An Empirical Analysis of Accessibility and Impact of Microcredit: the Rural Credit Market in the Mekong River Delta, Vietnam

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by

Dinh Khoi Phan

A thesis

submitted in partial fulfilment

of the requirements for the Degree of

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Declaration

To the best of my knowledge, I hereby declare that this thesis is my own work and it has not been previously submitted, either in whole or in part for a degree at this university or elsewhere. It contains neither materials previously published nor written by any other persons and all material cited has been explicitly acknowledged.

The work was done under the supervision of Professor Christopher Gan and Dr Gerry Nartea, at Lincoln University, New Zealand.

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Abstract

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This study examines the characteristics of Vietnam rural credit market, credit accessibility and impact of microcredit programme at the household level. The Vietnam rural credit market is imperfect and developing whereby market imperfection creates credit rationing and limits credit access to rural households (Stiglitz & Weiss, 1981), and market development leads to different credit sectors interacting to serve the clients (Bardhan & Udry, 1999). Since the development of the Vietnam Bank for Social Policy (VBSP) microcredit programme in 2003, rural credit accessibility has been improved. However, credit remains insufficient to meet the needs of a large number of rural population.

This study investigates the determinants of households' borrowing decisions in terms of formal and informal microcredit and microcredit accessibility. The results show that informal microcredit alters the households' decisions to obtain a formal microcredit. If this interaction is ignored when estimating households' borrowing decision for formal microcredit, the results will be biased. The results show that ease of access to informal microcredit can compensate for their high interest rates in the credit market. The positive factors influencing formal microcredit accessibility include being a local government employee, having credit group membership and a poor certificate, educational attainment, working skills and village road access.

The results consistently show a positive impact of the VBSP microcredit programme however data and evaluation methods were analysed. The Propensity Score Matching (PSM) estimators show a positive significant impact of the microcredit programme on household consumption. When the analysis is restricted to only the poor, greater impact estimators were obtained. The fixed effect models with instrumental variables and the PSM both confirm a positive impact of the formal microcredit programme and its loan amount on household per capita consumption and income. If programme exogeneity holds, the microcredit programme impact for the Mekong River Delta is greater than the country average.

In terms of policy implications, education and working skills build credit worthiness and road access enhances credit availability. Supporting programmes (e.g., vocational and job training programmes) and incentive policies (i.e., attracting investment to remote rural areas) are helpful to improve credit access to the microcredit programme. Government intervention is necessary to improve formal credit accessibility; however, re-defining microcredit strategies is needed to improve the microcredit programme impact.

Keywords:Vietnam, Mekong River Delta, microcredit, accessibility, programme impact, ruralhousehold

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Table of Contents

List of Tables

List of Figures

Abbreviations

2SLS	Two-stage least squares
ADB	Asian Development Bank
AIMS	Assessing Impact of Microcredit Services
ATE	Average treatment effect
ATT	Average treatment on the treated
CCF	Central People's Credit Fund
CIA	Conditional independence assumption
CIL	Credit Institutions Law
CPI	Consumer Price Index
DinD	Difference-in-Differences
ERD	Economic dependent ratio
FE	Fixed Effects
GMM	Generalised method of moment
GSO	General Statistics Office
IV	Instrumental variable
MFI	Microfinance institution
MOLISA	Ministry of Labour and Invalid Social Affairs
MLE	Maximum likelihood estimation
MRD	Mekong River Delta
NGO	Non-government organisation
NPRGS	National Poverty Reduction and Growth Strategy
OLS	Ordinary least squares
PCF	Peoples Credit Funds
PSM	Propensity score matching
RDD	Regression discontinuity design
RHS	Right hand side
ROSCA	Rotating Savings Credit Association
S.D.	Standard deviation
S.E.	Standard error
SME	Small and medium enterprise
SOE	State-owned enterprise
VBP	Vietnam Bank for the Poor
VBRAD	Vietnam Bank for Rural and Agriculture Development
VBSP	Vietnam Bank for Social Policies
VHLSS	Vietnam Household Living Standard Survey
VND	Vietnam Dong
VPSC	Vietnam Postal Savings Company
WB	World Bank

Chapter 1
Introduction

1.1 Introduction

The rural credit market plays an important role in agricultural production and rural development in developing countries. Typically characterised by excess demand, the rural credit market is only accessible to a certain number of borrowers regardless of the borrowers' repayment capacity. In fact, credit shortage is not simply attributed to excess demand but to a core economic problem – asymmetric information. The presence of information asymmetry creates adverse selection and moral hazard problems, which lead to banks reluctant to give out small loans. This is because commercial banks find it costly to deal with small loans since small or large loans either has to go through the same standard lending procedures. Moreover, including all transaction costs in lending interest rates to charge more for small is not possible. If borrowers default banks loose profit. Therefore, these commercial banks always requires collaterals to secure their loans. However, not many rural households posses valuable assets for collaterals, particularly in developing countries agricultural land is the only collateral but it is not always valued at the market price. This explains why rural households have limited access to credit from banks (Stiglitz & Weiss, 1981). Lack of credit access is even more severe in low income and poor families who are normally considered to have fewer opportunities to borrow from banks due to insufficient valuable assets for collateral. These low-income households face limited opportunity to acquire new technology and working capital for agricultural production; they tend to fall behind. As a result, providing access to finance to low-income rural households has been considered an important component of rural development strategy. However, many developing countries still have difficulty providing appropriate rural credit at reasonable costs to a large rural population (Morduch, 1999).

According to Beck and Demirgüç-Kunt (2008), the poor face two main problems in accessibility to bank credit. Poor households have no collateral and they are not able to borrow against their future income. Meanwhile, dealing with small credit transactions, such as microloans, is costly for financial institutions. Without any external support, the rural poor can never gain access to microloans. Hence, they seek alternative sources of credit. The development of microcredit is perceived as a strategic tool to provide credit accessibility to the poor. Although government intervention in the rural credit market is controversial, this external support to the poor is widely accepted because it can overcome the rural credit

market's failures. Aghion and Morduch (2005) provide a number of reasons for the government to intervene to expand credit access to rural households rather than not do so. However, most rural credit markets have been governed in one way or another towards delivering credit for the rural sector.

In Vietnam, the government has integrated microcredit into the National Poverty Reduction and Growth Strategy by utilising the state-owned banks to provide credit to the rural credit market, such as providing credit access to the rural poor at a preferable interest rate[1]. Different forms of credit are available to the rural credit market such as individual lending, group lending, and village banking. In particular, many microcredit programmes have been developed to provide greater credit accessibility to rural households. These include the provision of formal microcredit through the Vietnam Bank for Agricultural and Rural Development (VBARD), Vietnam Bank for Social Policy (VBSP), and others. Other programmes have been implemented through semi-formal credit providers, such as the Women's Union, Farmers' Association, and Youth Union, which are organised at national, provincial, commune, or district levels. Informal lenders exist to provide an alternative source of credit to a large proportion of the market. This mixture of different credit channels to serve rural households promises not only greater credit accessibility for rural poor households but also greater competition among the different forms of microcredit providers in the rural market. However, the Vietnam rural credit market shows many weaknesses in the lending process along with the market development.

Although the Vietnam rural credit system has been focussed on providing credit for low-income households, information asymmetry persists and creates problems related to screening in microcredit lending practice. Consequently, a large proportion of rural households was excluded from the formal credit market. For example, Pham and Izumida (2002) reveal as much as 30% of farming households were rejected by formal lenders. As farming households apply for loans to finance agricultural production subject to a collateral requirement, the result raises concerns about the inability to access formal credit for rural poor households in Vietnam. In the rural lending practices, Pham and Lensink (2007) indicate various strategies employed by different lenders to avoid adverse selection and moral hazard problems. In the adverse selection problem, formal credit providers tend to associate the probability of default with contract-related items, such as interest rate and loan repayment, as a part of the client's

[1] Decision No 67/1999/QĐ on March 30th, 1999 of the Prime Minister

previous credit history. In the moral hazard problem, informal lenders tend to link default risk to household related characteristics, particularly the presence of the lender-borrower relationship and social norms. As a result, there is always a proportion of rural households unable to obtain credit.

Lack of ability to obtain credit from the formal financial sector has long been viewed as the biggest obstacle to improving households' livelihood (McCarty, 2001; Pham & Lensink, 2002). To fulfil credit demand, rural households have to seek informal sources of credit at higher interest rate to support their production and consumption. This informal debt is believed to marginalise household income and likely leads the borrower into a cycle of debt and poverty. This market failure is eminent in many developing countries where the rural financial market is not functioning well (Musinguzi & Smith, 2000). Therefore, credit inaccessibility in rural areas impedes the development of the rural sector, which potentially decelerates the development of Vietnam's rural economy.

To increase credit access for rural households, the Vietnamese government has implemented credit policies targeting agricultural and rural areas nationwide. The policies aim to assist rural poor households access to microcredit through banks at a preferable interest rate. In addition, the government has recognised microcredit as a strategic tool to provide cheap credit to rural households. Different forms of microcredit are available such as individual lending, group lending and village banking. Particularly, microcredit programmes have been developed to provide rural households with greater credit accessibility. These include formal credit providers such as VBARD, VBSP, and others. Other programmes have been implemented through semi-formal credit providers such as mass organisations of women, farmers and youth.

1.2 Agriculture and Poverty in Vietnam and the Mekong River Delta

Vietnam has been known as the world's rice granary since the country became a leading rice exporter for the last decade[2]. Located in Southeast Asia, Vietnam shares land borders with China from the North, Laos and Cambodia from the West;the country possesses a 3,200 km long coastal line in the east. Geographically, Vietnam is divided into seven regions: Northern

[2] According to Vietnam Food Association, Vietnam rice export volume reached 7 million tons by December, 2011. This export volume is ranked the second after Thailand (VFA, 2011).

Uplands, Red River Delta, North Central, Central Coast, Central Highlands, South East and Mekong River Delta (MRD). The total land area is 305,000 km^2 and the population reached 87 million in 2010; the country is among the highest population density countries in Asia and in the world. The population is distributed unevenly between rural and urban areas although there has been a decline in the rural population. For example, Table 1.1 shows that over 73% of the population resided in rural areas in 2006 but this proportion had slightly reduced to 71% in 2010. Declining rural population has largely been attributed by urbanisation and industrialisation as a part of economic growth. According to the World Bank (2010), in 2010, Vietnam GDP per capita was over $USD1,200 and its GDP per capita growth was above 5% in 2011; this is the sixteenth year the Vietnamese have enjoyed an income growth rate over 5% in the past 20 years (see Table 1.1).

Table 1.1 Gross Domestic Product and Population Indicators of Vietnam (2006-2010)

Indicator	Unit	2006	2008	2010
GDP per capita (current price)	USD	731.14	1,070.15	1,224.19
GDP per capita growth	%	7.03	5.19	5.66
Total population	Million	83.31	85.12	86.94
Population density	People/km^2	268.69	274.53	280.38
Population growth rate	%	1.11	1.06	1.05
Rural population proportion	%	73.12	72.16	71.20

Source: The World Bank Data, 2010
Note: Offical exchange rate in 2010, 1USD = 19,000VND

The Vietnam economy has relied on agriculture for decades, however, the 'Reform' in 1986 has brought a transition to the economy. Government efforts have been proposed to boost industrialisation in the economic transition that aims to shift the economy from an agriculture based one to an industrial one. As a result, agriculture's contribution to national economic development in terms of share of GDP has been declining while there has been an increase in the industrial and service sectors' shares over the past 20 years. Table 1.2 shows agriculture accounted for over 40% of GDP in 1986 before the reform; agriculture's share had reduced to 24.5% in 2000 and accounted for only 20.6% in 2010. The industrial and service sectors contributed equally to a 41.1% share of the total GDP in 2010 (see Table 5.2).

Although agriculture's share of GDP has been declining, rural areas are still home to over 70% of the population and agriculture provides jobs for over half the country's labour force.

According to World Bank data, 51.7 % total employment were engaged in agricultural activities in 2006. This sector continues to create an increasing value added for the economy. For example, in 2006, agriculture contributed 199 trillion dong value added to GDP; this contribution doubled to 400 trillion dong, equivalent to 20.9 billion USD, in 2010. The agriculture sector is still one of the main elements in the development strategy in Vietnam (see Table 1.2).

Table 1.2 Value and composition of the Gross Domestic Product in Vietnam (2000-2010)

		Agriculture		Industry		Services	
Year	**GDP**	**Value**	**Share**	**Value**	**Share**	**Value**	**Share**
	(Bil. VND)	(Bil. VND)	(%)	(Bil. VND)	(%)	(Bil. VND)	(%)
2000	441,646	108,356	24.5	162,220	36.8	171,070	36.8
2001	481,295	111,858	23.2	183,515	38.1	185,922	38.1
2002	535,762	123,383	23.0	206,197	38.5	206,182	38.5
2003	613,443	138,285	22.5	242,126	39.5	233,032	39.5
2004	715,307	155,992	21.8	287,616	40.2	271,699	40.2
2005	839,211	175,984	20.9	344,224	41.1	319,003	41.1
2006	974,266	198,798	20.4	404,697	41.5	370,771	41.5
2007	1,143,715	232,586	20.4	474,423	41.5	436,706	41.5
2008	1,485,038	329,886	22.2	591,608	39.8	563,544	39.8
2009	1,658,389	346,786	20.9	667,323	40.2	644,280	40.2
2010	1,980,914	407,647	20.6	814,065	41.1	759,202	41.1

Source: GSO, 2011.
Note: Offical exchange rate in 2010, 1USD = 19,600VND

Poverty is one of the biggest challenges that Vietnamese government faces during the economic transition. Poverty alleviation programmes have reduced the poverty rate remarkably, the proportion of people with a per capita expenditure under the poverty line dropped from 58.1% in 1993 to 37.4% in 1998. The poverty rate continued to decrease to 28.9% and 19.5% in 2002 and 2004, respectively, and poverty has been reduced in all regions. However, a higher rate of poverty remains in some regions, especially remote and isolated areas (Nguyen, 2007). Table 1.3 also shows a declining trend in some poverty indicators in 2006 and 2008. Using the national poverty line, the poverty headcount was reduced significantly. However, the poverty head count ratio at $2 a day was considerably higher, 48.24% and 38.45% in 2006 and 2008, respectively. In other words, if the national poverty line is adjusted to align with the world poverty line, then over 21 million people are likely

revealed as living under poverty line. This shows the new challenges for the government to deal with poverty issues in the forthcoming changes.

Table 1.3 Poverty Indicators of Vietnam

Indicator	Unit	2006	2008	Changes/annum
Poverty headcount ratio at $2 a day	%	48.24	38.45	-4.90
Poverty headcount ratio at $1.25 a day	%	21.31	13.07	-4.12
Poverty gap at $2 a day	%	16.11	10.85	-2.63
Poverty gap at $1.25 a day	%	4.57	2.29	-1.14
Poverty gap at national poverty line	%	3.80	3.50	-0.15
Poverty headcount ratio at national poverty line	%	16.00	14.50	-0.75
Poverty gap at rural poverty line	%	4.90	4.60	-0.15
Poverty headcount ratio at rural poverty line	%	20.40	18.70	-0.85

Source: The World Bank Data, 2010

The MRD region, one of seven geographic regions, is located in the south of Vietnam; the MRD consists of 13 provinces. It is the main agricultural production region in Vietnam due to fertile soils and abundant water resources. With a natural land area of 40,518.5 km^2 and population of 17.27 million habitants in 2010, the MRD has 12.24% of the total land area and 19.87% of the total population of the country (GSO, 2010). The population density is 426 persons/km^2, which is much higher than the country's average population density. The population is distributed unevenly between urban and rural areas as well as among provinces in the MRD. The high but unevenly distributed pupulation density leads to ineffective utilisation of human and natural resources which, in turn, creates unfavorable conditions for economic development.

Table 1.4 shows that agriculture plays an important role in the MRD economy despite its share having been reduced as the shares of the industry and service sectors have become dominant. For example, agriculture accounted for over 43.9% of GDP of the MRD in 2006; this share was reduced to about 34.7% in 2010. However, the growth rate of the agriculture sector is still higher than the country's average, which is largely due to a structural shift from traditional rice farming towards aquaculture (Lensink & Mai, 2008 pp.33-34). In addtion, the reduction in agriculture has been largely subsituted by industry as a result of the industrilaisation trend in Vietnam. However, the transition process has taken place at a slower

pace than the country average. Overall, the agriculture sector remains a major sector in the MRD economy.

Table 1.4 Some selected economic indicators of the MRD and Vietnam

	2006		2008		2010	
	MRD	**Vietnam**	**MRD**	**Vietnam**	**MRD**	**Vietnam**
Population †	17.0	83.3	17,1	85.1	17,3	86.9
Labour force †	9.7	44.2	10.0	46.1	na	na
Population density ††	na	269.0	na	274	426.0	280.0
Composition of GDP						
Agriculture	43.8	20.4	39.2	22.2	34.7	20.6
Industry	23.7	41.5	30.4	39.8	33.1	41.1
Services	32.4	38.1	30.4	38.0	33.2	38.3

Source: VCCI Can Tho, 2010 and GSO of 13 Provinces
Note: † Million people
†† People per square km
††† 1994 fixed price, exchange rate 11,045VND/USD

The MRD is the largest national rice granary and is also the heart of agricultural and aquacultural production in Vietnam. Its rice production was reported at 17 million tons annually, contributing over 50% of the annual rice output and 90% of rice exports for decades (GSO, 2010; Lensink & Van Nam, 2008). In addtion, the MRD has played a key role in aquacultural production since 1994. The region also produces 50% of fishery products, of which 60% is exported, and contributes 80% of shrimp exports from the country (Nguyen & Sumalde, 2008). The region is also the country's main supplier of fruit (sugar cane, mangos, grapefruit, etc.) and livestocks.

The Khmer, Chinese and Cham are the main minority groups living together with a larger Kinh soceity in the Mekong River Delta. The Khmer typically reside in rural areas in the MRD mostly concentrated in Soc Trang, Hau Giang, Vinh Long, Tra Vinh and An Giang provinces. Representing a smaller percentage of the population than the Khmer, the Chinese highly populate urban areas in Soc Trang, Bac Lieu, Ca Mau, Kien Giang provinces and Can Tho city. A smaller proportion of Cham people inhabitat the border of Cambodia and Vietnam in An Giang province. The Kinh people comprise 86% of the total population and the remaining groups account for 14% (GSO, 2010).

Although the MRD has many advantages in agricultural production, the region also faces subtantial disadvantages such as poor human resource development and natural disasters. Particularly, lower education and a lack of work skills in the labour force due to a neglect of human development strategies and low investment in education in the past are the key weaknesses of human development in the region (Nguyen, Vo & Mai, 2007). In addition, region-wide flood yearly continues to threaten agricultural and aquacultural production as well as the livelihood of the MRD people. These downsides coupled with the large population living under the poverty line poses challenges to policy makers and local government. In the economic development process, the Mekong River Delta is confronted with conflicting demands. On the one hand, the demand for economic growth focussing on industrialisation and modernisation and, on the other, a sustainable development policy to deal with poverty in order to improve the livelihood of the poor households in the rural areas of the MRD.

1.3 Research Problems and Questions

Microcredit is an important part of Vietnam rural finance. Focussing on low income and poor households, microcredit provides small loans as working capital for income generating activities at individual, household and microenterprise levels. Microcredit is also used as a tool of the government in many poverty reduction programmes. However, providing microcredit to a large proportion of rural households remains a difficult task because of the nature of the rural credit market as well as the lending mechanisms which are highly regulated by government intervention.

The Vietnam rural credit market has been characterised as fragmented whereby different types of credit providers (e.g., banks, credit funds, money lenders and advance input suppliers) exist to supply credit for a variety of rural clients. Poor physical infrastructure (e.g., roads, bridges, public transports and communication) in rural areas, especially in remote areas, associated with market fragmentation doubles the limited outreach of credit delivery. In addition, formal credit providers, represented by the specialised banks and peoples trust funds, were established to provide rural households with collateral-free loans. Delivering loans to poor households can be quite challenging because of risk management and transaction costs associated with asymmetric information. Lenders are supposedly able to obtain and use information about the potential creditworthiness of the borrower in specifying credit contracts for each transaction. Hence, rationing of credit demand becomes necessary for formal lenders;

and, rural households often face limited access to credit (Stiglitz & Weiss, 1981). To circumvent the problems, many government microcredit programmes involve the local Peoples Committees in their lending process. The linkage between the microcredit provider and the local authorities theoretically reduces the level of information asymmetry between borrowers and lenders that promises to reduce the risk of collateral-free lending. Meanwhile, the linkage creates another bias and incentive problems that are likely to hinder the poor group's access to microcredit. Furthermore, supply-driven formal credit providers who deliver microcredit with a subsidised interest policy tend to adjust slowly to the changing needs among their clients. All lead to a situation where a large number of rural households, particularly the rural poor, lacks access to microcredit. Limited accessibility to capital in the formal credit sector leads rural households to rely more on informal credit sources. The poorest household and those living in remote areas have no access to formal microcredit; hence borrow from relatives, friends, traders and money lenders. Without access to microcredit, rural households are not able to invest in new equipment and inputs for production, which may prevent them from generating an income for a living.

The purpose of this study was to address the problem of access to microcredit programmes by rural households in the MRD. As the government microcredit programme has been significantly expanded after its official establishment, credit accessibility is often presumed to increase with microcredit expansion and the behaviour of households' credit demand is typically assumed unchanged. In addition, as the Vietnam rural credit market is developing, market development leads to different credit sectors interacting to serve the clients. The mixture of credit supply may change the way that the rural household decides to borrow from a certain type of credit provider. Given accessibility to formal microcredit, impact evaluation of the microcredit programme was further examined. Research on microcredit programme impact on households remains ambiguous because there is no standard methodology to assess the true impact. Therefore, a study to identify the impact of the microcredit programme helps re-define the scope and target of future microcredit programmes. To investigate the addressed problems, the following questions need to be answered:

Research question 1. What factors influence microcredit accessibility for rural households in Vietnam, particularly the rural households in the Mekong River Delta?

Research question2. Does access to a microcredit programme and loan amount of formal microcredit really have an impact on rural households?

Research question 3. What particular factors can be improved to enhance more microcredit access and programme impact?

1.4 Research Objectives

To answer the research questions, the objectives of this study include the following:

- to provide an overview of the Vietnam rural credit market and the microcredit programme targeting rural households;

- to identify the determinants of accessibility to formal microcredit, loan amount of formal microcredit and loan amount of informal microcredit by rural households;

- to evaluate the impact of the microcredit programme on rural households, in terms of consumption and income; and

- to identify the policy implications towards improving accessibility to microcredit by and its impacts on rural households in Vietnam.

1.5 Contribution of the Thesis

The contribution of this study to microfinance literature is twofold: microcredit accessibility and microcredit programme impact. First, it is vital to gain an understanding of the demand for microcredit from clients before expanding and improving credit accessibility. Empirical studies about credit accessibility are vast, however, studies on credit accessibility typically assume that the rural credit market includes both formal and informal sectors but these studies often ignore the interaction between them. Clearly, including the interaction in defining factors influencing accessibility provides a different way of looking at accessibility to microcredit in the rural credit market. Hence, this study advances our understanding of the dynamic nature of household's accessibility to the rural credit market.

Secondly, improving access to microcredit is the main aim of many microcredit programmes targeting rural households and the poor because credit is believed to improve rural

households' livelihood by improving productivity, and smoothing consumption and income. In Vietnam, most microcredit programmes are managed by the VBSP. Since its official establishment in 2003, studies evaluating the impact of the VBSP microcredit programme on the target households have sporadically been done at national, regional and local levels; to our knowledge, studies on impact evaluation particularly for the MRD are few. Therefore, this study is expected to fill the literature gap of microcredit programme impact evaluation for the MRD and to enrich the field of microcredit programme impact evaluation.

1.6 Data and Methods of Data Analysis

Two main sources of data were used in this study. The 2010 MRD survey data obtained through a rural household survey using a structured questionnaire was used for research Objective 2 and 3. In addition, the Vietnam Household Living Standard Surveys (VHLSS) 2006 and 2008 panel data, conducted by the General Statistic Office of Vietnam, were used for impact evaluation of the microcredit programme in research Objective 3.

Different techniques were applied to analyse the data. To account for selection bias due to observed and unobserved factors in the rural credit market (in research Objective 2), the selection, probit with continuous endogenous variable at right hand side (RHS) and Tobit models were applied using the 2010 survey data. Propensity Score Matching method (PSM) and Difference-in-Differences (*DinD*) approach were either independently or dependently employed using the datasets to produce unbiased impact estimators of the microcredit programme evaluation. Particularly, Kernel and Radius matching were applied on the 2010 survey data and fixed effects models with instrumental variables and PSM were used for the VHLSS in the *DinD* approach.

1.7 Definitions of terms

The following terms used in this thesis need defining for consistency. First, the working definition of '*microcredit programme*' includes all small-scale formal and semi-formal financial lending to rural households either directly or through a group. Microcredit programmes are largely under the management of the VBSP, which is the formal credit provider, the microcredit programme is mainly referred to in the text. This definition excludes direct income transfers to households, such as pensions from the Ministry of Labour, Invalids,

and Social Affairs (MOLISA), schemes or other aids from non-government organisations (NGOs), and informal loans. The choice of households in the rural area not only complies with the addressed problems of the rural credit market but also reflects the rural poverty as the rural poor largely constitute the poverty class in Vietnam. Next, the working definition of '*rural household*' is referred to the target household defined by the microcredit providers and the '*rural poor household*' strictly follows the definition of '*poor*' provided by MOLISA and implemented by the local authorities. Other definitions of poor are also referred to for comparison purposes but are not applied in this study. Unless otherwise defined, the terms '*borrower'* and *'borrower group'* refer to a rural household and a group of rural households borrowing from the microcredit programme, respectively.

1.8 Structure of the Thesis

The remainder of the thesis is organised as follows. Chapter 2 describes the rural credit market in Vietnam, including credit supply and demand, credit accessibility, credit policies and the microcredit programmes. Chapter 3 reviews the literature on the theory of credit rationing, households' demand for credit, accessibility to microcredit and the impact evaluation of microcredit programmes at the household level, including empirical models and their main findings. Chapter 4 presents the research methodology. Chapter 5 explains the survey data and respondents in the MRD.

Discussion of the results is presented in the following two chapters. Chapter 6 focuses on the determinants of accessibility to informal and formal microcredit under the condition that the two sectors coexist in the rural credit market. The probability of access to formal microcredit is explained given that the households' decisions to borrow from one sector might alter the probability of participation in the other sector. Chapter 7 assesses the impact of the VBSP microcredit programme on rural households. Two approaches were used to address the main sources of bias, observed and unobserved bias, in impact evaluation. Finally, Chapter 8 concludes the study, proposes some relevant policy implications, and outlines future research based on the research findings and limitations.

Chapter 2
The Rural Credit Market in Vietnam

This chapter describes the Vietnam rural credit market, including credit supply, credit demand and credit accessibility by rural households, credit policies and the VBSP microcredit programmes. Due to geographical heterogeneity, the MRD rural credit market may differ from its umbrella, the Vietnam rural credit market. However, the credit market in Vietnam is highly regulated and the formal financial institutions are vertically controlled and monitored wherein bank branches strictly follow unique policies from their headquarters. Thus, the MRD rural credit market resembles the characteristics of the Vietnam rural credit market. This chapter describes the Vietnam rural credit market and reviews credit policies at the national level. The chapter consists of four sections and is organised as follows. Section 2.1 provides an overview of Vietnam's rural financial system including the formal, informal and semiformal sectors. Section 2.2 discusses credit supply and demand in the rural credit market. Section 2.3 discusses the policies and events that influence the development of the rural credit market. Section 2.4 discusses the government microcredit programme targeting poverty reduction in Vietnam. Section 2.5 summarises the chapter.

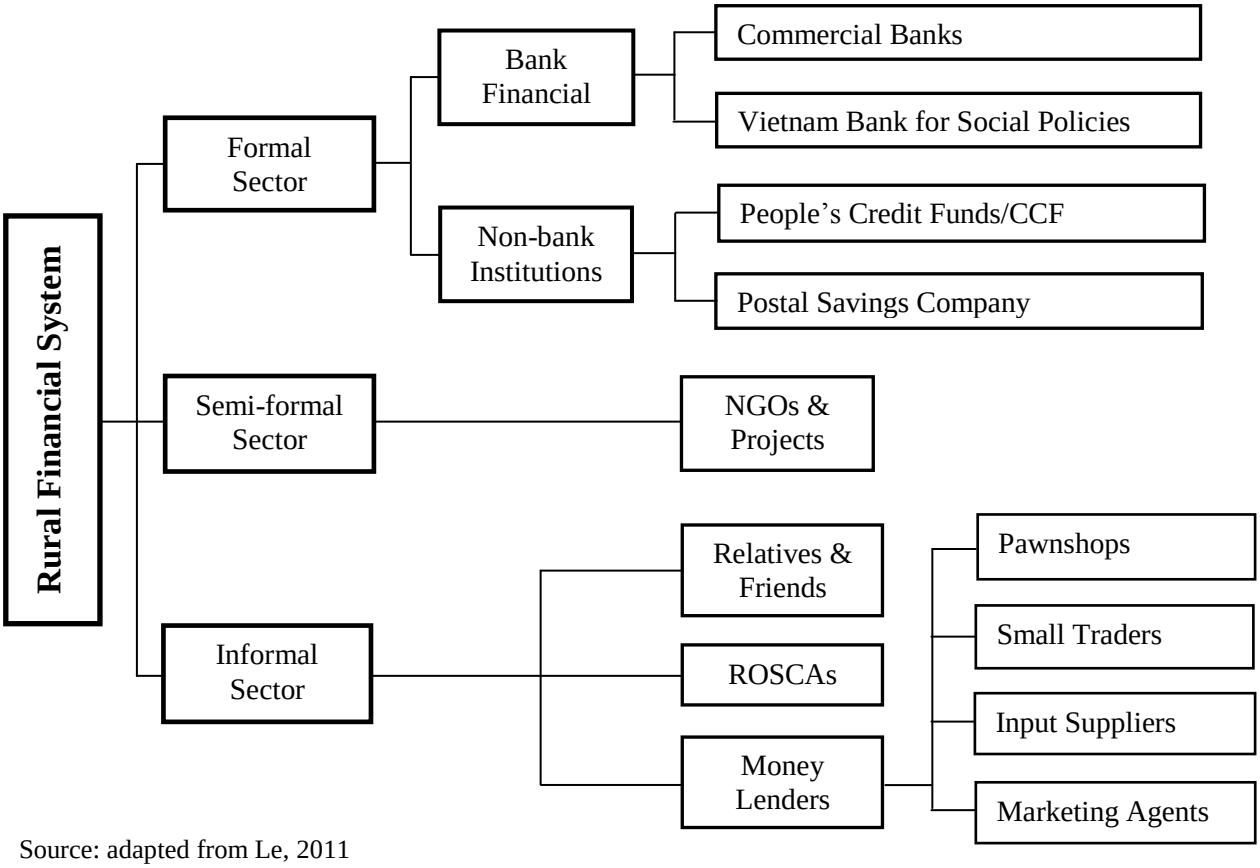
2.1 Rural Financing in Vietnam

The development of the Vietnam rural credit market is historically marked by the 'Reform' in 1986. Before 1986, under the central planning model, the rural credit market played a minimal role in supplying capital for the agricultural sector. As the State did not recognise private investment, it ignored the need for capital investment. Official credit was delivered by the State Bank to communes, cooperatives and state farms (Fallavier, 1998). In the late 1980s, the Vietnam rural credit market was established to supply capital to the agricultural sector. The establishment of the Vietnam Bank for Agriculture (VBA) in 1988 was the first step in lending for private investment in agriculture. After its official establishment, the formal credit market has been developed to serve rural clients. Meanwhile, non-government organisations (NGOs) and donors have joined to increase the credit supply through microcredit schemes in the rural credit market (Le, 2011).

