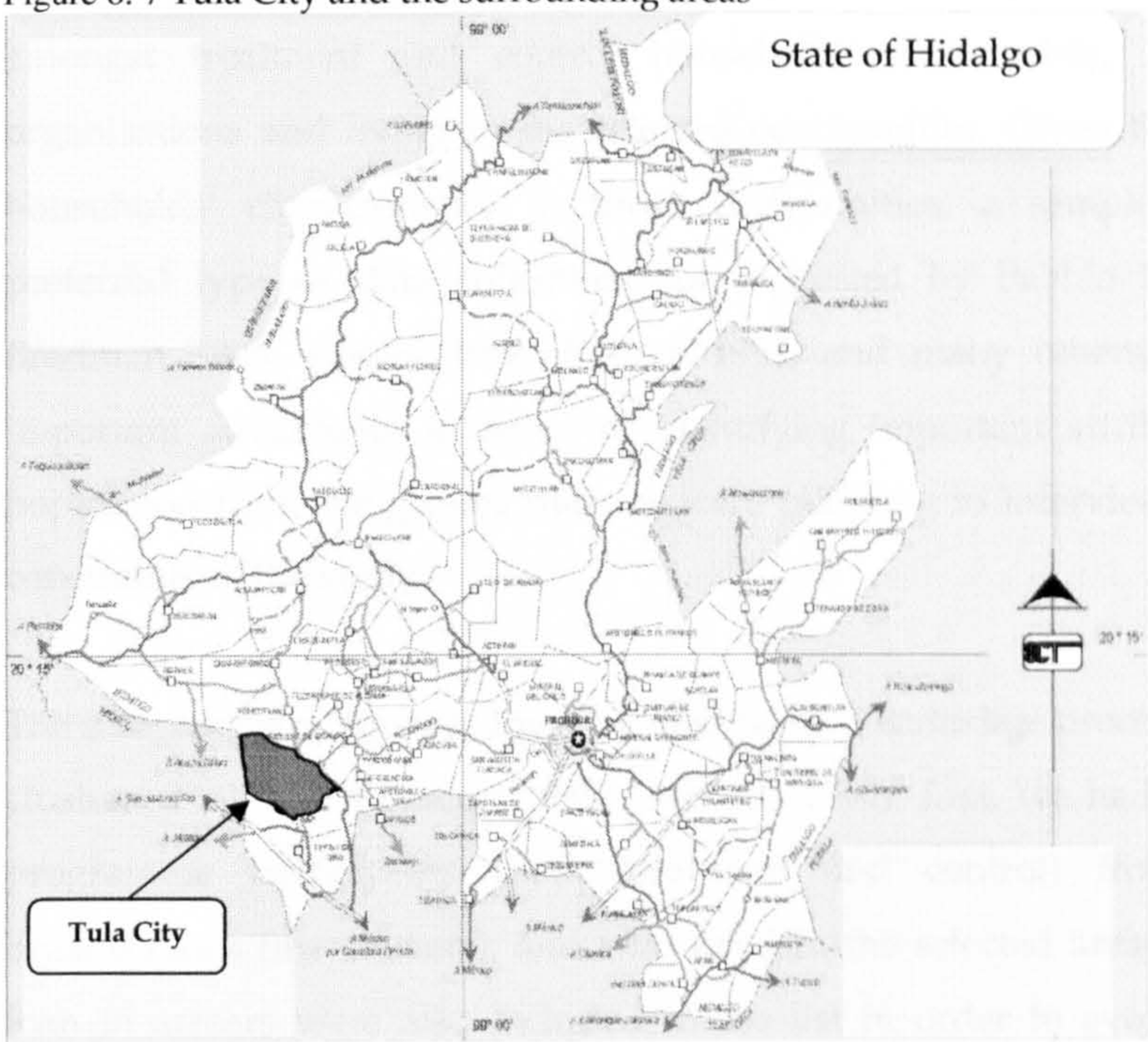
[13] Despite the fact that the Chalco Valley suffers from deficient public services, there have been substantial improvements in recent years as a consequence of governmental support. It was in this municipality where the National Programme, *Solidaridad*, a safety net known today as *Oportunidades*, began in 1985 with a public investment of 700 million pesos (almost

6.5.3 Tula City

Tula City is a medium-size town with 90,000 inhabitants located at the centre of the country, an hour from Mexico City (see figure 6.7). In an earlier study, it was estimated a potential number of borrowers in the order of 10,000 low-income women[14]. In 2000 the locality reported a ratio of 93 men per 100 women, which is explained by the large emigration, particularly amongst men, registered in recent years. Migration has actually grown at a rate of 15% per year, despite the fact that two large companies, Mexican Cements (CEMEX) and Mexican Petroleum (PEMEX) operate in the region. The main destinations are Mexico City and the US. In fact, about 4% of the working population is currently living abroad, and 80% of households in the municipality have relatives living in the US. Amongst those who stay in the region, 42% are self-employed.

Figure 6. 7 Tula City and the surrounding areas



US$ 2 billion). After this intervention, the percentage of households with drainage pipe increased from 58% in 1995 to 91% in 2000.

[14] This figure was obtained from a market research project reported by de Sousa and Hall (2001).

Household income in Hidalgo is particularly low. A recent survey reported that 75% of households earned no more than 2 minimum wages, which weighted by the average household size (4 members per household) gives an income per capita of about 2.5 dollars per day (INEGI 2001). Women play a fundamental role in generating income. About 50% of households had a female member employed or engaged in income-generating activities, and amongst those women, 60% were employed in the commerce sector, and 22% in the manufacturing sector. The distribution of financial institutions in Tula City is highly dispersed. On average, there is a branch per 11,000 inhabitants, where a few banks and non-banking financial institutions operate (INEGI 2001). As a consequence, indigenous savings and credit agents in the region are the natural competitors of Promujer.

6.6 Instruments of data collection

In order to collect primary data, a cross-sectional sample survey was conducted amongst treatment and control households participating in the case-study organisations and living in the selected communities. Given the homogeneity of households' characteristics in those communities, a sample survey was the preferred type of data collection. As suggested by Babbie 1990; Sudman and Bradman 1986; Fowler 1988; Keppel 1991, and many others, this strategy has important advantages in terms of identifying important attributes of the target population from the groups that we were planning to interview, and due to time constraints of the study.

The sampling strategy was implemented using a *multistage* procedure in the form of clusters (Fink and Kosecoff 1985; Creswell 1994): first, we had access to a list of programme participants (both treatment and control) from the case-study organisations (the clusters), and who lived in the selected areas. Participants with loan in arrears were also included in the list in order to avoid bias results and strengthen the internal validity. In the second stage, both treatment and control groups were selected at random. In the end, we managed to survey 148 households, 55 of which were participating at Fincomun and living in San Miguel Teotongo; 46 who were members of CAME and lived in the Chalco Valley, and 47 participants at Promujer and living in Tula City and the surroundings (see table 6.9).

Table 6. 9. Sources of primary data

Institution	Supply side	Demand side
FINCOMUN	Individual interviews with the Managing Director; and directors of Finance and Product Management	55 semi-structured interviews (36 with treatment households and 19 with control groups)
CAME	Individual interviews with directors of Finance; Operations; Research and Evaluations, and with the branch manager in the Chalco Valley	46 semi-structured interviews (28 with treatment households and 18 with control groups)
PROMUJER	Individual interviews with the Managing Director; and directors of Finance and Product Management	47 semi-structured interviews (26 with treatment households and 21 with control groups)
Total	10 interviews to key decision-makers	148 semi-structured interviews (90 with treatment households and 58 with control groups)

The survey was administrated face-to-face to programme participants employing, as instrument of data collection, a semi-structured-interview format. We selected a semi-structured interviewing technique due to its implicit properties: it enabled me to administrate a *quantitative component* to capture, just like structured questionnaires do, information on variables such as income, assets, education and so on, in combination of a *qualitative component* to capture with open-ended questions, just like in-depth interviews do, opinions, experiences and relevant information for the research (Arksey and Knight 1999; Berg 2003).

Semi-structured interviews, referred hereafter as simply interviews, were also useful in developing a positive connection with the interviewees and gaining insights in relevant issues that clearly improved the quality and reliability of the information. In this sense, the instrument embodied a combination of methods in a *dominant-less dominant design form* (Creswell 1994) aimed to answer the research questions based on the analytical framework presented in chapter 5, and where a *simultaneous triangulation*[15] was adequately and straightforwardly implemented.

[15] The concept of simultaneous triangulation refers to the procedure where the researcher is able to answer quantitative and qualitative research questions at the same time in the study. For further details see Morse 1991.

In this sense, it was possible to record answers and when needed, the reasons for such answers (Davis 1990). The interview was constructed as a modified instrument from a questionnaire that BANSEFI developed for a panel survey, and which we adapted for the objectives of the study. Permission from officials at BANSEFI was granted to obtain and modify the instrument into an interview format. A copy of the content sections of the interview is presented in the Appendix to Chapter 6[16].

6.6.1 The administration of the instruments

In the beginning of the fieldwork, a pilot testing was conducted with the purpose of improving language, format and order of the questions in the interview as recommended by Goode and Hatt (1952); Silverman (1999); Yin (2003), and Padua *et al* (1979). I asked permission to record the interviews using a digital recorder whereas I was taking brief notes on key elements. Several issues were tested, for example, is the interview too long? Is the idiomatic language correct? Are important questions omitted? Is the order of the questions appropriate? Are the questions answering the research questions? Pilot testing was important to improve the validity of the instrument and reliability of the information. For example, when I asked participants if they had borrowed from moneylenders, (known in Mexico as *usureros*), I often had to use other adjectives such as *agiotistas, prestamistas* or *quien presta a reditos*, to ensure a full understanding of the question. In the end, piloted interviews were excluded from the final sample.

Prior the interviews, I visited group meetings or the branch of the organisations where I introduced myself as a PhD student and I explained the scope and objectives of the study. Since many participants were busy, I arranged appointments to conduct the interview, usually for the day after, in their place of residence or where they had their business. Interviews were also conducted during group meetings, particularly with participants at CAME and Promujer, where long-period

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[16] By the time I operationalised the quasi-experiment in Mexico City, the National Savings and Financial Services Bank was piloting a panel survey that was expected to collect data from households borrowing from non-banking institutions, which traditionally offer financial services to middle and low income households across the country, over a period of 5 years. I arranged a meeting with the officials in charge of the project, and asked permission to access the first rounds of to the panel survey. Although I had several meetings with the officials I was never given an answer on whether or not I could access the database. I was allowed, however, to get a copy of the content of the questionnaire.

sessions allowed me to do so. Group meetings regularly took place at the branch of the organisation or at the residence of one of the group members. The interview was administrated, when possible, to both the interviewee and partner. Obtaining information about the household from more than one household member was important to triangulate and directly crosscheck the answers to increase the reliability of the evidence. Since our analysis is at the household level, the fungibility problem is considerable reduced. In order to evade *contamination*, control groups were immediately interviewed after data collection from treatment households had been finished. This strategy helped to avoid what Mosley (1998) has referred to as *downstream evaluations*.

Table 6. 10 Measures to strengthen internal validity

Potential threats	Corrective actions during instrument design and data collection
a. Selection bias b. Hawthorne effects	1. Households participants in a credit programme (including those with loans in arrears) were eligible to be sampled as members of the *treatment group*. Households who had self-selected to participate and had been accepted by the lender, but had not received a loan, were eligible to be sampled *as* members of the *control group*
c. Non-random programme placement	2. A *geographical criterion* was followed in order to hold constant external factors such as infrastructure, costs of inputs, and prices. An *observational protocol* helped to ensure the homogeneity of the selected areas. 3. A *Temporal criterion* was followed in order to record the effects of "treatment" after a certain level of market penetration from the case-study organisations.
d. Attribution	4. Data was collected in relation to access to credit from institutional lenders, moneylenders, and ROSCAS.
e. Fungibility	5. Data collection and econometric analysis were conducted at the household level. 6. A component was designed in the interview to investigate the use of credit.
f. Causation	7. *Simultaneous triangulation* was employed to record the answer, and when appropriate, the reason of such an answer.
g. Motivation	8. Drinks and costs of transportation (when applicable) were offered to participants. 9. Crosschecking with interviewees and other household members was used to ensure the reliability of the answers.
h. Downstream evaluations	10. Control groups were interviewed immediately after treatment groups.
i. Testing	*11. A Piloting process* was carried out to correct language, format and order of questions.

Note: Some ideas have been borrowed from Mosley (1998)

The length of each interview varied from household to household, from a minimum of 50 minutes to a maximum of 2 hours. During that period, I offered interviewees soft drinks and to cover transportation costs for participants that used public

transport. See table 6.10 for a synopsis of the corrective actions undertaken to strengthen the internal validity of the study. Interviews were also conducted with the Managing directors of the case-study organisations as well as with other key decision-makers, in order to get first-hand information on institutional issues that were relevant for the research, e.g. legal constitution; operational and financial structure; products and services; efficiency, productivity and outreach; risk and liquidity, etc. Documents and statistical information were requested during the interview in order to support the information provided.

I regularly spent 3 hours in daily return journeys from my place of residence (in the South of Mexico City) to San Miguel Teotongo and the Chalco Valley (in the Eastern periphery). In the case of Tula City, the Managing Director of Promujer offered me a temporal accommodation in the locality. On average, I interviewed 3 households per day, although in many occasions I was able to complete only one. To a great extent, the social characteristics of the selected neighbourhoods played an important role in slowing down the originally fieldwork plan. The Chalco Valley, and in particular San Miguel Teotongo, have been recently listed amongst the most dangerous areas of the metropolitan area of Mexico City (see the report on criminality from ICESI 2005).

Since dangerous gangs control the areas, I was advised, for security reasons, to leave before sunset. Despite of my precautions, I was robbed by some of these bands. I also faced other unexpected events. When I was conducted some interviews in a block next to the canal "La Compania", in the Chalco Valley, I was infected with a bacteria known as *Klebsiella pneumoniae* that sent me into hospital. I was ill for more than 3 weeks. This canal, that carries sewage water and produces a terrible odour, is the cause of significant health problems in the region. In the end, the fieldwork was completed in a period of 9 months, from September 2003 to May 2004.

6.7 The content areas of the interview

The interview began with general questions in order to build a rapport with the participant. When more private issues were discussed, open-ended questions often helped to encourage interviewees to provide information in grater detail. Interviews

were structured in seven components of interest: 1) general characteristics of the household; 2) physical capital, including both household and business assets; 3) human capital, including education and health; 4) social capital; 5) access to financial institutions and informal financial agents, including the use of products such as credit, savings, remittances and insurance. In this component, a special section was devised in order to capture information on the microfinance organisation; 6) labour activities and income sources, including waged employment and income-generating activities; and 7) external shocks and copying strategies. The first section was designed to investigate households' characteristics, for example: household size, age, gender and activity of each household member, marital status of the participant, and so on. An overview of this section is presented in table A6.9 in the Appendix to Chapter 6.

In section 2, information was collected on the stock of physical capital both at the household and business levels, e.g. data on asset-holdings such as vehicles, electrical appliances and real estate and the means by which these assets were acquired. Section 3 was designed to investigate the characteristics of human capital. This section was divided in two different areas: education and health. The former looked at the level of formal instruction of each family member whereas the latter focused on the health status and the means by which the household cope with illness and diseases. Section 4 was designed to investigate the stock of social capital in the form of formal and informal organised reciprocal networks of trust and mutual help. An overview of these sections is presented in table A6.10 in the Appendix.

Section 5 was devised to collect information on the access to and use of financial products. Questions were divided into several segments aimed to examine the following issues: 1) access to formal institutions and informal savings mechanisms such as ROSCAS. In this section, information was collected on the use and amount of savings, periodicity of deposits and conditions of such instruments. A special subsection was designed to investigate the use of savings instruments offered by the case-study microfinance organisation. See table A6.11 in the Appendix. A second segment was designed to investigate the access to institutional lending and informal credit agents such as moneylenders. In this section, information was recorded on loans requirements such as repayment periods, interest rates, collateral and so on;

and the use of such credits. A special subsection was also designed to record data on the use of credits from the case-study organisations, and qualitative questioning was employed to capture information on issues such as *fungibility* and *causation*[17] that could be relevant to the study (see table A6.12 in the Appendix). Information was also captured on the subjects of remittances and other forms of money transferring (see table A6.13 in the Appendix).

Section 6 was designed to capture information on labour and income sources, including waged labour and income-generating activities. In relation to income-generating activities, information was collected on the type, location and age of the business; reasons to start the business and sources of seed capital; number of people involved in the business, including household members and employees; wages paid to employees; days and hours worked per week; and revenues, costs and profits per week. Regarding waged labour, information was collected on number of household members with waged-jobs, wage-rate and job characteristics. Information was also collected on other income sources such as governmental safety nets, remittances and other transfers. Qualitative questions complemented and crosschecked the answers. With this information it was possible to estimate households income (see table A6.14 in the Appendix).