The Vietnam rural credit market is documented as segmented and dual structured where the formal and informal credit sectors prevalently exist (McCarty, 2001; Pham & Lensink, 2007).

For years, the formal credit sector, led by the VBA, mainly provided credit for agricultural production with a collateral requirement. The poor were mostly excluded from VBA credit. In 1995, the establishment of the Vietnam Bank for the has driven the credit supply to cover the unreached segment. McCarty (2001) documented a steady formal credit expansion so that the share of formal credit increased from 28% in 1993 to 46% in 1998 and to 70% in 2001. A proportion of unnerved households seek alternative credit from the informal sector such as friends, relatives, moneylenders at excessively high interest rates. The average interest rate charged for informal loans in 1993 was 80% per annum, which was over double the rate of formal loans.

At present, the Vietnam rural financial system consists of three sectors: the formal credit sector, semi-formal sector and informal sector. Figure 2.1 shows the types of lenders in each credit sector in Vietnam's rural financial system.



Source: adapted from Le, 2011

Figure 2.1 The Vietnam Rural Financial System

2.1.1 The Formal Credit Market

The formal credit sector is characterised by the dominance of the three state-owned commercial financial institutions, namely the Vietnam Bank for Agriculture and Rural Development (VBRAD), the Vietnam Bank for the Social Policies (VBSP) and the People's Credit Funds (PCFs). According to the World Bank (2002) report, the formal credit sector accounted for as much as 73.5% of the total lending to the economy. Heavily regulated by the State Bank of Vietnam, the formal credit sector was designed to cover the overall rural credit market but its operations fall short of achieving the defined objectives.

(1) The Vietnam Bank for Agriculture and Rural Development

The Vietnam Bank for Agriculture and Rural Development formerly known as the Vietnam Bank for Agriculture, was separated from the State Bank of Vietnam in 1988. The VBRAD is the largest supplier of credit to rural households, providing credit for all types of agricultural activity in rural areas (BWTP, 2008). The share of rural households having access to credit under VBRAD management increased rapidly from 9% in 1992 to about 30% in 1994 (Wolz, 1999). Although the VBRAD is by far the most important financial institution in rural areas, its lending coverage is still underdeveloped to serve the entire rural credit market, particularly the rural poor. Microcredit lending is dominated by larger loans in the VBRAD total outstanding loans. Of the total loans in 1998, small loans below 5 million VND[3] represented about 50% whereas the loan amount of microcredit (at an average of 1 million VND) was recorded only 16% (World Bank, 2007). A collateral requirement is another constraint in VBRAD's lending practices providing rural credit. VBRAD requires collateral such as residential property, movable assets, goods and land rights, when granting loans. Thus only about 30% of the households with a "red certificate" on land use rights have access to credit. Most rural households are unable to meet the lending requirements and are excluded from the supply of rural credit.

Bias in risk assessment and complicated procedures in the lending process have also contributed to the underdevelopment of VBRAD's operation. The VBRAD branches prefer to provide credit to state-owned enterprises (SOEs) due to the low risk of default. SOEs are often considered zero risk clients because the government is expected to bail them out in the case of default. Lending to SOEs also incurs relatively low transaction costs for significantly

[3] Exchange rate: 1USD = 16,000VND

large credit amounts compared with many small amounts of microcredit to a large number of households (Putzeys, 2002). Dealing with small loans and microloans is considered costly in terms of time and money because of the complexity in processing the loan applications. Often, VBRAD credit can be used only for specific agricultural investments but not for those activities that are the priority needs of the borrowers.

(2) The Vietnam Bank for Social Policies

The state-owned Vietnam Bank for the Poor (VBP), the second largest rural bank, was established in 1995 in the framework of the Hunger Eradication and Poverty Reduction Strategy. It officially started operating in 1996, providing credit at low interest rate to the rural poor who did not qualify for individual loans because of limited collateral. The VBP utilises the VBRAD's branch network is at the district level and, to a limited extent, at the commune level, where loan officers visit the communes on a weekly basis. This coverage and lending practice further reach the segment currently not served by the VBRAD in the rural credit market. The existing network was believed to have limited outreach to the poor in the most remote and rural communes. In 1999, only 2.3 million poor households were recorded as having obtained loans. Due to strong demand for microcredit, 8.3 million rural households were recorded by VBRAD and VBP in 2001. Of this, VBRAD accounted for 60% of the total number of loans and provided an average loan size of 6.45 million VND and 40% were from VBP with an average loan size of 2 million VND (World Bank, 2003).

In 2003, the Vietnam Bank for the Poor was renamed the Vietnam Bank for Social Policies (VBSP). Its operations have been modified to focus on the poor. The VBSP closely cooperates with local organisations in lending procedures in which the local People's Committees help VBSP to identify the poor and socially disadvantaged groups. Meanwhile, other social mass organisations in villages such as the Women's Union and the Farmers' Associations help the bank to monitor the loans. Collateral is not required for loans but the social mass organisations provide a Guarantee Fund to the bank. If the borrowers default, the bank will take a portion of the Guarantee Fund. To ensure repayment, the social mass organisations organise the borrowers in credit groups. Joint-liability groups were also formed in the initial stage of microcredit lending but this lending practice has been moved to the more flexible group lending (Bhole & Ogden, 2010) in which the individual is liable only for her or his loan but not for those of other group members. According to the VBSP 2009 report

(VBSP, 2009), the total outstanding loans reached 72,660 billion VND, providing loans for 7.5 million active borrowers. The 2009 outstanding loans increased 38.4% (20,149 billion VND) compared with 2008. Of this, loans to poor households are highest at 32,542 billion VND for over 3.7 million clients.

(3) The People's Credit Funds

After the collapse of the rural credit cooperatives, VBP was entrusted with reorganising the rural credit cooperative system. This resulted in a network of People's Credit Funds (PCFs) whereby PCFs' branches have been created in nearly all provinces of Vietnam. To restore public confidence in the formal rural finance system, the term 'cooperative' has been deliberately excluded from the name of this newly established finance institution (Putzeys, 2002). The PCFs' system has been set up as a member-owned organisation that aims to mobilise savings from its members. The system is managed according to the economic principle of cost covering, i.e., no easy money is available.

The PCFs' network has been established predominantly in those areas that are economically better off and have a better developed infrastructure. Therefore, the PCFs' system plays a limited role with respect to reducing rural poverty. Its major role is to provide a viable rural finance system to farm and small entrepreneurial households to stimulate economic development, which indirectly contributes to poverty eradication (Putzeys, 2002).

(4) The Postal Savings Company

The Vietnam Postal Savings Company (VPSC) was established in 1999 with the principal objective to mobilise idle money from the public for economic development. Postal savings services include a wide range of individual savings and postal related savings accounts. As VPSC is not allowed to provide credit, it plays a minor role in supplying credit to rural households.

2.1.2 The Informal Credit Market

Knowledge of the informal credit sector in Vietnam is primarily based on anecdotal evidence but its important role as the informal credit provider in rural credit market has recently been

well documented (for details, see Barslund & Tarp, 2008; Pham & Izumida, 2002; Pham & Lensink, 2007). Typically, rural households can borrow money from different types of informal loan sources such as relatives, friends and neighbours; Rotating Savings Credit Associations (ROSCAs); or private money lenders, with greater flexibility than they can borrow from formal credit providers.

(1) Relatives, Friends and Neighbours

Relatives, friends and neighbours are the first alternative sources of credit; loan size and interest rate are determined by individual relationships and reputations. Taking advantage of personal relationships, relatives and friends, in general, provide loans without collateral or any other written loan contract. Recorded interest rates are low for loans by the neighbours and, in many cases, loans from relatives and friends are interest free. The loan amount varies according to the loan purpose such as emergency, consumption for illness, funerals, and weddings, etc. Although, these loans are rarely sufficient to finance agricultural production, they partially reflect the prevalence of informal loans in the rural credit market in Vietnam (Pham & Izumida, 2002).

(2) Rotating Savings Credit Associations

Rotating Savings Credit Associations have been traditionally known as an informal credit channel for rural households in Vietnam. Although they have existed for many generations, these financial arrangements have never been recognised as business contracts under the Law of Credit. These groups are referred to as '*Hui*' in the South and '*Ho*' in the North (Pham & Lensink, 2007). ROSCAs promote periodic savings which, in turn, are rotated as funds among a limited group of members who trust each other. Members of these associations come mainly from the same hamlet or are organised on the spot among colleagues and friends at work. In general, membership averages 12 or more persons[4]. Decisions on interest rate, number of members and loan amounts are made either jointly by all members, by a bidding process or solely by the organiser. The life cycle of a ROSCA ends when every participant has obtained the total funds collected at least once. Most ROSCAs are set up to bridge short-term needs but

[4]Twelve people is an ideal matching number to the 12 months of the year.

they can also be set up to finance long-term investments. However, as ROSCAs are not regulated by the Law on Credit Institutions, defaults are commonly associated with either ROSCA members or organisers due to the weak screening process among members and weak social sanctions.

(3) Private Money Lenders

Private moneylenders are widespread and seem to be an important source of loans for most rural households. Putzeys (2002) revealed that, in 1997-1998, 51% of credit to farm households was provided by informal channels such as private moneylenders and individuals. Private money lenders are usually rich households in rural areas with surplus money and goods. The informal interest rate is normally higher than the formal rate; in some extreme cases, the interest rates are as high as 10% to 30% per month (Putzeys, 2002). Despite the high interest rates, there are many reasons why people borrow from moneylenders. Flexibility, both in getting the loan and repayment, as well as simple lending practices are documented as being far more important than the interest rates (Pham & Izumida, 2002). Generally, moneylenders do not ask for collateral and have no complicated screening steps to determine the loan.

Some moneylenders are traders who give cash in advance on the basis of the promise to receive or buy the products at harvest time. Others can be suppliers who provide credit as input for agricultural production at the beginning of the season then receive the principal payment plus interest at the end. This type of lender has emerged during the last few years as the agricultural products market became more developed. Therefore, it is widely accepted and assumed that it will become an important source of informal credit in the rural credit market.

Similar to other rural financial markets in developing countries, the informal credit sector remains controversial in Vietnam ’s rural credit market reconstruction. There are opponents who traditionally regard informal credit as a violation of financial discipline despite its contribution to meeting farmers’ financial needs. This is because the Vietnamese government does not recognise the legal existence of the informal sector and the development of informal credit is out of the government’s supervision. Therefore, informal credit should be excluded from the rural credit market by improving the lending operations of formal financial institutions to expand outreach in favour of rural households, which is crucial in establishing a

sound rural credit market and maintaining the sustainable development of the rural economy. However, according to the development finance's view, supported by the persistence of informal credit, suggests a better regulation for both formal and informal credit sectors would tap more financial resources from informal sector which would work towards improving more credit access to the rural credit market. The existence of informal credit reflects the imperfections of Vietnam's formal rural credit system, which is characterised as fragmented and unable to meet the diverse credit demands of the rural households. In terms of rural credit development, the existence of informal credit should be re-addressed in both rational views in order to facilitate credit accessibility to household in the rural credit market.

2.1.3 The Semi-formal Credit Market

The semi-formal credit sector was established through microfinance programmes in late 1990s, managed by international programmes and NGOs in partnership with local organisations at the provincial level. This sector consists of various structures of decentralised financing that offer microfinance services that try to reach that part of the population excluded from formal credit channels. Initially, the semi-formal credit sector was mainly funded by international and national donors who saw this channel as a means to provide more efficient aid to poor families in rural areas and thus combat poverty. Gradually, this microcredit scheme has become the central concern of many international poverty reduction programmes (World Bank, 2000, p.110).

Like other Asian countries, the semi-formal credit sector has a significant role in the provision of microcredit to the poor but at a smaller scale in Vietnam (see McCarty, 2001 for a survey). The key actors in the semi-formal credit sector are official mass organisations such as the Women's Union, Farmers Associations, Youth Union, and War Veterans, who play a crucial role in the implementation of donor-supported microfinance schemes. These organisations are usually represented at four administrative levels: national, provincial, district and commune. This structure enables the mass organisations to have direct contact with the local level and to establish a connection with the national level. The legal framework covering microfinance services in Vietnam was established in 2010; hence, the semi-formal credit sector was left outside the Law on Credit Institutions in recent years (a further review of credit policies is presented in the next section). Due to incomplete information, the semi-formal credit sector will not be included in this study.

2.2 Credit Policies and Microlending Practice in the Vietnam Rural Credit Market

A summary of the empirical studies providing information about the sources of credit supply and the purposes of credit demand in Vietnam is presented in Table 2.1. Like rural credit markets in other Asian countries, the formal credit sector fails to cover the credit demand for the production and consumption of rural households, hence, the informal sector exists in the rural credit market. Rural households are likely to borrow from different credit sources for different purposes. For example, McCarty (2001) and Pham and Izumida (2002) showed that the predominant purpose of formal loans reported by the surveyed households was for financing current production such as cultivation, livestock and handicrafts but most informal loans were obtained primarily for personal consumption and expenditure such as house repairs, weddings and funerals. Recently, Pham and Lensink (2007) showed a mixed contribution of the formal and informal credit sectors to households' credit demands in Vietnam. Rural households borrow from either the formal credit sector, largely to support their agricultural production such as purchasing chemical fertilisers and raising livestock, or they borrow from friends or relatives to supplement their consumption including house building, medical treatment and children's education. Evidence of the association between formal credit and informal credit for production and for consumption loans in the rural credit market in Vietnam has been documented but partially explained.

Table 2.1 Main Sources of Supply and Demand for Rural Credit

Studies	Production					Consumption				
	Fertiliser	Other inputs for crop production	Livestock	Fixed capital	Self-employment Non-farm activities	Daily expenses	Weddings and funerals	Schooling	Health care	Housing
McCarty (2001)	D F/IF	D F/IF	D F/IF	D F/IF	D F/IF	D IF	D IF	D IF	D IF	D IF
Pham & Izumida (2002)	D F/IF	D F/IF	D F/IF	D F/IF	D F/IF	D IF	D IF	D IF	D IF	D IF
Ho (2004)	D F	D F	D F	D F	D F	D IF	D IF	D IF	D IF	
Pham & Lensink (2007)	D F/IF	D F/IF	D F/IF	D F/IF	D F/IF	D F/IF	D F/IF	D F/IF	D F/IF	D F/IF

Note: D: Demanded for
F: Supplied by formal credit sector
IF: Supplied by informal credit sector

As the [Vietnam] agricultural input and product markets have developed, the demand for rural credit, particularly the demand for microcredit, has also changed (World Bank, 2007). Rural households have increasingly demanded more sophisticated loans. For example, a crop producer and a small trader have very different demands for loans. A crop producer might prefer a loan at the beginning of each crop planting and the loan repayment after harvest whereas a small trader requires a loan at any time for cheap stocks with a flexible repayment period. In addition, the loan size also differs between the very poor and less poor households based on their income generating activities. Though a small loan can certainly make a significant impact in raising the income-generating capacity of a crop producer, a medium-scale trader would demand a large loan for her or his business. Thus, under a supply-driven and subsidised credit policy, the provision of credit to poor households needs to be re-addressed in order to identify the changing demand for credit from clients as well as improve the formal lending practices.

2.3 Credit Policies in the Rural Credit Market

After the country's Reunification in 1975, the Vietnam economy was strictly regulated by the central planning model, which decelerated growth and created fewer incentives for economic agents to be involved in economic activities (Fan, Huong, & Long, 2004; McCarty, 2001). Before the 1980s, the economy was characterised by: *i)* state or collective ownership; *ii)* the centralisation of physical input and output supplies; *iii)* the absence of factor markets and highly regulated markets of goods and services; *iv)* a concentration on heavy industries; and *v)* a passive one-tier banking system in which the state bank performed as a commercial as well as a Central Bank in order to allocate the capital to designated projects rather than to mobilise domestic savings (Fan et al., 2004). Consequently, the average national income growth rate per annum during the period 1976 – 1980 was estimated at 1.4%, far below the targeted rate of 13% to 14%. Severe food shortages, trade deficits, aid cuts and budget deficits, high inflation and a declining per capita income imposed high pressure on policy makers in the early 1980s (Pham, 2009; Vo, 1987).

Faced with severe inflation and a budget deficit in 1986, the Vietnamese government reformed a number of macro policies, starting with decentralisation of SOEs, to control fiscal and monetary policies. The economic reform had a significant impact on the economy, particularly controlling inflation in the late 1980s. Within 10 years, the near hyperinflation in

1986 was reduced to a single-digit level, facilitating economic growth (Pham, 2009). In 1990, that financial reform started with separating the State Bank monopoly into the two-tier banking system with the State Bank functioning as a typical Central Bank and the commercial banks specialising in providing banking services. The newly established banking system opened the door for lending to the private sector. Currently, the commercial banking system consists of the state-owned banks and joint-stock banks, credit funds, joint-venture banks and foreign banks. Interest liberalisation, flexible management of the exchange rate and the application of indirect monetary measures in market management have also been implemented. The implementation of innovative monetary policies has contributed significantly to macroeconomic stabilisation, inflation control and an increasing supply of credit to all sectors of the economy. Table 2.2 summarises some key policies and events that particularly influenced the rural credit market in Vietnam.

Table 2.2 Key Policies and Events Influencing the Vietnam Rural Finance

Year	Policy/Event	Solution
1988	VietnamBank for Agriculture was established	To provide financial services to agriculture and rural sectors
1993	People's Credit Funds (PCFs) were re-established	To mobilised savings from rural households
1995	VietnamBank for the Poor was established	To provide credit to poor households at favourable interest rate
2001	Decree No.48/ND-CP/2001 of the Government to PCFs	To improve PCFs' organization and operations
2002	The Bank for Social Policies (VBSP) was established	To provide cheap credit to the poor and rural households
2005	Decree No.28/ND-CP/2005 of the Government	To direct the organization and operations of microfinance institutions (MFIs)
2008	Resolution 26-NQ/TW/2008 on "Tam nong" of the Party Congress	To continue to provide favourable credit to the rural sector, and encourage the MFIs to lend to the rural sector
2009	National Microfinance Steering Committee was formed	To develop a market-based microfinance sector
2009	Decision No.497/QD-TTg/2009 of the Prime Minister	To provide the interest support for farmers within the Demand Stimulus package
4/2010	Decree 41/ND-CP/2010 on Credit Policy for developing agriculture and rural sector	To increase non-collateral loans for farming households, non-farm households, farming cooperatives, farming enterprises
6/2010	The New Law on Credit Institutions (CIL) was amended to replace the CIL in 1997	To incorporate non-bank MFIs into the formal financial system and to liberalise the banking operations including rural finance

Source: adapted from Le (2011)

Despite a number of limitations, the rural credit market's development has significantly contributed to the rural development of Vietnam in terms of the expansion of outreach and

increasing credit access (Le, 2011; McCarty, 2001). The establishment of VBRAD in 1988 and the PCF in 1993 played a major role in supplying rural credit. They built a countrywide network for the specialised rural credit provider to expand its services. In 1995, the VBP was established under the control of VBRAD with the purpose of providing poor households with favourable credit, i.e., the poor could borrow collateral-free low interest loans. The establishment of VBSP in 2003 further expanded social policy lending to the target group to ensure the inclusion of the poor as well as further establishing the microfinance sector in the rural credit market.

Government policies have deliberately encouraged the microfinance sector's development. Several policy initiatives are implemented to ensure microfinance institutions' operations to work in the rural financial market as well as to include the microfinance sector in the rural development process. Particularly, Decree No. 28/ND-CP/2005 provided the primary legal framework to open up the MFIs' operations to service clients. Resolution 26/NQ-TW/2008 re-emphasised rural development based on three main actors – agriculture, farmers and the rural sector. The policy indicated a further need to continue providing favourable credit to the rural sector by encouraging financial institutions to lend to the rural sector. In 2009, the National Microfinance Steering Committee was formed to develop a market-based microfinance sector. Subsequently, two rural credit policies have been implemented. Decision No.497/QD-TTg/2009 of the Prime Minister aims to provide interest support for farmers within a demand stimulus package and Decree 41/ND-CP/2010 on Credit Policy for agriculture and rural sector development increases non-collateral loans for farming households, non-farm households, farming cooperatives and farming enterprises. In particular, non-collateral loans increased up to 50 million VND for farming households, 200 million VND for non-farm households and 200 million VND for agricultural cooperatives and farming enterprises.

Although the MFIs have been formally directed by Decree No. 28, the Law on Credit Institutions amended in 2010 has legislatively integrated the MFIs as a subset of the formal financial system. As the landmark legislation for MFIs to operate in the rural financial market has been established, on-going efforts to formulate the Microfinance Strategy are major tasks. Le (2011) indicated the paradox of defining the Microfinance Strategy that ensures the MFIs performance meets the social objectives while pursuing market-oriented rural finance. On one hand, the maximising profit behaviour of the banks could drive the vast majority of poor and

low-income households away from accessing a wider range of financial services, not just microcredit. In addition, the dominance of the subsidy from VBSP burdens the government budget and discourages the development of market-oriented rural MFIs.

2.4 Microcredit Programmes Targeting Poverty Reduction in Rural Vietnam

Despite a number of key policies established over the past two decades in the rural credit market to support poverty reduction, Vietnam is still home to over 12 million people (14.2% of the population) living in poverty[5] (World Bank, 2008). Currently, the majority of poor households in rural areas live in poor conditions such as temporary houses, lack of fixed assets, low and unstable income. Accessibility to credit has remained one of the critical issues of the country's poverty reduction and rural development strategy.

The VBSP microcredit programme has been designed to target the poor who face disadvantage in living conditions and have limited access to finance sources. Since its official establishment in 2003, the VBSP provides the poor with preferential microcredit through a '*group-based lending scheme*'. To borrow credit from VBSP, a household should join a credit group in its locality. A credit group consists of 5 to 50 members residing in the same village. If in a village the number of members is lower than 5, they should join a credit group in another village. Each credit group sets up a management board, which is responsible for the borrowing and credit use of its members. According to the VBSP's lending policies, to become a member of a credit group a household should meet the following criteria:

- The household has a long-term residence permit at the locality in which the credit group is located.
- The household has someone who is able to work (working force).
- The household is classified as poor by a commune authority.
- The household has a demand for credit. The credit needs to be used in production or for consumption necessary for subsistence.
- Total loan size is not more than 30 million VND (VBSP lending policies in 2012). A household can borrow many times, but the total outstanding loans may not exceed 30 million VND.

[5] In 2006, the national poverty line was set at 260,000 VND (16 USD) per month per person in urban areas and 200,000 VND (12 USD) per month per person in rural areas.

Standard lending procedures for a member of a credit group applying for VBSP loans are as follows. First, applicants send a formatted letter to their credit group. In the letter, the applicants specify the amount and purpose of the loan that they intend to take. Upon receiving the applications, the credit group leader arranges a meeting of all members to consider the relevance of the loans. During the meeting, the credit group, based on the consensus of members, determines which households are able to borrow and the amount and terms of each loan. A list of the successful applicants is prepared and sent by the credit group leader to the People's Committee in that commune. Once the list is ratified by the People's Committee, it is sent to a VBSP branch for final approval. It often takes from one to four weeks to obtain credit (Nguyen, 2008; Quach, 2005).

'Group-based lending' has been popular in making loans to rural poor households since the start of the VBSP microcredit programmes. However, it is worth noticing that this lending practice does not strictly follow the joint-liability principle. The borrowers are required to form a group, including a number of certified poor members and a group leader, but no joint-liability is specified. The group leader's tasks are: (i) to provide information of group members to credit officers; (ii) to collect loan applications from group members and disperse the loans, and (iii) to convince members to repay their loans. In the case of a default, the responsibility for dealing with default borrowers is the credit officer; the group leader helps persuade the defaulters to repay. It is simply, according to Quach (2005), a 'lending through a group' mechanism that adopts a 'group-based lending' to reduce transaction costs rather than to reduce default risk. However, lending through a group is more effective in dealing with asymmetric information than in individual lending. At the commune and microcredit institution levels, the process of lending and monitoring VBSP credit is rather stringent (Nguyen, 2008). To ensure high repayment rates in the system, the VBSP monitors outstanding loans and overdue outstanding loans from its local branches. It corresponds to the overdue outstanding loans with fund allocation every year, i.e., less funding to VBSP branches with large overdue loans. In addition to the credit groups the People's Committee is also administratively responsible for the repayment of credit group members in their commune. Often, when the applicants list is ratified, the People's Committee tends to exclude very poor households who might not be able to repay loans but non-poor or even better-off households can get loans (Dufhues, Pham, Ha, & Buchenrieder, 2001). Therefore, the poverty targeting of the VBSP program remains questionable.

Nguyen (2008) employs the World Bank–GSO poverty line to investigate how well the microcredit programme reaches the households. The results revealed that, in 2004, only 12% of the poor households with a favourable credit record obtained loans from the microcredit programmes provided by VBSP. The evidence strikingly indicates that the lending rate of microcredit programmes was significantly low. In addition, the poor usually receive smaller amounts of credit than the non-poor. The loan size per poor borrowing household was 3.174 million VND, which was rather lower of 3.715 million VND that a non-poor household borrowed on average.

Two main reasons explain why microcredit programmes did not reach the targeted poor households. First, the poverty targeting issue has difficulty in identifying the real poor. In Vietnam, the poverty definition is not consistent between the GSO-WB approach[6] and local authorities (Nguyen, 2008). At the commune level, a household is classified as poor if it is considered lacking food or is living in a damaged house while its income lies below the income poverty line constructed by the Ministry of Labour and Invalid Social Affairs (MOLISA). The criteria are set up by each commune and they can differ from one commune to another. Because of the inconsistent definition of poverty, the only way to differentiate the poor from the non-poor is principally the instinctive judgement of local officers who often have an obscure and varied understanding of the poverty line set by the government. Thus, it is difficult to monitor the delivery of the subsidised loans to ensure that the loans actually reach the poor.

In addition, the non-targeting issue, in which much of the benefit from the subsidised microcredit program is enjoyed by the non-poor rather than the poor, has also contributed to the failure of these programmes. Nguyen (2008) showed that the VBSP programme's coverage rate for middle and high income groups was 7.3% and 2.3%, respectively. The non-targeting issue in Vietnam was similar to that of China's subsidised loan programmes in the early 1990s. Rozelle, Zhang and Huang (2003) revealed that over 90% of loans in China in the early 1990s were invested in industrial production instead of agricultural production. Bias in loan allocation and profit concerns are the main reasons that prevented banks from delivering subsidised loans to the poor from microcredit programmes (Li, 2010).

[6]GSO-WB approach follows the international poverty line which set a minimum income 1.25 USD a day per person.

The second reason related to asymmetric information in selecting the borrowers in a poverty targeted microcredit programme is reported in Dufhues et al. (2001) study. The authors reported that due to high costs related to lending and monitoring process, credit groups and commune heads are reluctant to include poor households in the list of credit applicants. Since commune heads are involved in the screening process and they receive incentives based on the credit volume and repayment rate in the commune, the commune heads also involve in the reinforcement of the repayment of overdue loans. This is an unpleasant duty which the commune heads try to avoid. Therefore, they are more likely to select households that may not be poor according to the national criteria but have a credit demand with potential repayment. The poor are excluded because they are assumed to have a low repayment capacity. Meanwhile, non-poor households find it easier to obtain credit because they are expected to be more reliable in using credit effectively and repaying credit. In addition, the poor often have low levels of education, limited production skills and market information. They also tend to apply for smaller credit amounts than the non-poor.

2.5 Chapter Summary

The rural credit market in Vietnam is characterised as a segmented and emerging market wherein the growing demand for credit by poor and low-income households is unmet. Three forms of credit providers, namely formal, informal and semi-formal, exist. The formal credit sector was driven by series of institutional changes and credit policies designed to cover the credit demand of rural households, particularly the rural poor. More credit access has been documented, however, a large portion of the poor are unable to borrow from the formal credit sector hence seek an alternative source of credit. The informal credit sector, traditionally known as an alternative source of formal credit, is prevalent as the alternative for many rural households; it seems to exist with the existing formal one. The semi-formal credit sector, dominated by NGOs and donor support funds, participated in the market in late 1990s, and has an increasingly important role in providing microcredit and microfinance services to the poor but on a small scale.

In the development of the rural credit market, government policies targeting the poor have overcome the obstacle of collateral loan for a loan for the poor. Many credit policies in favour of the poor have been implemented; however, the asymmetric information inherently prevents the poor from having access to credit. Persistently, the subsidised microcredit policies appear

to be a paradox for the Vietnam government to perform its social objectives in a market-oriented rural finance market. On one hand, the dominating subsidised microcredit programme ensures a wider outreach of microcredit to the rural household, particularly the poor; however, it burdens the government budget and hampers the development of the market-oriented rural finance. On the other hand, to maintain the market-oriented rural banks with profit maximising behaviour, carrying a subsidised credit policy could drive the majority of poor and low-income households from accessing credit.

Chapter 3
Review of the Literature

This chapter addresses two areas of microcredit literature; it consists of three sections. Section 3.1 reviews the literature on accessibility to microcredit, including the theory and empirical models for microcredit accessibility, and the empirical findings of households' access to microcredit. Section 3.2 reviews impact evaluation of microcredit programmes, including impact evaluation methodologies and impact evaluation of microcredit programmes at the household level. Section 3.3 summarises the review.

3.1 Theory of Credit Rationing and Household Demand for Credit in the Rural Credit Market

3.1.1 Theory of Credit Rationing

Credit is a scarce resource by its nature and the availability of credit differs among borrowers due to risk assessment by lenders. Stiglitz and Weiss (1981) introduce the credit rationing theory based on two main assumptions: *i*) lenders cannot differentiate degrees of risk associated with safe and risky borrowers, and *ii*) loans are subject to the limited liability of borrowers to repay loans at the end of the investment period (i.e., if the project returns are less than the debt obligations, the borrower bears no responsibility to pay out of pocket). Because of the presence of asymmetric information, lenders judge borrowers' creditworthiness based on the available information before and after a loan is offered. The imperfect information creates at least two types of problem in microcredit - adverse selection and moral hazard. The adverse selection problem arises in the screening process where transaction costs involve differentiating between good and bad borrowers as reflected in the cost of borrowing, that is interest rate. Increasing interest rate to compensate for high transaction cost in small loans may drive out good borrowers from the pool of borrowers, hence, only bad borrowers with high risk project are able to borrow but not the target group. The moral hazard relates to the monitoring and enforcement mechanism where the borrowers may not make every effort to repay after receiving the loan since they know their lenders are sharing part of the risk (Pham & Lensink, 2007). In general[7], lenders decide whether credit is granted and how much is granted based on a set of information that they obtain, i.e., not all borrowers will receive the

[7] The case of asymmetric information is different from the case of perfect information where borrowers are able to borrow the desired money that they want for their production or consumption.

credit they apply for. This credit rationing leads to the problem that households and small-scale enterprises face credit constraints regardless of their repayment capability (Aghion & Morduch, 2005).

A model of credit rationing

A simple *ex-ante* asymmetric information model consisting of households and banks is used to illustrate how credit rationing exists in a credit market. Each household, referred to as a borrower, has an investment opportunity to generate income but he or she lacks capital. The opportunity cost of the investment for the borrower is assumed to be his or her own labour, which is tradable in the labour market. The borrower therefore seeks funds from the credit market in which the bank acts as a lending agent. Both agents are assumed to seek their own interests, i.e., to maximize their own objectives.

Since information asymmetry is persistent in the credit market, we follow the model of Stiglitz and Weiss (1981), which assumes that the projects have an identical expected return (μ_i) but different probability of success (ρ_i) and the borrower makes a decision based on a risk averse attitude. The returns in the cases of success and failure are therefore denoted by (μ_i^s) and (μ_i^f), respectively. The bank avails itself of information of the projects' expected return but not the probabilities of the success of each project. The bank therefore offers the same contract at interest rate (r) and amount of loan (B) to every borrower with the proposed expected return.

The expected return to a project depends on its probability (ρ_i). In the case of success, the return is assumed to be greater than the repayment to the bank, $(1+r)B$, but the return in the case of failure is assumed to be lower than that of the case of success and the borrower loses his labour as an opportunity cost (C_i). The project is launched if the expected return to the borrower is not lower than the opportunity cost in the case of success (Stiglitz & Weiss, 1981). Hence, the expected return to a project and to a borrower can be expressed as follows:

$$\mu_i = \rho_i \mu_i^s + (1-\rho_i)\mu_i^f \qquad (4.1)$$

$$\pi(\rho_i, r) = \rho_i[\mu_i^s - (1+r)B] \geq C_i \tag{4.2}$$

Substitute equation (4.1) into (4.2) and rearranging the terms, we obtain:

$$\pi(\rho_i, r) = \mu_i - \mu_i^f + \rho_i[\mu_i^f - (1+r)B] \geq C_i \tag{4.3}$$

Differentiating equation (4.3) with respect to ρ_i, yields:

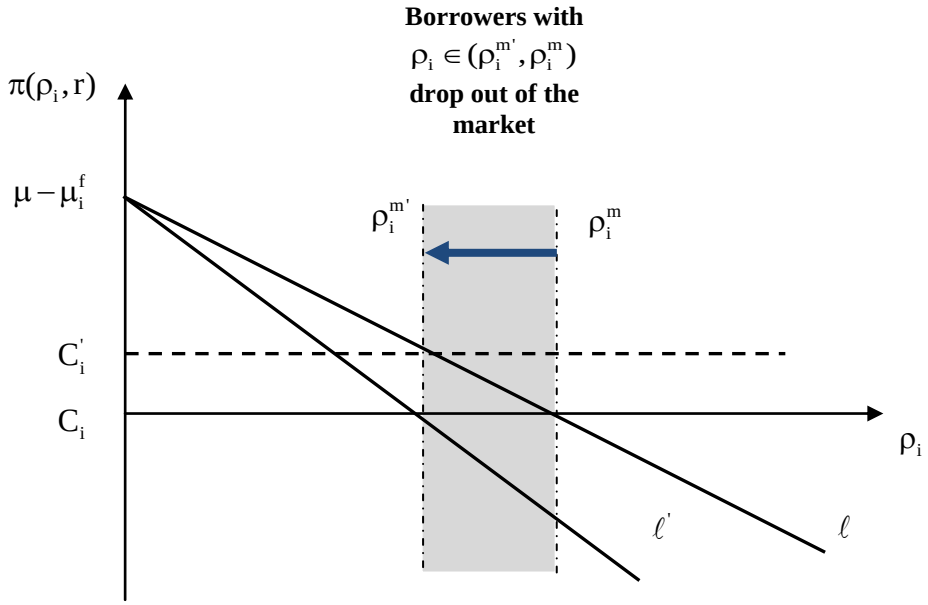
$$\frac{\partial \pi(\rho_i, r)}{\partial \rho_i} = \mu_i^f - (1+r)B < 0 \tag{4.4}$$

Since $\mu_i^f < \mu_i^s$ and μ_i^f is assumed to be lower than the repayment to the bank $(1+r)B$, equation (4.4) implies that the expected return to a borrower is a decreasing function of the probability of success ρ_i. Hence, at a certain interest rate, the least risky projects have the lowest break-even point and the most risky projects have the highest one.

To establish the relationship between interest and probability of success, differentiating r with respect to ρ_i in equation (4.2) using the implicit function theorem yields:

$$\frac{\partial r}{\partial \rho_i} = -\frac{\partial \pi(\rho_i, r)/\partial \rho_i}{\partial \pi(\rho_i, r)/\partial r} < 0 \tag{4.5}$$

Thus $\partial \pi(\rho_i, r)/\partial \rho_i < 0$ and $\partial \pi(\rho_i, r)/\partial r < 0$ and equation (4.5) imply that an increase in interest rate r leads to a decrease in probability of success. Evaluating this effect similar to Quach (2005), we consider marginal borrowers who satisfy the zero expected return condition $\pi(\rho_i, r^*) = 0$. An $r > r^*$ would induce these marginal borrowers to withdraw and the pool of remaining borrowers becomes riskier if the interest rate increases. The borrowers have to seek projects that promise higher returns but lower success rates. This effect is well established in the classical paper of Stiglitz and Weiss (1981). The idea is illustrated in Figure 3.1.



Source: adapted from Quach, 2005

Figure 3.1 Expected Returns to Borrowers and Probability of Success

Figure 3.1 shows the effect of a change in interest rate on expected returns to the borrower and the effect of an increase in opportunity cost. The line ℓ in equation (4.3) depicts the expected returns to a borrower when the probability of success varies; ρ_i^m is the probability of success of marginal borrowers. Since the return of failure is negative, i.e., $\mu_i^f - (1+r)B < 0$, an increase in the interest rate, r, moves the expected return to the borrower from ℓ to ℓ'. The expected return to a marginal borrower is then lower than the opportunity cost, and marginal borrowers drop out of the market. New marginal borrowers now confront the probability of success $\rho_i^{m'}$, which is lower than ρ_i^m, implying that the pool of borrowers becomes riskier. Additionally, an increase in opportunity cost from C_i to C_i' will also cause the same effect (Quach, 2005).

From the perspective of the bank, the bank always expects full repayment of $(1+r)B$ in the case of success but there are also chances that the bank might encounter a lower return to project μ_i^f in the case of failure. Thus, the expected return to the bank can be written as follows:

$$\kappa(\rho_i, r) = \rho_i(1+r)B + (1-\rho_i)\mu_i^f \tag{4.6}$$

Differentiating equation (4.6) with respect to ρ_i gives

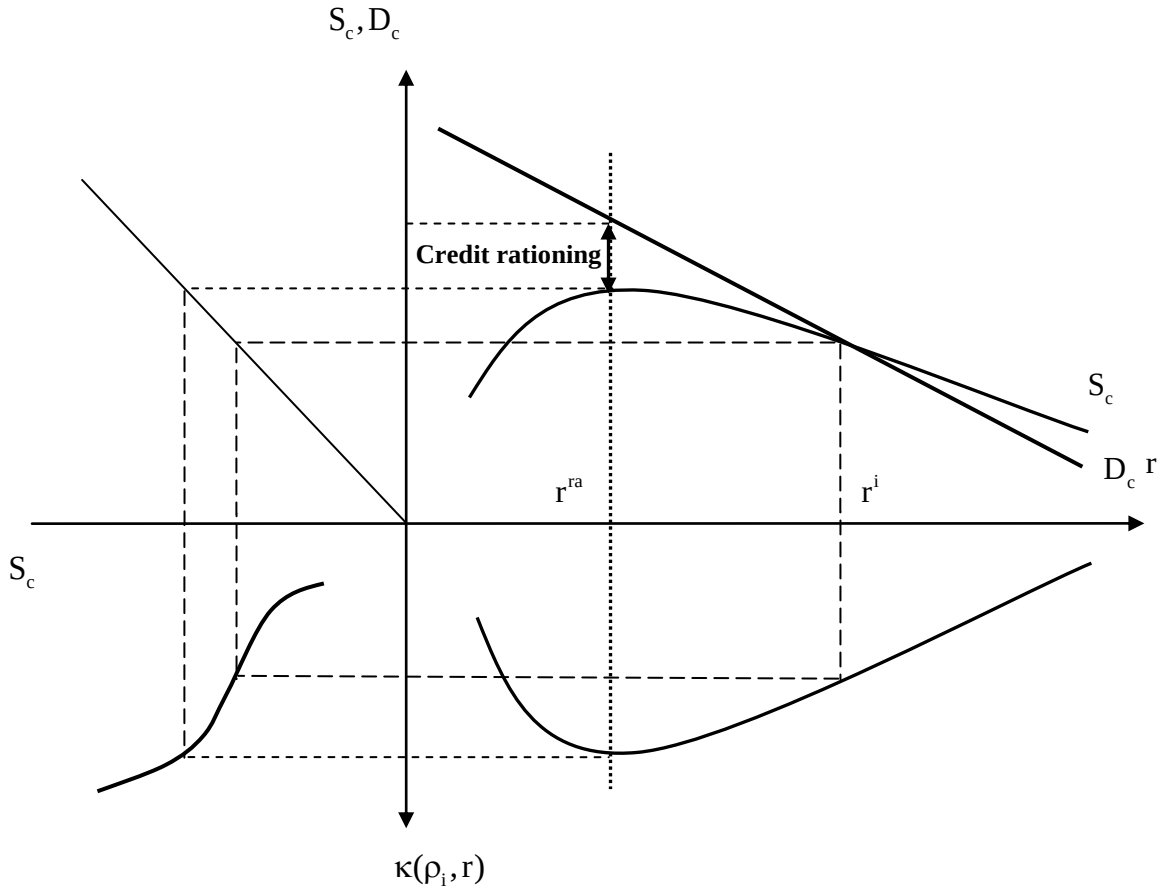
$$\frac{\partial\kappa(\rho_i, r)}{\partial\rho_i} = (1+r)B - \mu_i^f \tag{4.7}$$

Since $(1+r)B > 0$, equation (4.7) implies that the expected return to the bank is an increasing function of the probability of success. If the interest rate increases, there are two effects on the expected return to the bank: *i*) an increase in the value of the component $(1+r)B - \mu_i^f$, which is an increase in interest income; and *ii*) a decrease in ρ_i (established in equation. 4.5), which leads to a lower expected return to the bank as lower-risk borrowers drop out of the market (Stiglitz & Weiss, 1981).

Hence, there exists a critical equilibrium interest rate (r^{ra}) where, if the current interest rate r is lower than the critical equilibrium interest rate r^{ra}, the bank can increase the interest rate without any significant withdrawal of lower risk borrowers (Stiglitz & Weiss, 1981) and the expected return to the bank increases. However, if the interest rate increases beyond r^{ra}, lower risk borrowers drop out of the market and the new pool of riskier borrowers decreases the expected return to the bank. In such a case, the bank would prefer to allocate credit at the critical equilibrium interest rate r^{ra} and there exists a problem of underinvestment.

Figure 4.2 illustrates the overall relationship between returns to the bank and credit rationing through the demand and supply curves and interest rate in rural credit market. The upper right part of Figure 4.2 shows that credit rationing exists as the bank maximises its expected returns through the interaction between demand and supply via the interest rate. If at r^{ra}, the supply of loans meets the demand for loans, there is no rationing and the market is at equilibrium, and the bank maximises its expected return. However, if there is an excessive demand for credit, Stiglitz and Weiss (1981) show that it is better for the bank to ration credit rather than to increase the interest rate to meet the excess demand for credit.

Credit rationing observed in the market is a general aggregation of two components: internal credit rationing and external credit rationing. Internal credit rationing, associated with the demand for credit by households, is the borrowers' self-assessment of risk on the applied loan demand. According to Barry, Ellinger, Hopkin and Baker(1995), internal credit is a function of the borrowers' level of risk aversion and a set of factors determining the financial risk of the investment project. This perceived risk level varies across individual households and may change over time according to changes in assets, experience and household characteristics.



Source: adapted from Stiglitz and Weiss, 1981

Figure 3.2 Returns to the Bank and Credit Rationing

The external credit rationing, on the other hand, is related to the supply side of credit. In the lending transaction, external credit rationing happens when lenders decide to grant or not grant the amount of credit requested by the borrowers. Creditworthiness involves in the external rationing process that the lender considers the borrower has sufficient liability to account for the entire risk of debt in case of default. Collateral has proven to play an important role in this process in that collateral acts as a tool that allows a lender to value the

creditworthiness of the borrower. In other words, collateral solves the adverse selection problem in the *ex-ante* loan contract (Stiglitz & Weiss, 1981). Consequently, collateral helps reduce the level of external credit rationing. Hence, loan contracts occur in different levels of external credit rationing such as completely, partly, or no rationing at all. In other words, non-borrowers, due to the lack of creditworthiness, can actually borrow a loan conditional on their collateral.

External credit rationing on a household is not only conditional on the household's internal credit rationing but also is influenced by a set of lender's characteristics such as scales, capital and equity, business operations, and also by the legal structure and regulatory environment in which the lender operates (Barry et al., 1995). This credit constraint, from the development finance point of view, can be reduced by reducing the transaction costs of lending in the credit market. In the other words, access to credit is more likely to be improved by improving investment in physical and institutional infrastructure before adding more financial services to the market (Fenwick & Lyne, 1998; Krahnen & Schmidt, 1994). Generally, the level of external credit rationing is referred to as the credit constraint condition in various economic models of households.

3.1.2 Household Demand for Credit

To derive the household demand for credit, we assume that an individual household maximises its level of satisfaction via the consumption function under the underinvestment of credit rationing as discussed earlier. We set up the standard Ramsey model for the household consumption over time. The i^{th} household chooses a stochastic consumption plan to maximise the expected value of the lifetime utility function. We will show that borrowing an amount, in general, will increase consumption over time through increasing output under credit constraint. The household's production function comprises labour L and own capital K, under constant return to scale. Due to the credit constraint, a diminishing return to private capital reflects capital that is not perfectly mobilised between households. The general production function is in the following form: $Y = F(K, L)$. Define $y \equiv \frac{Y}{L}$ and $k = \frac{K}{L}$, the production function can be written in per capita terms as average product of capital $AP_K = y = \phi(k)$ and marginal product of capital $MP_K = y' = \phi'(k)$ that possesses the following properties:

$$\phi'(k) > 0 \qquad \text{and} \qquad \phi''(k) < 0 \qquad \text{for all } k > 0 \tag{4.8}$$

and $\lim_{k\to\infty} \phi'(k) = 0$ and $\lim_{k\to 0} \phi'(k) = \infty$

The total output Y is assumed to be allocated either to consumption C or gross investment Ig. When depreciation δ is taken into account, net investment I is expressed as:

$$I = \dot{K} = Ig - \delta K = Y - C - \delta K \tag{4.9}$$

Equation (4.9) can be expressed in per capita term as:

$$\dot{k} = \phi(k) - c - (n + \delta)k \qquad \text{where } c \equiv \frac{C}{L} \text{ and } n \equiv \frac{dL/dt}{L} \tag{4.10}$$

Equation (4.10) describes how the capital-labour ratio (k) varies over time, in relation to population growth rate (n), depreciation rate (δ), and per capita consume (c) at the household level. The level of per-capita consumption, in turn, determines the utility and hence welfare of household at any time. Therefore, the household utility, $U(c)$, is assumed to be in the following form:

$$U(c) = \frac{C_{(t)}^{1-\sigma}}{1-\sigma} \qquad (0 < \sigma < 1) \tag{4.11}$$

where U is increasing and concave in c and possesses the following properties:

$$U'(c) = C_{(t)}^{-\sigma} > 0 \qquad \text{and} \qquad U''(c) = -\sigma C_{(t)}^{-(1+\sigma)} < 0 \qquad \text{for all } c > 0 \tag{4.12}$$

and $\lim_{c\to 0} U'(c) = \infty$ and $\lim_{c\to\infty} U'(c) = 0$

We follow the standard Ramsey model in that the household maximises an inter-temporal additive utility integral. The integrating process of utility maximisation attained at any time should take into account the population growth, n, and a discount rate, ρ. The total utility measures the instantaneous average per capita utility, which depends only on per capita consumption at a discounting rate ρ at any period t. The higher the ρ, the subjective rate of time preference σ, implies the lower the contribution of a future generation's utility (Stiller, 2000). In other words, a higher rate of time preference means current consumption matters more to the household under capital constraint. Given that the rate of returns to savings r is the difference between ρ and n, the inter-temporal additive utility function in a reduced form as follows:

$$\int_0^{\infty} \frac{C_{(t)}^{\,1-\sigma}}{1-\sigma} e^{-(\rho-n)t} dt \qquad \text{where} \qquad (r \equiv \rho - n > 0) \tag{4.13}$$

A system of equations (4.13) and (4.10) and a set of assumptions form the standard optimal consumption growth. Following the methods for dynamic optimisation, derivation of the optimal rate of household consumption satisfies the Euler equation:

$$\dot{c} = -\frac{U'(c)}{U''(c)}\left[\phi'(k) - (n + \delta + r)\right] \tag{4.14}$$

Defining the optimal rate of consumption growth as $g(t) \equiv \frac{dC_{(t)} / C}{dt}$ and $d = \delta + n$ as the rate of depreciation plus labour augmenting technical progress, we can show the relationship between the rate of consumption growth, $g(t)$ and the marginal product of capital $y' = \phi'(k)$ is as follows:

$$g(t) \equiv d \ln C_{(t)} = \frac{1}{\sigma}\left[MP_K - (n + r + \delta)\right] = \frac{1}{\sigma}\left[MP_K - (r + d)\right] \tag{4.15}$$

The key feature of equation (4.15) is that the rate of consumption growth, $g(t)$, is a function of the marginal product of capital, $y'(k)$, the subjective rate of time reference, ρ, the rate depreciation, d, and the inter-temporal elasticity of substitution, σ. However, only the MP_K and d are induced by external capital. In the other words, under credit rationing and credit constraint, the household's demand for credit in order to improve its utility either via increasing the marginal product of capital through the production cycle or to directly finance some basic needs through decreasing constraint of current obligation is in terms of the depreciation rate.

The first reason explains itself but the latter may need more specification in the light of the household's demand for rural credit because the $(r+d)$ term enters the process as the coefficient of per capita expenditure for production in equation (4.10). Typically, agricultural production evolves from cultivation to harvesting, which may require large cash expenditure for inputs such as seeds, fertilisers, etc., but may take weeks or months to generate cash income. Many households cannot afford such large expenditure without external capital but producing with its own capital is insufficient to ensure consumption growth. In addition, the household's expenditure and consumption must be in cash. Due to sporadic income, poor rural households need credit to maintain their basic consumption while they face the constraint of obligations to machinery's depreciation and maintenance. Depreciation can be in the form of input credit and maintenance might be in the form of the cost of fixing or repair to keep the machine functional. All these obligations again can be in the form of advanced credit that the households are liable to repay. If the current obligation is repaid by an amount of micro credit, i.e., smoothing current consumption, whereby consumption growth can still be attained.

In short, disregarding the criticism against microcredit provision, the demand for microcredit is crucial for households in rural areas and access to credit is a key requirement for economic growth and rising living standards in less developed rural areas (Petrick, 2005).

3.2 Accessibility to Microcredit

3.2.1 Previous Studies of Accessibility to Microcredit

Rural credit is vital for agricultural development and accessibility to rural credit has an undeniable impact on agricultural production. The availability of rural credit helps the rural households to invest in new technology, improve productivity and hence increase outputs, income and consumption. Understanding the factors that affect accessibility to credit is important not only for improving credit access to households from credit suppliers in the rural credit market but also for the implementation of policies that aim to provide more credit accessibility to the targeted rural households under the poverty reduction policy. The credit rationing theory and theory of choice are briefly reviewed as guidelines for the credit accessibility model in this study.

Accessibility to credit starts with the demand theory for credit where an individual or a household wants to maximise his or her expected utility in borrowing money from credit providers. Every unit of money has its own opportunity cost, that is, the interest rate and, therefore, the decision to obtain any amount of loan is a rational choice based on demand theory. However, Stiglitz and Weiss(1981) show that demand theory alone cannot explain the behaviour of accessibility to credit where credit is rationed under asymmetric information. Credit providers, as the suppliers, do not only rely on market price or interest rate alone to charge the borrowers based on the amount of loan. Since the lenders have insufficient information on the default risk of the borrowers and the lenders cannot increase the equilibrium interest rate in the credit market, they tend to ration every loan they make to the borrowers. In other words, the flow of credit does not simply follow the supply and demand theory; it also follows a rationing process where the individuals apply for credit then the lenders determine how much credit is allocated to the borrowers, based on the lenders' perception of the borrowers' credit worthiness (Aleem, 1990). Lamberte and Llanto (1995) observing lending in the rural financial market in the Philippines, say that banks go through three stages in lending: the screening stage, the acceptance/rejection rationing stage, and the quantity rationing stage. In general, the flow of credit depends on its market structure and the nature of imperfect information. Adams and Vogel (1986) argue that in the credit markets where economic management is centralised, lending decisions tend to be rigid and concentrated, high transaction cost is associated with imperfection information in the lending process. On the other hand, markets where production decisions and information are dispersed, financial market must be flexible and transaction cost can be reduced.

Empirical studies either explicitly or implicitly use McFadden's (1972) discrete choice theory to discuss credit rationing with the credit demand theory. The discrete choice theory establishes the relationship between a utility and the discrete choice of individuals where an individual maximises his or her utility corresponding to a choice set[8]. This theoretical foundation has been applied in a wide range of fields including consumer choice, transportation and housing choice, and nonmarket goods (see McFadden, 1978, 1980; McFadden & Train, 2000). Choice theory can also be expanded to model the choice behaviour of households in the credit market. Under the assumption that borrowers obtain credit to maximise their utility, the demand for credit is derived from the attributes of choices that are specific to the borrower's decision and his or her socio-economic characteristics. Particularly, the borrowing decision is specified as a function of the household's demand for credit, which consists of the observable outcomes, i.e., loan amount and the determinants of these outcomes, i.e., the individual and household's characteristics. A binary choice model to describe the individual's decision to borrow or not to borrow has been applied in a number of studies using the logit model. Logit and probit models are preferred over the linear probability model because they better describe the arbitrary choice and their predicted probability of choice fits into a feasible range between zero and one (Aldrich & Nelson, 1992; Gujarati, 2004; Maddala, 1983).

Zeller (1994) conceptualises the sequential process of lending with credit rationing into two stages that facilitate empirical studies and enables empirical models to be estimable. The two-stage process simplifies the borrowing behaviour of borrowers and the lending process from lenders since the borrowers and lenders might simultaneously make their decision and the lending process may take place at any stage. In the first stage, a household or its member decides to apply for a loan. In the second stage, based on information that the borrower provides, the lender screens or decides whether to grant the applicant the entire loan amount he or she asked for, to partially reduce the loan amount, or fully reject the demand amount. This conceptualisation is prevalent as a standard framework for empirical research in microcredit accessibility.

[8] See McFadden (1972, 1978, 1980) and McFadden & Train (2000) for more details on discrete choice theory corresponding to the logit specification and its applications.

Following the above economic theory of microcredit and the econometric theory for model estimation, three main streams of empirical research in determining factors affecting accessibility to microcredit under credit rationing are reviewed in this section. The prominent stream of empirical studies aims to identify factors explaining the borrowing decision of households applying a binary or polychotomous choice model that depends on the nature of the choice specified in the dependent variable. This stream contributes extensively to the theory of choice and discrete dependent econometric models. Particularly, the probit and logit models for binary choice, whether access to credit is observed or otherwise, are normally found in this stream. Given the defined problem, the probit and logit models have high predictive power of the probability for a choice made. Choosing between the probit and logit models depends on the assumption of the error terms in each model. If the error terms are assumed to follow a normal distribution then the probit model is selected and if the error terms are assumed to follow a logistic distribution then the logit model fits better (for details, see Gan, Nartea, & Garay, 2007; Li, Gan, & Hu, 2011; Menkhoff & Rungruxsirivorn, 2009; Mohamed, 2003; Pham & Lensink, 2007).

The next stream of studies considers a two-stage lending framework to explain both the decision to borrow and loan in the lending process. For example Pham and Izumida (2002), Okurut, Schoombee and Berg (2005) and Swain (2002) consider the problem of sample selection bias in estimating the loan amount equation simultaneously with the selection equation. Implicitly, these studies treat different types of credit in the rural credit market separately and apply the standard Heckman two-step model or Tobit model depending on the nature of the selection bias in the model. Their findings advance our empirical understanding of the borrowing decision under the theory of choice and the determinants of loan under the credit rationing theory. Moreover, the findings reveal the nature of selection bias of households participating in a microcredit programme that, aside from the observed household characteristics, other unobserved factors significantly influence the households to self-select in a microcredit programme. Ignoring this self-selection in the lending process might lead to biased estimates in determining the loan amount.

For the third stream, Zeller (1994), among the pioneers, provides a conceptualised framework to analyse the determinants of credit rationing in formal and informal credit markets. Although no empirical evidence has jointly determined a household's borrowing behaviour from formal and informal credit, Zeller's framework significantly simplifies the modelling

interaction between the formal and informal sectors. This view is further supported by Kochar (1997b), Diagne (1999) and Swain (2002) whose studies attempt to capture in the model the dynamic interaction among different types of credit providers, using different underlying assumptions to estimate the determinants of credit access and the credit demand of the rural credit market. Despite some limitations, as well as the conceptual difficulties in analysing the determinants of credit rationing (Petrick, 2005), their findings marked a milestone in enriching empirical research in the rural credit market.

Studies applying the binary choice model to obtain the determinants of household access to microcredit include Mohamed (2003) and Gan et al. (2007). The logit model is used to determine factors influencing an individual's ability to access microcredit. The common factors in their models include age, years of education, gender, income and degree of awareness on the availability of microcredit services. Mohamed (2003) shows the complexity in the credit rationing model that information about credit availability also affects the accessibility to microcredit by households in Zanzibar. On the other hand, Gan et al. (2007) conclude that young farmers and poor fisherfolk have low accessibility to formal microcredit in the Philippines. Hence, the authors recommend that formal microcredit should be encouraged to increase the accessibility of small farmers and fisherfolk to microcredit, especially those who reside in adversely disadvantaged remote areas. Their findings also emphasise the important role of informal microcredit in meeting small farmers' demand for finance since formal and informal microcredit inevitably coexist in the rural credit market.

Recent studies that explore the issue of access to credit by poor households include Okurut (2006) in South Africa and Pham and Lensink (2007) in Vietnam. Using the Income and Expenditure Surveys of 1995 and 2000 in South Africa and applying the multinomial logit model, Okurut investigates the determinants and marginal effect of factors that influence the probability of access to different sources of credit in the two periods. For example, age of household head has an inconclusive effect on informal credit because the coefficient is negative and significant in 1995 but positive and significant in 2000. In a similar approach, Pham and Lensink (2007) use the Vietnam Living Standard Survey to analyse the determinants of households access to credit. The authors' study attempts to explore how different types of lenders try to account for adverse selection and moral hazard problems in the lending process. Given that the semi-formal and informal credit sectors exist in parallel with the formal credit sector, different determinants of household access to credit were

obtained for each sector but the interaction among them was ignored. Despite their limitations, these studies provide generic results regarding the lending practices of different types of lenders in the rural credit market.

In an attempt to capture the coexistence phenomenon, Pham and Izumida (2002) study the determinants of formal and informal credit in Vietnam using a household survey. Following the argument that rural households may borrow from the formal or informal sector, it is also possible for households to borrow from both sources at the same time. Since loans are derived from demand and supply, a reduced form of loans was used in the Tobit model. In estimating the borrowing function, the sample was decomposed into two main borrowing sources: formal and informal lenders. These borrowing functions were subsequently estimated separately.

The formal and informal credit providers coexist in the rural market but not many studies include both in their analysis. In trying to consider the dynamic interaction among different types of credit providers in the model, Kochar (1997b), using reservation costs as the supply for credit and transaction costs for credit demand under a set of assumptions, employed three models to capture different conditions of the rural credit markets. Importantly, Kochar provides empirical evidence that access to informal credit plays a role in determining participation in the formal credit sector. Similarly, Swain (2002), following Kochar (1997b), reconfirms the evidence reported earlier. In addition, Diagne (1999) provides estimates of formal and informal credit in a simultaneous system of equations under the assumptions that formal and informal credit have imperfect substitutability and unobserved factors are assumed to be freely correlated in his model. Although no statistical results have been determined for the simultaneous interaction, Diagne's (1999) critical findings shed light for further research in this narrow field.

Another issue emerging from the review of the literature is that, given the credit providers in the rural credit market, in which order a household chooses to resort to these types of credit? In other words, which credit sector does a household come to seek for a loan first? There are two possible theories to answer this question. First, under credit constraint, rural households will initially demand formal credit but some of them are excluded from the screening process due to insufficient collateral or lack the accountability to repay a loan. These households then resort to an informal lender as an alternative source of credit. Advocates of this view such as

Bell, Srintvasan and Udry (1997), Kochar (1997b) and Guirkinger (2008), strongly believe that an informal loan is the last resort the households can seek.

Another view suggests that informal lenders have a comparative advantage over formal lenders in offering loans to households because informal lenders have better information to monitor and manage their clients (Jain, 1999). This implies that informal lenders can have more control over the moral hazard and enforcing contracts. According to this view, informal lenders are preferred to formal lenders because informal loans may be cheaper than formal loans (Chung, 1995). The theory highlights that high transaction costs related to loan participation from the formal sector may discourage farmers from taking formal loans. If the transaction costs associated with informal credit are less than those of formal credit, households will resort to the informal credit sector first. In short, the simple screening mechanism that informal lenders use in the lending decision and informal contracts that do not require pledging collateral from the borrowers explicitly supports this view.

The literature shows that households' access to credit is derived from a determinant of many social economic factors that influence their decision to borrow a loan. Ignoring the correlation between the decision making and the loan amount, several studies focus on defining factors that explain the accessibility to formal and/or informal credit. Their findings therefore are insufficient to answer the question about the extent of the household's decision to access credit affects the loan amount. On the other hand, the literature also consistently emphasises the complexity of the rural credit market where formal and informal credit sources coexist and interact to serve their clients in various ways. Many studies focus only on the determinants of accessibility and the determinants of loans, treating informal credit separately from formal credit in the rural credit market, therefore failing to account for the economic interaction between both credit sectors. An investigation of this gap in the literature is essential to provide a better understanding of the rural credit market in developing countries.

Table 3.1 summarises the key factors influencing the households' borrowing decisions and their credit demand. These factors are not only used to analyse the determinant of credit accessibility and microloans but they also to control for the differences in households in evaluating the impacts of a microcredit programme at the household level. The factors that empirically explain lending practice can be categorised into four main groups: individual

characteristics, household characteristics, rural credit market's factors (including formal and informal credit sectors), and geographic factors. As the formal and informal credit sectors coexist, these groups of factors simultaneously influence the borrowing behaviour of households as well as the loan amount. For example, underhousehold characteristics, Pham and Izumida (2002) show that farm size is likely to affect the absolute loan amount because farm size determines the total demand for credit. On the other hand, an increase in farm size tends to increase the credit worthiness of the household, which increases the chance of getting a loan either from the formal or informal sector.