Finally, section 7 focused on recording information on preventive and coping strategies that households put into practice in order to deal with external shocks and reduce their vulnerability (for further details on these variables, see table A6.15 in Appendix).

It is important to acknowledge here the difficulties of getting accurate data, particularly in relation to income and profits. This constraint can cause estimation errors. This was initially pointed out by Morgenstern (1963) who identified three main sources of data inaccuracy: 1) inappropriate design of instruments of data collection, including unclear questions and definitions (referred hereafter as the *designing problem*); 2) inadequate training of field interviewers (the collecting

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[17] The term *causation* refers here to what Mosley (1998) has described as *misspecification of underlying causal relationships*, which could emerge from e.g. credit officers who encourage borrowers to sell assets or borrow from moneylenders to repay the loan in time.

problem), and 3) since data on income and profits can be highly sensitive to household members, they may have motives to hide or under report data (the motivation problem). These three factors often diminish the quality of the information.

In order to reduce this constraint, I follow different research strategies: to address the designing problem, I tested the quantitative and qualitative components of the interview during a pilot process, in which I checked language, concepts, and order of questions, as suggested by Silverman (1999) and Yin (2003). Since I personally administrated the survey, the collecting problem is believed to have been substantially reduced. However, the motivation problem is potentially the main source of errors. In order to address this problem, I administrated, when possible, the interview to programme participants and their partner or other member of the household. The flexibility of the interview allowed me to triangulate and crosscheck the answers to, as suggested by Arksey and Knight (1999); Berg (2003) and Creswell (1994), increase the reliability of the data. Nonetheless, I acknowledge the problem of data reliability.

6.8 Data entry and analysis

Primary data obtained from the sample survey was inputted in a rectangular format using the Statistical Package for Social Sciences (SPSS), version 12. Variables were coded and labelled according to their level of measurement, i.e. continuous (e.g. income, profits, revenues and costs, etc); nominal (e.g. categories such as gender, marital status, occupation, etc.); ordinal (e.g. health status, perceptions of financial situation, etc), and strings (e.g. alphanumeric codes for each household participant). For further details on the codes of each variable, see Appendix 6.

When the dataset was completed, I carried out a refining process to validate and check for consistency, i.e. to verify missing data in the dataset as well as to remove errors (Miller *et al* 2002). Data manipulation, including recoding, weighting and grouping was undertaking in order to produce new variables that were used afterwards for econometric analysis of the impacts of credit. Prior the econometric analysis, a descriptive statistical analysis including cross-tabulations, was carried

out in order to measure the degree of association between treatment and control groups in relation to the variables of interest. This analysis was carried out using SPSS. For the econometric analysis (presented in Chapters 7 and 8), I selected the Stata Package, version 8, for its structural advantages in cross-sectional analysis. Finally, for qualitative and narrative analysis, I used a complementary *thematic analysis technique* (Boyatzis 1998), in which transcriptions of important accounts were organised by themes according to the subjects of interest. In Chapter 7 and 8, I included narrative evidence to back the empirical findings.

Chapter 7
The impact of credit on income poverty

Introduction

In this chapter we discuss the econometric modelling as well as the results from estimating the impact of credit on income poverty in the context of urban Mexico. Traditionally, the discussion about methods and approaches aimed to analyse poverty impacts range from quantitatively based (Pitt and Khandker 1998a, 1998b; Hulme and Mosley 1996; Morduch 1998; Coleman 1999) to qualitatively related (Hashemi, Schuler et al 1996; Osmani 1998; Rahman 1999; Wood and Shariff 1997). Frequently, the analytical method is selected based on the conceptualisation that the researcher embraces with regards to human deprivation.

Our approach clearly acknowledges the multidimensional nature of poverty that goes beyond the boundaries of income deprivation, where the lack of economic opportunities and essential capabilities such as education, health and nutrition as well as restrictions on people's choices including freedom, dignity and self-respect, are dominant (Sen 1981, 1985; Anand and Sen 1994; UNDP 1997; World Bank 2000). However, as discussed earlier in Chapter 4, the analytical advantages of the income variable allow us to, for example, identify critical thresholds in the form of *poverty lines* and carry out statistical analysis in a straightforward manner (Ravallion 1992).

For analytical purposes, the econometric estimation procedure in section 7.2 focuses on the effects of credit on income changes as a mean to reduce poverty. Taking advantages of the analytical properties of our model, we discuss in section 7.3 the determinants of household borrowing as an introductory section to the effects of programme participation on the level of household income (7.4), which connects to the final section (7.5) that discusses the findings with regards to the poverty impacts.

The challenge of assessing poverty impacts has proved to be a difficult task, in particular due to the characteristics and sample size of the available data; however, our findings confirm what some scholars have found elsewhere. It is important to bring to the reader's attention the fact that in Chapter 8 we discuss the impacts of credit from a wider perspective, looking in particular at factors that affect household well-being such as asset accumulation, housing improvements, children's schooling, and labour.

7.1 The econometric estimation procedure

To begin with, our exposition considers the case where household *i* decides to participate in a credit programme in order to finance any specific productive activity. The amount of capital supplied is exogenously determined by the lender L, who set up this maximum threshold according to level of participation in the programme. The lender is expected to exploit several screening, incentive and enforcement devices to deal with the problems of moral hazard and adverse selection that are related to borrowers' behaviour (Akerlof 1970; Besley and Coate 1995; Hoff and Stiglitz 1990). Some of these devices are, *inter alia*, progressive lending, compulsory savings schemes, and periodical repayment schedules.

Given the particular environment in underdeveloped credit markets, the demand for credit is assumed to be rationed by the lender (Stiglitz and Weiss 1981), and endogenously determined by household's characteristics such as the stock of human capital, individual preferences, attitude towards risks, etc. Our primary concern is to estimate the effect of credit on the outcome to be investigated Y_i, which is observed through the income variable. As a point of departure for the analysis, we consider the following model

$$Y_i = X_i\beta + I_i\delta + u_i \tag{7.1}$$

where X_i is a vector of exogenous households characteristics and I_i is a dichotomous variable with value $I = 1$ if household *i* is a programme participant, $I = 0$ otherwise. The model measures the impact of programme participation by the coefficient of the parameter estimate, δ. An important assumption here is that programme participation is *always* voluntary. The variable I_i cannot be treated as exogenous if we assume a potential problem of *selection bias*, i.e. if the decision of a household of whether or not to participate in the credit programme depends not only on the effort, abilities, preferences, and attitudes towards risk. that generate individual *self-selection* (a demand-related bias), but also on the *selectivity*

discrimination made by credit programmes (a supply-related bias)[1]. An illustrative example of the latter appears when credit officers at Fincomun screen out applicants with no previous business experience, or when village-bank's members at CAME, or Promujer reject new applicants who do not live in the same neighbourhood. We consider, thus, a specification equation in the form:

$$Y_{1i} = \mathbf{X}_{1i}\beta_1 + \mathbf{I}_i\delta + u_{1i} \text{ (for programme participants)} \quad (7.2)$$

$$Y_{2i} = \mathbf{X}_{2i}\beta_2 + u_{2i} \text{ (for non participants)} \quad (7.3)$$

$$I_1^* = \mathbf{Z}_1\gamma_1 - \varepsilon_1 \quad (7.4)$$

$$I_2^* = \mathbf{Z}_2\gamma_2 - \varepsilon_2 \quad (7.5)$$

where $\mathbf{I}_i$ is defined by two components: I_1^* refers to the decision of a household of whether or not to participate in a credit programme, and I_2^* refers to the decision of the credit officer or group members of whether or not to accept such applicants. In this sense,

$I_1 = 1$ if household i chooses to participate in the credit programme

$I_1 = 0$, otherwise

$I_2 = 1$ if household i is accepted by group members or the credit officer

$I_2 = 0$, otherwise

A problem emerges here when we cannot observe households that choose either to participate or not, *and* households that are either accepted or rejected by credit officers or group members, i.e. $I = I_1 + I_2$, but just as a single indicator $I = I_1 \cdot I_2$. As a result, what we observe is household i self-selecting to participate in the credit programme and being accepted by the lender. Thus, we can only specify the distribution of households who have been accepted to participate in the programme (I_2^*) and then estimate the parameter γ_2, if these households have previously self-

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[1] The problem of selectivity has been widely discussed in several fields, in particular labour markets [Heckman (1974, 1979); Cogan (1980); Lee (1978); Abowd and Farber (1982), among many others]; however, just recently it began to be addressed in the literature of microfinance. Some examples are Khandker and Pitt (1998a, 1998b) and Coleman (1999).

selected ($I_1 = 1$). Our estimation strategy therefore will focus on households who have satisfied the condition $I = I_1 \cdot I_2$ (see figure 6.1 in Chapter 6, section 6.3).

Maddala (1999) suggests to define I_2^* over the whole population i.e. identify households with business activity or living in the same neighbourhood, and then analyse the model from the truncated sample where the parameters γ_1 and γ_2 can be estimated by maximising a likelihood function, e.g. Probit or Tobit. The argument, Maddala (1999:261) says, is that, *in principle, I_2^* exists even for the non-applicants.* Thus, the observed Y_i can be defined as $Y_i = Y_{1i}$ if $\mathrm{I}_i = 1$, and $Y_i = Y_{2i}$ if $\mathrm{I}_i = 0$, where the participation decision function is given by $I_i^* = Z_i\gamma = \varepsilon_i$. In another paper, Maddala (1977) derives the covariance matrix as follows:

$$Cov(u_{1i}, u_{2i}, \varepsilon_i) = \begin{pmatrix} \sigma_{11} & \sigma_{12} & \sigma_{1\varepsilon} \\ \sigma_{12} & \sigma_{22} & \sigma_{2\varepsilon} \\ \sigma_{1\varepsilon} & \sigma_{2\varepsilon} & 1 \end{pmatrix} \tag{7.6}$$

that enables us to evaluate the impact of programme participation on the outcome of interest, Y_i by comparing the expected outcome for treatment and control groups. Notice that both groups are participants with a time-variance difference that accounts for the length of membership. Consequently, control groups are integrated by households who just joined the credit programme. We follow the specification:

$$Y_{1i} = \mathbf{X}_i\beta_1 + u_{1i} \text{ (for treatment groups)} \tag{7.7}$$

$$Y_{2i} = \mathbf{X}_i\beta_2 + u_{2i} \text{ (for control groups)} \tag{7.8}$$

and

$$E\langle Y_{1i} \mid I_i = 1\rangle - E\langle Y_{2i} \mid I_i = 0\rangle = X_i(\beta_1 - \beta_2) + \sigma^* \frac{\phi(Z_i\gamma)}{\Phi(Z_i\gamma)} + V \tag{7.9}$$

where $\sigma^* = (\sigma_{2\varepsilon} - \sigma_{1\varepsilon})$, and $\phi(\cdot)$ and $\Phi(\cdot)$ are the density of the distribution function and the cumulative distribution function of the standard normal,

respectively, and $E(V)=0$. Under self-selectivity, $\sigma^{*}>0$, therefore equation (7.9) will report greater coefficients. In other words, households with comparative advantages will benefit more from the credit programme than disadvantaged households. However, since we surveyed households that satisfied the condition $I=I_1 \cdot I_2 \geq 0$ (see section 6.3 in Chapter 6), we believe to have considerably reduced the selection problem.

7.1.1 Using the Heckman procedure with I_i as endogenous regressor

Despite the fact that we believe that our sample strategy addresses the problem of self-selectivity, we may still encounter a problem of endogeneity in the model of programme participation if the explanatory variable I_i is correlated with unobservable factors that are relegated to the error term u_i. In other words, u_i may contain an omitted variable that is uncorrelated with all explanatory variables except I_i. In order to control for the potential endogeneity problem we follow a Heckit estimation procedure (Heckman 1979) with an identifying instrumental variable (IV)[2]. This Maximum Likelihood method follows the model

$$Y_i = X_i\beta_y + I_i\delta + u_i^y \tag{7.10}$$

$$I_i = X_i\beta_I + Z_i\gamma + u_i^I \tag{7.11}$$

where X_i is a n x K vector of household characteristics that capture not only conventional variables such as age, sex, and the dependency ratio, but also elements related to the level household capital endowments such as years of formal education (human capital); housing ownership and the state of the property (physical capital); and the number of household members at work and the number of years in business as proxy variables for the characteristics of the labour market. We introduce an exogenous regressor Z_i in equation (7.11) as the identifying instrument that will not be included in equation (7.10). Z_i is an observable variable distinct from those in X_i that affect I_i but not the outcome of interest Y_i

[2] See Wooldridge (2002), Greene (2003) and Maddala (1999) for a detailed discussion on the properties of the identifying instrument.

conditional on I_i. In other words, the instrument must be *partially* correlated with I_i, i.e. the coefficient on Z_i must be nonzero, $\gamma \neq 0$, so $Cov(Z_i, u_i^I) \neq 0$, whilst Z_i must be uncorrelated with Y_i, so $Cov(Z_i, u_i^y) = 0$, where the projected error, $E(u_i^y) = 0$, is uncorrelated with Z_i. Selecting an appropriate instrument becomes a crucial, but also a complex task for our estimation.

The Heckit procedure also allows us to test for the assumption of no self-selectivity by estimating the inverse Mills ratio, $\lambda(\cdot) \equiv \frac{\phi(\cdot)}{\Phi(\cdot)}$, resulting from the relationship between the density of the distribution function, $\phi(\cdot)$, and the cumulative distribution function of the standard normal, $\Phi(\cdot)$ in equation (7.11). As suggested by Heckman (1979), we can estimate consistently the parameters β_I and γ by exploiting the properties of the first stage Probit estimation and then get the estimated inverse Mills ratio, $\hat{\lambda}$. In the second stage we obtain the parameters β_y and δ from Ordinary Least Squares (OLS) with the inverse Mills ratio added to the regressors as follows:

$$Y_i = X_i\beta_y + L_i\theta_y + I_i\delta + \lambda M + u_i^y \tag{7.12}$$

where we have also included L_i that is a n x K vector of credit market characteristics, which captures the effect of banks and indigenous credit agents such as moneylenders and ROSCAS that compete in the market with microfinance organisations. The rationale behind incorporating these variables into L_i rely on the assumption that if we do not control for the effect of other intermediaries on the outcome of interest Y_i, then the parameter δ that captures the effect of programme participation may be inconsistent, i.e. we could wrongly attribute some outcomes to microfinance organisations when in fact they come from for example, ROSCAS. This is what we refer to in section 6.1 as the *attribution* problem.

The two-stage Least Square (2SLS) procedure yields consistent estimates in the parameter of interest δ (Wooldridge 2002) where M and λ are the inverse Mills

ratio and its parameter estimate, respectively. A simple way of testing for self-selectivity is under the null hypothesis of no selection bias, $H_0 : \lambda = 0$, using the usual 2SLS t statistic. When $\lambda \neq 0$ we may have a problem of self-selectivity.

7.1.2 Selecting the instrumental variable

In order to select our instrumental variable, we analysed instruments used by other researchers. Pitt and Khandker (1998a), for example, have exploited a particular exogenous rule that organisations such as Grameen Bank and BRAC in Bangladesh have set up in order to restrict programme participation by non-poor households. This exogenous rule is related to landownership, and has been defined as *households owning more than one-half acre of land*. This observable variable may contain good properties for the specific lending characteristics of rural Bangladesh where markets, infrastructure and demographic attributes are predominantly rural; however, in the context of urban Mexico, this instrument would be inappropriate.

Firstly, microfinance organisations in Mexico are not imposing any asset-specific restriction for programme participation, although they target deprived (mainly urban) and frequently highly populated areas, where markets are potentially large. Secondly, unlike the context of rural Bangladesh, agricultural activities in the surroundings of Mexico City are non-existent, and these areas have become, to a certain extent, dormitory towns where people travel to the city in search of job opportunities or to carry out self-employment activities. Thirdly, landownership is not a reliable indicator of well-being in the urban context. Locations such as San Miguel Teotongo and the Chalco Valley in the eastern periphery of Mexico City began as densely populated and irregular slums in community-owned land (known in Mexico as *Ejidos*), where entire families with two or more households live in the same residence. These houses are normally built gradually on land with no title deeds, and it was not until recent years that the local authorities began a legal process to regularise these settlements.

Finally, the maximum likelihood estimation method followed by Pitt and Khandker (1998a) was designed to use village fixed effects to control for the endogeneity problem of programme placement since the specific characteristics of the quasi-experimental household survey conducted in Bangladesh covered households in

villages with access to microfinance programmes and households in villages with no access to programme services, as control groups[3]; however, the concept of a *village* in itself is inappropriate and impractical in the context of urban Mexico, where the areas under study are highly populated and socially different from small rural communities. For that reasons, our quasi-experimental survey design followed a different approach:

1. As discussed earlier in Chapter 6, we collected information at household level, from treatment and control groups, where the latter were identified as those households who had just joined the programme but who had not received a loan by the time the survey was conducted. This procedure was essential to avoid potential problems of selection bias.