Table 3.1 Key Factors Affecting Household Access to Rural Credit

Factors	Accessibility to formal credit	Formal loan	Informal loan	Authors††
Individual level				Pham & Izumida (2002) Gan et al. (2007) Ho (2004) Li et al. (2011) Mohamed (2003)
Age of household head	+/-	+		
Gender (female)	+	+		
Head's ethnicity	+	+	+	
Head's education	+	+	+	
Household level				Gan et al. (2007) Ho (2004)
Land ownership	+			
Family size	+			
Member of credit group	+			Li et al. (2011) Pham & Lensink (2007)
Membership requirement	+			
Family income level	+			
Expenditure	+			
Credit market level				Pham & Izumida (2002) Kochar (1997b)
Agri. Loan	+	+	-	
Trade loan	+		+	
Loan duration	+			
Geographic level				Coleman (1999) Kochar (1997b) Li et al. (2011) Pitt & Khandker (1998)
Urbanised commune	+	+	-	
Road access	+	+	-	
Distance to nearest bank	+	+		

Note: +/- indicate a positive or negative effect on the dependent variable
† applied only to microcredit programmes
†† Individual authors might not include all factors in their studies

In addition, while household and credit market factors directly explain borrowing decision of the household or household head, geographic factors relate to the physical environment, where the household is located also affects their borrowing decision (see Table 3.1). Empirically, these geographic factors serve as a set of instruments to control for geographic differences at the village and commune levels (Coleman, 1999; Pitt & Khandker, 1998).

Three variables namely urbanised commune, direct road access at village level, and ethnic concentration in the commune are considered to be exogenous to the household's decision to borrow from the formal credit sector.

The urbanised commune variable is defined as a commune that is located in a rural but adjacent to city or town where industrial zone(s) are present. Travel distance from the commune to the industrial zone(s) is not more than 10 kilometres. Kochar (1997b) indicates that urbanised districts have more concrete roads that are likely to improve access to formal credit. In addition, households living in urbanised communes may have a higher incidence of employment from non-farm commercial enterprises in these industrial zone(s) that entails a higher income from non-farm sources and ensures stable consumption for the households. Therefore, they are less likely to borrow from the informal credit sector (see also Coleman, 1999; Ho, 2004; and Li et al., 2011).

3.3 Impact Evaluation of Microcredit Programmes

The primary goal of a microcredit programme is to provide credit to the poor by extending small collateral-free loans that purposely enable the borrowers to actively generate a range of improvements in economic conditions (World Bank, 2010). Islam (2007) hypothesised that microcredit can create a circle of growth for poor borrowers that 'low income households need credit for investment to create more income and more credit and more income'. In other words, microcredit enhances income growth, which increases a household's consumption level, hence, contributes to an immediate welfare improvement. For example, an enhanced income from borrowing encourages the poor to increase investment in working capital as well as physical assets. Capital and physical asset accumulation attributed to microcredit reinforces the income generating capabilities of borrowers (Aghion & Morduch, 2005; Hossain & Diaz, 1999). Hulme (2000) further illustrates that a conventional microcredit programme provides microcredit that lead to changes in household income, which leads to changes in economic security, educational and working skill levels. Ultimately, these changes lead to modification in household welfare and social political relations and structures. Thus, providing loans through microcredit programmes is a tool to create a desired impact on the target group of poor and low income households.

However, the extent to which the desired impact of microcredit on the poor is achieved is difficult to measure due to an incomplete information problem[9]. The question "How does a microcredit programme actually impact on the target group of borrowers?" has been raised but never been fully answered. In trying to give the best answer to this question, it is essential to measure the extent to which microcredit has changed the outcomes of the targeted households who received microloans as a treatment. This process is referred to as 'impact evaluation'[10]. Since assessing the impact of a microcredit programme is subjective to the design methods and data, the following subsections describe the framework of impact evaluation and its problems in defining the impact of a microcredit programme on the rural poor in this study.

3.3.1 Impact Evaluation Methodologies

3.2.1.1 Impact Evaluation Framework

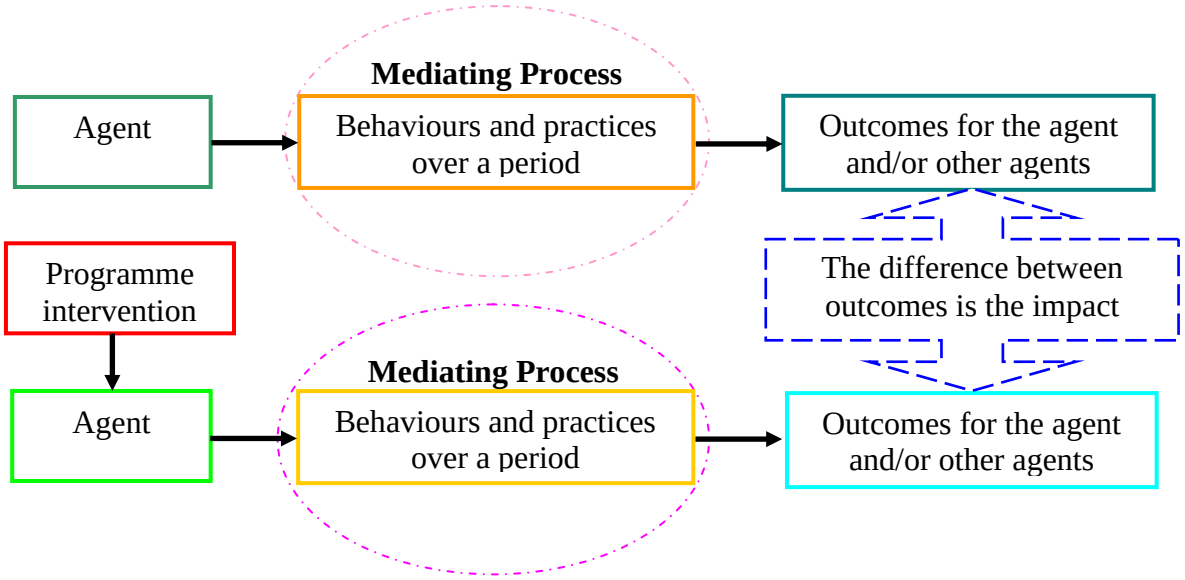
Inference about the impact of a programme on the outcome of an individual in the labour market involves speculation about how this individual would have performed if he or she had not participated in the programme. The analytical method used to evaluate the programme impact is widely referred to as 'the potential outcome approach' introduced by Fisher (1935) and Neyman & Iwaszkiewicz (1935) and subsequently developed theoretically and empirically by Roy (1951), Quandt (1972, 1988) and Rubin (1974). The approach was originally applied to evaluate programme impact in the labour markets and has been commonly known as the Roy-Rubin-Model (RRM) in the labour economic literature. The RRM has been expanded from the labour market to other fields such as health care, education and rural financial markets.

Like the labour market, the rural credit market is subject to intervention by many policies from government. Microcredit is among the policy interventions in which the government provides credit through microloan schemes to the poor in rural areas. Hulme (2000) provides an extensive review of impact assessment studies and the constructive framework of 'impact

[9]The incomplete information problem persists in non-experimental or observational studies where data are not derived in a process that is completely under the control of the researcher. Instead, one has to rely on information about how individuals actually performed after the intervention. That is, we observe the outcome with programme participation for participating households and the outcome without programme participation for non-participating households (Caliendo, 2006).

[10] The terms 'impact assessment', 'impact evaluation' and 'programme evaluation' imply the same thing. However, for convenience the term "impact evaluation" is used in this study.

assessment' in the microcredit literature. The idea of impact assessment is to define the difference between the outcomes of 'agents', i.e., individual, enterprise, household, community, etc., which have experienced a policy intervention, against the outcomes that would have occurred without any intervention. Based on this framework, the process of impact evaluation includes three steps: defining 'agents' as the assessment units, defining 'outcomes' as the assessment indicators and assessing methods (see Figure 3.1).



Source: Adapted from Hulme (2000)

Figure 3.3 The Framework of Impact Evaluation

To illustrate the definition of impact evaluation, suppose that there is a microcredit programme assigned to a target group of households. For a single microcredit programme, denote D as the binary choice variable of programme participation, i.e., $D=1$ if a household participates in the programme, and $D=0$ otherwise. Next, let Y denote the observed value of the outcome [11]. This variable receives two values depending on the participation variable, i.e., $Y=Y_1$ if $D=1$, and $Y=Y_0$ if $D=0$. The outcome is considered at a point or over a period after the programme is implemented. The impact of the programme on the outcome of the i^{th} household is measured by:

$$\Delta_i = Y_{i1} - Y_{i0} \tag{3.1}$$

[11] Y can be a set of outcomes, but for simplicity a single outcome of interest is considered.

This impact is equal to the difference in the outcome between the programme state and non-programme state. However, the problem in equation (3.1) is that Y_{i1} and Y_{i0} are mutually exclusive and receive values depending on the participation state, i.e., both outcomes cannot be observed for the same household. In other words, for households that participated in the programme, we can observe only Y_{i1}, and for those that did not participate in the programme we can observe only Y_{i0}. An outcome that cannot be observed is called 'counterfactual'.

It is impossible to estimate the programme impact for an individual household because the counterfactual outcome is not exactly known (Heckman, Ichimura, & Todd, 1997). If we were to construct an estimator for individual effects, the associated standard error would be very large. In fact, programme impact can be estimated for a group of people by finding an adequate comparison group[12]. In the impact evaluation literature for microfinance programmes, the Average Treatment Effect (ATE) and the Average Treatment Effect on the Treated (ATT) are commonly used because they provide a direct measure of the desired impact of the microcredit programme on the target group[13].

ATE is the expected impact of a programme on a person who is randomly selected and assigned to the programme. ATE is similar to the average partial effect APE of the switching model in econometrics because its parameter of impact is the difference between the observed outcome of participants and non-participants in the programme (Abbring & Heckman, 2007). To illustrate, write the switching model (Quandt, 1972) for the observed outcome of each individual as:

$$Y_i = D_i Y_{i1} + (1 - D_i) Y_{i0} \tag{3.2}$$

[12]The term 'comparison group' or 'control group' refers to a group of individuals who did not participate in the programme. The terms 'treatment effect' refers to the effect that an individual benefits from 'being treated' or participated in the programme.

[13]Other parameters such as local average treatment effect, marginal treatment effect, or effect of non-treatment on non-treated may be used for specific purposes of impact evaluation (Heckman et al.,1997).

Where, Y_i is the observed outcome, which is equal to Y_1 and Y_0 for participants and non-participants in the microcredit programme, respectively. Since equation (3.2) can never be estimated for individual effect with confidence, the average effect is estimated by taking the expectation of the outcomes over the population (Heckman et al., 1997). Rewriting APE we arrive at:

$$APE = E(Y \mid D = 1) - E(Y \mid D = 0) = E(Y_1) - E(Y_0) = \Delta_i = ATE \tag{3.3}$$

In fact, most microcredit programmes are targeted at a particular group of households, therefore the interest is the programme impact on those who were carefully selected to receive credit (Islam, 2007, p. 223). If the programme has a positive impact, it would be beneficial to expand the programme to similar groups. The true programme impact on the participants is ATT:

$$ATT = E(\Delta \mid D = 1) = E(Y_1 - Y_0 \mid D = 1) = E(Y_1 \mid D = 1) - E(Y_0 \mid D = 1) \tag{3.4}$$

In general, ATE and ATT are different from each other because the potential outcomes depend on the programme participation status, i.e., $E(Y_1) \neq E(Y_1 \mid D = 1)$ and $E(Y_0) \neq E(Y_0 \mid D = 1)$. Estimation of the ATT parameter is not straightforward because some components cannot be observed directly. Since our objective is to evaluate the impact of a microcredit programme on rural poor households, ATT is the main parameter of interest. The next subsection discusses the associated problems and underlying assumptions in estimating the impact evaluation parameter.

3.2.1.2 Problems of Impact Evaluation

The major obstacle in assessing the impacts of microcredit programmes is the difficulty in determining the 'counterfactual' (Baker, 2000; Hulme, 2000; Islam, 2007). This problem results in bias arising from the three steps of the process in the impact evaluation framework. In defining the 'agent' to be evaluated, there are concerns about the method used to identify the target group as the 'treated group', i.e., the unity of the target group over the entire population. There are also concerns about defining a 'control group" as a comparison group. This step is crucial in impact evaluation because different strategies used to construct the

control group lead to different evaluation methods, different data requirements and their potential biases. For example, if a microcredit programme is particularly designed for poor and low-income households, there is little interest in the effect of that programme on high-income and rich households because the policy's interest is in the effect of the programme on the targeted participants not those for whom the programme was never intended (Heckman, 1997). On the other hand, if the treated group is correctly selected but the control group is mis-selected for comparison then the result of such an impact evaluation will also be biased (Hulme, 2000; Islam, 2007).

Attributing specific effects to specific causes during the mediating process is another problem of impact evaluation. The main interest, how observed impacts are attributed to microcredit or what would have happened in the absence of microcredit, is at the core of impact evaluation (Aghion & Morduch, 2005; Mosley, 1997). Islam (2007) argues that impacts following a project intervention of a microcredit programme, in fact, may have been affected by other factors that are irrelevant to the particular project being evaluated. This argument makes more difficult the attribution of an observed change or impact to the project under evaluation. For example, the impact could not possibly assess the impact of microcredit on household income if the loan is not used for income generating activities but for gambling such as buying a lottery ticket. Including a lottery winner in the target group shifts the impact upward but this is not the desired impact of the microcredit programme.

Since impact evaluation is subject to the missing data problem, estimating programme impacts by ordinary least squares often results in biased estimators. To illustrate this, we estimate equations (3.4) and (3.4) under the assumption that the non-participant can be used as an adequate control group.

$$E(Y_0 \mid D=1) = E(Y_0 \mid D=0) \tag{3.5}$$

The assumption in equation (3.5) is likely to hold in randomised experiments but not likely to hold for non-randomised experiments. Consequently, estimating ATT by OLS using the different in sub-population means of participants $E(Y_1 \mid D=1)$ and non-participants

$E(Y_0 \mid D=0)$ will therefore lead to selection bias (Caliendo, 2006). Rewriting the OLS estimator for ATT then adding and subtracting the counterfactual terms, we have:

$$ATT_{OLS} = E(Y_1 \mid D=1) - E(Y_0 \mid D=0)$$

$$ATT_{OLS} = E(Y_1 \mid D=1) - E(Y_1 \mid D=0) + E(Y_1 \mid D=0) - E(Y_0 \mid D=0)$$

$$ATT_{OLS} = ATT + \{E(Y_1 \mid D=0) - E(Y_0 \mid D=0)\} \quad (3.6)$$

Equation (3.6) suggests that OLS produces the true programme impact if and only if equation (3.5) holds. This means one is able to select the non-participants to construct the counterfactual group. Therefore the term in the bracket of equation (3.6) approaches zero. However, the selection of the control group to resemble the counterfactual group provides no guarantee that the term in the bracket of equation (3.6) is equal to zero hence potential selection bias emerges. Selection bias arises because participants and non-participants are selected groups with different outcomes, even in the absence of the programme. The selection bias might arise from observable factors such as age or skill differences. A good example is where the programme group consists of unskilled individuals in the microcredit group and we compare their mean outcome with the mean outcome of a group of skilled individuals. Clearly, we would expect different outcomes even in the absence of the microcredit programme. Additionally, selection bias in a programme evaluation arises when unobservable factors such as motivation or entrepreneurship might also play a role in determining the participation decision. For example, if highly motivated individuals are more likely to participate and are more likely to have a higher outcome without treatment, we might again have a selection bias (Baker, 2000).

3.2.1.3 Impact Evaluation Methods

To overcome the incomplete information problem, different methods have been developed in order to minimise bias in impact evaluation and to derive the intended impact of a programme. Hulme (2000) provides a review of various methods to evaluate the impacts focussing on the strategies of data collection and the level at which the programme impact is

evaluated. These methods include sample survey design, rapid appraisal, participant – observation, case studies and participatory learning and action, including a description of the key features of each method (see Table 3.2). As each method has its own strengths and weaknesses, Hulme (2000) suggests that impact studies should adopt pluralistic approaches instead of a single method to avoid the weaknesses of individual methods.

To focus on the sample survey, different empirical economic strategies can commonly be used to resolve the problems of impact evaluation (see Table 3.3). The first is randomisation of the design. The idea of this method is to overcome the missing data problem by assigning the programme randomly to the agents. Non-participants will form the control group under the absence of the programme. Given the programme assignment is independent of the potential outcomes, the coefficients of programme impacts can be consistently estimated (Caliendo, 2006; Heckman et al., 1997). According to Baker (2000) and Blundell and Dias (2000), randomised data suffer from several drawbacks due to unethical and political issues. In microcredit programmes, randomisation means exclusion of some eligible households from the credit programme. It is unfair to deny or delay a programme that provides support such as health care or education programmes, for the eligible households. As a result, the microcredit policy will be criticised by the public (Nguyen, 2008). Nevertheless, this approach may suffer from the attributing effect since it is impossible to ensure the control group to be completely unaffected by the presence of the programme. Further, such experiments are often expensive to implement (Blundell & Dias, 2000).

A second approach is the matching method. The basic idea of the matching method is to find a control group that has the same or similar observable factors as the treated group. Heckman et al. (1997) show that by selecting sufficient observable factors that any two individuals with the same values of these factors will display no systematic differences in their reactions to the programme. The implied condition for the matching method to work hinges on finding the common support, which allows a reliable comparison. The difference in outcome of the control group and treated group defined from the common support region is attributed to the programme impact. The common support region can be constructed by using various matching techniques such as propensity score matching, nearest neighbour matching, Caliber and Radius matching, and Kernel matching (for technical notes, see Abadie, Drukker, Herr, & Imbens, 2004).

The selection model, on the other hand, can be an alternative to the matching methods if one believes that programme participation is subject to unobserved bias (Heckman, 1979; Heckman & Robb, 1985, 1986). This approach relies on an exclusion restriction, which requires a variable that determines participation in the programme but not the outcome of the programme. In contrast to matching, the selection model accounts for the unobserved factors that determine the programme participation. If the assumption of selection on the observables fails, i.e., the conditional independent between the potential outcomes and programme assignment no longer holds, the alternative assumption that there is at least an unobserved factor that affects both the potential outcome and programme participation. Programme impact can be identified using the sample selection model in the presence of sample selection bias because of non-random missing data (Heckman, 1979). Since the two approaches rely on two competing assumptions, a comparison of these two approaches can be extremely informative in understanding the advantages and drawbacks of these methods (Blundell & Dias, 2000).

Other methods such as the regression discontinuity design and instrumental variable (IV) identification strategy can also be used in impact evaluation. The main idea of the IV method to handle selection in the basis of unobserved factors is to find a variable that determines programme participation but does not influence the outcome. The instrumental variable affects the observed outcome only indirectly through the participation decision, hence causal effects can be identified through a variation in this instrumental variable (Imbens & Angrist, 1994; Rubin, Imbens, & Angrist, 1996). Blundell and Dias (2000) and Caliendo (2006) show that a valid instrument has to satisfy the following three conditions: *i*) the instrumental variable determines programme participation; *ii*) the instrumental variable is uncorrelated with the programme outcomes; and *iii*) the instrumental variable is not completely determined by the observable factors in the model.

Regression discontinuity design (RRD), on the other hand, can be seen as a particular type of IV identification strategy because RRD uses discontinuities in the selection process to identify causal effects. In RRD, programme participation depends on some observed instrumental variable, Z, according to a known and deterministic rule such as $D=1$ if $Z>\bar{Z}$ and $D=0$ otherwise (Heckman, LaLonde, & Smith, 1999). Similar to IV method, RRD requires that Z has an indirect impact on the outcome through D. This indirect impact is the causal effect to be identified. Caliendo (2006) notes that RRD relies on the assumption that selection is on

observable characteristics only and there is no common support for participants and non-participants making matching impossible. Moreover, the selection rule is assumed to be deterministic and known, therefore the variation in the relevant variable Z is exogenous (Hahn, Todd, & Van der Klaauw, 2001).

Another popular evaluation method, which requires data before and after the programme implementation, is named 'Difference-in-Differences' (*DinD*). This approach can be used to recover the average effect of the microcredit programme on those individuals who entered the programme. Under the critical assumptions that there is a common time effect across groups and no compositional changes within each group, *DinD* allows one to estimate the coefficient of the average effect of the treatment on the treated, ATT (Blundell & Dias, 2000). The main advantage of this method is that it allows for the selection bias of the programme based on some unobservable factors. However, the method has two disadvantages. The first is the requirement of the data set. Panel data that are collected before and after the programme are required. The second is the time invariant assumption of the unobservable variables that affect the programme selection that are unchanged over time and the programme states. This assumption might be violated under non-experimental data in which the households in both groups are systematically different and unbalanced in the pre-programme attributes, which are possibly related to the outcome (Ashenfelter & Card, 1985; Athey & Imbens, 2006). Violation of the time invariant assumption is likely to happen when income growth differs across household groups due to the initial endowments such as physical capital or human capital. For example, given capital constraint, households that borrow a microloan to generate income expect to have higher income growth than non-borrowing households. Borrowing households have to generate the income that is expected at least to cover the loan plus interest at the repayment time, but non-borrowing households may not expect their income to grow at the same rate as the borrowing household. As a result, there are some changes over time in the unobserved factors that affect the households' participation in a microcredit.

In general, impact evaluation methods confront numerous possible biases due to the incomplete information problem and the fact the coefficients of the programme impacts rely on their own assumptions and data availability in order to become consistent estimates. Smith (2004) notes that matching methods make no sense without rich data, IV methods make no sense without good instruments, and the *DinD* method makes no sense when the treatment selection depends on transitory rather than permanent shocks. Therefore, given the available

data of an intervention programme, the estimates of programme impacts are sensitive to the methods and the inferences about the impacts have to be justified with their own assumptions. A summary of impact evaluation methods and a summary of impact evaluation methods using survey data are documented in Tables 3.2 and 3.3.

3.3.2 Impact Evaluation at Household Level

Studies on impact evaluation of microcredit programmes in the rural credit market have been recently documented, and compared with the well-established programme evaluation in labour markets. However, the essence of evaluating the impacts of microcredit programmes has increasingly drawn the attention of researchers due to its importance in providing inputs to policy makers in designing poverty reduction strategies in developing countries. As Pitt and Khandker (1998) note, very few studies have attempted to identify the causal effects of programme participation in microfinance in Bangladesh in late 1980s. Currently, the number of impact evaluation studies has expanded across developing countries where microfinance programmes exist. This section reviews the impact evaluation of microcredit programmes focusing on studies of impact evaluation at the household level that applied one of the related impact evaluation methods described in the earlier section.

In an attempt to assess the impacts of microfinance, the Assessing Impact Microenterprise Services Project (AIMS) funded by USAID's AIMS Project, seeks to produce a complete picture of the overall impacts of microfinance programmes at individual, household and community levels (Hulme, 2000; Mosley & Hulme, 1998). Given large financial and human resources, the AIMS project aims to provide longitudinal impact assessments of microenterprise credit as well develop a low-cost impact assessment tool to keep track of microfinance impact (Alexander, 2001). Using a wide range of panel data for qualitative and quantitative assessment methods, the project's coverage includes the Lima, Peru, Ahmedabad, India, and Zimbabwe rural credit markets. In addition to testing the hypothesis of microcredit programme impacts at different levels, the AIMS project further introduces the concept of household economic portfolio model, which allows one to seek the overall impact of the social programme (Hulme, 2000).

In obtaining the programme impact, the AIMS projects collected data at several points of time that allows for "before versus after" comparison. The procedures followed two steps. First,

the team selected clients randomly from the lists provided by the programmes. Then they identified the control group. Different selection methods of identifying the control group were applied for different microcredit programmes. Following this method, researches conducted in India and Peru used the control group as a random sample drawn from non-participants in the same regions who met programme eligibility criteria. In Zimbabwe, the control group was selected by a 'random walk procedure' in which they set off in a given direction to find non-client households for the control group (Aghion & Morduch, 2005, p. 211). A wide range of impact indicators was obtained from calculating the difference between the baseline data and the survey data two years later; the approach is believed to adequately control for both non-random participation and non-random programme placement. However, if the programme placement is ill-controlled the programme impact will be subject to bias due to unobservable variables that possibly change over time.

Table 3.2 Summary of Impact Evaluation Methods

Method	Key features	Strength/Weakness
Sample survey	Collect quantifiable data through questionnaires. A random sample and a matched control group are used to measure predetermined indicators before and after intervention.	High scale of applicability and representative High quantification and data standardisation High ability to isolate and measure non-project causes of change High cost and time scale High human resource requirements High ability to capture diversity of perceptions and negative impacts
Rapid appraisal	A range of tools and techniques developed originally as rapid rural appraisal (RRA). It involves the use of focus groups, semi-structured interviews with key informants, case studies, participant observation and secondary sources.	Low scale of applicability and representative Low quantification and data standardisation Low ability to measure project causes of change High ability to capture qualitative information and causal processes High skilled resource requirements
Participation observation	Extended residence in a programme community by field researchers using qualitative techniques and mini-scale sample surveys.	Low scale of applicability and representative Low quantification and data standardisation High ability to capture diversity of perceptions and negative impact High time scale and medium cost range
Case studies	Detailed studies of a specific unit (group, locality, organisation) involving open-ended questions and the preparation of histories.	Low scale of applicability and representative, quantification High ability to capture diversity of perceptions and negative impact
Participatory learning and action	The preparation by the indented beneficiaries of a programme of time lines, impact flow charts, village and resource maps, well-being and wealth ranking, seasonal diagrams, problem ranking and institutional assessments through group processes assisted by a facilitator.	Low scale of applicability and representative, quantification Low ability to measure project causes of change High ability to capture diversity of perceptions and negative impact

Sources: adapted from Hulme (2000) and Montgomery, Davies, Saxena and Ashley (1996)

Table 3.3 Summary of Programme Impact Evaluation Methods Using Survey Data

Method	Key features	Strengths/Weaknesses
Randomisation design	Experimental type of data Programme impact can be calculated directly from the control and treated groups	Randomisation can solve missing data problem Randomisation design still suffers from attribution problems
Matching	Non-experimental type of data Programme impact can be recovered from the coefficients under common support region	Various matching techniques developed can be used to obtain the impact coefficient Matching require relatively rich data to construct the common support region
Sample selection	Non-experimental type of data Programme impact can be estimated under selection of unobserved factors that determine participation decision	Sample selection model can solve selection bias of participating decision of unobserved factors due to non-experimental sampling design
Instrumental variable	Non-experimental type of data Programme impact can be estimated under selection of unobserved factors that affect participation decision	Instrumental variable can solve bias of participating decision based on unobserved factors due to non-experimental sampling design
Regression discontinuity	Non-experimental type of data Programme impact can be recovered from the coefficients under observed factors that determine the selection rule	Regression discontinuity can solve bias of participating decision based on observed factors affecting the decision rule
Difference-in-Differences	Non-experimental and panel type of data Programme impact can be calculated from the control and treated groups under time invariant assumption and no compositional changes within each group	Difference-in-difference method can solve problems related to selection bias and attribution Difference-in-difference method requires two period data and relies on two underlying assumptions

Sources: adapted from Hulme (2000) and Montgomery et al. (1996)

Pitt and Khandker (1998) provide a major study of microcredit programme impacts on poor households in Bangladesh, the world's prevalent and extensive microfinance programme operations. To address the sample selection bias such as non-random programme placement bias and self-selection bias, the authors constructed a quasi-experimental design survey, which is based on the interaction between participation eligibility and programme availability to provide identification for the estimation strategy. Hence the survey design alternates the instrumental variable approach. Following this, the impacts of group-based microcredit programmes on a set of household behaviours such as labour supply, children's schooling and intra-household distribution of resources such as household consumption, were estimated using the sophisticated econometric method called WESML-LIML-FE[14]. The results indicate that microcredit not only has a direct and significant effect on households' material poverty by increasing the households' annual consumption, but also indirectly contributes to the households' well-being by improving children's schooling and the labour market supply including self-employment. Moreover, the impacts of microcredit are more favourable to empowerment because credit provided to women seems to influence all the outcomes investigated more significantly than credit provided to men.

In a similar quasi-experimental design, Coleman (1999) makes use of a unique survey to address selection bias in assessing the impact of microcredit programmes in Northeast Thailand. The method drew on the fact that most microcredit activities operated by village banks start in a narrowly defined area and then expand their coverage to similar villages elsewhere. The author first compared the household outcomes between the participants and non-participants in 'treatment villages' where the microcredit programmes were already available. Following this, the author then compared between the participants and non-participants in 'control villages' where the programmes would be introduced later. Controlling for village fixed effect to identify the treatment and the control groups, the idea of including non-participants in the sample and combining with the use of village fixed effects is to control for possible endogenous programme placement. Following this, the impact is obtained by comparing the outcome of households with microcredit access to the outcomes of households that are eligible but not living in a treatment village. Contrary to Pitt and Khandker (1998), Coleman (1999) provides remote evidence of microcredit programme impacts on the poor households. The impact is insignificant on a set of outcomes such as

[14]WESML-LIML-FE stands for Weighted exogenous sampling maximum likelihood, Limited information maximum likelihood and village fixed effects.

physical assets, savings and expenditure. In fact, the impact is significant and negative on expenditure for men's health care, and positive and significant on women's high-interest debt.

A comparison of the Pitt and Khandker (1998) and Coleman's (1999) studies provides useful insights into the impact evaluation of microcredit programmes. Unable to identify reliable instrumental variables, both studies applied a quasi-experimental design based on the interaction between the programme's participation eligibility and programme availability to correct for programme placement and self-selection bias. These studies, however, provide contradictory conclusions of the programme impacts. Unlike Pitt and Khandker (1998), who estimated marginal impacts using a cumulative amount of borrowing variable and conclude a positive impact of microcredit programme on outcomes care and education, Coleman (1999) estimated average impacts using a membership dummy and found no significant impact of the microcredit programme. Not only has Pitt and Khandker's (1998) study been criticised because the 'exogenous' eligibility criterion is violated in many cases, for example, households that should not have been eligible for loans are actually programme participants (Morduch, 1998), Coleman's (1999) study also faces similar limitations. However, under certain conditions of microcredit programme implementation, both methods can be appropriately applied to investigate impact.

Khandker (2005) does not rely on a quasi-experiment but makes use of the panel data[15], that combines two time periods to strengthen identification. The availability of panel data helps to eliminate the potential source of bias, the unobserved but fixed household and individual characteristics that simultaneously affect microcredit borrowing and outcomes in Pitt and Khankder (1998). Khandker (2005) points out that individual and village level effects may not be fixed hence sources of endogeneity likely remain. Therefore, the author included interactions of a pair of dummies differentiated along the time dimension, i.e., whether household members of either gender could borrow in 1991/1992, and the same for 1998/1999, like the eligibility to borrow criterion. The findings of the household-level fixed-effects suggest that male borrowing has no significant effect, but female borrowing has a significant positive effect on the per capita consumption outcome. Despite strong arguments and evidence proposed by Roodman and Morduch (2009), Pitt and Khandker (1998) and

[15]Khandker (2005) constructed the panel data from the World Bank 1991/1992 survey and a follow-up survey in 1998/1999. Not all households in 1991/1992 survey were revisited because of attrition and split households found in 1998/1999 survey.

Khandker (2005) remain the most visible empirical evidence of microcredit programme impacts on the poor at the household level.

A follow-up study of Coleman (1999) by Coleman (2006) attempts to improve his own estimation to better control for self-selection bias by dividing the participants into rank-and-file (from poorer households to richer households) and committee members. Relying on the same survey strategy, but with more variables introduced to control for village fixed effects to identify the treatment and the control groups, the idea again is to include nonparticipants in the sample and to combine these with the use of village fixed effects to control for possible endogenous programme placement. The author finds a significant difference between ordinary and committee participants. The impact of microcredit on ordinary members' welfare was either insignificant or even negative, but the impact on committee members' outcomes such as income and production expenses, was positive, implying that most benefits of microcredit programmes were captured by the less poor rather than the poorest.

Other studies of microcredit impacts include Alexander (2001) in Peru, Copestake, Bhalotra and Johnson (2001) in Zambia, Mosley (2001) in Bolivia. Although different methods of quasi-experimental design survey and different estimation strategies were used, the authors' empirical results produce evidence that all the programmes studied had positive impacts at the household level such as incomes, physical assets and expenditure, hence on poverty reduction. For instance, Copestake et al. (2001) use multiple data collection methods involving questionnaires, focus group interviews and key informant interviews to mitigate selection bias in impact evaluation. The authors conclude that the positive impacts of microcredit on the borrowers' business profits or household income are strictly associated with the receipt of a second loan. In addition, Mosley (2001) indicates that microcredit might be successful in reducing the poverty of those close to the poverty line but inefficient in reducing extreme poverty.

Some studies applied the Heckman two-step technique to tackle selection bias problems by simultaneously estimating the outcome regression equation and participation equation. Zaman (1999) assesses the impact of the Bangladesh microcredit programme on reducing consumption poverty in Bangladesh. Following Heckman's (1978) model, Zaman first identifies factors driving participation with the probit estimate, which helps to construct a

household-specific selectivity variable. Subsequently, the selectivity variable is added to the outcome equation to control for selection bias. The empirical analysis reveals that the impact of microcredit on consumption poverty is a function of borrowing beyond a certain loan threshold and is contingent on how poor the household is at the beginning of borrowing. Similarly, Sarangi (2007) employed Heckman's two-step technique to examine whether microcredit programmes in India can increase the borrowers' income and both studies show that microcredit has such potential. Sarangi (2007) showed a positive effect of programme participation by an increase in the income of the poor household as the participants in the programme get easy access to credit from the group savings fund. However, the impact is negligible for households at the lower end of the income distribution.

Though microcredit programme impacts on poor households have been thoroughly examined in Bangladesh, Thailand, India and some African countries, few attempts have been made to evaluate the desired impacts of microcredit programmes in Vietnam. Most studies on microcredit elaborate on the issues of development and regulations; a few studies focus on the programme impact on target households and hence poverty reduction. Nguyen (2008) applies the instrumental variable approach to estimate the impact of the microcredit programme provided nationwide by VBSP. The empirical findings show that the programme has a positive and significant impact on total expenditure per capita, expenditure on health care and expenditure on education of the participating households. The programme also helps to increase household income and income from crop production. As the instrumental variable approach is subject to identification problems, Nguyen's (2008) findings still leave room for studies to investigate the robustness of the impact of microcredit programmes in Vietnam.

3.4 Chapter Summary

Understanding the factors influencing credit access both from the borrower and lender helps improve households' accessibility to credit. Asymmetric information complicates the lending process in the credit market as lenders judge borrowers based on the borrowers' characteristics. This is even true when empirical studies showed that under collateral-free lending, the observed characteristics such as household head's age, gender, education and land holding status, etc., are significantly defined in the determinants for credit accessibility. The lending practice is even more complicated when considering the rural credit market in which the formal and formal credit sectors coexist to provide more choices for the borrowers.

While formal and informal credit's coexistence is prevalent in the rural credit market, their interaction is often ignored, particularly in the Vietnam rural credit market. Consequently, studies recognised the influence of the informal credit sector to credit accessibility in the formal sector but few studies adequately address the issues in the literature.

Empirical studies also showed that accessibility to microcredit programmes undeniably has the programmes' desired impacts on the poor. However, the empirical evidence indicates that the impact of microcredit programmes is controversial because of the missing data problem. Impact evaluation inferences are subject to their evaluation methods and assumptions; different impact evaluation methods depend on their own specific assumption to resolve the missing data problem. This also implies different methods of data collection to encounter the missing data problems whereby a chosen econometric evaluation method performs better than others for programme impact assessment. This is one reason why inconsistent results of impact evaluation for microcredit programmes across countries arise. In Vietnam, few empirical studies have documented a positive impact of microcredit programmes; however, it is necessary to re-evaluate the impact as many time varying factors influence households' behaviours in using microloans and their outcomes.

Our study will contribute to the existing microcredit field in twofold. First, it explicitly addresses the accessibility to microcredit of rural households under conditions that formal and informal credit sectors interact in the credit market. Secondly, our expected findings will add more evidence to enrich the field of impact evaluation for microcredit programmes.

Chapter 4
Research Methodology

This chapter provides the theory of the credit rationing and credit demand for households. The chapter consists of three subsections. Section 4.1 begins with the standard assumptions of credit rationing in Stiglitz and Weiss's (1981) model to determine how asymmetric information creates the problem of credit rationing in the market. Given credit constraint, the household demand for credit is derived using the standard Ramsey growth model to show that external credit can improve a household's utility via production and consumption, and hence increase household welfare. Sections 4.2 and 4.3 discuss the empirical models on accessibility to microcredit and the impact evaluation of microcredit programmes, respectively. In addition, estimation strategies and hypothesis testing are presented in each section in order to facilitate the research findings.

4.1 Determinants of Accessibility to Microcredit

4.1.1 Model Specification

To link the credit rationing and credit demand ideas above, we exploit McFadden's (1972) discrete choice theory. The rural market is generalised by a demand for and a supply curve of credit in which the households under credit constraint want to obtain a loan from the credit suppliers. Though the central idea of credit rationing caused by information asymmetry persists, the rural credit market also has its specific characteristics such as the segmented coexistence of the formal and informal sectors and highly subsidised interest rate. To model the rural credit market under credit rationing, first the demand for credit is derived from attributes of choices that are specific to the borrowers' decisions and the household's socio-economic characteristics. Next, the supply of credit is defined as a screening procedure in which the credit providers use the available information about the applicants to decide whether to grant all the credit that the applicant applied for or partially reduce the credit amount, or totally reject the application (Zeller, 1994). The idea of credit rationing in the rural credit market can be established in the following model.

$$\boldsymbol{FL} = \mathrm{f}(\boldsymbol{X}_1, \boldsymbol{H}_1, \boldsymbol{M}_1, \boldsymbol{G}_1) \tag{4.16}$$

Where the formal loan amount, $\boldsymbol{FL}$, underlying a reduced form of demand and supply credit, is a function of vectors of individual characteristics $\boldsymbol{X}_1$, household characteristics $\boldsymbol{H}_1$, micro-credit institution characteristics $\boldsymbol{M}_1$, and geographic factors $\boldsymbol{G}_1$. The estimable form of (4.16) is linearly specified as follow:

$$\boldsymbol{FL} = \alpha_1 + \beta_1' \boldsymbol{X}_1 + \delta_1' \boldsymbol{H}_1 + \theta_1' \boldsymbol{M}_1 + \gamma_1' \boldsymbol{G}_1 + u_1 \tag{4.17}$$

The reduced form of the loan amount (equation 4.17) is rarely estimated in empirical research because the expected loan amount is a conditional function of the probability of participation in the lending. That causes the estimated results for $\boldsymbol{FL}$ for less desirable properties, particularly the estimators, to be significantly biased due to sample selection (Heckman, 1979). To overcome the problem, a binary choice variable $\mathbf{B}$ is introduced into the model to capture the effect of the probability of participation in the formal credit. Equation (4.17) is rewritten as:

$$\boldsymbol{FL} = \alpha_1 + \beta_1' \boldsymbol{X}_1 + \delta_1' \boldsymbol{H}_1 + \theta_1' \boldsymbol{M}_1 + \gamma_1' \boldsymbol{G}_1 + \lambda B + u_1 \tag{4.18}$$

where α_1, β_1, δ_1, θ_1, and γ_1 are estimators of the exogenous vectors defined earlier, the error term u_1 is assumed to be normally distributed, and λ is the estimator of the choice variable B. The choice variable of the credit demand equation (4.18) is derived from the utility theory in the following steps.

First, the individual's decision to apply for a loan, where B takes the value of 1 if one choice is made (borrowed) and 0 otherwise. Let U_{i0} and U_{i1} denote the utilities of the two choices, $\mathbf{z}'_{i0}$ and $\mathbf{z}'_{i1}$ vectors of characteristics of the alternatives as perceived by the i^{th} individual and $\mathbf{g}'_i$ a vector of socio-economic characteristics of the i^{th} individual. The utility functions can be expressed in linear forms with the error terms as follows:

$$\mathrm{U}_{i0} = \overline{\mathrm{U}}_{i0} + \mathrm{e}_{i0} = \mathrm{a}_0 + \mathrm{z}'_{i0}\mathrm{d} + \mathrm{g}'_i \mathrm{t}_0 + \mathrm{e}_{i0} \tag{4.19a}$$

$$U_{i1}=\overline{U}_{i1}+e_{i1}=a_1+z'_{i1}d+g'_i t_1+e_{i1} \quad (4.19b)$$

Next, let P_i represent the probability that B takes the value 1; the individual's choice is made if $U_{i1} > U_{i0}$ and B is 0 otherwise. The probability of a household's access to microcredit can be expressed in probability terms as follow:

$$\Pr(B=1) = \Pr(U_{i1} > U_{i0}) = \Pr[(a_1 - a_0) + (\mathbf{z}_{i1} - \mathbf{z}_{i0})'\mathbf{d} + \mathbf{g}'_i(\mathbf{t}_1 - \mathbf{t}_0) > (e_{i1} - e_{i0})] \quad (4.20)$$

Then, let B^* denote the unobserved utility that an individual makes a decision. Though B^* is unobservable, it can be used to explain the relationship between an individual's choice and a set of variables that contribute to that choice. B^* can be expressed as follows:

$$B^* = \begin{cases} B=1 \text{ if } B^* = U_{i1} - U_{i0} > 0 \\ B=0 \text{ otherwise} \end{cases} \quad (4.21)$$

Equations (4.19) and (4.20) can be rewritten as follows:

$$B_i^* = (a_1 - a_0) + (\mathbf{z}_{i1} - \mathbf{z}_{i0})'\mathbf{d} + \mathbf{g}'_i(\boldsymbol{\varphi}_1 - \boldsymbol{\varphi}_0) + (e_{i1} - e_{i0}) \quad (4.22)$$

Rewriting equation (4.22) in a short form by replacing the terms in brackets and specifying different factors namely individual, household, microcredit and socio-geographic factors influencing the household decision as follows:

$$B^* = \alpha_2 + \beta'_2 \boldsymbol{X}_2 + \delta'_2 \boldsymbol{H}_2 + \theta'_2 \boldsymbol{M}_2 + \gamma'_2 \boldsymbol{G}_2 + u_2 \quad (4.23)$$

Subsequently, we can express the equation of the formal loan amount ($\boldsymbol{FL}$) via the latent variable, B^* as follows:

$$\boldsymbol{FL} = \alpha_1 + \beta_1' \boldsymbol{X}_1 + \delta_1' \boldsymbol{H}_1 + \theta_1' \boldsymbol{M}_1 + \gamma_1' \boldsymbol{G}_1 + \lambda B + u_1 \tag{4.24}$$

$$B^* = \alpha_2 + \beta_2' \boldsymbol{X}_2 + \delta_2' \boldsymbol{H}_2 + \theta_2' \boldsymbol{M}_2 + \gamma_2' \boldsymbol{G}_2 + u_2$$

$B = 1$ if $B^* > 0$

$B = 0$ otherwise

The Heckman (1979) two-step method is able to resolve the problem of selection bias possibly present in the system of equations (4.24). Using the inverse Mills ratio hence yields unbiased and consistent estimators. However, demand theory suggests that there are other complementary and/or substitute sources of credit that might likely alter the demand of formal microcredit of the households. Hence one should take into account the economic impact of other sources of credit in the household decision making. The most conventional alternative for formal microcredit is generally considered as informal credit although this alternative takes different forms in different countries. In Thailand, for instance, informal credit can be found in the form of small collateral-free and interest-free loans between friends and relatives or loans from moneylenders with no collateral requirements but a relatively high interest rate (Giné, 2005). Other types of informal credit in the form of agricultural inputs such as seeds, fertilizers, animal feeds, etc., provided by local suppliers are prevalent in the rural financial market in Vietnam (Pham & Izumida, 2002; Pham & Lensink, 2007). Madestam (2009) further puts this idea into a more sophisticated theory for informal finance that provides direction for empirical researchers in finding policy recommendations for rural finance development. This motivated our study to include the informal sector in our model based on the common notion that credit rationing in the formal sector nurtures the existence of the informal form of credit in the rural credit market.

The fact that a large proportion of the households that are unable to access the formal form of microcredit are likely to seek sources of finance elsewhere is persistent (Bell et al., 1997). The demand for other sources of credit, so called informal credit, exists in almost every rural

credit market in developing countries as documented in a number of studies[16]. This implies that households choose the formal source first before resorting to the informal one as an alternative. This view is particularly true where the formal sector is designed to supply cheap credit to the rural market and the rural area is characterised as good infrastructure but the transaction cost is considered relatively low compared with the informal one. By contrast, in Vietnam and some Asian countries where the rural area is characterised by poor infrastructure and the rural market seems to be segmented, the transaction cost is considered high for households to obtain a loan hence the prevalence of the informal sector as the alternative. As Kochar (1997b) argues, informal loans particularly loans from friends and relatives, may be cheaper than formal loans in rural India hence the author suggests that the informal sector can also be the sector of choice for households.

Another reason for informal credit to coexist is when the formal microcredit provider imposes a credit limit on the loan contract. If the actual loan is less than the amount demanded, households find themselves with insufficient capital for agricultural production or other economic activities; borrowing more money from informal lenders is the conventional solution. The existence of informal credit is inevitable in the rural credit market and it is argued that, despite its importance, the coexistence of formal and informal credit markets has not received much attention because there has been little theoretical and empirical work on this field of microfinance (Madestam, 2009). Therefore, research on formal credit in the rural credit market should take into account the effect of informal credit.

The basic argument on specifying the econometric model is based on the fact that formal credit is systematic and mandated in the credit market but informal credit is discrete and prevalent at the local level hence the rural credit market mechanism is on the side of the greater formal sector. Therefore, modelling the formal as an endogenous part of the informal may lead to a false interpretation of generalisations about the market mechanism. Given the specific characteristics of the rural credit market in the MRD in Vietnam, the informal loan is considered an intangible endowment of rural households and the informal credit takes various forms hence there are no corresponding specifications for the formal credit compared with its counterpart. In addition, the informal loan is believed to be less constraining than the formal loan therefore its reduced form is able to reflect the informal credit without imposing the

[16]For more evidence, see Udry(1990, 1994) in Northern Nigeria; Okurut, et al. (2005) in Uganda and Okurut (2006) for cases in Africa; Aleem (1990) and Kochar (1997b) in the Middle East; Pham & Izumida (2002),Giné(2005), and Pham & Lensink (2007) in Asia.

selection equation. This means rural households normally hold a certain amount of formal credit at any period of time but their desire to obtain a loan from the formal sector depends on the formal regulation in the credit market.

To account for informal credit in the model, the informal loan amount is included in the system of equations (4.22). Without losing generality, the informal loan amount is allowed to alter the household's decision to borrow formal microcredit but not alter the amount of formal microcredit. The reason is that formal lenders practically do not consider informal loans in the lending process and this belief proves that the informal credit is treated more often exogenously or separately from the formal loan in many studies (see Gan et al., 2007; Mohamed, 2003; Petrick, 2005; Pham & Izumida, 2002; Zeller, 1994). On the other hand, allowing these two credit sectors to interact directly with each other under a rationing process produces problems in deriving a joint distribution assumption for their correlated error terms. It also helps to relax the trivariate distributions of the error terms in our model. However, if these two credit sectors were completely separate, treating them separately one actually ignores the fact that formal and informal sources of microcredit coexist in the rural credit market. Some empirical evidence documented that an informal loan influences the determinants of access to formal microcredit that allows us to have more control over the unobserved factors in the informal loan and these unobserved factors are actually directed toward the determinants of access to the formal loan equation[17]. This consideration makes the empirical model in this study differ from the other empirical studies in the microcredit literature and particularly a microcredit study in Vietnam. Since informal lenders do not use a screening mechanism as formal lenders do, it is reasonable to assume that the informal credit is a function of a household's characteristics that the informal lender can observe. The amount of informal credit ($\boldsymbol{IFL}$) function takes the form:

$$\boldsymbol{IFL} = \alpha_3 + \beta_3' \boldsymbol{X}_3 + \delta_3' \boldsymbol{H}_3 + \theta_3' \boldsymbol{M}_3 + \gamma_3' \boldsymbol{G}_3 + u_3 \tag{4.25}$$

Incorporate equation (4.25 in to the system of equations (4.24), we have (4.26) as follows:

[17]There is another possibility to model the direct interaction between formal and informal that we include formal in informal loans in a system of simultaneous equations. However, more assumptions and specifications are required for the model to be empirically estimable.

$$\boldsymbol{FL} = \alpha_1 + \beta_1' \boldsymbol{X}_1 + \delta_1' \boldsymbol{H}_1 + \theta_1' \boldsymbol{M}_1 + \gamma_1' \boldsymbol{G}_1 + \lambda B + u_1 \quad (4.26\text{-}1)$$

$$B^* = \alpha_2 + \beta_2' \boldsymbol{X}_2 + \delta_2' \boldsymbol{H}_2 + \theta_2' \boldsymbol{M}_2 + \gamma_2' \boldsymbol{G}_2 + \mu \boldsymbol{IFL} + u_2 \quad (4.26\text{-}2)$$

$$B = 1 \; if \; B^* > 0$$

$$B = 0 \; otherwise$$

$$\boldsymbol{IFL} = \alpha_3 + \beta_3' \boldsymbol{X}_3 + \delta_3' \boldsymbol{H}_3 + \theta_3' \boldsymbol{M}_3 + \gamma_3' \boldsymbol{G}_3 + u_3 \quad (4.26\text{-}3)$$

The above model possesses some economic interpretation. First, the amount of informal credit is specified to capture the flexibility of informal credit in which the screening mechanism is rather informal, therefore no selection bias is involved in this process. Next, the informal credit is considered as an intangible endowment of the household and it is believed to be less constraining therefore it can be represented in a reduced form. On the specification issue, the model can capture different phenomena of economists' interest. It encounters selection bias in determining the determinants of the formal microcredit under a credit rationing condition. It also allows informal and formal microcredit to interact via the latent function of the household's choice.

The model specification provides two main advantages over how the household makes a choice among credit sectors. First, the model facilitates the estimation strategy that a particular choice is rather conditional on the other choice. For example, households borrow from informal because they are not able to borrow from banks for some observed and unobserved factors. This is particularly true in the Vietnam rural credit market where poor households often lack working capital and most likely face credit constraint. Taking that into account, the model gives a better explanation of the household choice by specifying a conditional relationship between the formal loan decision and informal loan. Second, the model also overcomes the difficulty of multi-choice modelling that tries to capture more than two choices, e.g., borrowing from formal, borrowing from informal, borrowing from both credit sectors and non-borrowing. Because the estimation strategy for the multi-choice model needs the relationships among the choices to be defined, this task is very complicated and may not be possible, in practice, due to multi-loans, which the households may have

borrowed over a period of time. In fact, studies trying to estimate a multi-choice model based on an assumption that choices are irrelevant to other sets of choices tend to ignore the coexistence of and interaction among formal and informal credit in the rural credit market.

4.1.2 Estimation Strategies

The system of equation (4.26) is rewritten as follows:

$$\boldsymbol{IFL} = \alpha_3 + \beta_3' \boldsymbol{X}_3 + \delta_3' \boldsymbol{H}_3 + \theta_3' \boldsymbol{M}_3 + \gamma_3' \boldsymbol{G}_3 + u_3 \tag{4.27-1}$$

$$B^* = \alpha_2 + \beta_2' \boldsymbol{X}_2 + \delta_2' \boldsymbol{H}_2 + \theta_2' \boldsymbol{M}_2 + \gamma_2' \boldsymbol{G}_2 + \mu \boldsymbol{IFL} + u_2 \tag{4.27-2}$$

$$B = 1 \; if \; B^* > 0$$

$$B = 0 \; otherwise$$

$$\boldsymbol{FL} = \alpha_3 + \beta_3' \boldsymbol{X}_3 + \delta_3' \boldsymbol{H}_3 + \theta_3' \boldsymbol{M}_3 + \gamma_3' \boldsymbol{G}_3 + \lambda B + u_1 \tag{4.27-3}$$

Since $\boldsymbol{IFL}$ is an endogenous variable in the equation (4.27-2), this simultaneous equation system is referred to as *the probit model with continuous endogenous variable at the right hand side* (probit with continuous endogenous variable RHS), therefore, the standard probit or OLS method can give biased estimates and joint estimation of this equation system is needed in order to obtain consistent estimates (Wooldridge, 2002). River and Vuong propose a useful two-stage conditional maximum likelihood method to estimate this system. Their method provides some advantages over the standard 2SLS since it is more efficient and it gives direct estimates of the parameters of interest and their correct asymptotic standard error (Pham & Izumida, 2002; Pham, 2009). The standard statistical test can be applied to test whether the endogeneity problem exists by testing the correlation of the u_3 and u_2 in equation systems (4.27-1 & 4.27-2). On the other hand, since B is an endogenous variable in equation (4.27-3), this binary endogenous variable in a simultaneous equation system (4.27-2 & 4.27-3) is known as *the model of selectivity* (Heckman, 1979; Lee, 1983). Therefore, the coefficients α_i,

β_i, δ_i, θ_i, γ_i (i=1,3), μ and λ in the system of equations (4.26) can be estimated using the following steps:

Step 1. Regress *IFL* on exogenous variables to obtain the residual $\hat{u}_3$.

Step 2. Plug $\hat{u}_3$ in to equation (4.27-2) as a regressor and run the standard probit to get the vectors of consistent coefficients α_2, β_2, δ_2, θ_2, γ_2, and μ.

This method also provides a simple test for the endogeneity of *IFL* by conducting the familiar t-test for the coefficient μ where the null hypothesis $H_0 : \mu = 0$. If H_0 holds, this means u_1 and u_2 are uncorrelated, endogeneity is not a problem and *IFL* is an exogenous variable.

Once all the coefficients α_2, β_2, δ_2, θ_2, γ_2, and μ in the probit model are well treated, we estimate the sample selection model using the following procedures:

Step 3. Estimate the probit model for the probability of borrowing from formal credit, then calculate the inverse Mills ratio of the probit model.

Step 4. Take into account the inverse Mills ratio in the loan amount, equation (4.27-3) and run the regression to obtain the coefficients and the coefficient, $\hat{\lambda}$ of the inverse Mills ratios.

Using the inverse Mills ratio to correct sample selection bias yields consistent coefficients for the determinants of access to the credit model. In addition, White's heteroskedasticity consistent standard errors will also be used in the weighted least square regression to correct for asymptotic bias in $\hat{\lambda}$ in step 4. Again, a t-test for the presence of sample selection is applied similar to the endogeneity problem in step 2.

Equation (4.27-3) is the main equation of interest in which the formal loan amount in log form is explained by a set of independent variables and the error term, u_1. The error term u_1 is assumed to be normally distributed. Selection equation (4.27-2) is called the latent equation because its dependent variable is unobservable. Only the choice variable B is observed when the latent value is believed to be positive, i.e. a choice is made. This system of equations can be estimated by the standard sample selection Heckman model if the latent equation is well specified.

Since *IFL* is assumed to be endogenous, which influences the borrowing behaviour of the household in the formal credit market, *IFL* has to be treated before the above equations are

estimated. This problem forms another system of equations (4.27-1) and (4.27-2) to be estimated. Cameron and Trivedi (2009) suggest estimating the two equations (4.27-1) and (4.27-2) simultaneously using instrumental variables for IFL, so called *ivprobit* model. Equation (4.27-2) might be refered to as the "structural" equation in this system. This structural equation is the main interest and the other equation, called the reduced-form equation, serves only as a source of identifying instruments for IFL. The reduced form equation explains the variation in the endogeneous variable by including instrumental variables that are excluded from the structural equation.

In general, the model can be estimated by different methods depending on its distributional assumptions. Since access to formal credit is a binary variable and an informal loan is a continuous variable, their covariate error terms can be normalised to 1. Consistently, the model can be estimated by the conditional maximum likelihood method where the likelihood function is derived from the joint distribution of the error terms. Under a bivariate normal distribution, the conditional maximum likelihood method outperforms the ordinary 2SLS for two reasons. First, there is no requirement for the functional forms to be specified for the model as long as there are valid instrumental variables to control for the endogeneity and to achieve identification in the simultaneous equations. Second, the conditional maximum likelihood method fits the model by recursive algrorithms to obtain the coefficients with full observations in the sample hence more information will be included in the covariates in the model for the ordinary 2SLS method[18].

The bivariate normal distribution of the error terms in equations (4.27-1) and (4.27-2) can be specified following the standard procedures introduced by River and Vuong (1988) and explained in detail in Wooldridge (2002). Since u_2 and u_3 are correlated and form the bivariate normality of (u_2, u_3) in a form $u_2 \mid u_3 = \rho_{23} u_3 + e_1$, and e_1 is normally distributed and independent of u_2 and u_3, a test for exogeneity of the endogeneous variable, which is equivalent to testing the null hypothesis $H_0 : \rho_{23} = 0$ of the error terms can be performed using an asymptotic t-test (Cameron & Trivedi, 2009; Wooldridge, 2002). This type of model can be estimated using IV probit model. The valid instruments must significantly explain IFL but not for the selection equation. To find the covariate that not only serves as the instrument

[18]Roodman (2009) introduces the cmp command which provides a flexible way to estimate different types of econometric models in Stata using the maximum likelihood estimation method.

but also helps determine the dependent endogenous IFL, we include more exogeneous variables into the reduced equation then estimate the simultaneous equations by the conditional recursive mixed process (Roodman, 2009).

Under similar assumptions for the joint distribution of u_2 and u_1, the correlation between u_2 and u_1 can be estimated following the Heckman (1979) twostep method. First, run a probit model of selection equation (4.27-2) using all obsevations in the sample. The estimates of the probit model are then used to construct consistent estimates of the inverse Mills ratio term. Next, using OLS to estimate the outcome equation, which is the equation (4.27-3), with the inverse Mills ratio term substituted for B to obtain consistent and asymtotically normal estimators for the coefficients and λ, expressing by this relationship $\lambda = \rho_{12}\sigma_1$. The sign of ρ_{12} indicates the correlation between the unobserved factors in the selection equation and outcome equation. A standard t-test of the null hypothesis that $H_0 : \lambda = 0$, i.e. $\rho_{12} = 0$, can be carried out to test whether selection bias is present in the model (Vella, 1998; Wooldridge, 2002).

4.2 Impact Evaluation of Microcredit Programme at Household Level

External capital can improve a household's utility through consumption growth hence the main objective of microcredit is to provide an opportunity for the households to improve their consumption growth over a lifetime. The remainder of this section discusses the methods of impact evaluation for the Vietnam Bank for Social Policy (VBSP) microcredit programme. The empirical model for impact evaluation of the VBSP microcredit programme starts with the derived impact model in equation (4.15) of the theoretical model. The motivation of our estimating strategy for the empirical model is threefold. First, appropriate measurements for the outcome variable are defined for the empirical models. Next, the empirical models are specified for the defined outcomes and the explanatory variables are modified to capture the effect of participation in a microcredit programme as well as the value of the microloan on the outcome variables. Finally, the estimation strategies and justifications are provided in order to establish the desired results from the empirical models.

4.2.1 Outcome Indicators of Impact Evaluation

The main purpose of impact assessment of a programme is to measure the extent to which the programme has changed the outcomes of the agent, where the agent can be defined as group of individuals, households, firms, cities, etc. The outcomes of interest are theoretically derived from the utility function of the agent; however, utility is an unrealistic measurement to measure the outcomes and utility represents a broad sense of the outcomes of impact evaluation. To evaluate the economic impact of a programme, two common indicators have been widely used (Hulme, 2000). First, income indicators, including all sources of income, are considered indicators to changes in the outcomes of programme intervention. Although income captures all possible sources of the household economic activity, such as income from farming, non-farm, and wages, using the changes in the households' income as a measure of welfare impact may be misleading due to possible measurement error in income data (Coudouel, Hentschel, & Wodon, 2002).

Alternatively, expenditure is considered as a set of indicators for the outcomes of a programme. Expenditure directly reflects the real term of the consumption function, which is theoretically derived from the utility function in the household consumption and growth model, therefore using expenditure as an indicator for the outcome is more reasonable than an income indicator. Moreover, consumption takes place in the daily needs of the households and better reflects the households' living standard. In this study, consumption is used as the first indicator of the outcome variable. Additionally, the income function is also included to investigate the impact of microcredit on income generating activities (such as farm and non-farm income) of the households.

4.2.2 Empirical Model

In assessing the impact of the microcredit programme, this study follows the impact evaluation framework by setting participation in a microcredit programme similar to participation in a job training programme (Heckman & George, 1980) and a health care programme (Ahn & Schmidt, 1995). Generally, an individual household is defined to be exposed to a ditchonomous treatment state, corresponding to participating or not participating in a microcredit programme. This participation results in two potential outcomes for the individual household. Let $D=1$ if a household is a programme participant; $D=0$ otherwise. Let Y_{i1} denote the potential outcome for participants and $\mathrm{Y_{i0}}$ denote the potential outcome for

the other. Y_{i1} and Y_{i0} are mutually exclusive and receive values depending on the participation state and hence only one outcome can be observed while the other, called '*counterfactual',* is not. The estimated impact of the programme on the outcome of the i^{th}household in a sample is defined as follows:

$$\delta_i = Y_{i1} - Y_{i0} \tag{4.27}$$

The actual observed outcome for an individual subject to the mutually exclusive nature of the counterfactual and independently distributed assumption (Heckman & Vytlacil, 2005; Rubin, 1990) can be described as follows:

$$Y_i = D_i Y_{i1} + (1 - D_i) Y_{i0}$$

or $$Y_i = Y_{i0} + (Y_{i1} - Y_{i0}) D_i = Y_{i0} + \delta D_i \tag{4.28}$$

As discussed section 3.2, estimating equation (4.28) to obtain the coefficient of impact δ using OLS would produce a biased result due to self-selection and endogeneity problems. In addtion, the literature indicates that there is more than one impact estimator for any outcome indicator. Because our research interest is to provide relevant policy implications for the targeted poor households that need microcredit, we restrict our focus to estimating the programme impact using only the average treatment effect on the treated (ATT) proposed by Heckman et al. (1997). Following this, two types of programme impact estimator are used to evaluate the impact of the microcredit programme. Estimation strategies and techniques of these two impact estimators are discused in the following subsection.