2. Our quasi-experiment only covered treatment and control groups who lived in the same location. The high density of population in the areas under study as well as the homogeneity of household deprivation allowed us to collect primary data that satisfied the requirements for our analysis. We surveyed for example households borrowing from Fincomun who lived in San Miguel Teotongo (treatment group) and households who had just joined Fincomun and who also lived in the neighbourhood (control group). The same procedure was repeated in the Chalco Valley and in Tula, Hidalgo, where CAME and Promujer operate, respectively. In this sense we have three locations, one for each microfinance organisation, and two groups of households, treatment and control, for each case-study organisation.

3. The sampling strategy was implemented using a *multistage* procedure in the form of clusters (see Fink and Kosecoff 1985, and Creswell 1994): first, I had access to a list of programme participants (both treatment and control) from the case-study organisations (the clusters), and who lived in the selected areas. Participants with loans in arrears were also included in the list in order to avoid biased results and strengthen the internal validity. In the second stage, both treatment and control groups were selected at random.

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[3] The authors used a weighted exogenous sampling maximum likelihood-limited information maximum likelihood-fixed effects (WESML-LIML-FE) approach.

Other researchers have employed instrumental variables that attempt to control for the problem of endogeneity, but at the *village level*. For example Quach et al (2005) have used three identifying instruments in the context of rural Vietnam: the availability of funds; the credit allocation pattern and the level of competition between lenders. Zaman (1999) on the other hand, has used the number of eligible households to participate in microcredit programmes in the context of rural Bangladesh. The problem with these instruments is that they are aimed to work at the village level; however, since we follow an empirical estimation at the *household level* and in the *urban context* these potential instruments were ruled out from our estimation. Given the particular characteristics of urban lending in Mexico, it is reasonable to assume that the level of programme participation, I_i, is exogenously determined by the lender, i.e. microfinance organisations require from applicants a set of minimum requirements in order to participate in the programme. Thus, we decided to concentrate on the supply side in order to identify the instrument Z_i.

Initially, an obvious identifying instrument was the price of the endogenous variable i.e. the rate of interest paid to the lender. Fincomun and Promujer, for example, charge an interest rate of 72% on annum basis whilst CAME charge a rate of 66%; however, since these microfinance organisations charge fixed rates that do not vary across the sample, this policy made it impossible to use the interest rate as an identifying instrument. Then we considered another potential instrument that could provide us with sufficient information on the costs associated to programme participation. As discussed in Chapter 6, microfinance organisations demand periodical repayments (normally on a weekly basis) that take place in the branch of the institution (in the case of Fincomun and Promujer) or in the house of one of the group members where periodical sessions are arranged (in the case of CAME). For simplicity, hereafter we refer to these locations as "the branch".

Weekly *compulsory* meetings, in particular for participants at CAME and Promujer can be highly time-intensive and implicitly costly for programme members. In the beginning we considered an observable variable with computational values that varied from household to household and which reflected the heterogeneity of the *utility cost of programme participation*. We computed this variable by estimating the *cost of transportation* per credit cycle, C_i^T, in which we attempted to capture the

physical and geographical characteristics of the accessibility to the branch, in addition to the *opportunity cost of borrowing*, C_i^O, as a proxy of the income forgone for attending weekly meetings and other activities, per credit cycle. We transformed the values (in pesos) of the *utility cost of programme participation* into logarithmic form, (coded as $\text{LGCOSTBORROWPC} = \sum_{i=1}^{N} \log C_i^T + \log C_i^O$) in order to test for the underlined assumption of no correlation between the identifying instrument and the income variable as follows:

$$\text{LGINCOMEPC} = \beta_1 \text{AVEDU}_i + \beta_2 \text{HOWNER}_i + \beta_3 \text{HESTATE}_i + \beta_4 \text{TIMEBUS}_i + \beta_5 \text{WWORKER}_i + \beta_6 \text{DEPENDRATIO}_i + \beta_7 \text{AGE}_i + \beta_8 \text{WOMAN}_i + \beta_7 \text{MARITAL}_i + \theta_1 \text{ ROSCAS}_i + \theta_2 \text{ FORMALCREDIT}_i + \theta_3 \text{ MONEYLENDER}_i + \delta \text{ LGMAXCREDIT}_i + \gamma \text{ LGCOSTBORROWPC}_i$$

We find that in the case of Fincomun the coefficient γ of LGCOSTBORROWPC reported p-values of the t statistic that rejected the null of $H_0 : \gamma = 0$ at 5% level of significance (see table 7.1), throwing out any possibility of using this variable as the identifying instrument to be exploited in the impact estimation for the three institutions participants in the study as a whole [4].

Table 7. 1 Identifying equations on functional form
Logarithm of the cost of borrowing (LGCOSTBORROWPC) as identifying instrument
Dependent variable in (7.11): logarithm of the maximum amount of credit borrowed (LGMAXCREDIT)
Dependent variable in (7.12): logarithm of monthly income per adult equivalent 1 in pesos of 2004 (LGINCOMEPC)

	FINCOMUN		CAME		PROMUJER	
	Equation 7.11	equation 7.12	equation 7.11	equation 7.12	equation 7.11	equation 7.12
LGCOSTBORROWPC	1.574	0.325	1.705	0.082	1.458	0.055
	(21.18)***	(2.05)**	(10.74)***	(0.62)	(14.61)***	(0.50)
Observations	55	55	46	46	47	47
R-squared		0.44		0.49		0.41

Absolute value of t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Note: For the full results of the estimation regression, see table A7.1 in the Appendix to chapter 7.

We also tried to exploit the first component of LGCOSTBORROWPC, as the identifying instrument i.e. the logarithm of the cost of transportation per credit cycle, $\log C_i^T$, (referred here as LGCOSTRANSPC). Our argument here relies on the

[4] We tested the $\gamma \neq 0$ condition in (7.11) and (7.12) by simply computing a heteroskedasticity-robust *t* statistic after OLS estimation.

idea that there is a correlation between programme participation and accessibility but we do not see how this instrument may affect the income variable. We wish to consider the assumption that the correlation between $\log C_i^T$ and I_i emerges from two sources: 1) microfinance organisations may decide to set up lending restrictions to households *living* a considerable distance from the branch due to the transaction costs implicitly related to the monitoring and enforcement processes.

Regarding this particular issue, the Managing director of Fincomun mentioned in an interview that one fundamental criterion for the organisation is to operate in a geographical radius that do not exceed a journey of 30 minutes walking or by public transport to house of the applicant. He added: *Fincomun bases its operation on the principle of having small and modest branches close to the borrower and several credit officers per branch to cover the local market. This strategy is one of the main institutional innovations in the country* (Interview with Vicente Fenoll, Managing Director of Fincomun (code 03052004, minute: 11:04) [5].

2) We should expect a process involving individual choice where households reporting high transaction and opportunity costs of participation would either have high incentives to borrow the largest amount of capital accessible in order to compensate these costs or may simply decide drop out or not to participate in the first place.

Our survey collected information on the cost of transportation per week given the periodicity of the group meetings; however there were a substantial number of missing values in the data that reflected the individual choice of walking to the branches rather than using public transport (see table 7.2). Since several programme participants walk to attend periodical meetings, we decided to explore the attributes of the time dimension that captured the information about the distance from the residence (or businesses) of the programme participant to the branch, as a proxy of *accessibility*, in substitution of $\log C_i^T$.

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[5] In fact, this policy appeared to be a common practice amongst MFIs in Mexico. For example, the mean value for a time-dimensional variable that measured the distance from the household's residence to the branch was 20 minutes for the case of Fincomun (only outward journey); 21 minutes for CAME and 25 minutes for Promujer.

Table 7. 2 Cost of transportation per credit cycle

	Figures in pesos of 2004				
	Sample	Mean	Maximum	Minimum	Missing values
FINCOMUN	55	99.78	1280	0	39
CAME	46	29.91	320	0	39
PROMUJER	47	60.60	320	0	32
Pooled sample	148	65.62	1280	0	110

Our survey collected information on the time (in minutes) that participants spent since they left home (or business) until they arrived at the branch. This variable was weighted when public transport was used in order to capture the time that they would had consumed if they had walked to the branch[6]. We coded this identifying instrument as DISTANCE. When we estimated the reduced form equation (7.11) with DISTANCE as identifying instrument $\mathbf{Z}_i$ for each of the microfinance organisations, the p-values of the *t* statistic for the coefficient γ rejected the null of $H_0 : \gamma = 0$, i.e. it reflected the statistically significance correlation between accessibility and participation; however, when we included $\mathbf{Z}_i$ in equation (7.12), the parameter estimate γ accepted the null of no correlation against the outcome of interest Y_i (see table 7.3). As a result we were able to use DISTANCE as the identifying instrument for the Heckit procedure.

Table 7. 3 DISTANCE as identifying instrument
Dependent variable in (7.11): logarithm of the maximum amount of credit borrowed (LGMAXCREDIT) †
Dependent variable in (7.12): logarithm of monthly income per capita in pesos of 2004 (LGINCOMEPC)

	FINCOMUN		CAME		PROMUJER	
	Equation (7.11)	Equation (7.12)	Equation (7.11)	Equation (7.12)	Equation (7.11)	Equation (7.12)
DISTANCE	0.028	-0.000	0.073	0.005	0.066	-0.005
	(1.88)**	(0.09)	(2.15)**	(0.94)	(1.92)*	(1.57)

Absolute value of t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
† The Heckman procedure transforms LGMAXCREDIT into a dummy variable for treatment group = 1 if $I_i > 0$. For more details on the regression estimations see table A7.2 in the Appendix to Chapter 7.

One of the reasons for choosing the Heckit procedure is due to its structural qualities. On the one hand, it enables us to test for the assumption of no self-selectivity by exploiting the non-linearity properties of the inverse Mills ratio (coded in the regression equation as MILLS). As discussed above, we conducted the quasi-experiment in a way as to reduce the problem of self-selectivity; however, we

[6] In order to estimate these weights, we asked programme participants about the approximate distance they travel to attend group meetings.

needed to test the hypothesis of no selection problem, $H_0 : \lambda = 0$, (allowing I_i to be endogenous) by using the 2SLS t statistic for $\hat{\lambda}$ in equation 7.12 (Wooldridge 2002). The results accepted the null of no self-selectivity, confirming that we followed an appropriate methodological procedure during the data collection.

On the other hand, the Heckit procedure allows us to test for the quality of the identification variable, and provides us with important information about the robustness of our estimation. In order to do so, the identifying instrument DISTANCE was included in (7.12) alongside with the other exogenous variables, including the inverse Mills ratio. The identification is achieved by exploiting the properties of the inverse Mills ratio that result from the non-linear relationship of the exogenous variables in the reduced form equation (7.11). The coefficients and significance levels of LGMAXCREDIT and MILLS are reported in Table 7.4.

Table 7. 4 Robustness of DISTANCE as instrumental variable
Endogenous explanatory variable in (7.12): Logarithm of the maximum amount of credit borrowed (LGMAXCREDIT) †
Dependent variable in (7.12): logarithm of monthly income per capita in pesos of 2004 (LGINCOMEPC)

	FINCOMUN		CAME		PROMUJER	
	Equation (7.12) on functional form	Equation (7.12) with DISTANCE as identifying Instrument	Equation (7.12) on functional form	Equation (7.12) with DISTANCE as identifying instrument	Equation (7.12) on functional form	Equation (7.12) with DISTANCE as identifying instrument
LGMAXCREDIT	0.591	0.595	0.103	0.088	0.629	0.582
	(2.48)**	(3.39)***	(0.59)	(0.90)	(1.98)**	(1.88)*
MILLS	0.258	0.653	0.089	0.043	-0.053	0.261
	(0.58)	(1.57)	(0.67)	(0.15)	(0.14)	(1.05)
DISTANCE	0.002		0.006		-0.006	
	(0.32)		(1.13)		(1.06)	

Absolute value of z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
† The Heckman procedure transforms LGMAXCREDIT into a dummy for treatment group = 1 if Ii > 0

After running the identification equation, the coefficients of the endogenous explanatory variable in the estimation equations as well as the Mills ratio for each organisation under study remained stable. The consistency of the results confirms the robustness of DISTANCE as the instrumental variable in our estimation[7].

[7] In order to test for potential problems of collinearity, we decided to adopt Lawrence Klein's rule of thumb (1962), and regress the identifying instrument DISTANCE on the remaining explanatory variables and then compute the R^2. Klein suggests that collinearity may be problematic if the R^2 obtained from the auxiliary regression is greater than the regression of I_i on the exogenous variables. Only in the case of Fincomun the auxiliary regression

7.2 Results of the first-stage probit estimation: the determinants of household participation

Despite the fact that our primary interest focuses on the impact of household participation on income levels, we obtain interesting information from the first-stage probit estimation. Notice that the Heckit procedure relies heavily on the distributive nature of the probit model that takes the following form:

$$\text{Prob}(I = 1|X_i) = \int_{-\infty}^{X_i\beta} \phi(t)dt = \Phi(X_i\beta) \tag{7.13}$$

where $\phi(\cdot)$ and $\Phi(\cdot)$ are the same density of the distribution function and the cumulative distribution function of the standard normal derived in equation (7.9). We assume that at least a group of independent variables contained in X_i explain the decision of households to participate in the programme, $(I = 1)$. It is important to stress that the parameters β do not capture the marginal effects (or elasticities) of the model[8]. We can derive the effect of one unit change in the explanatory variables on the probability of households' participation by estimating the marginal effects as follows:

$$\frac{\partial E[I|X_i]}{\partial X_i} = \frac{\partial \Phi}{\partial X_i} = \phi(X_i\beta)\beta \tag{7.14}$$

where the rates of change are computed in STATA at the means of the independent variables, i.e. computed for a variable whilst the rest are held constant (Long and Freese 2003). The results are presented in table 7.5 below.

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reported a greater R^2 (0.37) than the one obtained from the main regression ($R^2 = 0.33$), suggesting a potential problem of collinearity; however, we did not find evidence of serious collinearity when we repeated the procedure for CAME ($R^2 = 0.45$ vs. $R^2 = 0.33$) and Promujer ($R^2 = 0.44$ vs. $R^2 = 0.16$). We believe that the possible collinearity found in Fincomun essentially emerges from micronumerosity in the survey. In fact, when we pooled the individual samples surveys in a single data set the collinearity problem disappeared.

[8] For a detail discussion of the derivation of marginal effects for a Probit regression equation see Greene (2003), Johnson and DiNardo (1997), Maddala (1999) and Wooldridge (2003).

7.2.1 The identifying instrument

To begin the analysis, we turn our attention to the identification variable DISTANCE. Surprisingly, the marginal effects of the parameter estimates for this instrument are *positive* for each of the three organisations under study. In the case of Fincomun, for example, an increase in say, 10 minutes of transportation from the branch to the business (or residence) increase the propensity to participate in the programme by 8%, *ceteris paribus*, and this percentage increased up to 22% and 23% in the cases of CAME and Promujer, respectively.

Table 7. 5 The first-stage probit estimation: the determinants of households' participation
Dependent variable: Logarithm of the maximum amount of credit borrowed (LGMAXCREDIT) †

	FINCOMUN		CAME		PROMUJER		POOLED SAMPLE	
	Coef	$\frac{\partial\Phi}{\partial X_i}$	Coef	$\frac{\partial\Phi}{\partial X_i}$	Coef	$\frac{\partial\Phi}{\partial X_i}$	Coef	$\frac{\partial\Phi}{\partial X_i}$
AVEDU	0.076	0.022	-0.317	-0.096	-0.122	-0.043	-0.05	-0.019
	(1.15)	(1.15)	(3.16)***	(3.16)***	(1.50)	(1.50)	(1.44)	(1.44)
HOWNER	0.477	0.150	2.287	0.679	-0.166	-0.058	0.252	0.095
	(0.77)	(0.77)	(3.12)***	(3.12)***	(0.33)	(0.33)	(0.99)	(0.99)
HESTATE	0.439	0.133	0.639	0.226	0.898	0.334	0.448	0.172
	(0.89)	(0.89)	(0.59)	(0.59)	(1.50)	(1.50)	(1.58)	(1.58)
TIMEBUS	0.094	0.026	-0.058	-0.018	-0.080	-0.028	0.001	0.000
	(1.41)	(1.41)	(0.84)	(0.84)	(2.13)**	(2.13)**	(0.06)	(0.06)
WWORKER	-0.310	-0.087	0.279	0.084	-1.449	-0.510	-0.157	-0.058
	(1.13)	(1.13)	(0.57)	(0.57)	(2.13)**	(2.13)**	(0.95)	(0.95)
DEPENDRATIO	0.746	0.210	-1.329	-0.401	3.538	1.246	0.200	0.074
	(0.82)	(0.82)	(0.75)	(0.75)	(1.53)	(1.53)	(0.35)	(0.35)
AGE	-0.007	-0.002	-0.161	-0.049	0.053	0.019	-0.014	-0.005
	(0.27)	(0.27)	(3.01)***	(3.01)***	(2.15)**	(2.15)**	(1.11)	(1.11)
WOMAN	0.177	0.050	0.488	0.159			0.184	0.069
	(0.32)	(0.32)	(0.71)	(0.71)			(0.69)	(0.69)
MARITAL	-1.725	-0.340	2.248	0.739	1.172	0.429	-0.093	-0.034
	(2.03)**	(2.03)**	(3.21)***	(3.21)***	(1.47)	(1.47)	(0.33)	(0.33)
ROSCAS	-0.031	-0.009	0.686	0.192	0.457	0.157	0.155	0.057
	(0.06)	(0.06)	(1.17)	(1.17)	(0.84)	(0.84)	(0.67)	(0.67)
FORMALCREDIT	0.162	0.043	-2.953	-0.816	-2.078	-0.662	-0.558	-0.218
	(0.21)	(0.21)	(2.38)**	(2.38)**	(2.74)***	(2.74)***	(1.30)	(1.30)
MONEYLENDER	-0.494	-0.161	-1.048	-0.380	-0.972	-0.367	-1.10	-0.417
	(0.67)	(0.67)	(1.06)	(1.06)	(1.51)	(1.51)	(2.87)***	(2.87)***
DISTANCE	0.028	0.008	0.073	0.022	0.066	0.023	0.028	0.010
	(2.58)***	(2.58)***	(2.56)**	(2.56)**	(2.29)**	(2.29)**	(5.08)***	(5.08)***
CONSTANT	-0.510		4.543		-4.477		-0.071	
	(0.29)		(1.80)*		(2.11)**		(0.08)	
Observations	55		46		47		148	
LR Chi-squared	23.13		30.83		23.59		37.97	
Prob > chi2	0.0401		0.0036		0.0231		0.0003	
Pseudo R-squared	0.3295		0.4962		0.4514		0.1553	
Log Likelihood	-23.770		-15.511		-17.725		-83.711	

Robust z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
† The Heckman procedure transforms the LGMAXCREDIT variable into a dummy variable for treatment group = 1 if Ii > 0

Initially, as discussed in section 7.2.1, we were expecting a negative relationship between DISTANCE and the propensity of programme participation given the

policies that microfinance organisations have set up to reduce the transaction costs implicitly related to the monitoring and enforcement processes; however, these policies have been focusing on the geographical boundaries of the place of residence of programme participants. When we analysed the economic activities that households carry out, we found that:

- A large percentage of treatment groups were engaged in self-employment activities (97.2%, 78.6% and 100% in the cases of Fincomun, CAME and Promujer, respectively), where retail commerce played an important part of these activities.

- Since a large percentage of households were selling their products and services at street markets or owned (rented) premises (for example, 30.6% of programme participants at Fincomun were trading at street markets –in comparison to 5.6% of control groups, and this percentage increased up to 50% in the case of members of CAME and Promujer[9]), households with higher *mobility* and able to sell their products in areas economically more dynamic, far from their place of residence reported a higher propensity to borrow from microfinance organisations, independently that both treatment and control groups lived in the same neighbourhood.

- Treatment groups at Fincomun spent on average, 78 minutes in a return journey from their place of work to the branch, whilst the control groups did the journey in 42 minutes. Treatment groups at CAME and Promujer travelled during 65 and 82 minutes, respectively, whilst the control groups travelled for 45 and 54 minutes, respectively.

Thus, it is plausible to argue that *mobility* and *accessibility* to better markets are important determinants that increase the probability of borrowing from microfinance organisations. We believe that this is particularly true in the urban context where the poor often travel long distances in search of sources of livelihood.

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[9] We conducted cross-tabulations to measure the statistical association between treatment and control groups that engaged in self-employment activities at street markets. We find that this association was significant at 0.01 levels for the case of CAME. For further details of the results of the cross-tabulations see the Appendix to Chapter 6.

An important issue arises here from mechanisms such as *periodical repayment schemes* that microfinance organisations extensively employ as a monitoring device.

CAME and Promujer, for example, request programme participants to attend meetings on a weekly basis where subjects of collective interest are discussed e.g. loan instalments, deposits, loan applications, loans in arrears, etc. For those organisations, periodical repayment schedules are fundamental in order to reduce the informational costs and the expected rate of loan default[10]; however, as pointed out by Stiglitz (1990), these informational costs are transferred to the borrower, and can generate an opportunity cost for group members who are economically more active, since they have to forego potential earnings as a consequence of attending meetings that often last for several hours. In that perspective, we wish to consider the following proposition:

Proposition 1: *Borrowers with access to better markets face a higher opportunity cost of borrowing from periodical repayment schedules in group meetings; however, due to the monopolistic characteristics of credit markets, borrowers remain in the credit programme in order to take advantage of progressive lending and minimise this cost.*

Note that as long as the interest rate remains constant, a change in income will shift the household budget constraint to the right, and since the alternative choice for the household is the moneylender, credit from the microfinance organisation will perform as a *normal good*, and an *income effect* will be observed. This behaviour will continue as long as the percentage change in the loan size is larger than the percentage change in earnings from income-generating activities, i.e. progressive lending is available, and the credit market remains monopolistically concentrated. In order to test this proposition, an auxiliary Tobit regression was estimated as follows:

$$C_i = \alpha_c + X_i \beta_{1c} + C_i^o \beta_{2c} + L_i \theta_c + u_i^c \qquad (7.15)$$

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[10] Since Fincomun relies mostly on individual lending, it does not require periodical meetings but just weekly instalments. Fincomun has recently widened the options for loan repayment by opening an account at the HSBC where borrowers can deposit their weekly instalments at any of the branches of this bank. This initiative has benefited borrowers by reducing transaction and opportunity costs of travelling to the branch.

where C_i measures the maximum amount of credit borrowed during the last credit cycle, expressed in logarithmic form. C_i^O captures the *opportunity cost of borrowing* per credit cycle whereas X_i and L_i are, respectively, the same vectors of household and credit market characteristics derived earlier in (7.12).

We have computed C_i^O in logarithmic form (coded as LGOPPORTCOSTPC) by estimating the time spent in each compulsory group meeting, t_i^M, plus the time spent on travelling to attend such meetings, t_i^T. The sum has been weighted by the estimated earnings forgone, based on the actual values reported from income generating activities, π_i, and the outcome multiplied by 16, given the number of periodical repayments meetings per credit cycle, i.e. $C_i^O = 16\sum_{i=1}^{N}\left[\left(t_i^T + t_i^M\right)\pi_i\right]$.

In this sense, a borrower spending, for instance, one hour in a return journey to the branch plus two hours in a group meeting session, and reporting a mean weekly household income in the order of 1750 pesos from 40-hours work in an income generating activity, will absorb an average opportunity cost of 130 pesos per week, which multiplied by the number of periodical repayments meetings in a credit cycle, represents almost one-tenth of the estimated household earnings, *ceteris paribus*.

It is important to point to the fact that we could overestimate the opportunity cost of borrowing if other household members cooperate with the borrower and work in the business whilst attending group meetings. When we analysed the dataset we found that about 45% of programme participants reported to have been engaged with one (or more) member(s) of the household in income generating activities, suggesting that for that sample subgroup we could actually be overestimating the opportunity cost of borrowing. However, we also found that a large percentage of borrowers (about 47%) worked alone, and about half of those were single mothers having their business as the only source of household income. If we take into account the risk associated to the income loss and if the time in which group meetings are arranged takes place during the prime selling hours of the business,

then we could be underestimating the opportunity cost of borrowing. We acknowledge, nonetheless the possibility of being overestimating this cost.

Based on proposition 1, we expect from equation 7.15 a large (and positive) responsiveness in the demand for credit as a result of a percentage increase in the opportunity cost of borrowing, i.e. an elasticity ≥ 1. The econometric results are presented in Table 7.6. As predicted, a one percent change in the opportunity cost of borrowing gives rise to a 1.614 percent change in the amount of credit demanded from borrowers at Fincomun, ceteris paribus, and this figure was 1.716 and 1.513 for participants borrowing from CAME and Promujer, respectively.

Table 7. 6 Tobit estimation equation with LGOPPORTCOSTPC as explanatory variable
Dependent variable in (7.15): Logarithm of the maximum amount of credit borrowed (LGMAXCREDIT)

	FINCOMUN	CAME	PROMUJER
LGOPPORTCOSTPC	1.614	1.716	1.513
	(21.10)***	(10.96)***	(13.51)***
Observations	55	46	47
Left-censored	19	18	21

Absolute value of t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
For more details about the Tobit regression equation see table A7.3 in the Appendix to Chapter 7.

Note that due its correlation with the income variable, the opportunity cost of borrowing will observe an increasing trend once households achieve better living conditions. Ours results show the necessity of improving the existing lending technology in group lending contracts in order to reduce this cost. This could eventually benefit both active borrowers and microfinance organisations, by increasing the likelihood of programme participation with effects on institutional outreach and market coverage.

7.2.2 The variables contained in L_i

We turn now our attention to the variables contained in L_i, the vector of credit market characteristics, which capture the effect of formal and informal credit agents that compete with microfinance organisations. To begin with, the choice of borrowing from institutional lenders such as banks and non-banking financial

institutions[11] (variable coded as FORMALCREDIT in Table 7.5) has a significant negative impact upon participation. In the case of programme participants at CAME (-0.816) and Promujer (-0.662), the parameter estimates show, not surprisingly, a substitution effect between the credit products offered by institutional lenders and microfinance organisations. In other words, borrowing from e.g. savings and credit co-operatives reduce the probability of borrowing from microfinance organisations, *ceteris paribus*. It is important to say, however, that the level of substitutability may be relative. A limited percentage of households (only 28% of treatment groups at Fincomun and 21% and 50% at CAME and Promujer, respectively[12]) had applied for a loan to institutional lenders and just about a third of the applicants got the credit.

The individual choice of a large percentage of households of not applying for a loan to institutional lenders was not necessarily due to elements related to the characteristics of the credit market (e.g. interest rate or collateral demanded), but due to the negative expectations about the final outcome (rejection of the application in this case), which in part reflected the lack of information and knowledge about the process of borrowing as well as the risk-averse behaviour amongst households that was evident by common expressions of lack of trust in these intermediaries (see figure 7.1).

The negative perception about institutional lenders deepened in the aftermath of the financial crisis of December 1994, when many non-banking financial institutions, in particular credit unions, were investigated by the National Banking and Securities Commission for allegations of white-collar fraud. In the end, the Mexican government was forced to implement a rescue plan to guarantee deposits that ended up costing tax payers approximately 4.4 billion dollars[13]. Some households participants also reported having experienced daylight armed robberies outside the branches of commercial banks after they had withdrawn cash, and in several occasions the police found that credit officers had been in collusion with

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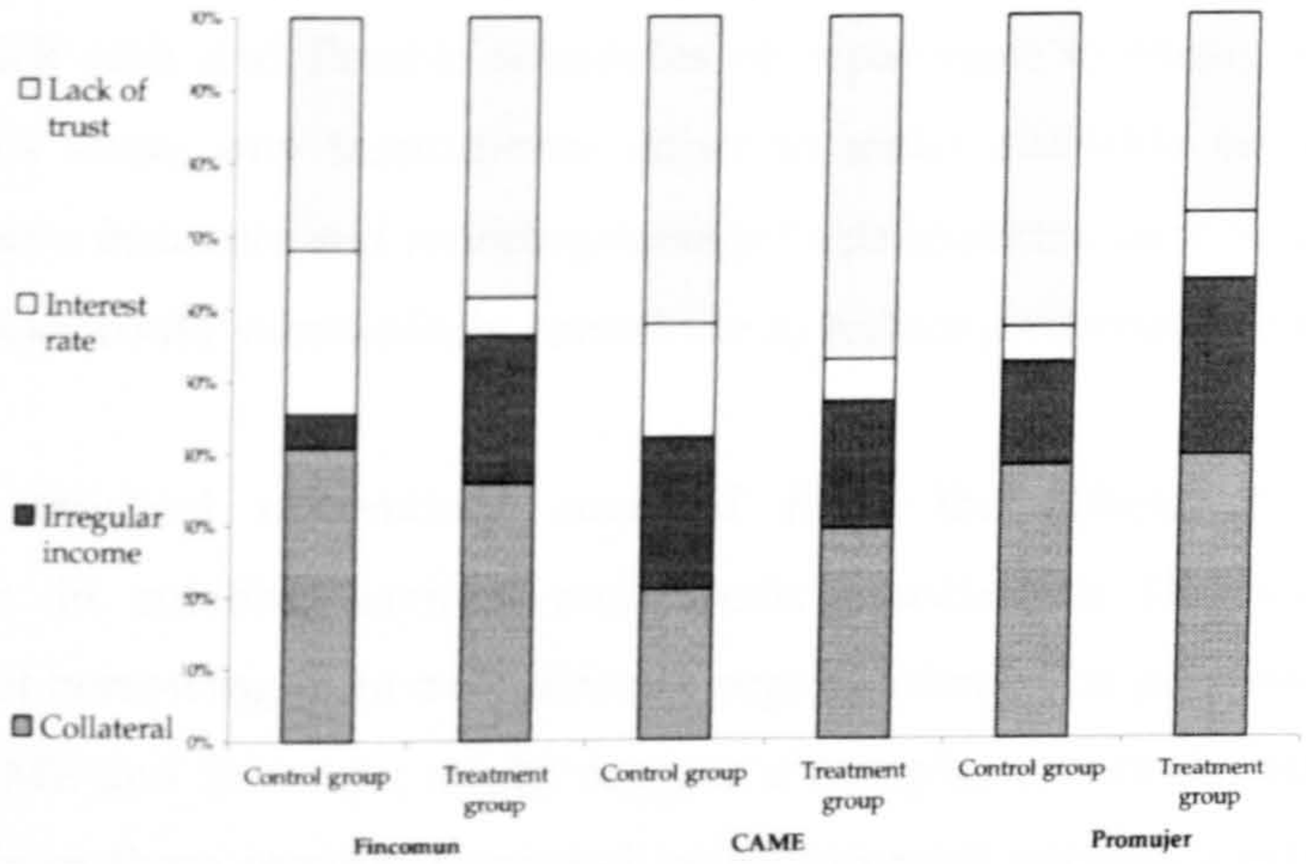
[11] Non-banking financial institutions include Savings and Credit Associations; Credit Unions; Savings and Credit Co-operatives, and Solidarity Associations.
[12] The reason of the increase of loan applications amongst households living in Tula, Hidalgo, is due to the number of Savings and Credit Co-operatives operating in the area. Several of these intermediaries are targeting low-income households and have become natural competitors for microfinance organisations.
[13] For further details about this issue, see Chapter 3

criminal organisations. This kind of criminal behaviour has seriously undermined the reputation and collective confidence in institutional lenders, in particular amongst households living in the Metropolitan area of Mexico City.

Figure 7. 1 Reasons for not applying for a credit



Source: Sample survey

In relation to the variable that captures the choice of borrowing from moneylenders (coded as MONEYLENDER) in the probit equation (7.11), we are not certain about the level of its effect since the coefficients are not significantly different from zero. The only information reported suggests that there might be a negative effect of these agents on the probability of borrowing from microfinance organisations; but we cannot make any final conclusion about it. We might infer, however, that the statistically insignificant levels of the parameter estimates of MONEYLENDER reflect the small number of households who borrowed from these informal agents (16%) despite the fact that the lenders do not require physical collateral to back the loans; they instead, exploit other mechanisms such as physical intimidation to guarantee repayment, and charge substantially higher rates of interest than microfinance organisations: the average interest rate charged by these informal agents was 145% on annum basis (in comparison to 71% charged by Fincomun; 66% by CAME, and 72 by Promujer), and some households sampled had paid rates as high as 240% per annum.

It is not surprising, therefore, that two thirds of the households who had borrowed from moneylenders had problems in repaying the loan, and amongst those, half were forced to sell some of their assets to pay off the loan. A central question

emerges here: why do households borrow from moneylenders when they already have access to the microfinance organisation? We found that more than half of these households used this source of informal funding in order to cope with unexpected events, destabilising shocks such as robberies, ill-health, accidents or the death of a family member. These informal agents exploited their comparative advantages by offering quick cash and flexible schedules of repayment to those households in need. In this sense, any institutional effort to make available services such as *emergency loans, insurance* and *voluntary savings* to programme participants who face external shocks, could substantially contribute to reduce households' vulnerability.

A similar statistical uncertainty emerged from the effects of households' participation in rotating savings and credit associations (ROSCAS) on the probability of borrowing from microfinance organisations. The positive signs in the cases of CAME and Promujer might suggest a complementary dynamic between borrowing from these organisations and using informal savings mechanisms, but the effects are insignificant. In fact, the wide participation of households in ROSCAS (e.g. 58% of treatment groups and 63% of control groups at Fincomun participated in ROSCAS, whereas these figures where very similar at CAME and Promujer: 54% and 50%, and 42% and 48%, respectively), may reflect the severity of credit constraints that emerge from credit rationing imposed by the lenders.