4.3.2.1 Impact Estimator for Cross-section Data: Propensity Score Matching Approach

a) PSM estimators and assumptions

Propensity score matching (PSM) is a widely-used method in drawing causal inferences in programme evaluation studies. It is based on the idea of contrasting the outcomes of programme participants with the outcomes of 'comparable' non-participants wherein differences in the outcomes between the two groups are attributed to the programme

(Heckman, Ichimura, & Todd, 1998). This approach has been extensively applied in impact of job training and education programmes (see Dehejia & Wahba, 2002; Heckman et al., 1997; Titus, 2007). One advantage of this approach as Dehejia and Wahba (2002) pointed out that it can be invaluable for cross-sectional survey data because, given the nature of survey data, resurveying thousands of units at a later period might be costly.

The PSM method matches a participant from the treatment group with a participant from the control group with similar observable characteristics to infer the intervention impact (Caliendo & Kopeinig, 2008). However, there likely exist some observations of participants in the treatment and control groups that cannot be matched due to significant differences in their observable characteristics. The differences of the participants such as rich households with significantly high income in the control group and non-income or isolated households with self-subsistence characteristics in the treatment group, are called outliers. These outlier participants cannot be matched using their income. Including these unmatched participants in evaluating the impact may produce misleading interpretation. An important feature of the matching method is that, after the treated and control participants are matched, the unmatched participants in the matching process are discarded and not directly used in estimating the programme impact (i.e., matching is performed within the overlapping or common support region). Therefore, the matching algorithm can significantly reduce bias in programme evaluation studies (Heckman, Ichimura, Smith, & Todd, 1996; Rosenbaum & Rubin, 1983; Setboonsarng & Parpiev, 2008).

The matching approach can be applied to estimate the impact of a microcredit programme. Under similar settings as in job training programmes, the PSM method first estimates the propensity score for each participant and non-participant in a microcredit programme on the basis of observed characteristics and then compares the mean outcome of the participants with that of the matched (similar in terms of scores) non-participants. In other words, the purpose of PSM is to select comparable non-borrowing households among all non-borrowing households to generate a control group, and then compare the outcome of the treatment and matched control groups. The PSM relies on the crucial assumption that, among non-borrowers, those with the same or similar characteristics to borrowers should have the same outcomes as what the borrowers would have had without credit participation. This assumption is called '*unconfoundedness*' or '*conditional independence assumption*' (CIA) (Rosenbaum & Rubin, 1983). The underlying point of this assumption is that the control and treatment units

with the same propensity score have the same probability of assignment to the treatment as in randomised experiments (Dehejia & Wahba, 2002). The assumption that outcome Y is independent of treatment D, conditional on some covariate X following Dawid's (1979) notation:

Assumption 1. Unconfoundedness: $Y_0, Y_1 \coprod D \mid X$ (4.29)

Assumption 1 enables us to define the outcome distributions of participant and non-participant groups as follows:

$$E(Y_0 \mid X, D=1) = E(Y_0 \mid X, D=0) \quad (4.29\text{ a})$$

and $$E(Y_1 \mid X, D=1) = E(Y_1 \mid X, D=0) \quad (4.29\text{ b})$$

Equations (4.29a and 4.29b) imply that the participant outcomes have the same distribution that non-participants would have experienced had they participated in the programme. Like randomisation, matching balances the distributions of all relevant covariates X in the treatment and comparison groups. Heckman et al. (1997) show that the missing counterfactual means can be constructed from the outcomes of non-participants and participants as follows:

$$E(Y_0 \mid X, D=1) = E(Y_0 \mid X, D=0) = E(Y_0 \mid X) \quad (4.30\text{ a})$$

and $$E(Y_1 \mid X, D=1) = E(Y_1 \mid X, D=0) = E(Y_1 \mid X) \quad (4.30\text{ b})$$

In order that both sides of equations (4.30a and 4.30b) are simultaneously defined for all X, it is additionally assumed that:

Assumption 2. Overlap: $0 < Pr(D=1 \mid X) < 1$, for all X (4.31)

Assumption 2 implies that the support of X is equal in both groups, i.e., $S = Support(X \mid D=1) = Support(X \mid D=0)$. This assumption prevents X from being a perfect predictor in the sense that one can find for each participant a counterpart in the non-treated population and vice versa. If there are regions where the support of X does not overlap for the treated and non-treated individuals, matching has to be performed over the common support region only (Lechner, 2000). Blundell, Dearden and Sianesi (2005) suggest that interpreting the estimated effects has to be redefined as the mean treatment effect of those individuals falling within the common support.

Assumptions 1 and 2 are called 'strong ignorability' in practice (Rosenbaum & Rubin, 1983). Heckman et al. (1997) provide an alternative assumption for estimating ATT under the matching method.

Assumption 3. Mean Independence:

$$E(Y_0 \mid X, D=1) = E(Y_0 \mid X, D=0) \tag{4.32 a}$$

and $$E(Y_1 \mid X, D=1) = E(Y_1 \mid X, D=0) \tag{4.32 b}$$

Based on the above assumptions, the mean impact of treatment on the treated can be written as:

$$\delta_{PSM}^{ATT} = E(Y_1 - Y_0 \mid X, D=1)$$

$$\delta_{PSM}^{ATT} = E(Y_1 \mid X, D=1) - E_X[E(Y_0 \mid X, D=1) \mid D=1]$$

$$\delta_{PSM}^{ATT} = E(Y_1 \mid X, D=1) - E_X[E(Y_0 \mid X, D=0) \mid D=1] \tag{4.33}$$

The first term in equation (4.33) can be estimated from the treatment group and the second term from the mean outcomes of the matched comparison group. The outer expectation is taken over the distribution of covariates X in the treated population (Caliendo, 2006, p. 33).

According to Dehejia and Wahba (2002), the PSM method produces estimates with low bias if the datasets satisfy the following conditions: (i) data for the treatment and control groups are collected using the same questionnaire; (ii) both treatment and control groups are drawn from the same locality; and (iii) the dataset contains a rich set of variables relevant to modelling credit participation and the outcomes. The similarity of the treatment and control groups, in terms of observable characteristics, increases the likelihood of getting matches and hence reduces the bias. In addition, the PSM method allows controlling for potential bias such as non-placement and self-selection on observed characteristics in programme participation.

In this study, various PSM estimators of the microcredit impact on expenditure and income are discussed. To control selection bias based on observable factors, a set of covariates will also be included. The set of controlling covariates should meet conditions of matching controlling variables discussed in Imbens (2004), Lee (2005), and Rosenbaum and Rubin (1983), among others.

b) Implementation strategies of Propensity Score Matching estimators

Theoretically, the households representing one matched pair are identical to each other except for their loans from the microcredit programme. Therefore, matching is able to isolate the impact idiosyncratic factors have on the outcome variables by reducing observed heterogeneity between the borrowers and non-borrowers. The procedure of implementing PSM estimation consists of two stages. In the first stage, probit or logit is used to estimate the propensity score or probability of receiving a microloan conditional on control variables, and then stratifies individuals or households into blocks according to their scores. This procedure may include stepwise model selection, with repeating steps until the treatment and control groups are achieved. In the second stage, the estimated propensity scores will then be used together with various average treatment effect estimators to obtain estimates of the average treatment effect on the treated (ATT).

Different possible matching procedures can be used in such a study. One possible procedure is Stratification Matching, which performs matching by dividing the range of variation of the propensity score in intervals to ensure that within each interval test the average propensity scores of treated and control households do not differ (Becker & Ichino, 2002). The Stratification Matching algorithm, in fact, discards observations when either treated or control units are absent. Therefore, this method is not recommended for data in which the treated and control groups are unbalanced. Another possible procedure is Radius Matching. With Radius Matching, the average treatment effect is computed by averaging over the unit-level treatment effects of the treated where the control unit(s) within a pre-defined radius of propensity score(s) is/are matched to a treated unit. If there is more than one control unit within a radius, the average outcome of those control units is used. This approach can avoid bad matches and can overcome the drawback of stratification matching, so, the quality of matching rises (Caliendo & Kopeinig, 2008). Given the dataset, the smaller the radius, the better the quality matching becomes since matched control units and the treated units have close scores. However, Radius Matching uses those treated units that have control matches within a radius, so if the radius is very small, many treated units are not matched and hence dropped. Therefore, the ATT by the radius matching estimator is no longer representative of the population of the treated units (Becker & Ichino, 2002; Caliendo & Kopeinig, 2008).

Instead, other variants in matching estimators are applied to estimate programme impact. Kernel Matching is used to match all treated with a weighted average of all controls with weights that are inversely proportional to the distance between the propensity score of treated and controls (Arun, Imai, & Sinha, 2006). Becker and Ichino (2002) show that Kernel Matching provides a solution to the problem of discarding observations in Radius Matching because the Kernel Matching estimator possesses a smaller variance since information from all or nearly all control units is used. However, one drawback of this approach is bad matching because few or many far-distance control units may be used to match with one treated unit (Caliendo & Kopeinig, 2008).

The next consideration is the choice of the covariates for the propensity score estimation. In the PSM method, choosing the covariates is important because they directly affect the estimation outcomes. Lee (2005) suggests that the chosen covariate X must be predetermined and affect both outcome Y and treatment D. In addition, to avoid the causality bias,

X should not be affected by D, hence post-treatment covariates should not be controlled for because that will remove part or all of the effect of D on Y.

The unconfoundedness assumption or conditional independence assumption (CIA) (Rosenbaum & Rubin, 1983) implies that the observable control covariates should not be affected by the treatment, and the outcomes of interest are independent of the treatment assignment. Thus, included variables should either be fixed over time or be measured before the treatment intervention (Caliendo & Kopeinig, 2008) and the pre-treatment measured variables must not be affected by anticipation of the treatment participation (Imbens, 2004). For example, if the households know they will receive credit, this may lead to higher consumption even before the household is lent the money (Doan, 2011).

In addition, the variables should be excluded if they are either unrelated to the outcome or not proper covariates of the treatment participation decision model. Bryson, Dorsett and Purdon (2002) suggest selecting a variable that affects only credit participation but not treatment outcome so it is not necessary to control for this because the outcome of interest is not affected by this variable. On the other hand, if a variable affects only the outcome but not the treatment participation, one should not control for it since the variable will not make any significant difference between the treatment and control groups. Consequently, only the variables that influence simultaneously the participation decision and the outcome should be included in the score estimation stage.

Finally, Dehejia and Wahba (1999) and Heckman et al. (1997) state that the exclusion of important variables could seriously increase bias in estimates. But a covariate is not, or only weakly, correlated with the outcomes and the treatment may reduce the precision of the estimates (Imbens, 2004). In the presence of uncertainty, however, it is better to include too many rather than too few covariates (Bryson et al., 2002). Furthermore, Dehejia and Wahba (1999) suggest starting with the covariates linearly and checking whether balancing of covariates within each stratum is obtained, and then test for statistical significance of differences in the distribution of the covariates. As balance is obtained, the specification is accepted. Otherwise, one should change the potential covariates into higher-order terms and interactions until balancing is satisfied.

The third consideration is defining the common support and overlap region. The second assumption of PSM is the common support. Only a subset of the comparison group that is comparable to the treatment group will be used, therefore it is necessary to check the overlap and the common support between the treatment and control groups. Lechner (2002) suggests inspecting the density distribution of propensity scores to check the overlap and common support in order to see whether comparability between the treatment and control groups is sizeable. Imbens (2004) shows how the PSM method handles the lack of overlap. The probability or score receives a value from 0 to 1; the observations with probabilities close to one will receive high weights, leading to an increase in the variance of the average treatment effect estimator. As a result, the PSM is designed to cope with limited overlap in the covariate distributions than parametric regression models because adding control observations of outliers, i.e., scores near 0 or 1, in a parametric regression approach will lead to substantial changes in the estimated coefficients.

What happens if the assumption of the common support is violated? If treated and control observations fall outside the common support, they need to be dropped. If the number of outside-common support observations of the treatment group is large, the estimate of the within-common support observations may be misrepresented and misleading (Caliendo & Kopeinig, 2008; Imbens, 2004). Therefore, ignoring the common support problem or estimating a subpopulation within the common support may give misleading estimates and inferences (Lechner, 2002).

Furthermore, the lack of overlap in the covariate distributions between the control and treatment groups could lead to imprecise estimates and could cause the estimators to be sensitive to the choice of specification (Crump, Hotz, Imbens, & Mitnik, 2004). Evaluators often use a strategy of trimming the sample to address limited overlap. Crump et al. (2009) suggest a simple rule of thumb to discard all units of both control and treatment groups that have an estimated propensity score outside the range [0.1, 0.9]; the authors show that the precision gain from the approach is substantial with most of the gain captured. This is because using probit and logit models to estimate the scores will give different results when the propensity scores are close to 1 or 0; and for units with scores close to 1 or 0, the weights could be large so these units may considerably affect the estimates of the treatment effects and hence the estimates become imprecise (Imbens & Wooldridge, 2009). However, Crump et al. (2009) also suggest that potentially some external validity may be lost by changing the focus

to average treatment effects for a subset in the range [0.1, 0.9] of the original sample if the dropout observations significantly affect the estimated result when a large number of observations is discarded; the estimates could be misleading even if the strategy of estimation improves the lack of overlap.

In summary, matching is expected to produce less biased results than those from OLS because matching compares borrowers only with similar non-borrowers. Nevertheless, the 'similarity' of non-borrowers to borrowers is built on observed characteristics, so bias likely exists if unobservables affect both treatment participation and outcomes of interest. The assumption is easily violated if we are unable to control for all variables, especially the unobservables that affect both the treatment participation and outcomes (Bryson et al., 2002) . However, since our data focused only on the rural poor households, the disparity in unobservables between the borrowers and non-borrowers is expected not be large hence the bias may be reduced and the reliability of the matching estimates is improved.

However, one drawback of the PSM method is that it fails to control for unobservable characteristics, which may create a hidden bias because the scores are calculated only on the basis of observed characteristics. Dias, Ichimura and Berg (2007) argue that if the treatment assignment and the outcome are affected by unobservables, matching tends to give biased results because the unobservables cannot be controlled. This means that the observed characteristics may not fully capture the individual motivation, ability and skills, which may affect treatment participation. Again, the success of PSM closely depends on how similar the control group is to the treatment group in terms of space and time, and the two groups should have as little baseline difference as possible (Lee, 2005).

4.3.2.2 Impact Estimator for Panel Data: Difference-in-Differences Approach

a) Difference-in-Differences estimators and assumptions

We now turn to the idea of using panel data to estimate the treatment effect under the Difference-in-Differences approach, which is an increasingly popular method for identifying programme impact in the absence of purely experimental data (Ashenfelter & Card, 1985; Athey & Imbens, 2006). It takes sometime for a policy to be implemented or to take effect on the target group of participants. The observed outcomes over time may be attributed not only to the treatment but also the observed and unobserved factors such as economic conditions,

other concurrent policies, individual motivation and ability, etc. It is necessary to exclude such undesired attributes in order to assess the real effect of the policy. The *DinD* method resolves the problem by comparing the control individuals, who share the same characteristics, with the treated ones and then substracting the difference in the outcome variables of the treated ones over time by the difference of the control ones. In doing so, the desired effect can be expressed as follows:

$$\delta_{DiD}^{ATT} = E(Y_{i,t+1} - Y_{i,t} \mid D = 1) - E(Y_{i,t+1} - Y_{i,t} \mid D = 0) \tag{4.34}$$

$$\delta_{DiD}^{ATT} = (\bar{Y}_{i1,t+1} - \bar{Y}_{i1,t}) - (\bar{Y}_{i0,t+1} - \bar{Y}_{i0,t}) \tag{4.35}$$

Equation (4.35) can be represented by the following regression equation (Angrist & Krueger, 1999; Meyer, 1995; Wooldridge, 2002):

$$Y_{it} = \alpha_0 + \delta_0 D_t + \alpha_1 D_i + \delta_1 D_t D_i + \in_{it} \tag{4.36}$$

Y_{it} is the outcome of interest for individual i at period t. D_t is time dummy variable, taking a value of zero for individual in pre-programme period and one for post-programme. D_i denotes the treatment variable, which equals unity for an individual in a treatment group and zero otherwise. Hence, D_i captures the differences in outcome between the treatment and control groups due to policy change. The interaction term, $D_i D_t$ indicates the programme participation and takes a value of one if the household i borrowed money and the observation observed in the second period, and zero otherwise. The final term $\in_{it}$ is the idiosyncratic disturbance, which is assumed to be normally distributed with zero mean and constant variance. Under this assumption, equation (4.36) can be estimated by OLS from repeated cross-sectional or panel data. The coefficent δ_0 accounts for aggregate factors that affect the outcome over time for both treatment group and control group. Coeficient α_1 captures the mean of the potential time-invariant difference between the two groups. The coefficient δ_1 is the parameter of the programme impact since it measures the average effect of the treatment on the treated individuals, e.g., the average programme impact on the borrower group

compared with the non-borrower group and its statistical significance can be tested by the conventional t-test.

However, for δ_1 to be the consistent estimator of the average treatment effect on treated individuals, two crucial assumptions have to be made (Blundell & Dias, 2000). The first assumption that, in the absence of the treatment, both the treatment and control individuals experience the same time-effect. Under this assumption, it is postulated that the unobserved factors, for example changes in economic conditions and other policy initiatives, may affect both groups in a similar manner. The second assumption is that there is no systematic changein the composition of individuals within each group. That is, before and after the treatment being implemented and takes effect, there is no big event that induces a majority of individuals in one group to move to another group.

Equation (4.36) provides an unbiased programme impact estimator under randomisation of programme participation, i.e., households are randomly selected in a microcredit programme. However, given non-random participation in microcredit programme, it is likely that participants in a microcredit programme are selected based on pre-programme attributes. Consequently, the pattern of change in the outcome influenced by programme participation may vary systematically across the two groups if there are no credit programme. Ignoring these systematic differences may lead to biased estimates of the programme impact (Abadie, 2005; Islam, 2010).

To control for the pre-programme attributes, a vector of observable household characteristics and commune characteristics is included in equation (4.36). The programme impact estimator can be obtained from the following model:

$$Y_{it} = \alpha_0 + \delta_0 D_t + \alpha_1 D_i + \delta_1 D_t D_i + \boldsymbol{X}'_{it}\mu_i + \in_{it} \tag{4.37}$$

Equation (4.37) allows heterogeneity of the two groups in terms of the observable characteristics such as individual demographic characteristics, geographical differences of residence, etc. That is, unbiasedness of the estimator is possible only when the treatment of interest is not systematically correlated to other factors affecting Y. However, this assumption

is rarely satisfied in programme evaluation since programmes are normally designed to help groups with specific attributes. To capture the heterogeneity of individuals' attributes by conditioning on covariates, $\boldsymbol{X}$, such as demographic characteristics or housing characteristics, the treatment effect model is specified as:

$$Y_{it} = \alpha_0 + \delta_0 D_t + \alpha_1 D_i + \delta_1 D_t D_i + \boldsymbol{X}'_{it}\mu_i + D_t D_i \boldsymbol{X}'_{it}\gamma_1 + \in_{it} \quad (4.38)$$

where μ_i captures the effects of the covariates on the outcome for each time period. The parameter γ_1 measures the treatment effects of $\boldsymbol{X}'_{it}$ in case the treatment changes the slope of the coefficients in equation (4.38). The coefficient δ_1 in equation (4.37) no longer explains the full treatment effect as in equation (3.38) but, instead, $\delta_1 + \boldsymbol{X}'_{it}\gamma_1$ does (Pham, 2009).

Estimating equation (4.38) faces problems of endogeneity and selection bias (see also Athey & Imbens, 2006; Coleman, 1999; Heckman, 2001; Heckman & Vytlacil, 2005; Pitt & Khandker, 1998). It isimportant to note that equation (4.38) is a non-linear model. Therefore, the treatment effects coefficient should be interpreted with care because in a non-linear model, covariates X cannot be excluded by taking the differences across individual groups and time periods. The treatment effect is conditional on both covariates and the functional form of the response functions (Ai & Norton, 2003). Hence, the magnitute of the effect and its statistical significance may vary across $X's$ values.

b) Estimation strategies

Recent studies have used panel data to tackle the major issues and shortcomings in microcredit programmes. The fixed effects method using panel data is used to evaluate the impact of a single microcredit programme and the results confirm that microcredit is statistically significant in reducing poverty among poor borrowers and within the local economy in Bangladesh (Khandker, 2005). To estimate the impact estimator, the outcome equation is respecified as follows. First, the interaction terms in equation (4.37) are considered as latent variables of borrowing, which is the participation function.

$$C_{it} = \alpha_0 + \delta_0 D_t + \beta_0 D_i + \boldsymbol{X}'_{it}\mu_i + I_{it}\phi_1 + \in_{it} \quad (4.39)$$

$$I_{it} = \boldsymbol{W}'_{it}\varphi + \varepsilon_{it} \quad (4.40)$$

Next, the real term of borrowing is used as a dependent variable of the latent function; this is equivalent to the loan equation. Therefore, equations (4.39 & 4.40) can be re-written as a system of equations as follows:

$$C_{it} = \alpha_0 + \delta_0 D_t + \beta_0 D_i + \boldsymbol{X}'_{it}\mu_i + \phi_1 FL_{it} + \in_{it} \quad (4.41)$$

$$FL_{it} = \boldsymbol{W}'_{it}\varphi + \varepsilon_{it} \quad (4.42)$$

where FL_{it} is the amount of loan if the household borrows in the post-period and zero otherwise. C_{it} is consumption at the household level. $\boldsymbol{W}_{\text{it}}$ is a vector of household factors that may be different from $\boldsymbol{X}_{\text{it}}$. Again, two potential problems arise in estimating the model, namely endogeneity and selection bias. The fixed effects model can be applied to solve potential biases using the maximum likelihood or two-step estimation methods(Angrist, 2004; Wooldridge, 2002). Equation (4.42) is estimated in the first step and equation (4.41) is estimated in the second step. The coefficient, ϕ_1, is now the impact of the microcredit programme on the consumption outcome of the household.

To measure the impact of formal microcredit on household income, Coleman (2006)suggests using income as the dependent variable to credit constraint. The income model can be written as follows:

$$I_{it} = \alpha_0 + \delta_0 D_t + \alpha_1 D_i + \boldsymbol{X}'_{it}\mu_i + \phi_2 FL_{it} + \in_{it} \quad (4.43)$$

$$FL_{\text{it}} = \boldsymbol{W}'_{it}\varphi + \varepsilon_{it} \quad (4.44)$$

where all notations in equations (4.43 and 4.44) are similar to equations (4.41 and 4.42) in the consumption model, except income is replaced as the outcome variable in equation (4.41). A similar estimation technique will be applied to estimate the system equations (4.43) and (4.44) to obtain the coefficient microcredit programme impact, ϕ_2, on the consumption outcome of the household.

4.3 Chapter Summary

This chapter demonstrates a number of important issues in microcredit literature including asymmetric information, credit constraint and credit rationing, and consumption. Through the theoretical models, various economic relationships have been established for empirical estimation. Information asymmetry is the core of the lending principle that explains why lenders always select a certain borrower to grant a loan contract and hence there is always a mismatch between supply of and demand for credit in the formal rural credit market. This credit rationing creates a credit constraint on the rural household, particularly the rural poor. Subsequently, the household consumption model shows that credit helps reduce constraints to working capital in agricultural production or in non-farm income generating activities and hence, enhances the household's consumption growth.

Following the defined economic relationship, different empirical models are discussed in this study. First, the credit accessibility model is specified to determine factors affecting the household's decision to borrow from the formal credit sector under the conditions that the informal sector exists and interacts with the formal sector in the credit market. The model is expected to achieve consistent estimators for the determinants of the household's access to the formal and informal credit under the credit rationing assumption, selection bias and interaction between informal and formal credit.

The Propensity Score Matching method and the Difference-in-Differences approach used for evaluating the impact of a microcredit programme on household consumption and income were also discussed. Their estimation strategies were proposed to obtain unbiased and consistent estimators, depending on the types of dependent variables as well as the nature of the dataset. The dataset and the estimation results for the empirical models will be presented and discussed in the following chapters.

Chapter 5
Data and Respondents

This chapter describes the MRD survey data and the VHLSS data used in the study. Section 5.1 describes the MRD survey data including the questionnaire, the selection of the respondents and data collection process. Section 5.2 provides a profile of the respondents in terms of demographic, socio-economic and loan characteristics using the MRD survey data. Section 5.3 briefly introduces the VHLSS in years 2006 and 2008. The last section summarises the chapter.

5.1 Description of the MRD Survey Data

5.1.1 Questionnaire Design

The household survey was conducted in 2010 using a structured questionnaire interview. The questionnaire was designed to gather information on the respondents' access to microcredit in the Mekong River Delta, given the availability of microcredit programmes. The survey questionnaire aimed to collect information about the demographic characteristics, income, expenditure (on farm and non-farm activities, education, health care) and information about accessibility to credit (formal microcredit and informal credit) of rural households. In addition, if they had participated in a microcredit programme, respondents were asked about the impact of microcredit on their families and welfare.

The questionnaire consists of six sections. The first section was designed to identify the demand for credit and the access to formal and informal credit for all respondents. Information about the different microcredit programmes and the future demand for credit were included in this section. Section 2 focussed on the loan (both formal and informal) characteristics of the borrowing households; specific characteristics such as loan amount, loan duration, interest rate, mode of repayment, and purpose of loan were asked. Sections 3, 4 and 5 were designed to obtain information from the respondents about participation in a microcredit programme and to understand how microcredit affected the respondents' living conditions. Only respondents who had obtained a loan in 2009 were asked to answer these sections. Section 6 concludes the questionnaire with demographic information of the respondents in the sample (see Appendix C).

The questionnaire was pre-tested with a small sample of six borrowing and four non-borrowing households in Can Tho city to check for completeness and consistency. This pre-testing helped to clarify and improve the quality of the questions used in the questionnaire before administering the survey.

5.1.2 Data Collection

A three-stage stratified random sampling technique was used to draw the survey sample. In the first stage, sample communes were selected on the basis of the availability of formal microcredit providers. Fourteen rural districts[19] were selected. To capture the micro lending practices, the selected districts must have had microcredit programmes operating since 2002. All rural districts in the sample complied with the condition that a branch of the microcredit provider existed in the district. To control for heterogeneity at the commune level, 3 of the14 communes were selected from ethnic populated districts. Next, communes were selected from the sample districts to form the sample communes. Two villages were randomly chosen from each sample commune; altogether 22 villages were included. The selection of the sample households was the final stage of the sampling process.

To capture credit accessibility in the rural credit market, the selected respondents addressed the household credit constraint that requires the sampled respondents to have at least demanded any type of loan during the previous 12 months. In addition, the objective of this study is to assess the impact of the microcredit programme on rural households, it is necessary to obtain a sample containing a sufficient number of rural households borrowing from the microcredit programme and a similar number of rural households that had a demand for credit but were unable to obtain a microloan. The specified sample is expected to be appropriate for the household model of credit accessibility and for the impact assessment framework using the propensity score matching approach discussed in Chapter 4.

Unless informal loan associated with borrower is stated, respondents were classified into two groups based on their formal borrowing status. The group of rural households that had borrowed from microcredit programmes is referred to as the borrowing group and the other group of rural households that had a demand for credit but had never borrowed a formal loan

[19]The administrative divisions in the MRD are classified as provincial, district, commune, and village. Communes or their urban equivalent, the district towns or wards, are defined as the primary unit of sample design in the VHLSS.

is referred to as the non-borrowing group. Given the households' characteristics, the survey questionnaire was designed to capture the credit constraints of rural households with respect to formal microcredit in the previous 12 months. Households that had not borrowed a formal loan were asked to provide information about any informal loan if they had borrowed an informal loan. The informal loan is used to investigate the interacting effect between the formal and informal credit markets.

The sampled households were selected as follows. First, the households with access to microcredit, namely the borrower group, were identified through the local authority at each research site. A total of 619 borrowers were randomly chosen to participate in an interview. Then, 309 non-borrowing households that had not been able to obtain a formal loan within the last 12 months were randomly selected. Overall, 928 households were included in the sample; all respondents were the head of the household since we considered the household head as the representative for household's decision making and because microcredit are issued to the household under the name of the household head. This selection ensures a consistent covariate of the household characteristics to be obtained from the survey.

5.2 Profiles of the Sampled Households in the MRD Survey

This section describes the sampled respondents' characteristics including individual, household, formal and informal microcredit characteristics, and geographic factors. Microcredits were classified based on the borrowing sources in order to identify the respondents for the subsequent analysis. Descriptive tables containing frequency, mean and median, and their respective tests were constructed to compare the two groups of respondents. First, a t-test was used to test whether the means of the household characteristics between the two groups, borrowers and non-borrowers in microcredit programmes, were statistically different. This indicates how good a metric variable can be used to control for the similarities and differences between the two groups. Second, a Chi-square test shows how likely a categorical variable is independent of the distribution of the two groups.

5.2.1 Forms of Microcredit

The borrower and non-borrower groups were divided into three types of respondents corresponding to the two types of loan in the rural credit market. Table 5.1 shows the 928

respondents classified into three categories: borrowers, non-borrowers due to credit constraint and non-borrowers subject to unconstrained credit. Of the total, nine respondents were not exposed to credit constraint because they had had no loans and they had not needed to borrow money at any time in the past 12 months. The nine non-borrower households with no credit constraint were excluded; the remaining 919 households were used in the subsequent analysis (see Table 5.1). The 775 borrowers and 144 non-borrowers formed the sample of 919 respondents considered to have a demand for a loan and were subjected to credit rationing in the rural credit market. The 144 non-borrowers were rationed out of the rural credit market and the 775 borrowers were either partially rationed or not rationed in the informal or formal credit sector. Of the borrowers, 156 households borrowed only from the informal sector, 261 borrowed only from the formal sector, and 358 borrowed from mixed sources of credits from both sectors.

Table 5.1 Formal and Informal Microcredit

Number of Respondents	**Source of loans**			**Total**
	Informal	Formal	Mixed Formal and Informal	
Borrower households	156	261	358	775
Non-borrowers due to credit constraint			144	144
Non-borrowers subject to unconstrained credit			9	9
Total number of respondents	156	261	511	928

Source: The author's survey data, 2010.

Table 5.1 shows formal microcredit (261 formal contracts) outnumbered the informal loans (156 informal contracts), and the households with both types of loan (358 contracts) outnumbered both. The 358 housheolds, over one third of the households, obtained loans from the formal and informal microcredit sectors simultaneously. This confirms the prevalence of private lenders and suggests co-existence of formal and informal microcredit in the rural credit market. These results for the rural credit market are similar to those of other rural credit markets in the developing countries such as the Philippines, Indonesia and Vietnam (Pham & Izumida, 2002).

5.2.2 Individual Characteristics

The individual characteristics of the sampled respondents are summarised in Table 5.2. The variables *age, ethnic group,* and *main occupation,* are significantly different at the 1% level, but *gender* and *education level* are not significant. This means the distribution of borrowers and non-borrowers is strongly associated with the *age, ethnic group* and *main occupation* of household heads in the sample. Although the proportion of female heads in both the borrower group (57.1%) and non-borrower group (53.1%) was over 50%, the statistical evidence is not strong enough to conclude that being female or male is associated with borrowing or not borrowing microcredit.

The age of the respondents ranged from 24 to 89 years; the average was 47. When grouped into age categories, a substantial proportion (76.3%) of the borrowers fell into the 41-60 years old category but the majority (73.9%) of non-borrowers were in the 31-50 years old category. The average age of the borrowers and non-borrowers is significantly different at the 5% level. There are more, younger respondents in the non-borrower group.