The vast majority of participants in ROSCAS made periodic deposits ≤ 200 pesos during 11 weeks, and when the funds where given to individual participants, they were used, on average, to buy household assets (45%); for consumption smoothing (30%), and as preventive mechanisms against external shocks (20%) (for more details see the Appendix to Chapter 6). Despite their popularity and their heavy reliance on trust amongst participants, ROSCAS were seen as a risky mechanism of deposit when individual reputations were dubious or when participants had uncertain information about new entries.

7.2.3 The variables contained in X_i

We focus now on the components contained in the vector of household characteristics X_i that are related to the level of household capital endowments, in

particular human capital and physical capital[14]. Firstly, we analysed the marginal effects of the variable (AVEDU) that measures the number of years of schooling, as a proxy of the stock of human capital. AVEDU shows a negative relationship, and statistically significant levels on the probability of borrowing from CAME. More precisely, it shows that an increase in one year of formal education reduces the probability of borrowing from CAME by 9.6%. These results tell us that households with higher levels of human capital are more likely to access other sources of funding. We cannot make any definitive conclusion about participants at Fincomun and Promujer since the coefficients of AVEDU are not significantly different from zero.

We might expect, however, a negative relationship since the levels of human capital amongst programme participants are low. In fact, the average years of schooling amongst treatment and control groups at Fincomun were 7 and 5 years, respectively, whereas these figures were 7 and 8 years at CAME and 7 and 9 years at Promujer. The homogeneity of these results is partially explained by the levels of deprivation in the areas under study. For example, 83.3% of treatment groups and 100% of control groups at Fincomun reported a combined primary, secondary and tertiary enrolment ratio below the local average of Mexico City. 60.7% of treatment households and 61% of control groups at CAME reported a combined enrolment rate below the local average in the state of Mexico, whilst at Promujer 61.5% and 24% of treatment and control groups, respectively, fell behind the average enrolment rate in the state of Hidalgo.

We observed that the homogeneity of households' deprivation was extended to variables that capture the effects of the levels of physical capital endowments on the probability of household borrowing: HOWNER (housing ownership), and HESTATE (housing under construction). For example, 73.7% of treatment households and 86.1% of control groups at Fincomun who were living in San Miguel Teotongo held title deeds of their properties, and these percentages went down to 55.6% and 60.7%, and 61.9% and 61.5% for participants at CAME (living in the Chalco Valley) and Promujer (living in Tula, Hidalgo), respectively.

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[14] See section 5.2.2 for a theoretical exposition.

As discussed in Chapter 6, San Miguel Teotongo and the Chalco Valley began as irregular settlements in communal land and it was just recently when the local authorities began to regularise these properties. The low percentage of title holdings partly reflects this situation.

The positive sign, but statistically insignificance levels of the marginal effects of HOWNER and HESTATE (with the exception of housing ownership for participants at CAME) are not giving us enough information to confirm a positive relationship between these two variables and the probability of borrowing from microfinance organisations.

We discuss now the results from the group of variables that capture intra-household characteristics in equation 7.11: the dependency ratio (coded as DEPENDRATIO); the age (AGE); sex (WOMAN), and marital status (MARITAL) of programme participants. We begin the analysis by turning our attention to the dependency ratio. We computed this variable, $DEPENDRATIO = \sum_{i=1}^{N}\left[\frac{(Ch_i + St_i + Rt_i)}{H_i}\right]$; by dividing the number of household's members economically inactive, i.e. children (Ch), students (St), and the elderly (*Rt*) over the household size (*H*). The average size of households' participants was four, although 73% of treatment households borrowing from Fincomun had more than 5 members. About half of households' participants had two members actively working in the labour market and one-fourth of women borrowing from Promujer were head of the family. The data collected from the quasi-experiment did not provide us with enough information to make definitive conclusions about the effect of the dependency ratio on the probability of borrowing from microfinance organisations, since the statistically significant levels of the marginal effects of this variable were not different from zero.

We observed the same statistical insignificance in the parameter estimates of the dummy variable WOMAN for the cases of Fincomun and CAME. Given that Promujer lends exclusively to women, we excluded this variable in the estimation equation for Promujer. To have included it in the probit model, would have caused perfect predictability. Despite the fact that a large percentage of women were borrowing from CAME (79%) and to a lesser extend from Fincomun (53%), the

homogeneity between treatment and control groups might explain the positive signs but statistically insignificant levels of the coefficient estimates of WOMAN. For that reason, we cannot make any final conclusion about the effect of this variable on the probability of borrowing from microfinance organisations.

Regarding the last two variables under analysis, i.e. years of age (continuous variable coded as AGE), and marital status (dummy variable coded as MARITAL that takes the value 1 if the borrower is in a relationship and zero, otherwise) we observed the following in relation to the former: the Probit estimation reported statistically significant levels different from zero in the case of CAME and Promujer, although the signs of the coefficients were opposite to each other. In this sense, whereas the effect of an increase in one year of age on the probability of borrowing from CAME was negative (-5%), in the case of Promujer this effect was positive (2%). Since the marginal effects are computed at the means, ceteris paribus, we believe that this condition might be influencing the results. In other words, given that programme participants at Promujer were younger than participants at CAME, we could expect that a woman at the age of 39 was on average more likely to borrow from Promujer when she turned 40 than a woman at the age of 43 borrowing from CAME when she turned 44.

Opposite signs and statistical significance were also observed in the parameter estimate of the variable MARITAL. More precisely, to be in a relationship had a negative effect on the probability of borrowing from Fincomun whereas the effect of the same variable was positive in the case of CAME. When we look closely at this variable we find a statistically significant association at 0.01 levels between treatment and control groups (see the Appendix to Chapter 6). This association was caused by a large number of participants in the control group who were involved in a relationship (95%), in comparison to the participants in the treatment group (61%).

Finally, we tried to capture the conditions of the labour markets in the areas under study by incorporating two variables in the vector of household characteristics X_i that reflected, on the one hand, the number of households' members with wage-earning jobs (variable coded as WWORKER) and, on the other hand, the number of years being self-employed (variable coded as TIMEBUS), as a proxy of the level of households' involvement in self-employment activities.

In relation to the first variable, WWORKER, a small percentage of households' participants (21%) had wage-earning members, and in most of the households there was just one wage-earner. For example, in the case of Fincomun, 78% of treatment households and 63% of the corresponding control groups had one wage-earner, and in the cases of CAME and Promujer, the figures were 57% and 100%, and 93% and 80%, respectively. The low levels of formal instruction amongst those households explain the *relative* low wages. In particular, 89% of wage-earners living in San Miguel Teotongo (where Fincomun operates), and 80% living in the Chalco Valley (where CAME do business), reported monthly wages ≤ 3627 pesos (about 360 US dollars), and this percentage went down to 50% in the case of workers living in Tula Hidalgo.

The improvement in wages in Tula, Hidalgo, can be linked to the effects of the oil refinery that Mexican Petroleum (PEMEX) operates in the region, and where several husbands of the participants at Promujer are employed. These elements may explain the negative and statistically significant levels of the parameter estimate of WWORKER in the probit regression. The results show that one additional wage-earner in households living in Tula, Hidalgo reduces the probability of borrowing from Promujer in 51%.

The second variable related to the labour market, TIMEBUS, provides us with interesting information. Firstly, we analysed households' businesses by type of activity. We found that a large percentage of households' participants were heavily involved in self-employment activities in the retail commerce sector. For example, almost 60% of treatment households at Fincomun and 43% and 85% at CAME and Promujer, respectively, were employed in that sector, whilst the involvement in industrial activities was restricted to fewer households. In the case of Fincomun and CAME, 22% and 14% of treatment households were working in industrial activities whereas at Promujer, this percentage was rather modest (3.8%). Regarding the services sector, 19% of households at Fincomun, 21% at CAME and 12% at Promujer were engaged in activities such as car repair shops, shoe repairs, restaurants, etc.

Secondly, we observed amongst control groups at Fincomun (61.1%) and CAME (44%) a high concentration of entrepreneurs with a few years of experience in their

business (≤ 2 years) whilst more experienced entrepreneurs were found amongst treatment households. Our findings were expected in particular in the case of Fincomun since the organisation requested that loan applicants had a minimum of one year of business experience in order to be creditworthy. In fact, we found in a cross-tabulation a statistical association, significant at the 0.001 levels, between treatment and control groups in relation to the number of years of experience in the business[15].

Thirdly, an important issue emerged from the probit regression. The parameter estimates of TIME BUS reported a small effect with statistical significance, although with a negative sign, in the case of programme participants at Promujer. More precisely, one additional year of experience in the business reduced the probability of programme participants to borrow from Promujer in 2.8%. The small and negative marginal effects of the same variable for participants at CAME, although statistically insignificant, might suggest a similar behaviour. We believe that the negative sign of TIME BUS can be linked to the upper limits of progressive lending that organisations such as CAME and Promujer have traditionally imposed.

The problem is that these upper limits cause *micro-rationing*, which might affect in particular *experienced* borrowers who are more likely to borrow the largest amount of capital. As soon as these borrowers reach the upper limits, they are forced to search for other sources of funding, or continue borrowing at a suboptimal level. In this sense, policies aimed to open up (or even eliminate) the upper limits of progressive lending would be beneficial to borrowers as well as to lenders since the latter would be able to cut down monitoring and enforcement costs by keeping *good* borrowers in the organisation and by doing so, the expected rate of default that directly impact the loan portfolio at risk. It is reasonable to argue that microfinance organisations that impose upper limits to incentive devices such as progressive lending and pursue policies of *graduation* amongst old borrowers are potentially losing the best clients! Any attempt to diversify services and open up loan restrictions to reach down and up the market could benefit the institutions' operational and financial performance.

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[15] For further details of the results of the cross-tabulations, see the Appendix to Chapter 6.

Additionally, organisations such as CAME and Promujer that rely their operations on rigid monitoring devices such as periodical repayment schedules, can be facing a mismatch between loan repayments and households' income. This mismatch could cause serious distortions in the market since poor households not only have *low income* but *insecure income*, which can vary dramatically from season to season.

For example, cobblers and carpenters know that from January to the end of February it is a bad season for their businesses whereas toy and gift shop owners expect high earnings in the same period. Income variability can also constrain loan size: for example, we should expect that a household with four members that have monthly earnings of 4000 pesos in *bad* seasons and 7000 pesos in *good* seasons will rather prefer to borrow capital based on how much they can afford to repay in bad seasons (4000 pesos) than on the average earnings (5500 pesos). In this sense, borrowers with seasonal income will end up with a credit limit below the optimum level.

Since the rigidity of loan contracts can substantially increase the transaction and opportunity costs of borrowing, it may actually be keeping good borrowers from borrowing. In fact, we recorded empirical evidence from households interviewed in the Chalco Valley suggesting that borrowers at CAME were dropping out the programme in order to avoid going into default. Frequently these borrowers were, ironically, excellent clients. In this sense, flexibility possesses two great advantages:

On the one hand, flexible contracts can increase client retention and thus help organisations to expand and deepen their operations; on the other hand, flexibility can significantly increase the impact of credit, since it can prevent households having to take actions that might affect the rate of return on investment. As we discussed earlier, the opportunity cost of borrowing (that emerges from rigid periodical meetings) is positively correlated with the level of household income. If microfinance organisations succeed in reducing this cost, by designing innovative technology and flexible contracts, this could ultimately benefit household welfare and reduce the level of deprivation. We discuss in the next section the results from the second-stage Heckit estimation, which precisely focus on the impact of credit on household income.

7.3 Results of the second-stage Heckit estimation: the impact of *programme participation* on household income

We now turn the attention to the results from the estimation of the impact of programme participation on household income presented in table 7.8. We have estimated Y_i in (7.12) by employing the logarithm of income per capita and three different definitions of income per adult equivalent as the dependent variable. The use of adult equivalence scales is generally justified given the fact that children normally have lower consumption expenditure than adults and therefore they should be given a lesser weight. Some studies (e.g. Drèze and Srinivasan 1997) suggest that additional adults should be weighted less than the first adult after taking into account economies of scale.

Poverty rates can be sensitive to equivalence scales and thus, alter the conclusions reached on the impact of microfinance on poverty reduction. In this sense, it becomes important to look at this particular issue. There have been recent attempts to incorporate weights to the distribution of wealth in developing countries by assigning adult equivalencies to household members according to their age and sex [e.g. May, Carter and Posel (1995) in South Africa and Hentschel and Lanjouw (1995) in Ecuador]; however, given the lack of a general guideline regarding the use of equivalence factors in the context of Mexico, we decided to follow, as discussed previously in Chapter 4, the approach adopted by Rothbarth (1943).

The equivalence factor takes the form $e_h = (A_h + \Phi K_h)^\theta$, where e_h is the equivalence factor for household h, A_h is the number of adults (from age 18 to 65) and K_h is the number of children in household h. The parameter θ is equal to 1 and Φ has different values corresponding to the age and sex of every child. In this sense, boys in the range 0-5 years have a Φ value of 0.661 while girls have one of 0.609; boys in the range of 6 to 12 years have a parameter Φ of 0.750 while girls have one of 0.664; young men in the range of 13 to 18 years have a parameter of 0.633 while young women in the same range of age have a weight of 0.635. Finally elderly men and women (65 years of age and older) were assigned values of 0.553 and 0.570, respectively. For the purpose of our analysis, we will refer to this measurement as equivalence factor 1 (IAE1).

We also include in our estimations other equivalence factors in order to conduct a sensitivity analysis. We follow, therefore, the adult equivalence scales developed by Wagstaff and van Doorslaer (1998) where it is given the parameters Φ and θ in equation (7.16) a value equal to 0.75 and children are defined as those aged less than 14 years. We refer to this measurement as equivalent factor 2 (IAE2). Additionally we employ the OECD modified equivalence scale based on Hagenarrs *et al*, (1998) which weights the first adult with 1, additional adults with 0.5 and children aged 14 and less with a weight of 0.3. In our analysis we refer to this product as the income per adult equivalent 3 (IAE3). Although we are aware of the fact that the use of income *per capita* (IC) does not take into consideration intra-household allocation of resources, which could undermine problems of household inequality, we decided to include this definition as another proxy of household distribution of wealth for comparative purposes.

Table 7. 7 Intra-household distribution of income by equivalent factors

Figures in pesos of 2004	FINCOMUN		CAME		PROMUJER	
	Treatment	Control	Treatment	Control	Treatment	Control
Average household income per month	9,899	4,831	6,567	5,219	6,339	6,663
Household income as a % of treatment group	100%	49%	100%	79%	100%	105%
Average monthly IC	2,338	1,372	1,707	1,473	1,711	1,503
IC as a % of treatment group	100%	59%	100%	86%	100%	88%
Average monthly IAE1 a/	2,684	1,533	1,963	1,699	2,010	1,766
IAE1 as a % of treatment group	100%	57%	100%	87%	100%	88%
Average monthly IAE2 b/	3,545	1,945	2,524	2,106	2,546	2,364
IAE2 as a % of treatment group	100%	55%	100%	83%	100%	93%
Average monthly IAE3 c/	4,208	2,271	2,982	2,474	3,040	2,836
IAE3 as a % of treatment group	100%	54%	100%	83%	100%	93%

a/ Income per adult equivalent 1 follows the approach developed by Rothbarth (1943),

B/ Income per adult equivalent 2 follows Wagstaff and van Doorslaer (1998).

c/ Income per adult equivalent 3 follows the OECD modified equivalence scale based on Hagenarrs et. al, (1998).

As we were expecting, after taking into account distributional factors, the level of individual welfare was substantially affected by the weights given to households' members, with income per capita being the measurement that most over-stated the level of deprivation. For example, the average income per capita amongst treatment households at Fincomun was reported to be in the order of 2,338 pesos whilst the same variable substantially increased when equivalent scales were introduced, e.g. 2684 pesos using IAE1; 3545 using IAE2, and 4208 employing IAE3 (see table 7.7). For analytical purposes, we primarily focus on the income per adult equivalent 1.

We have also pooled the individual sample surveys into a single data set. In order to do so, we employed the Kruskal-Wallis test to compare the statistical difference of the income variable between the three samples i.e. households living in the Iztapalapa District, in the Chalco Valley and in Tula, Hidalgo. The KW statistic takes the following form:

$$KW = \frac{12}{N(N+1)} \sum_{i=1}^{k} n_i \left(R_i - \frac{N+1}{2} \right)^2$$

where k represents the independent samples of size $n_1,...,n_k$, N is the total number of all n_i, and R_i is the average of the ranks of the observations in the i^{th} sample. Under the null hypothesis, the KW test states that the k distribution functions are equal. In order words, the income variable between the samples yields similar values. The alternative hypothesis is that at least one of the sample populations tends to yield larger values than the other sample populations. We reject the null hypothesis that all k distributions are the same if $KW > \chi^2 K-1$.

Test for Equality in the income variables

Method	Income per capita		Income per adult equivalent 1 a/		Income per adult equivalent 2 b/		Income per adult equivalent 3 c/	
	Value	Probability	Value	Probability	Value	Probability	Value	Probability
Med. Chi-square	2.352468	0.3084	1.694794	0.4285	1.258431	0.5330	2.037339	0.3611
Adj. Med. Chi-square	1.699714	0.4275	1.198024	0.5494	0.834387	0.6589	1.441233	0.4865
Kruskal-Wallis	1.281291	0.5270	1.847889	0.3970	2.075369	0.3543	2.185005	0.3354
Kruskal-Wallis (tie-adj.	1.281718	0.5268	1.847971	0.3969	2.075442	0.3543	2.185297	0.3353
MFI	Median	Mean Rank	Median	Mean Rank	Median	Mean Rank	Median	Mean Rank
FINCOMUN	1600	78.49091	1899.540	78.30000	2501.090	78.79091	3047.620	78.22727
CAME	1400	68.89130	1606.535	67.41304	2105.520	67.04348	2425.000	66.75000
PROMUJER	1400	75.31915	1636.160	76.98936	2188.450	76.77660	2666.670	77.72340
All	1488	74.50000	1681.930	74.50000	2149.480	74.50000	2563.495	74.50000

a/ it follows the approach developed by Rothbarth (1943); b/ follows the approach developed by Wagstaff and van Doorslaer (1998) and c/ follows the OECD modified equivalence scale based on the work of Hagenarrs et. al, (1998). For more detail, see chapter 4.

The p values obtained from the KW test accept the null of equality between the three samples for each of the income variable definitions (see table above). These results allowed us to pool the three individual samples into a single data set for comparative purposes. The econometric results of the impact of programme participation on individual income are shown below in table 7.8.

Table 7. 8 The impact of programme participation on household income

Endogenous explanatory variable (I_i in Equation 7.12): Logarithm of the maximum amount of credit borrowed (LGMAXCREDIT) †

		FINCOMUN		CAME		PROMUJER		Pooled sample	
		OLS	Heckit	OLS	Heckit	OLS	Heckit	OLS	Heckit
Dependent variable (Y_i in Equation 7.12): logarithm of monthly income per capita in pesos of 2004 (LGINCOMEPC)	LGMAXCREDIT	0.553	0.595	0.126	0.088	0.110	0.582	0.313	0.115
		(2.53)**	(3.39)***	(0.81)	(0.90)	(0.73)	(1.88)*	(3.52)***	(1.75)*
	MILLS		0.653		0.043		0.261		0.129
			(1.57)		(0.15)		(1.05)		(0.61)
Dependent variable (Y_i in Equation 7.12): logarithm of monthly income per adult equivalent 1 in pesos of 2004 (LGINCOMEPAE1) a/	LGMAXCREDIT	0.548	0.588	0.140	0.099	0.102	0.701	0.315	0.121
		(2.57)**	(3.27)***	(0.91)	(1.00)	(0.67)	(2.33)**	(3.59)***	(1.81)*
	MILLS		0.671		-0.010		0.293		0.118
			(1.57)		(0.03)		(1.18)		(0.08)
Dependent variable (Y_i in Equation 7.12): logarithm of monthly income per adult equivalent 2 in pesos of 2004 (LGINCOMEPAE2) b/	LGMAXCREDIT	0.605	0.554	0.109	0.063	0.067	0.691	0.314	0.111
		(2.91)***	(3.05)***	(0.80)	(0.68)	(0.44)	(2.53)**	(3.75)***	(1.74)*
	MILLS		0.676		0.183		0.294		0.226
			(1.57)		(0.65)		(1.28)		(1.09)
Dependent variable (Y_i in Equation 7.12): logarithm of monthly income per adult equivalent 3 in pesos of 2004 (LGINCOMEPAE3) c/	LGMAXCREDIT	0.611	0.558	0.095	0.066	0.065	0.737	0.313	0.109
		(2.93)***	(3.14)***	(0.71)	(0.70)	(0.43)	(2.75)***	(3.74)***	(1.69)*
	MILLS		0.661		0.180		0.311		0.219
			(1.57)		(0.63)		(1.35)		(1.05)

Robust t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

† The Heckman procedure transforms LGMAXCREDIT into a dummy variable for treatment group = 1 if $I_i > 0$

a/ Income per adult equivalent 1 follows the approach developed by Rothbarth (1943).

b/ Income per adult equivalent 2 follows the approach developed by Wagstaff and van Doorslaer (1998).

c/ Income per adult equivalent 3 follows the OECD modified equivalence scale based on the work of Hagenarrs *et. al* (1998). For more details on these definitions of income per adult equivalent, see Chapter 4.

For more details about the OLS regression equations, see tables A7.4 in the Appendix to Chapter 7. For the Heckman results, contact me at: m.nino@sheffield.ac.uk

The parameter estimate δ of the impact variable, I_i, in (7.12) reports the difference in the *mean* log income per adult equivalent of treatment households relative to the control group. The slope coefficients show a positive sign for each of the three microfinance organisations; however, the coefficients were only statistically significant different from zero in the case of Fincomun. Since in the earlier analysis on the coefficients of the inverse Mills ratio revealed no evidence of selection bias (see section 7.2.2 above), we were able to concentrate on the least square estimation.

In order to calculate the percentage change of income per adult equivalent of treatment households relative to the control group, we take the antilog of the parameter estimate I_i and compute $(e^{\delta}-1)\times 100$ (Halvorsen and Palmquist 1980). For example, if we estimate the antilog of δ when the logarithm of monthly income per adult equivalent 1 was derived as the dependent variable we obtain $e^{0.548}=1.7297$, suggesting that ceteris paribus, the *median* income per adult equivalent of treatment households with at least one year of programme participation at Fincomun was higher than that of the control groups by about 73%. We observed nevertheless a degree of variability in the coefficient of I_i when different definitions of income per adult equivalent were introduced, suggesting that the impact analysis of credit might be sensitive to intra-household distribution of welfare. Surprisingly, the parameter estimate δ in the regression equation was positive *but* not significantly different from zero in the case of CAME and Promujer. In other words, although there might be a positive effect of programme participation on individual income, there is no evidence to confirm this relationship.

The starting point in examining the reasons of the insignificant levels of δ was to see the degree to which it might be related to the severity of deprivation amongst households' participants. In fact, some researchers have found that very poor borrowers are more likely to report low income impacts not only because they are engaged in low-return self-employment activities (Hulme and Mosley 1996; Husain 1998; Zaman 1999; Wood and Shariff 1997)[16] but also because in the process of decision making, the vulnerable have attitudes that indicate they are more risk-

[16] Self-employment represented 85%, 65% and 71% of the income sources, for treatment households at Fincomun, CAME and Promujer, respectively.

averse (see e.g. Ravallion 1988; Sinha and Lipton 1999). The problem is that the estimation procedure provides us with information on the impact of programme participation at the *mean* of the dependent variable; however, it does not tell us to what extent those participants are actually poor. Furthermore, notice that the parameter δ measures the *average* impact of programme participation on Y_i; however, it does not take into consideration the effect of credit over time. Treatment households with say five years of membership are expected to report a greater impact than those households with just one or two years of membership. This is in part due to the effect of progressive lending that continuously increases the credit limit of borrowers. In order to address the latter issue we extend the Heckman procedure to a Tobit selection equation in section 7.3.1, before we concentrate in section 7.4 on finding out to what extent CAME –and the other two organisations- were actually reaching the poor.

7.3.1 Substituting the Heckit procedure for a Tobit selection equation: the impact of *credit* on households income

As mentioned above, the parameter δ measures the *average* impact of programme participation on the level of income per adult equivalent; however, it does not take into consideration the effect of credit over time. In order to address this problem, we replace the treatment dichotomous variable I_i in equation (7.11) by a continuous variable, C_i, that measures the maximum amount of credit borrowed during the last credit cycle. We assume that C_i is *exogenously* determined by the lender *L*, who set up this maximum threshold according to level of participation in the programme. Thus we have the following specification equation

$$C_i^* = X_i\beta_c + Z_i\gamma + u_i^c \tag{7.16}$$

where

$$C_i = \max(0, C_i^*)\text{, i.e.} \tag{7.17}$$

$$C_i = C_i^* \quad \text{if} \quad C_i^* > 0 \text{ (for treatment group)} \tag{7.18}$$

$$C_i = 0 \quad \text{if} \quad C_i^* \leq 0 \text{ (for control group)} \tag{7.19}$$

and

$$u_i | X_i \sim Normal(0, \sigma^2)$$

Consequently, C_i takes a maximum value and a lower threshold zero in the form of a censored Tobit model (Tobin 1958) with a $C_i > 0$ for treatment groups and $C_i = 0$ for control groups[17]. In this way we believe to be capturing a more precise measure of the impact of programme participation by using C_i in the reduced form equation, where δ now measures the impact of credit *per additional unit of capital borrowed*. Notice that the use of OLS for the sub-sample for which $C_i > 0$ will produce inconsistent estimators of β_c and γ, since we are using only the data on uncensored observations (Wooldridge 2002), causing a downward bias result (Greene 2003)[18]. Thus, the Tobit model implies that the probability of observing $C_i > 0$ and $C_i = 0$ are $\phi(\cdot)$ and $p(C_i^* < 0) = \Phi(0)$, respectively, where $\phi(\cdot)$ and $\Phi(\cdot)$ denote the same density function and the cumulative density function of the standard normal analysed above in section 7.2. These assumptions are very similar to those implied in the Probit selection equation, but now the log-likelihood function takes the form

$$\ln L = \sum_{C_i > 0} \left(-\ln \sigma + \ln \phi \left(\frac{C_i - X_i \beta_c}{\sigma} \right) \right) + \sum_{C_i = 0} \ln \left(1 - \Phi \left(\frac{X_i \beta_c}{\sigma} \right) \right) \qquad (7.20)$$

which generates three conditional mean functions[19]: one of the latent variable C_i^*, which can be used to understand the *unobservable* factors (e.g. individual preferences, attitudes towards risk or entrepreneurship) that affect the propensity to borrow from microfinance organisations; one of the *observed* dependent variable C_i, which can be used to understand the determinants of the level of borrowing by treatment and control groups alike; and one of the uncensored observed dependent

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[17] Since we have a data-censoring case demanding the variable C_i^* to follow a homoskedastic normal distribution, we use a logarithmic transformation in our estimation strategy to make this assumption more reasonable.

[18] Goldberger (1972) and Greene (1981) have proved that the ratio of the OLS estimates to the maximum likelihood estimates get close to the proportion of data uncensored.

[19] For further details on the derivation of the conditional mean functions, see Greene (2003).

variable $C_i|C_i>0$, which can be used to understand the determinants of the level of borrowing by treatment households alone.

We are particularly interested in looking at the conditional mean function of the observed dependent variable C_i that is *censored at zero* for control groups, and have disturbances normally distributed. In other words, we are interested in examining the *observed* factors that affect the level of household borrowing between treatment and control groups. This is actually the fundamental reason of using a standard Tobit specification. If no censoring had occurred, to use a Tobit model in our estimation procedure would be inappropriate (Maddala 1999). In order to interpret the estimation results, we follow (Greene 2003) to derive the marginal effects of X_i on C_i as follows:

$$\frac{\partial E[C_i|X_i]}{\partial X_i} = \beta_c \Phi\left(\frac{X_i\beta_c}{\sigma}\right)^{20} \tag{7.21}$$

We can estimate now a borrowing function for the level of programme participation (including the intercept), which is determined by the maximum amount of capital lent during the last credit cycle as follows:

$$C_i = \alpha_c + X_i\beta_c + Z_i\gamma + L_i\theta_c + u_i^c \tag{7.22}$$

where X_i is a n x K vector of household characteristics; Z_i is a set of observable variables distinct from those in X_i that affect C_i but not the outcome of interest Y_i conditional on C_i that plays the role of the identifying instruments; L_i is a vector of credit market characteristics; $\alpha_c, \beta_c, \gamma$ and θ_c are the intercept and the unknown parameters, respectively whilst u_i^c is the error term that captures unmeasured household characteristics that determine borrowing levels. It is important to acknowledge the fact that microfinance organisations are not only lending

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[20] McDonald and Moffitt (1980) have decomposed equation (7.21 into two parts to obtain the effects of a change in X_i on the conditional mean of C_i, and on the probability that the observation will fall in the part of the distribution where $C_i > 0$.

organisations. In the case of Fincomun, the organisation is legally authorised to receive deposits, whereas the internal fund at CAME has become an important saving mechanism for village bank members. Nevertheless, given that credit remains the primary product of interest that motivates households to join the organisations[21], we consider the maximum amount of credit as the best indicator to measure the impact of programme participation on household welfare. The function for the outcome of interest Y_i, i.e. income per adult equivalent, conditional on the level of programme participation C_i takes the form

$$Y_i = \alpha_y + X_i\beta_y + L_i\theta_y + C_i\delta + u_i^y \tag{7.23}$$

where α_y, β_y, θ_y and δ are the intercept and the unknown parameters respectively, whilst u_i^y is the error term reflecting unmeasured determinants of Y_i that vary from household to household. Given that we are including C_i as the explanatory variable in (7.23), we may expect some level of endogeneity emerging now from the lenders' policy-specifics that affect the *maximum amount of credit borrowed* and not only the *accessibility* to it, as discussed earlier when the Heckman procedure was estimated.

To select an identifying instrument for the Tobit selection equation, additional to DISTANCE, becomes once again an essential and difficult task. This instrument must satisfy the same conditions as in section 7.2 to enable us to estimate a 2SLS Tobit procedure, the type of method that Amemiya (1984) has referred to as Type III Tobit model. We derive this estimation equation as follows:

$$Y_i = \alpha_y + X_i\beta_y + L_i\theta_y + C_i\delta + R_i\upsilon + e_i \tag{7.24}$$

where R_i and υ are the predicted Tobit residuals and its parameter estimate, respectively, and $e_i \equiv u_i^y - E(u_i^y \mid R_i)$, where (e_i, R_i) are assumed to be independent

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[21] In interviews, the majority of participants said that credit was the main product of interest, nevertheless 36% of members at CAME said that the *internal fund* was an important incentive to join the organisation, whereas 62% of borrowers at Promujer described the periodic training sessions as useful instruments of education and empowerment.

of X_i, i.e. $E(e_i|X_i, R_i)=0$. The predicted residuals from the Tobit equation are estimated when $C_i \geq 0$ in (7.22) and then included as another regressor in (7.24) to yield consistent and efficient estimators (Wooldridge 2003). The null of no selection bias is tested in similar fashion as the Heckit procedure; however, we now use the 2SLS heteroskedasticity-robust t statistic on the predicted residuals: when $\upsilon \neq 0$ we encounter a selection problem.

In order to identify the additional instrument contained in Z_i, we analysed the incentive and enforcement devices that the case-study organisations employ, and which are expected to affect C_i but not the outcome of interest Y_i. We explored two variables as identifying instruments: the length of membership (coded as MEMBERSHIP) and the amount of compulsory savings requested by the organisation in logarithmic form (coded as LGSAVINGSMFI). The former instrument was related to progressive lending, a device employed by microfinance organisations in order to deal with the problem of moral hazard and reduce operational costs in the long run; this instrument was computed as the number of years of programme participation. The latter instrument was linked to compulsory savings schemes that lenders request in order to be eligible to participate in the programme, and which are designed to reduce the problems of moral hazard and the expected default rate.

Initially we tried to exploit the information contained in LGSAVINGSMFI to be used as instrumental variable; however, we faced two fundamental problems during the estimation process: firstly, some concerns emerged in relation to the identifying instrument since the level of compulsory savings might be correlated, to some degree, to the level of income. Secondly, the three case-study organisations required applicants to deposit an amount equal to 10% of the size of the credit. In this sense, the *percentage share* of the variable LGSAVINGSMFI did not vary too much from household to household causing a potential problem of collinearity. For those reasons we decided to focus on the variable MEMBERSHIP.

When we estimated equation (7.22) with DISTANCE and MEMBERSHIP contained in vector Z_i as identifying instruments for each of the case-study organisations, the

p-values of the t statistic for the coefficient γ rejected the null of $H_0 : \gamma = 0$, i.e. it reflected the statistically significance correlation between the maximum level borrowing, C_i, and the two instruments contained in Z_i; however, when we included Z_i in equation (7.23), the parameter estimate γ accepted the null of no correlation against the outcome of interest Y_i (see table 7.9). We also followed Klein's rule of thumb (1961) to test the instruments for potential problems of collinearity. None of the auxiliary regressions with DISTANCE and MEMBERSHIP as dependent variables reported a higher R^2 than the one obtained from the main regression equation (7.22), rejecting any serious problem of collinearity. As a result we were able to use DISTANCE and MEMBERSHIP as identifying instruments for the Tobit selection procedure[22].