Ethnicity is significantly associated with classifying borrowers and non-borrowers; more ethnic households were represented in the borrower group than in the non-borrower group. Table 5.2 shows that about 11% of non-borrowers belong to ethnic groups compared with 20% ethnic households in the borrower group. Ethnicity explicitly influenced participation in formal credit because most microcredit programmes target ethnic groups.

Survey respondents were divided into seven groups with respect to educational attainment: those without any education, primary school, middle school, high school, college, vocational training, and higher education. Table 5.2 shows that about 90% of the respondents had obtained some form of education. The distribution of education levels shows a small difference between the two groups but the distributions do not follow similar education patterns. For example, there is a similarity between the borrowers and non-borrowers in that over half of the respondents had attended at least primary school. The proportion of non-borrowers with middle school is higher than that of the borrowers (25.2% versus 23.7%). Conversely, the proportion of non-borrowers (9.7%) with high school level is slightly smaller than that of borrowers (10.6%). The proportion of households with education beyond high

school was low (< 3%). This variation in education pattern is related to a weak association between educational attainment and credit accessibility in the sample (see Table 5.2).

The survey data also show that the respondents engaged in various occupations such as rice farming, orchard farming, aquaculture, and handicrafts. The survey results indicate that more households engaged in agriculture-based activities than other occupations. The proportions were 41.3% and 51% of households had farming work (rice farming, orchard farming and aquaculture farming) in non-borrower and borrower groups, respectively. The proportion of households classified in other occupations such as small trader, handicraftsmen, housewives, government employees, and mixed occupations, are similar with small differences between the borrower and non-borrower groups, except for non-skilled workers. More household heads were unskilled workers in the non-borrower group (25%) than in the borrower group (15.8%). This reflects a significant difference in source of income between the borrower and non-borrower groups at 1% level (See Table 5.2).

In general, access to microcredit is largely explained by household income. However, using income as an explanatory variable for access to microcredit is problematic due to endogeneity. Therefore, using the difference in income sources to explain credit accessibility is more acceptable and this is consistent with a number of studies in microfinance. For example, Li et al. (2011) used income sources, including farm and non-farm income, to explain sources of income attributed to credit accessibility of rural households in China.

Similarly, Kaino (2006) used sources of income (agricultural and non-agricultural income, income during slack season) to explain credit accessibility in Myanmar. Our results indicate that, the households' main income source from primary production accounted for 52.1% of the sample (32.8% agriculture, 10.7% orchard farming, 4.4% aquaculture and 4.2% livestock breeding). Other sources of income included non-farm activities such as small trade (9.8%) and handicrafts (6.1%). However, if we compare the sources of income between the borrower and non-borrower group, the non-borrowers were more likely to exhibit unstable earnings from unskilled jobs (unskilled workers accounted for 25% of the non-borrowers versus15% of the borrowers). This relationship is significant at the 1% level. This implies that differences in income sources contributed significantly to a household's occupation and income sources which in turn influence credit accessibility (see Table 5.2).

Table 5.2 Profile of the MRD Survey Respondents (Individual Characteristics)

	Non-Borrowers (N_1=300)		Formal Borrowers (N_2=619)		All respondents (N=919)		Statistical Test
	Count (n_1)	% of N_1	Count (n_1)	% of N_2	Count ($n=n_1+n_2$)	% of N	
Individual characteristics							
Gender							
Female	171	57.0	332	53.6	503	54.7	
Male	129	43.0	287	46.4	416	45.3	
Total		100		100		100	χ^2 =0.92
Age group (years)							
22-30	34	11.5	32	5.2	66	7.3	
31-40	73	24.7	146	23.8	219	24.1	
41-50	80	27.0	179	29.2	259	28.5	
41-60	66	22.3	167	27.2	233	25.6	
61-89	43	14.5	89	14.5	132	14.5	
Total		100		100		100	
Mean age	46.74		48.26		47.76		t = 13.09***
Ethnic group							
Kinh	267	89.0	489	79.0	756	82.3	
Khmer	32	10.7	122	19.7	154	16.8	
Others	1	0.3	8	1.3	9	1	
Total		100		100		100	χ^2 =14.22***
Education level							
No education	36	12.1	73	11.8	109	11.9	
Primary school	150	50.3	320	51.7	470	51.3	
Middle school	75	25.2	147	23.7	222	24.2	
High school	29	9.7	68	11	97	10.6	
Vocational training	3	1.0	5	0.8	8	0.9	
College	3	1.0	3	0.5	6	0.7	
Higher education	2	0.7	3	0.5	5	0.5	
Total		100		100		100	χ^2 =1.61
Main occupation							
Rice farming	79	26.3	222	35.9	301	32.8	
Unskilled workers	75	25.0	98	15.8	173	18.8	
Orchard farming	27	9.0	71	11.5	98	10.7	
Small traders	29	9.7	61	9.9	90	9.8	
Handicrafts	24	8.0	32	5.2	56	6.1	
Housewife	17	5.7	28	4.5	45	4.9	
Aqua. Farming	18	6.0	22	3.6	40	4.4	
Livestock breeding	10	3.3	29	4.7	39	4.2	
Govt Employees	11	3.7	14	2.3	25	2.7	
Mixed occupation	10	3.3	42	6.8	52	5.7	
Total		100		100		100	χ^2 = 28.35***

Source: The author's survey data, 2010.

Note: 1. n_i and N_i (i=1,2) are number of respondents in each sub-sample.
2. *, **, and *** indicate significance level at 10%, 5%, and 1%, respectively.

5.2.3 Household Characteristics

Table 5.3 describes the household characteristics, namely *household size*, *number of income earners*, *number of children*, *land holding status*, *agricultural land* and *household income*. The household size, number of children, and land holding status characteristics are statistically significant at the 10% level, but *number of income earners* and *household income* are not significantly different. The average household size was about five members; a greater proportion (59%) of the households had one to four members in the family than households with five to seven members (36.1%). Households with over seven members were only 5% of the sample. Due to the birth control policy in Vietnam, families are encouraged to have only one or two children. This implies that most households would be four members or fewer. Households with over four family members are likely to have more than two generations living in the house. Overlapping generations in the family probably enable the households to accumulate more wealth such as land, durable assets and savings. Table 5.3 shows 43.3% of households in the borrower group had more than four members in the family compared to 36.3% in the non-borrower group. The variation in the average household size between the two groups is moderately significant. Overall, the average household size is statistically different at the 10% level between the borrower and non-borrower groups in the sample.

The number of income earners and the number of children in the family are distributed in proportion to the household size. For example, over 60% of households have one or two income earners in the family and over 45% of households have one or two children. Overall, there was little difference in the number of income earners between the two groups of households. However, the difference in the number of children is statistically significant at the 1% level, i.e., on average, households with more children are more associated with participating in the microcredit programme (see Table 5.3). The economic dependent ratio (EDR) is the ratio of the household members without income to the number of income earners. Households with a higher EDR tend to have more dependants, such as children and the elderly, and are more financially stressed. The proportion of households with more than three children (3.30) in the borrower group is significantly greater at the 1% level than the households with fewer than three children (2.90) in the non-borrower group. As a result, the non-borrower group is less likely to be financially stressed than the borrower group.

Table 5.3 Profile of the MRD Survey Respondents (Household Characteristics)

	Non-Borrower (N_1=300)		Formal Borrower (N_2=619)		All Respondents (N=919)		Statistical Test
	Count (n_1)	% of N_1	Count (n_2)	% of N2	Count ($n=n_1+n_2$)	% of N	
Household characteristics							
Household size (members)							
1 – 4	191	63.7	351	56.7	542	59.0	
5 – 7	94	31.3	238	38.4	332	36.1	
8 – 10	14	4.7	28	4.5	42	4.6	
11 and more	1	0.3	2	0.3	3	0.3	
Total		100		100		100	
Mean household size		4.32		4.53		4.47	t = -1.82*
Number of income earners							
None	3	1.0	2	0.3	5	0.5	
1 – 2	199	66.3	398	64.3	597	65.0	
3 – 4	72	24.0	171	27.6	243	26.4	
5 and more	26	8.7	48	7.8	74	8.1	
Total		100		100		100	
Mean income earners		2.50		2.54		2.54	t = -0.39
Number of children							
None	15	5.0	15	2.4	30	3.3	
1 – 2	150	50.0	272	43.9	422	45.9	
3 – 4	81	27.0	193	31.2	274	29.8	
5 – 7	42	14.0	116	18.7	158	17.2	
7 and more	12	4.0	23	3.7	35	3.8	
Total		100		100		100	
Mean number of children		2.9		3.3		3.13	t = -2.69***
Land holding status							
Owned land	162	64.0	436	79.3	598	74.5	
Leased land	7	2.8	17	3.1	24	3.0	
Landless	84	33.2	97	17.6	181	22.5	χ^2 =
Total		100		100		100	24.10***
Agriculture land (ha)							
Less than 0.1	24	14.6	67	15.0	91	14.9	
0.1 to less than 0.5	71	43.3	192	43.0	263	43.1	
0.5 to less than 1.0	38	23.2	88	19.7	126	20.7	
Above 1.0	31	18.9	99	22.2	130	21.3	
Total		100		100		100	
Mean agriculture land		0.496		0.686		0.632	t = -1.78*
Household income in 2009 (in million VND)							
Less than 10	60	20.6	82	13.4	142	15.7	
10 to less than 50	167	57.4	392	64.1	559	61.9	
50 to less than 100	52	17.9	101	16.5	153	16.9	
100 to less than 200	9	3.1	29	4.7	38	4.2	
Above 200	3	1.0	8	1.3	11	1.2	
Total		100		100		100	
Mean household income		35.07		39.76		38.25	t = -1.41

Source: The author's survey.

Note: 1. n_i and N_i (i=1,2) are number of respondents in each sub-sample.

2. *, **, and *** indicate significance level at 10%, 5%, and 1%, respectively.

In terms of land holding status[20], households were divided into the following categories: land owner, land leasee and landless. Table 5.3 shows that there is a difference in 'long-term owned' land and landless status between the borrower and non-borrower groups. About 80% of households in the borrower group owned land compared with 64% in the non-borrower group. Conversely, about 33% of the landless households were non-borrowers compared with 17.6% of the landless households in the borrower group. Land-leasee households accounted for only 3% of the total sample. The difference in land holding status between the two borrowing status groups is statistically different at the 1% level.

The agricultural land area held by land holding households was significantly different at the 10% level between borrowers and non-borrowers. Table 5.3 shows that borrowing households owned, on average, about 0.7 ha and the non-borrowing households owned 0.5 ha. The proportion of households over both groups holding less than 1 ha was about 15%; households holding from 0.1 to 0.5 ha and 0.5 ha to 1.0 ha accounted for about 43.1% and 20.7%, respectively. A comparison of borrowers and non-borrowers owning more than 1.0 ha showed a slight difference: 18.9% of the non-borrower group households held over 1.0 ha compared with 22.2% in the borrower group. Generally, agricultural land area and land ownership serve as a proxy of creditworthiness although their collateralised value is low because agricultural land is a less liquid asset. Even though most microcredit programmes do not require collateral for a loan, households owning land seem to have an advantage over landless households in borrowing (see Table 5.3).

Household annual income was divided into five levels[21]: less than 10 million VND, between 10 and 50 million VND, between 50 and 100 million VND, between 100 and 200 million VND, and more than 200 million VND. Table 5.3 shows the mean income of the borrower group was 39.76 million VND compared with 35.07 million VND for the non-borrower group. In terms of the income brackets, a higher proportion of non-borrower households fell into the lowest income bracket. However, there was a higher proportion of the borrower group in the second lowest income bracket (between 10 and 50 million VND) than in non-borrower group. About 64% of the households in the borrowing group earned between 10 and 50 million VND compared with 57.4% of the non-borrower group. For the middle income

[20]According to the Law of the Land of Vietnam, land is owned by the people and the state is the representative of the people and responsible for administering the use of land and the rights of land users. The term 'long-term owned land status' refers to the land use rights of land owners.
[21] Exchange rate in 2010: 1 USD = 19,000 VND

category (between 50 and 100 million VND), approximately 17% of each group of households was represented. Similarly, there was little difference between the borrower and non-borrower groups in the higher income brackets. The average income of the borrower group (39.76 million VND) is greater than that of the non-borrower (35.07 million VND) group but the difference in average income is not significant.

5.2.4 Formal and Informal Microcredit Characteristics

Table 5.4 provides general information about the microcredit obtained by the respondents from the formal microcredit provider, i.e., VBSP, and informal lenders. The six characteristics of the formal and informal loans are: *amount of loan*, *interest rate*, *loan duration*, *processing time*, *repayment frequency*, and *loan purpose*.

In terms of the maximum amount in a single loan, formal microcredit were categorised into three groups as follows: less than 10 million VND, between 10 and 50 million VND, and more than 50 million VND. On average, households obtained a single loan for a maximum of 12.6 million VND. Most households (70%) borrowed less than 10 million VND and 27.8% of the households borrowed between 10 and 50 million VND per single loan. Only 2.3% of the households borrowed over 50 million VND in a single loan.

Informal microcredit were similarly categorised into three levels: less than 5 million VND, between 5 and 10 million VND, and more than 10 million VND. The average informal loan was 6.4 million VND, which is equal to half the average of the formal loan. About 70% of the households borrowed less than 5 million VND, 17.3% borrowed between 5 and 10 million VND and 12.8% borrowed more than 10 million VND.

Interest rates were expected to vary more for informal microcredit than for formal microcredit since the microcredit programme received subsidised interest from the government whereas informal interest rates have normally been found to be excessively high in Vietnam (Pham & Izumida, 2002). The great majority of households (96%) borrowed at low interest rates of less than 1.5% per month and only 4% of the households borrowed at a rate higher than 1.5% per month. There was a wider variation (zero to 5% per month) in informal interest rates as shown in Table 5.4. In particular, 52% of the households borrowed at an interest rate of over 5% per

month, followed by 42% of households that borrowed at an interest rate between 2% and 5% per month. Only 6% of households obtained an informal microcredit at an interest rate lower than 2% per month. The results suggest that rural poor households faced credit constraints and borrowing money from the formal sector is likely to be a favoured choice because microcredit lending provides a preferential interest rate for the targeted poor households.

Table 5.4 also compares formal and informal microcredit in terms of loan duration, which was classified as short-term, medium-term and long-term. The microcredit programme tends to give short-term loans (loan duration less than 12 months) rather than medium (loan duration over 12 months but less than 36 months) and long-term loans (over 36 months to 60 months). For example, 72% of households received a short-term formal loan and they had to repay the loan principal by the end of the loan period. The proportion of households borrowing medium and long-term formal loans were 18% and 10%, respectively. On the other hand, informal loans are associated with longer term. For example, 33% of households borrowed long-term informal loans and 63.1% borrowed short-term informal loans. While only 5% of the households who borrowed from an informal provider obtained medium-term loans (see Table 5.4).

Loan processing is expected to be different between formal and informal microcredit. Table 5.4 shows that 51.8% of the households obtained a formal microcredit from the VBSP within a week from submitting the application. This loan processing time is, however, not as quick as for informal microcredit since 91% of the informal loan processing was within a day and over 80% of the informal loans were given instantly to the borrowers. In other words, the time spent obtaining the loan from informal microcredit providers (such as relatives, friends, or money lenders) is significantly less than the time spent obtaining a formal microcredit. A significantly shorter time to process a loan implies simplicity of the lending procedures in the informal credit sector. In addition, as transaction costs exist in most lending processes (in the form of application fee, travelling cost, waiting time, etc.), borrowing money from informal lenders incurs significantly lower transaction costs than obtaining a formal microcredit.

The most common interest payment frequency was monthly although paying interest at the end period of the contract was also quite common for both formal and informal microcredit. For example, 67.8% of the households with informal microcredit paid interest monthly

compared with 62% of those with formal microcredit. Besides the common payment modes, a number of households paid the interest on an irregular basis such as at the end of harvesting crops or paid interest and principal at the end of the loan contract period. Some borrowers of small amounts of formal microcredit were even given the option to choose a flexible repayment schedule based on their ability to repay the loan. Therefore, the interest rate was calculated based on the flexible loan period and payment in one sum plus the principal. This practice is very common in the rural credit market in Vietnam, particularly in the informal credit sector. Table 5.4 shows that 25.4% of the households paid formal loan interest on an irregular basis and 29.6% paid informal loan interest similarly.

Households obtained formal and informal microcredit to finance their needs such as agricultural production, small investment/trade, consumption, education, health, repairing the house, and even to repay other loans, although the loan purposes varied between the formal and the informal microcredit. Table 5.4 shows the main purpose for obtaining formal microcredit was for agricultural activities, with over 49% of these loans being mainly used as production capital for rice farming, cropping, or livestock raising. This loan purpose was largely associated with short-term contracts with monthly interest payments or some interest payment modes based on the loan contract. One particular characteristic of a microloan is that the repayment schedule of VPSB loans is rather flexible and some loan contracts were actually given according to the loan purpose. As most formal microcredit in the sample were used to finance agricultural production, the repayment mode was closely linked to the production cycle, with the interest payment often after the harvest season. Formal microcredit used for small investment/trade, whose business activities were considered more flexible than agricultural production, were similarly flexible in the loan period. The repayment period for these loans were relatively short hence the interest payment mode was mostly monthly (see Table 5.4).

On the other hand, informal microcredit were largely used for consumption purposes such as purchasing durable assets, paying off other loans, production, and for emergencies such as attending funerals, medical treatment or weddings. The results showed about half (47.5%) of the households borrowed money from private lenders to finance a shortage of cash in purchasing durable assets such as machinery or home appliances. Meanwhile, 13% of the households borrowed to pay off other debts, 12% borrowed for production capital and 10% of

loans were for emergencies. The proportions of informal microcredit for small investment/trade and repairing houses were 6% and 4%, respectively (see Table 5.4).

Table 5.4 Profile of the MRD Survey Respondents (Characteristics of Formal and Informal Microcredit)

Loan characteristics	Informal credit All Borrowers (N^{IFL} = 514)		Loan characteristics	Formal credit All Borrowers (N^{FL} = 619)	
	Count	Frequency		Count	Frequency
Informal loan value (in million VND)			***Formal loan value (in million VND)***		
Less than 5	359	69.8	Less than 10M	435	69.9
From 5 to 10	89	17.3	From 10Mto 50M	173	27.8
Above 50	66	12.8	From 50M to 100M	14	2.3
Sub-total	514	100	Sub-total	622	100
Mean	6.37		Mean	12.61	
Informal interest rate (%/month)			***Formal interest rate (%/month)***		
Less than 1.5	11	3.2	Less than 1.5	598	96.0
1.5 to 2	10	2.9	More than 1.5	25	4.0
2.1 to 5	146	42.0	Sub-total	623	100
More than 5	181	52.0			
Sub-total	348	100			
Mean	7.15		Mean	0.70	
Informal loan duration (months)			***Formal loan duration (months)***		
Short term (up to 12)	269	63.1	Short term (up to 12)	443	72.1
Medium term (up to 36)	17	4.0	Medium term (up to 36)	112	18.2
Long term (up to 60)	140	32.9	Long term (up to 60)	59	9.6
Sub-total	426	100	Sub-total	614	100
Mean	19.7		Mean	20.7	

(*Table 5.7 continued next page*)

Table 5.4 Profile of the MRD Survey Respondents (Characteristics of Formal and Informal Microcredit) (cont.)

Loan characteristics	Informal credit All Borrowers (N^{IFL} = 514)		Loan characteristics	Formal credit All Borrowers (N^{FL} = 619)	
	Count	Frequency		Count	Frequency
Processing time for formal loan			***Processing time for informal loan***		
Instantly	413	81.0	Less than a week	300	51.8
Within a day	52	10.2	1 week	143	24.7
1 week	29	5.7	2 weeks	60	10.4
More than 1 week	16	3.1	More than 2 weeks	76	13.1
Sub-total	510	100	Sub-total	579	100
Formal repayment frequency			***Informal repayment frequency***		
Weekly	6	1.6	Weekly	2	0.3
Monthly	257	67.8	Monthly	379	62.0
Semi-annually	3	0.8	Semi-annually	54	8.8
Annually	1	0.3	Annually	21	3.4
Others	112	29.6	Others	155	25.4
Sub-total	379	100	Sub-total	611	100
Formal loan purposes			***Informal loan purposes***		
Production capital (farming)	60	11.7	Production capital (farming)	304	49.3
Small investment/trade	31	6.0	Small investment/trade	49	7.9
Pay tuition fees	6	1.2	Pay tuition fees	25	4.1
Emergencies (health)	51	9.9	Emergencies (health)	9	1.5
Housing (repair)	21	4.1	Housing (repair)	42	6.8
Purchasing durable assets	244	47.5	Purchasing durable assets	99	16.0
Pay other loans	67	13.0	Pay other loans	22	3.6
Others	34	6.6	Others	67	10.9
Sub-total	514	100	Sub-total	617	100

Source: The author's survey data, 2010.

Note: 1. N^{IFL} are the total number of respondents borrowing from only informal credit and from mixed formal and informal sources.
2. N^{FL} are the total number of respondents borrowing from only formal credit and from mixed formal and informal sources.
3. The sub-total in each category may be less than N^{IFL} or N^{FL} due to missing data.

5.2.5 Geographic Factors

Table 5.5 shows the geographical distribution of respondents. The three main indicators that capture the geographic characteristics of the sample are: *urbanisation*, *ethnic concentration commune* and *direct road access at village level*. Information on these variables was obtained from direct interviews with local officials at the research sites. The *province* variable was included to capture geographical differences between the borrowers and non-borrowers at the provincial level. The ethnic concentration commune and province variables were statistically significantly associated with access to microcredit at the 1% level; urbanisation and direct road access were not significant for credit access.

The urbanised commune, direct road access, and ethnic concentration commune variables introduced in this study were aimed at accounting for differences between borrowers and non-borrowers at commune and village levels. The urbanised commune variable is defined as a commune located in a rural area but adjacent to a city or town where industrial zone(s) are present and the distance from the commune to the industrial zone(s) is less than 10 kilometres. The urbanised commune variable implies that, normally, households living in urbanised communes may have a higher incidence of employement in non-farm commerical enterprises in the industrial zones that entails a higher income from non-farm sources and ensures stable comsumption for the households. Hence, these housesholds may be less likely to participate in a microcredit scheme as well as being less likely to borrow an informal loan. Table 5.5 shows the distribution of households between urbanised and rural communes. The proportion of households located in rural and urbanised communes were 54.5% and 45.5%, respectively. There is an approximately equal proportion of non-borrower households (50.7% versus 49.3% of non-borrowers) in rural and urbanised commnues, respectively. However, the results showed a considerably smaller proportion of borrowers in urbanised communes in the borrowing group (45.5% of urbanised borrowers versus 54.5% of rural borrowers). This difference implies that households in urbanised communes are less likely to participate in the microcredit programme.

Table 5.5 Profile of the MRD Survey Respondents (Geographic Characteristics)

	Non-Borrower (N_1=300)		Formal Borrower (N_2=619)		All Respondents (N=919)		Statistical test
	Count (n_1)	% of N_1	Count (n_2)	% of N_2	Count ($n=n_1+n_2$)	% of N	
Geo-economic characteristics							
Province							
Bac Lieu	15	5	72	11.6	87	9.5	
Ben Tre	25	8.3	77	12.4	102	11.1	
Ca Mau	45	15	33	5.3	78	8.5	
Can Tho	16	5.3	60	9.7	76	8.3	
Dong Thap	20	6.7	39	6.3	59	6.4	
Hau Giang	17	5.7	54	8.7	71	7.7	
Kien Giang	37	12.3	54	8.7	91	9.9	
Soc Trang	25	8.3	69	11.1	94	10.2	
Tien Giang	47	15.7	52	8.4	99	10.8	
Tra Vinh	15	5	66	10.7	81	8.8	
Vinh Long	38	12.7	43	6.9	81	8.8	
Total		100		100		100	$\chi^2 = 70.82^{***}$
Urbanised commune							
No	152	50.7	349	56.4	501	54.5	
Yes	148	49.3	270	43.6	418	45.5	
Total		100		100		100	$\chi^2 = 2.66$
Ethnic concentration commune							
No	260	86.7	484	78.2	744	81	
Yes	40	13.3	135	21.8	175	19	
Total		100		100		100	$\chi^2 = 9.42^{***}$
Direct road access commune							
No	122	40.7	222	35.9	344	37.4	
Yes	178	59.3	397	64.1	575	62.6	
Total							$\chi^2 = 1.99$

Source: the author's survey data, 2010.
Note: *, **, and *** indicate significance level at 10%, 5%, and 1%, respectively.

Ethnic concentration at the commune level controls for differences in terms of ethnicity because the ethnic issue is believed to be closely related to poverty in Vietnam. Evidence of an ethnic differential was found in all geographic and income levels; the adverse effects of minority status were most pronounced among poor households in remote areas (Teerawichitchainan & Phillips, 2008). For this reason, communes with a high ethnic concentration might have a higher chance of being selected into the national microcredit programme. This might provide a higher chance of households in these communes receiving formal microcredit than households in other communes. Granting a formal loan might also alter the occurence of an informal loan as a substitute. Table 5.5 shows that the proportion of the borrowers in ethnic concentration communes (21.8%) is much higher than that of the non-

borrowers (13.3%). The results show that ethnic concentration is significantly associated with accessibility to microcredit at the 10% level.

Direct road access at the village level means villages have a direct concrete road connecting them to their commune centre. This factor helps to control for the availability of formal credit given the respondents' location. In Vietnam, geographic factors, particularly in the rural MRD where the land teritory is divided by many rivers and river branches and poor physical infrastructure such as bad road conditions and unconcreted bridges, all suggest that they are important in differentiating the rural households' livelihoods. A few studies in Vietnamand in other countries provide evidence that households located in villages with good road access to the commune centre, where formal credit branches are present, would have a higher chance of gettting access to microcredit. Meanwhile, households in remote rural areas with difficult road access are likely to borrow from informal sources more often (Ho, 2004; Kochar, 1997a). Table 5.4 shows the number of more borrowers (64%) located in the villages with direct road access to their commune centreis more than the borrower (36%) located in the villages without direct road.

5.3 Description of the Vietnam Household Living Standard Survey Data

This study also uses data from the two Vietnamese Household Living Standard Surveys (VHLSS) conducted by the General Statistics Office of Vietnam (GSO) with technical support from the World Bank (WB) for the years 2006 and 2008. Each survey contains a sample of 9,189 households and the two datasets form a panel dataset of 4,127 households which are representative of the whole country; the data also form a panel dataset of 866 households that is representative for the MRD. The panel data contain information about the households for the two separate years, including the urban and rural population in Vietnam, however, only the rural sample is used in this study. In addition, information on commune characteristics was collected from 2,880 and 2,219 communes in the 2006 and 2008 surveys, respectively. These data consist of demographic and general information regarding communes, general economic conditions and aid programmes, non-farm employment, agricultural production, local infrastructure and transportation, education, health, and social affairs. The commune data are merged with the household data to form a combined panel dataset that includes household, village and commune charateristics.

The collected information includes demography, income, expenditure, education, health care, employment, fixed assets and durable goods; and particularly, access to finance through formal or informal credit. This study utilises information on household members' characteristics such as age, gender, place of residence, education qualifications, as well as information on expenditure and income. In addition, information about participation in microcredit programmes is also used such as loans, values of loans, the interest rate from different banks and social funds, loan purposes. The dataset represents Vietnam and the MRD therefore both samples will be used to evaluate the impact of microcredit in this study. Table 7.5 summarises variables for the impact evaluation models.

Table 5.6 Description of Variables using VHLSS 2008

		Borrowers		Non-borrowers	
Variables	Description	Mean	S.D.	Mean	S. D.
1. Individual characteristics					
AGE	Age of household head (years)	46.90	10.86	50.89	13.44
GENDER	Gender of household head	0.78	0.41	0.74	0.44
ETHNIC	Ethnic group (1= ethnic group, 0=Kinh)	3.31	5.49	1.88	3.52
MARRIED	Marital status (1=married, 0=otherwise)	0.86	0.35	0.81	0.39
	Completed education degree of head				
PRI_SCHO	Head with primary school	0.01	0.07	0.01	0.08
SEC_SCHO	Head with secondary school	0.26	0.44	0.27	0.44
HIG_SCHO	Head with high school	0.33	0.47	0.29	0.45
TEC_DEGRE	Head with technical degree	0.10	0.30	0.14	0.35
UNI_DEGRE	Head with university degree	0.01	0.07	0.01	0.10
POST_GRAD	Head with post-grad degree	0.01	0.09	0.04	0.19
2. Household characteristics					
HH_SIZE	Household size	4.54	1.63	4.12	1.67
R_FEMALE	Ratio of female members	0.51	0.18	0.52	0.20
R_BELOW16	Ratio of member below 16	0.26	0.21	0.22	0.21
R_ABOVE60	Ratio of member above 60	0.06	0.14	0.14	0.27
R_WAGRI	Ratio of members working in agriculture	0.47	0.29	0.39	0.33
R_WINDUS	Ratio of members working in industry	0.28	0.25	0.25	0.26
R_WSERV	Ratio of members working in services	0.12	0.21	0.15	0.23
R_PRI_SCHO	Ratio of members with primary school	0.26	0.25	0.25	0.26
R_SEC_SCHO	Ratio of members with secondary school	0.26	0.26	0.24	0.26
R_HIG_SCHO	Ratio of members with high school	0.14	0.22	0.15	0.23
R_UNI_DEGRE	Ratio of members with tertiary education	0.01	0.05	0.03	0.12
NUM_SDAYS	Num of day-off due to illness per member	7.15	6.48	6.67	6.19
LAND_ACROP	Area of annual crop land (m^2)	4309.05	8685.75	3459.07	9890.42
LAND_PCROP	Area of perennial crop land (m^2)	1538.86	11269.48	1270.29	6203.83
LAND_WSURF	Area of aquaculture water surface (m^2)	195.25	1341.47	406.68	4598.76
RE_OVERSEAS	Oversees remittance (1,000 VND)	504.70	4533.89	1218.28	8815.66
RE_DOMESTIC	Domestic remittance (1,000 VND)	1605.16	3391.04	2460.80	7597.42

PENSION	Pension (1,000 VND)	608.56	2861.87	1496.57	5655.33
SAVINGS	Savings (1,000VND)	37.75	426.46	656.57	9199.07
POOR_CER	Poor certified households	0.34	0.47	0.11	0.32
3. Village and commune characteristics					
GEO_CSTAL	Coastal area	0.07	0.26	0.07	0.25
GEO_DELTA	Delta	0.36	0.48	0.55	0.50
GEO_MIDLAND	Midland/hilly land	0.05	0.22	0.07	0.25
GEO_LMOUNT	Low mountainous areas	0.23	0.42	0.18	0.38
GEO_HMOUNT	High mountainous areas	0.29	0.45	0.13	0.34
CR_COM	Having car road commune	0.81	0.39	0.69	0.46
DE_CENTER	Distance to the nearest extension centre (km)	12.96	10.86	10.96	8.83
NF_ENTER	Having nonfarm enterprise commune	0.49	0.50	0.53	0.50
TR_VILLA	Having traditional-village commune	0.08	0.27	0.10	0.30
CR_VILLA	Having car road village	0.75	0.43	0.63	0.48
4. Instrumental variables					
R_POVERY	Poverty ratio by commune authority	0.24	0.17	0.16	0.14
D_BANK	Distance to the nearest bank (km)	9.19	3.24	7.80	2.67
	Number of observations	556		3,571	

Source: The Vietnam Household Living Standard Survey in 2008, GSO.