Table 7. 9 Identifying instruments for the Tobit selection equation
Dependent variable in (7.22): logarithm of the maximum amount of credit borrowed (LGMAXCREDIT)
Dependent variable in (7.23): logarithm of monthly income per adult equivalent 1 in pesos of 2004 (LGINCOMEPAE1)

	FINCOMUN		CAME		PROMUJER	
	Equation (7.22)	Equation (7.23)	Equation (7.22)	Equation (7.23)	Equation (7.22)	Equation (7.23)
MEMBERSHIP	2.235	-0.024	2.074	0.018	5.487	-0.003
	(6.80)***	(0.19)	(6.78)***	(0.29)	(10.36)***	(1.22)
DISTANCE	0.060	-0.001	0.058	0.004	0.042	0.340
	(2.60)**	(0.41)	(1.76)*	(0.88)	(2.84)***	(1.65)

Absolute value of t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
For more details about the regression equation see table A7.5 in the Appendix to chapter 7

The econometric results of the impact of credit on individual income using equivalent factors are shown below in table (7.10). Notice that the predicted residuals from the second-stage Tobit selection equation report statistically insignificant levels in the parameter estimates v, confirming – as before in the Heckit procedure - the assumption of no selectivity. It is possible to argue that the decision process that involves increasing levels of borrowing is largely a function of the policy-specifics that are exogenously determined, and linearly correlated to progressive lending (captured by the length of membership).

[22] The first-stage Tobit results, contact me at m.nino@sheffield.ac.uk.

Table 7. 10 The impact of credit on household income

Endogenous explanatory variable (C_i in Equation 7.20): Logarithm of the maximum amount of credit borrowed (LGMAXCREDIT)

		FINCOMUN		CAME		PROMUJER		Pooled sample	
		OLS	2S-Tobit	OLS	2S-Tobit	OLS	2S-Tobit	OLS	2S-Tobit
Dependent variable (Y_i in Equation 7.21): logarithm of monthly income per capita in pesos of 2004 (LGINCOMEPC)	LGMAXCREDIT	0.065	0.070	0.014	0.003	0.015	-0.043	0.037	0.044
		(2.82)***	(1.41)	(0.80)	(0.09)	(0.83)	(0.94)	(3.67)***	(2.38)**
	RESID		-0.007		0.012		0.048		-0.008
			(0.12)		(0.41)		(1.30)		(0.42)
Dependent variable (Y_i in Equation 7.21): logarithm of monthly income per adult equivalent 1 in pesos of 2004 (LGINCOMEPAE1) a/	LGMAXCREDIT	0.064	0.075	0.015	0.003	0.015	-0.049	0.036	0.045
		(2.88)***	(1.57)	(0.89)	(0.07)	(0.79)	(1.12)	(3.77)***	(2.51)**
	RESID		-0.014		0.014		0.052		-0.010
			(0.25)		(0.47)		(1.46)		(0.52)
Dependent variable (Y_i in Equation 7.21): logarithm of monthly income per adult equivalent 2 in pesos of 2004 (LGINCOMEPAE2) b/	LGMAXCREDIT	0.070	0.085	0.012	0.004	0.010	-0.045	0.037	0.050
		(3.21)***	(1.96)*	(0.77)	(0.14)	(0.56)	(1.03)	(3.91)***	(2.87)***
	RESID		-0.019		0.008		0.045		-0.016
			(0.39)		(0.28)		(1.28)		(0.89)
Dependent variable (Y_i in Equation 7.21): logarithm of monthly income per adult equivalent 3 in pesos of 2004 (LGINCOMEPAE3) c/	LGMAXCREDIT	0.070	0.086	0.010	0.004	0.010	-0.047	0.037	0.050
		(3.24)***	(1.94)*	(0.69)	(0.12)	(0.55)	(1.10)	(3.89)***	(2.87)***
	RESID		-0.019		0.007		0.047		-0.016
			(0.39)		(0.25)		(1.34)		(0.84)

Robust t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

a/ Income per adult equivalent 1 follows the approach developed by Rothbarth (1943).

b/ Income per adult equivalent 2 follows the approach developed by Wagstaff and van Doorslaer (1998).

c/ Income per adult equivalent 3 follows the OECD modified equivalence scale based on the work of Hagenarrs et. al, (1998). For more details on these definitions of income per adult equivalent, see Chapter 4.

We found little evidence to suggest that it is a function of unobservable factors that are related to individual choice, preferences, or entrepreneurship. In order to confirm the assumption of exogeneity we decided to exploit the qualities of the Hausman's procedure (Hausman 1978) by testing under the null hypothesis that the asymptotic covariance matrix of the OLS estimator is not systematically larger than the 2S-Tobit selection equation. In order words, we examined under the null if $p\lim \mathbf{d} = 0$, where $\mathbf{d} = \mathrm{b}_{2S-Tobit} - B_{OLS}$, whereas under the alternative, $p\lim \mathbf{d} \neq 0$. Following Greene (2003:83) we computed the Hausman statistic in STATA as follows:

$$H = (\hat{b}_{2S-Tobit} - \hat{B}_{OLS})' \left\{ Est.Asy.\ \mathrm{Var}\left[\hat{b}_{2S-Tobit}\right] - Est.Asy.\ \mathrm{Var}\left[\hat{B}_{OLS}\right] \right\}^{-1} \left(\hat{B}_{OLS} - \hat{b}_{2S-Tobit}\right) \xrightarrow{d} \chi^2(J)$$

When we estimated the Hausman statistic for the pooled data we found that the $\chi^2(13) = 0.09$, whereas in the sample surveys of Fincomun, CAME and Promujer, the $\chi^2(13) = 0.24$, $\chi^2(13) = 0.13$, and $\chi^2(12) = 2.11$, respectively. Consequently, we could not reject the null for each of the individual samples surveys that the $\hat{B}_{OLS}$ and $\hat{b}_{2S-Tobit}$ were both consistent, and $\hat{B}_{OLS}$ efficient relative to $\hat{b}_{2S-Tobit}$.

When the Hausman procedure was estimated using the pooled sample, we could reject the null only at the 0.1 level. In this sense, although we recognise the possibility of selectivity bias in the process of borrowing, we have evidence to reject a significant effect of unobservable factors on our results, allowing us to concentrate on the OLS estimation. The parameter estimate δ of the impact variable, C_i, reported as expected a positive sign for each of the three microfinance organisations; however, the coefficients were only statistically significant different from zero in the case of Fincomun. More precisely, the econometric results suggest that if the maximum amount of capital borrowed by treatment households had gone up by x%, the income per adult equivalent 1 had increased in the order of 0.064x% relative to the control group, *ceteris paribus*.

This result is important for two reasons: First, it confirms that our findings are in line with the statistically significant impacts that we reported in equation 7.12; however, by substituting C_i for I_i we have managed to discount the effects that older borrowers have on the mean value of the impact equation, allowing us to obtain a more accurate estimation. Second, our results confirm the findings of other researchers (e.g. Morduch 1998; Coleman 1999) in relation to the small (or insignificant) effects that credit has on the level of individual income. To illustrate this consider the following case study:

Case study 7.1

Mrs S has been a member of Fincomun since 2002. By the time we interviewed her (code int2-14012004) she had borrowed 5 credits from an initial loan of 3,000 pesos (about US $270) that progressively increased up to 10,000 pesos (US $897). She runs a small grocery in San Miguel Teotongo where she invested the credit to pay suppliers and buy some assets that she needed to improve her sales.

We had evidence to believe that Mrs S was suffering from micro-rationing since she had repeatedly taken the maximum amount of capital available, which increased at a rate of 30% in every credit cycle, after the incentive of progressive lending that Fincomun put in place. In fact, Mrs S expressed the intention to borrow 13,000 pesos in the subsequent credit cycle, information that matched with our expectations. Mrs S reported a monthly household income of 3000 pesos that after being weighted by the equivalent factors yield an individual disposable income (after loan instalments) of 904 pesos.

Based on the results from the regression equation, we can predict that a percentage increase of 30% in the loan size (i.e. 3000 pesos additional to the previous 10000) will have an impact on the level of Mrs S's income of about 904 x 0.064(0.30) = 17.36 pesos (US $1.56), ceteris paribus[23]. In other words, an *absolute change* in the level of income, coming from a *proportional change* in income relative to a change in the maximum amount of credit borrow will be marginal and heavily dependent on the level of initial welfare of Mrs S and her family.

Based on the evidence reported from Hulme and Mosley (1996), we consider the following proposition:

Proposition 2. *Organisations reporting poverty impacts have the largest effects amongst those who are closest to, or above, the poverty line.*

[23] Unfortunately, the picture of a sustained virtuous circle of growth in capital, production and income experienced by Mrs S tell us just one part of the story. In reality, several borrowers reported that their project had failed their projects, and for many of them growth had been flattened. Similar behaviour is reported in Hulme and Mosley (1996)

We test this proposition in section 7.4 by looking at the relationship between the severity of deprivation amongst programme participants and the poverty impacts of the case-study organisations.

7.4 The impact of credit on poverty reduction

To begin the discussion, we proceed to calculate the incidence of poverty and poverty gap amongst household members by computing four different monetary thresholds of income deprivation. We also include the Human Development Index for comparative purposes:

Poverty line 1 (PL1). It measures the incidence of *extreme poverty*, and has been calculated at 784.5 pesos per month.

Poverty line 2 (PL2). It measures the incidence of *poverty*, and has been computed at 1507.5 pesos per month.

Poverty line 3 (PL3). It measures the incidence of *moderate poverty* and has been calculated at 1881 pesos per month

World Bank's poverty line, which is fixed at US$ 2 a day

The use of several critical thresholds of human deprivation is justified for two reasons: firstly, there is a widespread recognition that the conventional absolute poverty line of US $2 a day is too low for the existing domestic prices in Mexico. Underestimating the magnitude and severity of poverty amongst programme participants could tell us a wrong story about poverty impacts. Secondly, by computing several poverty lines we were able to analyse how deep the case-study organisations were reaching the poor, and to measure the magnitude of the poverty impacts by levels of deprivation. We followed the Sedesol (2002) criteria to identify PL1 as the lowest threshold of income required to fulfil the minimum nutritional requirements to have a healthy living. A *food-based poverty line*. PL2 includes the basket of basic goods plus other components such as health care and basic education. A *capabilities-based poverty line*. PL3 measures moderate poverty and is

referred to as an *asset-based poverty line*. These poverty lines have been derived for the urban context[24].

The estimation of the incidence of poverty and poverty gap are presented in table 7.11. Incidence and depth of poverty are particularly important for the evaluation of these microfinance programmes. The former has been computed as the percentage of programme participants whose income per adult equivalent 1 was below the selected poverty line. In other words, the incidence of poverty (also known as headcount index) shows the share of households that could not afford to buy the basket of basic goods that was previously selected by the INEGI-ECLAC (1993). We observed a larger incidence of poverty amongst treatment households at CAME and Promujer than at Fincomun when PL2 and PL3 were employed.

Table 7. 11 Poverty and human deprivation amongst programme participants
Figures in percentages

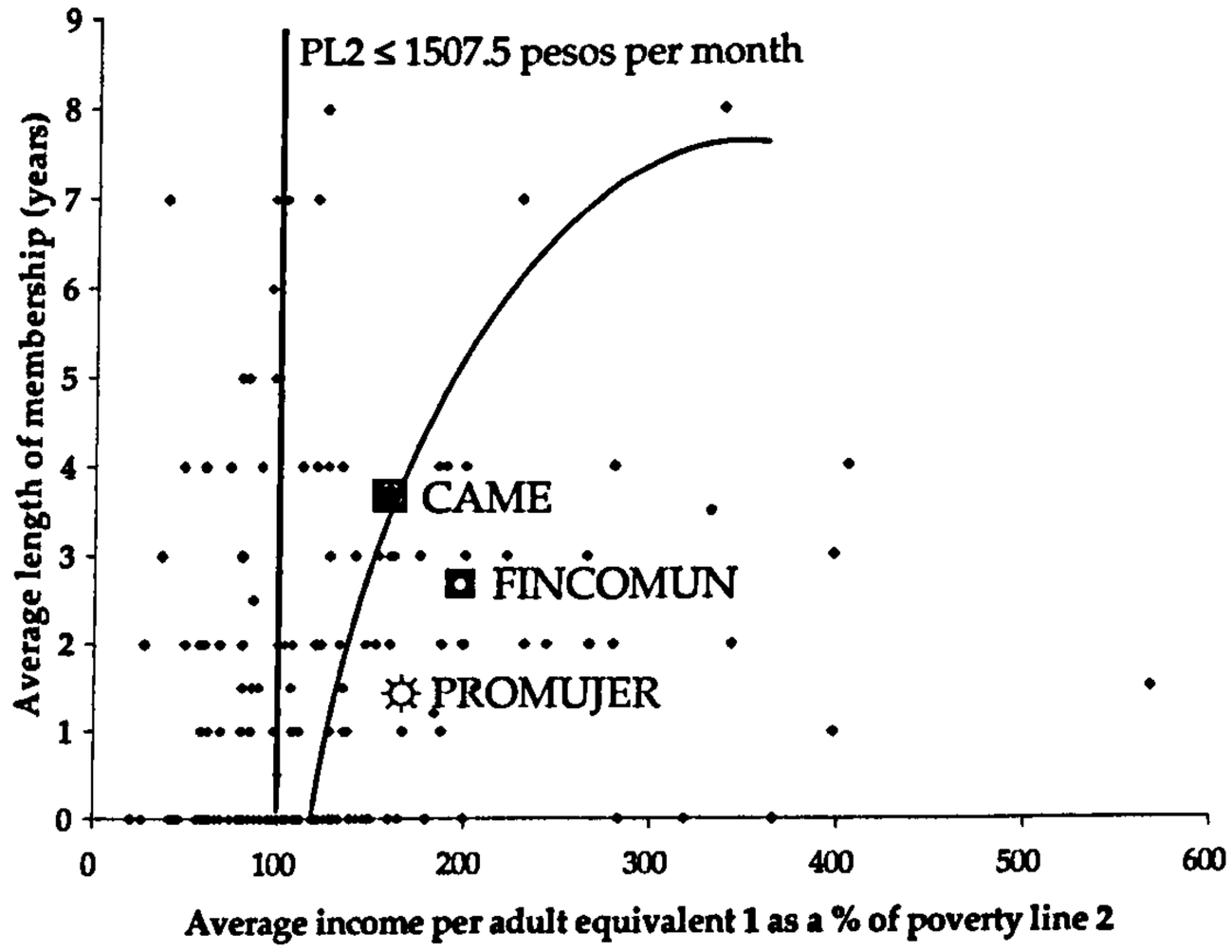
Concept	Sample size	FINCOMUN		CAME		PROMUJER	
		Control	Treated	Control	Treated	Control	Treated
Overall	148	34.5	65.5	39.1	60.9	44.7	55.3
Human Development Index							
Below the index at local level a/	145	100	97.2	94.4	96.4	100	100
Below the index at country level b/	139	100	86.1	83.3	96.4	100	100
Incidence of extreme poverty (PL1) c/							
≤ 784.5 pesos per month	10	15.8	11.1	11.2	0	0	3.9
Poverty gap		43.4	28.2	13.5	0	0	5.1
Depth of poverty (in pesos)		341	221	106	0	0	43
Incidence of poverty (PL2)							
≤ 1507.5 pesos per month	60	63.2***	27.8	50.0	42.9	33.3	38.5
Poverty gap		38.1	36.2	35.0	20.2	17.5	21.2
Depth of poverty (in pesos)		574	545	527	304	263	319
Incidence of moderate poverty (PL3)							
≤ 1881 pesos per month	87	73.7**	36.1	77.8	67.9	61.9	53.9
Poverty gap		44.8	39.3	34.1	25.4	23.3	30.6
Depth of poverty (in pesos)		842	738	642	477	439	576
World Bank's poverty line							
≤ US$ 2 a day	7	15.8	8.3	5.6	0	0	0
Poverty gap		33.6	23.7	1.1	0	0	0
Depth of poverty (in pesos)		225	159	7	0	0	0

The statistically significant association in the cross-tabulations are indicated by the Chi-square values for the cell as a whole at 0.001 (*); 0.01 (**); 0.05 (***); and 0.1 (****) levels of significance.
a/ The HDI was estimated at 0.891, 0.795 and 0.755 points for Mexico City, the state of Mexico and the state of Hidalgo, respectively; b/ The HDI was estimated at 0.801 points for the country as a whole; c/ Poverty lines are derived using income per adult equivalent 1
Sources: UNDP 2002, Sedesol (2002), World Bank (2000) and the author's sample survey

[24] See Chapter 4 for a detailed discussion on these poverty lines

For example, although 43% and 39% of treatment households at CAME and Promujer, respectively, reported earnings that were below the minimum requirement to satisfy their basic needs according to poverty line 2, in comparison to 28% at Fincomun, only in the case of Fincomun we could find a statistically significant association at 0.05 level between treatment and control groups in relation to the incidence of poverty. More precisely, the empirical evidence may suggest a positive cause-effect relationship between programme participation and poverty reduction. It is also clear that the case-study organisations were reaching the poor at different levels of deprivation. To illustrate this, take the case of the depth of deprivation amongst poor borrowers (see figure 7.2).

Figure 7. 2 The relationship between average borrower income and the length of membership



The computed poverty gap showed a longer distance between poor borrowers and the poverty line amongst participants at Fincomun than at CAME and Promujer. Poor borrowers at Fincomun had to cover, *on average*, an income shortfall of 545 pesos per month in order to cross the PL2, whereas poor borrowers at CAME and Promujer had to cover only 304 and 319 pesos, respectively. As suggested before, we might have the case here where some organisations (e.g. Fincomun) are more effective at reducing the number of poor households but only by lifting those who were closest to the poverty line, with low impacts on the poverty gap.

Other organisations (e.g. CAME and Promujer) might be more effective in reaching

the extreme poor but by doing so, they report low impacts on the overall incidence, bringing the extreme poor closer to the poverty line but still below it. One way to find out whether our assumptions are correct is by estimating the marginal effects of credit across the poverty lines. In order to do so, we ran a probit estimation equation in the form

$$PL_i = \alpha_i + \delta C_i + u_i \qquad (7.25)$$

where the dependent variable PL_i is a binary variable that takes the values

$$\mathrm{PL_i} = \begin{cases} 1 \text{ if } i^{th} \text{ household is below the poverty line} \\ 0 \quad \text{otherwise} \end{cases}$$

and C_i is the same continuous variable in equation (7.22) that measures the maximum amount of credit borrowed in logarithmic form. We have run (7.25) with PL_i adopting different poverty lines and using by default the definition of income per adult equivalent 1. In this sense PL_i was coded as POORPL1 when households were below the incidence of extreme poverty, PL1; POORPL2, when households were below the PL2; POORPL3, when households were below PL3, and POOR2US when households were below the World Bank's 2 US dollar a day poverty line. For comparative purposes, we have also run 7.25 with I_i as a substitute for C_i where I_i is the dichotomous variable previously defined with value $I = 1$ for treatment households and $I = 0$ for control groups.

By estimating the marginal effects of C_i we were able to capture in δ the impact of *a relative change in the amount of capital borrowed by a poor household* on the probability of staying below the poverty line. Alternatively, if we included I_i in the Probit equation, we were able to capture in δ the impact of *the individual choice of a poor household to participate in the microfinance organisation* on the probability of staying in poverty. We present the results in table 7.12. Our findings reveal interesting information regarding the level penetration of the case-study organisations and their poverty impacts:

As we were expecting, the slope coefficient of C_i reported negative signs when POORPL2 and POORPL3 were included as dependent variables, but they only showed statistically significant levels when we estimated the Probit equation for programme participants at Fincomun. Other things held constant, the effect of a *relative* change of x% in the level of borrowing by poor members at Fincomun was a decline in the probability of staying below that poverty line of about –0.038x%, and the magnitude of this impact was marginally greater (-0.043x%) when better off households were included in the estimation, i.e. when POORPL2 was replaced for POORPL3.

Table 7. 12 Probit: the effect of programme participation on the probability of staying in poverty
Explanatory variable in (7.25): with C_i: logarithm of the maximum amount of credit borrowed (LGMAXCREDIT); In (7.25) with I_i, LGMAXCREDIT is transformed into a dummy variable =1 for treatment households

Dependent variable: dummy variable = 1 if household *i* reports an IAE1 ≤ the derived poverty line a/		FINCOMUN		CAME		PROMUJER		Pooled sample	
		(7.25) with I_i	(7.25) with C_i	(7.25) with I_i	(7.25) with C_i	(7.25) with I_i	(7.25) with C_i	(7.25) with I_i	(7.25) with C_i
World Bank poverty line ≤ US $2 a day	Coef	-0.379	-0.051					-0.350	-0.419
		(0.82)	(1.12)					(0.98)	(1.08)
	$\frac{\partial\Phi}{\partial X}$	-0.074	-0.009					-0.036	-0.003
		(0.82)	(1.12)					(0.98)	(1.08)
Incidence of extreme poverty PL1 ≤ 784.5 pesos per month	Coef	-0.217	-0.029				0.178	-0.229	-0.027
		(0.49)	(0.66)				(5.83)***	(0.72)	(0.79)
	$\frac{\partial\Phi}{\partial X}$	-0.046	-0.006				0.003	-0.031	-0.003
		(0.49)	(0.66)				(5.83)***	(0.72)	(0.79)
Incidence of poverty PL2 ≤ 1507.5 pesos per month	Coef	-0.925	-0.100	-0.180	-0.019	-0.137	-0.013	-0.327	-0.390
		(2.49)**	(2.58)***	(0.47)	(0.47)	(0.36)	(0.29)	(1.53)	(1.67)*
	$\frac{\partial\Phi}{\partial X}$	-0.353	-0.038	- 0.071	-0.007	-0.051	-0.005	-0.127	-0.015
		(2.49)**	(2.58)***	(0.47)	(0.47)	(0.36)	(0.29)	(1.53)	(1.67)*
Incidence of moderate poverty PL3 ≤ 1881 pesos per month	Coef	-0.989	-0.108	-0.301	-0.030	-0.206	-0.029	-0.467	-0.055
		(2.61)***	(2.73)***	(0.72)	(0.70)	(0.55)	(0.64)	(2.15)**	(2.31)**
	$\frac{\partial\Phi}{\partial X}$	-0.375	-0.043	-0.099	-0.010	-0.080	-0.011	-0.178	-0.021
		(2.61)***	(2.73)***	(0.72)	(0.70)	(0.55)	(0.64)	(2.15)**	(2.31)**

Robust z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
a/ Income per adult equivalent 1 (IAE1) follows Rothbarth (1943)
Note: Equation (7.25) could not be estimated neither using the World Bank's poverty line nor the Poverty line 1, due to the fact that we did not observe treatment households at CAME, and control groups at Promujer whose income was below the thresholds of extreme deprivation. The immediate consequence of that was to face a typical case of perfect predict probability.

Although the parameter δ reported negative signs when the extreme poor was included in the estimation (e.g. POORPL1 and POOR2US), it was not significantly different from zero. In other words, we could not find statistical evidence to confirm a poverty impact from Fincomun at the lowest point of deprivation, where the

extreme poor are grouped. The result support the proposition regarding the idea that poverty impacts are more likely to be observed at the upper limits of deprivation, amongst those closest to the poverty line. As Hulme and Mosley (1996:109) state: *"this should not be unexpected given that those with higher incomes have greater range of investment opportunities, more information about market conditions and can take on more risk than the poorest households without threatening their minimum needs for survival"*.

Interestingly, Promujer reported *positive* signs and statistically significant levels in the slope coefficient of C_i when POORPL1 was computed as dependent variable. This suggests that, other things held constant, a relative change in the loan size of an extreme poor woman borrowing from Promujer will *increase* the probability of staying poor. The fact that the slope coefficient of C_i reported negative but insignificant levels when POORPL2 and POORPL3 were included in the estimation, suggests that Promujer might be effective in reaching the extreme poor but by doing so, the organisation is reporting impacts just on the poverty gap and not on the overall incidence, which may also explain the considerably smaller poverty gap reported by the organisation compared to that of Fincomun (see table 7.11). Surprisingly, although the slope coefficient of C_i showed negative signs, we could not find any statistical significance to confirm poverty impacts from CAME at the estimated thresholds of deprivation.

The empirical evidence discussed in section 7.3 points to a linkage between insignificant poverty impacts and lending technology. The link can be tracked to some devices that microfinance organisations have traditionally employed to deal with screening, monitoring and enforcement problems. In particular, we refer to the opportunity costs that periodical repayment schedules, which demand weekly compulsory meetings, generate to programme participants. The results from equation 7.15 showed a large and positive responsiveness in the demand for credit as a result of a percentage increase in the opportunity cost of borrowing. In fact, CAME reported the largest elasticity between the three organisations. This reflects the direct effect that weekly compulsory meetings have on income, in particular when households economically more dynamic experience an increase in the rate of return to investment and are forced to forego earnings for being required to attend sessions that quite often last for several hours. To illustrate this, we estimated the

opportunity cost of borrowing per credit cycle, just as we did in equation 7.15. We find, for instance, that borrowers at CAME absorb, on average, an opportunity cost of participation that represents about 17% of the capability-based poverty line for urban areas (PL2). This issue is of great significance to poor households.

It is known that not always the investment finance by microfinance programmes is successful; it largely depends on the ability of borrowers to generate value through production or commercialisation, and the demand for such products. These two preconditions explain why poor borrowers are frequently engaged in more than one project at the same time; they diversify the risk associated to the production of one product by producing (or selling) another. The problem is that economic constraints of local markets shape a low demand curve that force poor entrepreneurs to search for better markets in the City, in areas faraway from their place of residence. If we add the transaction costs to the opportunity cost of borrowing, it should not be surprising to expect that rigid repayment schedules exacerbate the expected rate of return to investments in income-generating projects. Narrative evidence collected through several interviews validates our concerns. Take the following case studies:

Case study 7.2

Mrs T lives with her husband and youngest son in a modest house in the Chalco Valley. She has been member of CAME for 7 years. Over the last 3 years, she alone (her husband and son are waged workers) has been engaged in the business of selling shoes at street markets that are usually held on particular days of the week. For that reason, she has to travel from square to square across Mexico City. She works 6 days per week, and on average, 8 hours per day. After reporting total revenues and costs, we were able to estimate a level of business profitability in the order of 4640 pesos per month.

Once a week, Mrs T is required to attending compulsory group meetings that last, on average, for one hour and a half, although in various occasions, these meetings were reported to last for several hours. Based on the level of business profitability and the time spent on attending these meetings, including travelling, we estimate an opportunity cost of programme participation for Mrs T in the order of 6% relative to total profits that represented 16% of the capability-based poverty line (or PL2) estimated for urban Mexico. When we asked her opinion about CAME she said: *"I cannot make repayments every week, I don't have problems with the interest rate but I don't like when they (CAME) force us to come every week. I have a business to attend, you know, and it is faraway…"* Interview with Mrs T; code: Int2-11032004, Minute 24:05.

Case study 7.3

Mrs C, married and with three small children, lives in Tula City, in the state of Hidalgo. She began to sell home products with relatives and friends, and at street markets with an initial 1300 pesos credit from *Promujer*. She works alone in the business, being her husband a waged worker employed by Mexican *Petroleum*. Since she is in charged of childcare, she is able to work only 2 hours per day, 6 days per week, although she stated her desire of spending more time on her business. Based on revenues and costs data, we estimated a level of business profitability in the order of 750 pesos per month. Once a week, Mrs C is required to attend compulsory group meetings that last, often, for several hours.

Based on the time spent on group meetings, including travelling, we estimate an opportunity cost of programme participation in the order of 12.5% relative to total profits, which represented about 6% of the capability-based poverty line. Although the monetary value of the opportunity cost of programme participation for Mrs C was lower than the estimated value for Mrs T, the social burden could be higher for the former given the household structure. When we asked Mrs C to tell her opinion about Promujer she said: *"What I don't like from Promujer is that we have to come every week and wait hours and hours for some comrades that come late. I have lots of problems to be sitting here waiting for them* (group-members)*. And now because of the meetings I cannot pick up my children from school. To be honest with you, I will leave the group as soon as the cycle ends…"* (Interview with Mrs C; code: Int5-06042004, Minute 23:45

7.5 Concluding remarks

We have discussed in this chapter the relevance of conducting an appropriate strategy of data collection in order to reduce the potential problems of self-selection and endogeneity that emerge from the implicit nature of the object of study. The population density as well as the homogeneity of households' deprivation in poor urban areas in Mexico has allowed us to survey households that satisfied the condition $I = I_1 \cdot I_2$ in a relatively straightforward manner, and the results from the Heckit and Tobit selection models confirmed the efficacy of our method.

The use of income per capita in poverty assessments is still the mainstream approach for intra-household distribution of welfare. However, the empirical evidence suggests that poverty-impact analysis can be sensitive to the weighting factors adopted by the researcher. In this sense, appropriate equivalent scales should be considered in future evaluations in order to evade misleading results.

Furthermore, the use of poverty lines should be carefully decided on the grounds of domestic prices and patterns of consumption in order to avoid under (or over) estimating the magnitude and severity of deprivation.

Our results suggest that the rigidity of screening and monitoring devices such as periodical repayment schedules in compulsory group meetings substantially increase the utility cost of borrowing, particularly when the distance that the poor have to travel, and the time spent on long group sessions are taking into consideration. As we discussed in section 7.5 this cost is highly correlated with the level of income. We remind the reader that although programme participants live close to the branch of microfinance organisations, they often work faraway where they find better markets and sources of income. This characteristic seems to distinguish the urban poor from the rural poor. Rigidity in loan contracts can also cause market inefficiency by keeping households with large seasonal income from borrowing at the optimum level.

Narrative evidence actually suggests that this rigidity explain why good borrowers decided to leave the credit programme. The empirical results also show that incentive devices such as progressive lending cause micro-rationing in credit markets particularly when upper limits of progressive lending are imposed through policies of graduation. In this sense, lending innovations aimed to reduce the rigidity of loan contracts could help, on the one hand, organisations to increase client retention and expand outreach; and on the other hand, improve poverty impacts, by preventing poor households to take actions that could affect their returns to investments. In that perspective, government interventions such as PRONAFIM, could go beyond the narrow objective of expanding outreach and facilitate research activities and experimentation that could potentially improve market efficiency and poverty impacts.

Our results also reveal that microfinance organisations reach the poor at different levels of deprivation; however, although reaching the poor has its own merits, it does not necessarily lead to poverty reduction: those organisations that base their credit operation on group lending technology (CAME and Promujer) report insignificant impacts on the overall incidence, and they just closed the distance of the poverty gap. Only one organisation (Fincomun) reports statistically significant,

but small poverty impacts at the upper limits of the poverty line, where the moderate poor is located, suggesting a strong relationship between the level initial welfare and the magnitude of the poverty impacts. However, we find no evidence of credit impacts on extreme poverty. Our findings are similar to the evidence reported in Hulme and Mosley (1996), and question the ability of credit programmes to reduce extreme poverty, as the Campaigners of the Microcredit Summit suggest (see e.g. Daley-Harris 2005).

This has important policy implications. In Mexico, for instance, the government's safety net programme *Oportunidades* targets the extreme poor in rural communities. However, one-third of the extreme poor in Mexico remain excluded from *Oportunidades* for the simple reason of living in urban areas. Our results show that it would be desirable to extend the benefits of *Oportunidades* to urban areas, where resource allocation for nutrition, health care and other social services could be more effective in order to avoid extreme deprivation. In that context, credit could play a complementary role in a wider strategy of extreme poverty reduction. In the next chapter, we analyse the impacts of credit from a wider perspective, looking at the effects on business and household assets, as proxies of physical capital accumulation; children's schooling and health status, as proxies of human capital enhancements, and labour.

Table 7. 13: Summary of findings

	FINCOMUN	CAME	PROMUJER	Pooled sample
Sample size	55	46	47	148
Percentage of female borrowers	49	74	100	73
Lending technology	Individual lending	Village banking	Solidarity groups in co-operative groups	
Periodicity of loan collection	Weekly and fortnightly	Weekly	Weekly and fortnightly	
Compulsory meetings	NO	YES	YES	
Upper limits to progressive lending	NO	YES	YES	
Income-generating activities (as % of income sources)	79.49	73.12	65.22	73.18
Years in business (average)	5.78	4.24	5.34	5.16
Opportunity cost of borrowing per credit cycle (in pesos of 2004)	886	1008	540	824
Elasticity of demand for credit per additional unit of opportunity cost	1.61	1.72	1.51	1.66
Average income per adult equivalent per month (in pesos of 2004)	2286	1860	1901	2031
Proportion of borrowers below poverty line (%)	40	45.65	36.17	40.51
Average income of poor borrowers (in pesos of 2004)	946	1108	1211	1024
Income of poor borrowers as % of the poverty line	62.76	73.46	80.33	67.88

Did the organisation report a statistically significant income impact with I_i as explanatory variable?				
Heckit	YES	NO	YES	YES
OLS	YES	NO	NO	YES
And with C_i as explanatory variable?				
2S-Tobit	NO	NO	NO	YES
OLS	YES	NO	NO	YES
Did the organisation report statistically significant marginal effects of a change in the amount of capital borrowed on the probability of staying in poverty?	YES	NO	NO	YES
Did the organisation report statistically significant marginal effect s of programme participation on the probability of staying in poverty?	YES	NO	NO	NO

Source: Sample survey