5.4 Chapter Summary

This chapter describes the survey data and respondents in the study. The descriptive analysis reflects the data, profile of respondents, and loan characteristics of the formal and informal lenders in the rural credit market.

The profile of respondents includes 919 households, of which 619 are borrowers and 300 are non-borrowers in the sample. The average age of the respondents is 47 years old and has attained some form of education but predominately at the primary level. The household head most likely engaged in farming work such as rice farming, orchard farming or aquaculture farming, although different non-farm activities were also possible occupations. In general, a rural household has five members in the family of which three are children. The household owned about 0.63 ha of land and earned a mean income of 38.28 million VND a year. However, a non-borrower household earned a mean income below the average.

The microcredit characteristics are different from formal and informal credit sectors. On average, the formal microcredit given for a single loan is greater than the informal one. Interest rates vary more for the informal microcredit than the formal one. The formal interest rates are commonly fixed and below the average market interest rate for different microcredit schemes while the informal interest rates are excessively high. Two advantages of informal microcredit over formal microcredit are loan duration and loan processing time. The formal microcredit through microcredit programmes is associated with short-term loans, while the informal one is associated with longer term. The processing time is significantly less for an informal microcredit than a formal one. One equal advantage of formal and informal microcredit is the flexible interest payment frequency; borrowers are allowed to pay loan interest at some irregular basis in accordance to their income flow. Formal microcredit are mainly used for production purpose, while informal ones are largely given to consumption.

In addition, the 2006 and 2008 VHLSS were used to analyse the microcredit programme impact evaluation. The data were collected in 2006 and 2008 following the commencement of the VBSP microcredit programme. Therefore appropreate impact evaluation models need to be defined in the subsequent analyses in order to obtain unbiased estimator for the microcredit impact evaluation.

Chapter 6
Determinants of Rural Households Access to Microcredit

This chapter discusses the empirical results of the models for informal microcredit, accessibility to formal microcredit, and formal microcredit using survey data from the Mekong River Delta, Vietnam. The models are estimated using maximum likelihood method. The estimated results are expected to reflect the rural household's decisions to seek credit under credit constraint and coexistence of the informal and formal credit sectors in the rural credit market.

The chapter is organised as follows. Section 6.1 specifies the empirical models of informal microcredit, accessibility to formal microcredit, and formal microcredit. Estimation strategies to obtain the desired estimates are also discussed for each model. Section 6.2 discusses the empirical findings of the three models. Finally, Section 6.3 summarises the results and discusses the empirical findings.

6.1 Model Specification and Estimation Strategies

6.1.1 Model Specification

The empirical models of the informal microcredit, accessibility to formal microcredit, and formal microcredit of the rural household are rewritten from specified in the reduced form equations (see section 4.2.2) as follows:

$$\boldsymbol{IFL} = \alpha_1 + \beta_1' \boldsymbol{X}_1 + \delta_1' \boldsymbol{H}_1 + \theta_1' \boldsymbol{M}_1 + \gamma_1' \boldsymbol{G}_1 + u_1 \tag{6.1}$$

$$B^* = \alpha_2 + \beta_2' \boldsymbol{X}_2 + \delta_2' \boldsymbol{H}_2 + \theta_2' \boldsymbol{M}_2 + \gamma_2' \boldsymbol{G}_2 + \mu \boldsymbol{IFL} + u_2 \tag{6.2}$$

$$B = 1 \; if \; B^* > 0$$

$$B = 0 \; otherwise$$

$$\boldsymbol{FL} = \alpha_3 + \beta_3' \boldsymbol{X}_3 + \delta_3' \boldsymbol{H}_3 + \theta_3' \boldsymbol{M}_3 + \gamma_3' \boldsymbol{G}_3 + \lambda B + u_1 \tag{6.3}$$

All dependent variables and groups of independent varibles were previously defined in chapter 4. However, in order to obtain the desired estimates, each equation in the model is defined in the following subsections.

- *Empirical model of informal loan (IFL)*

An informal microcredit is a function of individual and household characteristics plus a set of credit and geographic factors (see equation 6.1). The informal loan (ln IFL) is empirically specified as a function of age (ln AGE), gender (GENDER), no education (NOEDUC), land holding (OWN_LAND), savings (SAVINGS), number of children (NUM_CHILD), monthly household consumption (HH_CONS), household income levels (INCL_1, INCL_2, INCL3), informal loan purposes (IF_TRAD, IF_CONS), informal loan interest rate (IF_INT), informal loan duration (IF_DURA), and geographic factors (DRA_VIL, UBR_COM, ECO_COM).

- *Empirical model of accessibility to formal microcredit (B)*

Accessibility to formal microcredit is a function of age (ln AGE), marital status (MARRIED), ethnicity (ETHNIC), no education (NOEDUC), primary school (PRI_SCH), middle school (MID_SCH), local government employee (GOV_EMP), member of a credit group (CRE_MEM), poor certificate (POOR_CER), household income levels (INCL_1, INCL_2, INCL_3), main income sources (MI_FARM, MI_LIVES, MI_NONF), main income inflows (MINC_1, MINC_3, MINC_6, MINC_9), and geographic factors (DRA_VIL, ECO_COM, UBR_COM,). In addtion, the term informal loan (IFL) is also included as an exogeneous variable in the model because an informal loan is supposed to influence the household's decision to borrow a microloan. The dependent variable in equation (6.2), decision to borrow, is observed only as the borrowing status of the household. This borrowing status is interpreted as accessibility to microcredit. The borrowing status (B) takes the value 1 if the household borrowed a microloan and 0 otherwise. Non-borrower households fall into two groups: one group faces credit constraint, the other does not. Including the second group inthe sample might result in biased estimators since the households that do not face credit constraints tend to have a stable and high income and tend to save money instead of borrowing from a microcredit organisation. This inclusion might lower the coefficient of income in the analysis. Thus the credit unconstrained group is excluded from the sample. The borrowing variable, (B), includes only the credit constrained households and is replacedfor (Y*) in equation (6.2) for the model to be estimable. This model is now referred to as the borrowing model.

- *Empirical model of formal microcredit (FL)*

The formal microcredit (FL) is a function of age (ln AGE), gender (GENDER), no education (NOEDUC), local government emplyee (GOV_EMP), main occupation (RI_FARM, UN_SKILL, OR_FARM), houshold size (HH_SIZE), number of children (NUM_CHILD), number of income earners (NUM_ERN), agricultural land (AGRI_LAND), health expense (HH_EXP), interest subsidy (SUB_INT), formal microcredit duration (F_SHO, F_MED), formal microcredit purposes (F_AGRI, F_TRAD, F_CONS), and geographic factors (DRA_VIL, ECO_COM, UBR_COM). In addtion, the borrowing decision is believed to be correlated with the formal microcredit since the formal microcredit given to a borrower is conditional on the self-selection of the household into the microcredit programme (Pham & Izumida, 2002; Zeller, 1994). In the other words, if households form themselves into a microcredit group to receive microloans then estimating this group with the pool of non-credit group participation and non-borrower group might suffer from selection bias (Heckman, 1979). Therefore, the borrowing decision is also included in the formal microcredit equation 6.3. Table 6.1 provides the names, descriptions, and summary statistics of all the explanatory and dependent variables to be used to estimate the formal microcredit model.

The specification of the informal and formal microcredit models follows Zeller's (1994) framework that suggests individual characteristics (age, gender, education) and household characteristics (household size, wage income, assets, savings) are highly related to informal credit access. In addtion, other factors such as social responsibility of houshold head and location are also included in the determinant of the informal microcredit and accessibility to formal microcredit equation. To address the loan amount of formal credit, Pham and Izumida (2002) included the amount of formal credit in the accessibility to formal credit equation and use the Tobit model to investigate formal credit rationing in the rural credit market in Vietnam. In an attempt to determine the factors that influence informal loan, accessibility to microcredit and microcredit , our models' specification is similar to Pham and Izumida's (2002) model.

The informal and formal credit sector coexist despite the fact that formal interest rates are substaintitally lower than those charged in the informal sector (Hoff & Stiglitz, 1990); few empirical models have considerred this fact in their model. For example, Kochar (1997b), Diagne (1999) and Guirkinger (2008) are some of the pioneer papers advancing our understanding of the coexistence of formal and informal credit markets. Detail of these three

studies can be found in Chapter 4. The interaction between the formal and informal credit sectors will be examined in our model. The names, describtions and summary statistics of the independent variables used in the models are given in Table 6.1.

- *Definitions of the explanatory variables in the models*

In lending practice, many variables simulteneously determine assessiblity to microcredit as well as the loan amount of microcredit. For example, farm size is likely to affect the absolute amount of microcredit because farm size determines the total demand for credit. On the other hand, an increase in farm size tends to increase the credit worthiness of a household hence affects the supply side of credit (Pham & Izumida, 2002). This indicates the simultaneous nature of the demand for and supply of credit hence some variables might be jointly determine the lending process. The following subsection will define some addtional explanatory variables used in the model and discuss some simultaneous influences on the dependent variables. The the expected signs are ambiguously defined due to the simultaneous effects.

Under the household characteristics, having a government poor certificate[22] is one important factor that influences accessibility to microcredit because having a poor certificate is one criterion to be selected into a microcredit programme in Vietnam. This is an indicator for the Vietnamese government to monitor the coverage of the microcredit programmes since 2002. Particularly, information about poor households has been collected in the National Survey for the purpose of examining the coverage of National Target Program of microcredit and health programmes to the poor in Vietnam. However, having a poor certificate does not guarantee the poor households a microloan but it does give them a greater chance to participate in microcredit programme with a favourable interest rate. The descriptive analysis of the variables shows that 22% of the respondents with poor certificates in the survey did not have access to microcredit. This makes the poor certificate variable an interesting instrument to monitor the implementation of microcredit programmes in Vietnam.

Interest rates and loan duration are also included as explanatory variables in order to determine the formal and informal microcredit. This is because interest rates are closely related to the credit demand and supply sides of the credit market and loan duraitons are

[22]Poor certificate is based on the the national poverty line. In 2010, the national poverty line was set at 300,000 VND (16 USD) per month per person.

related to risk and incentives in a loan contract of a certain type of microcredit. These two variables are known to highly influence the the formal and informal microcredit equations in the model.

In this study, interest rate is hypothesised to be negatively correlated with microcredit, i.e., a low interest rate is associated with a higher demand for microcredit from rural household. However, including interest rate in the formal microcredit equation likely faces endogeneity problem because the interest rate serves as cost of money and it is simultaneous defined by credit supply and demand in the credit market (Stiglitz & Weiss, 1981). To capture the effect of interest rate, we used the subsidised interest rate which is defined as the difference between the average interest rate of commercial lending in 2009 and the interest rated given to rural households in the microcredit programme. This variable reflects the relationship between the demand for formal microcredit and the interest rate in terms of how much interest subsidy affects microcredit. Although, subsidised interest rate has been widely used in microcredit programmes, credit subsidy in the form of an interest rate below the market interest rate is arguably an effective tool to address poverty (Giné, 2010).

Similarly, loan duration is hypothesised to be negatively correlated with loan size on the demand side of microcredit. In a capital shortage rural credit market like Vietnam, given a constant interest rate, households tend have higher demand for long-term loans. In addtion, some agricultural investments, e.g., replanting perennial crops requires longer loan duration than others. Long-term loans are also prefered for education expenses because returns to education of a university studenttakes at least after four years to repay the loan. Therefore, loan duration is expected to reflect with the loan size including the difference in lending practice in the formal and informal sectors. This specification of loan duration is consistent with Ho (2004) whose study concludes that short-term loans exhibit a higher probability from informal sources.

Table 6.1 Determinants of Informal Microcredit in Rural Vietnam

Variable	Description	Mean	S.D.	Min	Max
Individual characteristics					
AGE	Age of household head (years)	47.29	13.34	22	89
GENDER	Household head (1=male, 0=female)	0.45	0.50	0	1
ETHNIC	Ethnic group (1=ethnic group, 0= Kinh)	0.18	0.38	0	1
MARRIED	Marital status (1=married, 0=otherwise)	0.91	0.28	0	1
NOEDUC	No education (D)	0.12	0.32	0	1
PRI_SCH	Primary school (D)	0.51	0.50	0	1
MID_SCH	Middle school (D)	0.24	0.43	0	1
HIG_SCH	High school level (D)	0.11	0.31	0	1
GOV_EMP	Work for local government (D)	0.19	0.39	0	1
CRE_MEM	Credit group member (D)	0.15	0.36	0	1
OCCUPATION†					
RI_FARM	Rice farming (D)	0.42	0.49	0	1
UN_SKILL	Unskilled worker (D)	0.19	0.39	0	1
OR_FARM	Orchard farming (D)	0.11	0.31	0	1
Household characteristics					
HH_SIZE	Household size (persons)	4.46	1.63	1	11
NUM_ERN	Number of income earners (persons)	2.53	1.39	0	10
NUM_CHIL	Number of children (persons)	3.12	1.96	0	10
OWN_LAND	Landownership (1=land owner, 0= otherwise)	0.66	0.48	0	1
AGRI_LAND	Agricultural land (1,000m^2)	6.27	13.84	0	300
POOR_CER	Household having poor certificate (D)	0.26	0.44	0	1
SAVINGS	Household having savings (D)	0.34	0.47	0	1
HH_INC	Household income (million dong)	38.25	46.94	1	567.2
SUB_INC	Subsidised income (million dong)	2.48	9.61	0.2	180.0
HH_CON	Hh. consumption (million dong)	22.91	23.90	0.003	434.8
HEA_EXP	Health expenditure (million dong)	1.57	7.36	0	150.0
MAIN INCOME INFLOWS†					
MINC_9	Main income from [9-12) months (D)	0.22	0.41	0	1
MINC_6	Main income from [6-9) months (D)	0.09	0.29	0	1
MINC_3	Main income from [3-6) months (D)	0.04	0.20	0	1
MINC_1	Main income from [1-3) months (D)	0.03	0.17	0	1
MAIN INCOME SOURCE†					
MI_FARM	Main inc. from farming (D)	0.47	0.50	0	1
MI_LIVES	Main inc. from livestock (D)	0.25	0.43	0	1
MI_NONF	Main inc. from nonfarm (D)	0.11	0.32	0	1
INCOME LEVEL†					
INCL_1	Average income below 300,000dong/person/month) (D)	0.24	0.43	0	1
INCL_2	Average income between 300,000dong to 600,000dong/person/month) (D)	0.31	0.46	0	1
INCL_3	Average income between 600,000dong to 1,000,000dong/person/month) (D)	0.20	0.40	0	1
Informal credit					
IFL	Max informal loan (Million dong)	3.54	8.16	0	100
IF_DURA	Informal loan duration (months)	10.66	21.39	0	60
IF_INTER	Informal interest (%/month)	3.94	12.27	0	240
INFORMAL LOAN PURPOSES					
IF_AGRI	Informal loan for agricultural production (D)	0.17	0.38	0	1
IF_TRAD	Informal loan for small trade (D)	0.06	0.23	0	1
IF_CONS	Informal loan for consumption (D)	0.29	0.45	0	1
Formal credit					

FL	Max formal microloan (million dong)	12.58	16.18	0.4	150
F_INTER	Formal interest (%/month)	0.69	0.39	0	1.9
F_DURA	Loan duration (Months)	20.70	20.25	0	120
SUB_INT	Subsidised interest rate (%)	1.03	0.46	0	1.5
FORMAL LOAN PURPOSES†					
F_AGRI	Formal loan for agricultural production (D)	0.49	0.50	0	1
F_TRAD	Formal loan for small trade/investment (D)	0.08	0.26	0	1
F_EDUC	Formal loan for education (D)	0.05	0.22	0	1
F_CONS	Formal loan for consumption (D)	0.12	0.33	0	1
LOAN DURATION†					
F_SHO	Short-term loan from 1 to 12 months (D)	0.48	0.50	0	1
F_MED	Medium-term loan from 12 to 36 months (D)	0.12	0.33	0	1
Geographic factors					
DRA_VIL	Direct road access to village(D)	0.63	0.48	0	1
ECO_COM	Ethnic concentration com (D)	0.19	0.39	0	1
URB_COM	Urbanized commune (D)	0.45	0.50	0	1
Dependent variables					
IFL	Max informal loan (million dong)	3.54	8.16	0	100
FL	Max formal microloan (million dong)	12.58	16.18	0.4	150
B	Borrowing status in microloan (B=1 if borrowed, B=0 otherwise)	0.67	0.47	0	1
Number of observations††				919	

Source: The author's survey data, 2010.

Note: D is dummy variable, indicating the variable takes the value of 1 if the statement is true and 0 if otherwise.

† At least one sub-group is excluded from this categorical variable in the estimation.

†† Some variables do not have full observations due to missing data.

Development economic theory suggests that if the rural credit market is underdeveloped and fragmented and if formal credit is difficult to access, informal credit can help the households to reduce credit constraints. This underdevelopment of the market is largely attributed to factors such as poor physical infrastruture as well as institutional development (Conning & Udry, 2007). Therefore, variables such as direct road access from the home village to the commune centre, urbanised commune, and ethnic concentration commune, are also included as explanatory variables in the model. Table 6.1 documents the names, descriptions and summary statistics of the explanatory and dependent variables used to estimate the informal loan model.

Geographic factors serve as a set of instruments that control for geographical differences at the village and commune levels. The inculsion of this group follows Jalan and Ravallion (2002), whose study suggests a set of geographic factors to explain household consumption growth in the standard Ramsey model. Under geographic factors, three variables namely urbanised commnue, direct road access at village level, and ethnic concentration commune are assumed to be exognenous to the households' decision to borrow formal microcredit and

are hypothesised to be highly correlated to informal loans. All variables in the geographic factors are dummy variables that receive the value 1 if the statement is true and 0 otherwise.

The urbanised commune variable is defined as a commune that is located in rural area adjacent to a city or town where industrial zone(s) are present. The travel distance from the commune to the industrial zone(s) is not more than 10 kilometres. Householdsliving in urbanised communes may have a higher incidence of employement in non-farm enterprises in these industrial zone(s) that entail a higher income from non-farm sources and ensures stable comsumption for the households. Hence, the housesholds may less likely to participate in a microcredit scheme and less likely to borrow an informal loan. This variable is specified differently in Kochar (1997b) in which the author argued that urbanised districts have more concrete roads, which likely improve access to formal credit.

Direct road access at the village level is defined as a village that has direct concrete road connecing to the commune centre. This specification is similar to the study by Ho (2004) where the average distance from the commune to the main formal microcredit institutions was used to control for the availability of formal microcredit. In Vietnam, particularly in the MRD where there are many rivers and river branches coupled with poor infrastructure such as road and bridges, makes the endowment of geographic factors really matter for rural households' livelihood. It is beleived that households located in villages that have easy road access to the commune centre where the formal credit branches are present will have a higher chance of accessing to formal microcredit. Meanwhile, the households in remote rural areas with difficult road access are likely to borrow from informal sources more often than access formal microcredit.

Ethnic concentration at the commune level controls for differences in ethnicity because ethnicity issue is closely related to poverty in Vietnam (Nguyen, Albrecht, Vroman, & Westbrook, 2007). Ethnic differentials are evident in all geographic and income levels, although the adverse effects of minority status are most pronounced among poor households in remote areas (Teerawichitchainan & Phillips, 2008). For this reason, communes with a higher ethnic concentration migh have a higher likelihood of being selected into the national microcredit programme. This, in turn, might provide the household with a higher likelihood of receiving formal microcredit in these communes than the household in other communes.

6.1.2 Estimation Strategies

This section addresses some estimation issues to ensure consistent coefficients are obtained in the final results. The first consideration is the distribution of the dependent variables, formal and informal loan. Next, the problem of a truncated dependent variable is considered when estimating the simultaneous model with a truncated right hand side endogeneous variable. The restriction from the exclusion of explanatory variables in the covariates is also considered for the identification of simultaneous equations. Finally, tests for multicollinearity and heteroskedasticity are conducted to validate the statistical tests of coefficients before inferences from the estimated results can be made.

Distributions of the dependent variables informal and formal loan were examined in level and in natural logarithmic forms (see Appendix A-1). The distribution of the formal microcredit is very right-skewed due to its nature that loan amount ranges from zero to infinity hence the loans in the level form will be transformed to the logarithmic scale. Transforming the dependent variable into log form gives the estimation the following advantages. First, at the level form a linear model tends to provide very poor predictions because it restricts the effects of regressors to be additive (Cameron & Trivedi, 2009). For example, age of household may increase the formal microcredit by a constant amount regardless of the observed loan amount. This seems unrealistic in microcredit since there should be a maximum limit for a loan contract for each household imposed by the credit provider. Secondly, if log transformaton is applied to both sides of the equation, it gives more intuitive economic meaning to the estimated coefficient, called elasticity. For example, if an estimated coefficient $\beta_j = 0.05$, then a 1% change in x_j is associated with a proportionate increase of 5% in the formal loan. Lastly, log transformation brings the distribution of the error terms of the model close to the normal distribution. To be consistent, the dependent, informal micorcredit, and all the independent variables in our model, except the dummy variables, are also transformed to natural logarithms.

The informal microcredit (IFL) and accessibility to microcredit (B) models can be estimated following Rivers & Vuong's (1988) probit model with continuous endogenous variable at the right hand side(probit RHS). The probit RHS estimates jointly two equations to obtain consistent estimates (Wooldridge, 2002). However, as Rivers and Vuong (1988) referred to

the endogenous variable at the right hand side as continuous, the IFL in our model is continuous but it is not fully observed for all observations. In the other words, the endogeneous IFL is truncated at some point where the formal microcredit are recorded but the informal microcredit are not. A formal microcredit is officially recorded but an informal microcredit can be any unwritten contract without verification. Therefore, the respondents tend to hide the amount of the informal microcredit or even exaggerate the amount during the interview process. Empirical evidence from other study in Pakistan indicates that when conducting interviews with informal lenders to obtain information about informal loans was even more difficult because of concern that the obtained information may end up with the government (for example, see Aleem, 1990). Any hidden informal loan amount, however, if not taken into account, might result biases in the borrowing model that might lead to other biases in determining the microcredit model. The unobserved amount of informal microcredit is a truncated variable.

To take into account truncation in accessibility to formal microcredit, a Tobit model will be used to estimate the informal microcredit in the first step, following Rivers and Vuong (1988). Then the probit model using the residual of the informal credit is estimated in the second step. Alternatively, the equations can be estimated simultaneously using maximum likelihood estimation. This, however, can also be estimated using the conditional mixed process (*cmp*) introduced by Roodman (2009).

Restrictions on exclusion are recommended to check for robust identification for the models. The exclusion restrictions require that the borrowing equation (6.2) has at least one exogenous variable that is excluded from the formal microcredit equation (6.3). Moreover, the excluded variable should have substantial impact on the probability of selection (Cameron & Trivedi, 2009). This restriction, however, can be satisfied in our models because the informal microcredit (equation 6.1) is endogeneous in the selection and the informal microcredit does not directly influence the formal microcredit. Specifying this way, the informal microcredit is expected to be significant in the accessibility to formal microcredit and the informal microcredit should have at least one valid explanatory variable as an instrument. In addtion, to obtain more robust identification, the dependent variables were fitted using different covariates of the individual characteristics, household characteristics, formal microcredit, and geographic factors in which some of the variables in the covariate of the selection equation are excluded from the outcome equation and vice versa (Greene, 2003).

Tests for multicollinearityand heteroskedasticity were also conducted to check for the consistency and robustness of coefficients in the models. VIF tests for the linear forms of the three equations confirmed no collinearity in the model; however, the Breusch-Pagan and Cook-Weisberg test for heteroskedasticity concluded at the 1% level that heteroskedasticity presents in the three equations. Therefore, the models were estimated using robust variance to resolve hetereskedasticity. A summary of the tests for multicollinearity and heteroskedasticity is presented in Appendix A-2.

6.2 Results and Discussion

6.2.1 Determinants of Informal Microcredit

Table 6.1 shows the parameter estimates of the informal microcreditmodel. Overall, 896 observations were used to calculate the estimated coefficients. The likelihood ratio test, with the Chi-square statistic equal to 156.24 with 23 degrees of freedom, rejects at the 1% level the null hypothesis that the parameter estimates for the model are all equal to zero. As a result, the coefficients of the explanatory variables can be used to explain the informal microcredit.

For endogeneity relationship between the informal microcredit and accessibility to formal microcredit models, the estimated coefficient $\hat{\rho}_{12} = 0.216$ is positive and significant at the 5% level, indicating that a positive correlation exists between the unobserved factors in the informal microcredit and accessibility to formal microcredit. The probit endogenous model and the selection model suggest that there are unobserved factors such as entrepreneurship, personal accountability, or attitude of housheolds in the formal or informal credit sectors, etc., that might induce the household to either borrow from the formal or informal sectors or not borrow from either sector (Heckman, 1979; Rivers & Vuong, 1988). The estimated $\hat{\rho}_{12}$ suggests that, holding informal microcredit and all other observable factors constant, if a household head exhibits a high degree of entrepreneurial skills, that willl enable him or her to have a higher likelihood in accessing formal microcredit than those who do not have such skills.

This relationship is particularly true in many formal microcredit programmes where the selection of borrowers is based on group voting. Credit group members vote not just for their

peers based on observed factors but also based on the next of kin relationship for the unobserved factors. This is possible because credit group members have more information about their peers than the credit provider. If a financially constrained household with high entrepreneurial skills has borrowed an informal microcredit, there is a higher probability that he or she will be able to access formal microcredit. The significance of this correlation also confirms the interaction between the formal and informal credit sectors where there is a positive relationship between the informal microcredit and access to formal microcredit if a household exhibits a positive unobserved desire to borrow money in order to improve its family's livelihood.

Empirical research often presumes the existence of the informal credit sector and considers it as an exogeneous variable that affects the accessibility to microcredit. This presumption, therefore, tends to ignore the endogeneity effect of the informal microcredit. Therefore, when the informal microcredit equation is specified and estimated simultaneously with the accessibility to formal microcredit equation, the unobserved factors in the accessibility to formal microcredit equation likely account for more unobserved bias in the model of access to formal credit. Consequently, the estimated result of the probability of access to formal microcredit is more reliable hence better predictive power for accessibility will be achieved. In our result, the interaction between the formal and informal microcredit sectors is documented; hence, this problem is appropriately addressed. The result is consistent with Kochar (1997b) whose results provide evidence of the important role of the informal credit sector in determining participation in the formal credit sector. However, this result contrasts with Diagne (1999) whose findings reject the bias from informal microcredit characteristics to the formal microcredit equation due to weak correlation.

Holding all explanatory variables unchanged, the constant indicates that, rural households tend to borrow 2.4 million VND in informal microcredit without considering any covariates that control for differences among households. This prediction is much lower than the average formal microcredit, which is 6.37 million VND. The precision of this prediction is not statistically significant because informal microcredit are truncated. This will be explained further as more explanatory variables enter our model to form the determiants of the informal microcredit.

We now turn to the determinants of the informal microcredit. The estimated results show that the informal microcredit is significantly explained by the following factors: ln AGE, NOEDUC, OWN_LAND, SAVINGS, ln HH_INC, INCL_1, INC_2, IF_TRAD, IF_CONS, IF_INTER, ln IF_DUR, DRA_VIL, and URB_COM.

Under the individual charateristics, the coefficients ln AGE and NOEDUC are negative significant at the 10% level. This implies a proportionate change in age with the informal microcredit, older household heads tend to borrow proportionately less informal loans. This finding supports the evidence of Pham and Izumida (2002) whose study showed that age has an inverse relationship with the informal credit demand in Vietnam. On the other hand, the inverse relationship between education and the informal loan suggests that household head with no education level tends to borrow less informal microcredit compared to household heads with educational attainment. This finding does not support most empirical evidence that additional education tends reduce the level of informal credit demand (Barslund & Tarp, 2008) (see Table 6.2).

For household characteristics, the positive significant OWN_LAND coefficient at the 1% level indicates that households who hold land borrow more from informal lenders than landless households (see Table 6.2). In fact, the land-holding household borrows as much as 31.5% more than the landless household, other factors held constant. As in the case of credit constraint, we assumed that households lack working capital for agricultural production, therefore, greater land-holding households are likely to require more inputs such as fertilisers. Land-holding households can obtain these agricultural inputs in the form of informal microcredit from the local input suppliers. On the other hand, land-holding households can obtain more informal microcredit because they have collateral for informal loans as the informal lender's decision to give a loan is heavily based on the wealth of the borrower. This finding supports the evidence that most informal lenders' decision to approve a loan request is based on the wealth of the borrower, which is an indicator of repayment capacity (Zeller, 1994).

Table 6.2 Determinants of Informal Microcredit in Rural Vietnam

	Coefficient	R.S.E.	P_value
ln Informal loan amount (ln IFL)			
Constant	0.882	0.768	0.251
Individual characteristics			
ln AGE	-0.362*	0.207	0.080
GENDER	-0.104	0.090	0.252
NOEDUC	-0.232*	0.132	0.078
Household characteristics			
OWN_LAND	0.315***	0.100	0.002
SAVINGS	-0.312**	0.127	0.014
ln NUM_CHILD	-0.039	0.095	0.679
ln HH_CONS [a]	-0.036	0.036	0.328
INCL_1	-0.321**	0.145	0.027
INCL_2	-0.308**	0.137	0.025
INCL_3	-0.133	0.146	0.362
Informal credit			
IF_TRADE	0.416**	0.182	0.022
IF_CONS	0.663***	0.091	0.000
IF_INTER	0.505***	0.042	0.000
ln IF_DURA	0.438***	0.031	0.000
Geographic factors			
DRA_VIL	0.342**	0.145	0.018
ECO_COM	0.068	0.139	0.624
URB_COM	-0.397***	0.111	0.000
Accessibility to formal microcredit (*probit estimation results are omitted*)			
ρ_{23}	0.220*	0.112	0.051
$\hat{\rho}_{23}$	0.216	0.107	
Number of observations[†]	896		
Log likelihood	-1379.82		
Chi2(23)	126.54		

Note: 1. R.S.E. stands for Robust Standard Errors
2. *, **, and *** indicate significance level at 10%, 5%, and 1%, respectively
3. [a] indicates VND/month
4. [†] is smaller than the number of respondents in the sample due to missing data

The coefficient SAVS is negative and significant at the 5% level indicating that savings in household significantly reduced the demand for informal microcredit. Economic theory suggests that savings helps the rural household self-insures against natural disasters that may affect its income. Savings is compulsory in some microcredit programmes that aim to help members to build up their assets over time or to smooth future consumption (Aghion & Morduch, 2005). The negative relationship of savings with informal microcredit indicates that households can subsidise their savings to demand for an informal microcredit. This finding partially reflects the idea that savings is a substitute source of credit rather than a source of collateral for the lenders (Fenwick & Lyne, 1998). In terms of the household income, the significant negative coefficients of income level indicates that the informal microcredit is strongly associated with the income level of the borrower. The specification of income levels

categorises the rural household into four groups[23]: group 1 is poor, group 2 is low-income, group 3 is average and group 4 is others. Comparing among different income levels, the significant coefficients of income levels 1 and 2 show significantly that poor and low-income households tend to borrow from informal microcredit sources although the amount of informal loans differ. Meanwhile, households with fairly high income show no statsitical evidence of demand for informal microcredit.

Under informal credit factors, the loan purposes (IF_TRAD) and (IF_CONS) coefficients are positive and significant at the 5% and 1% level, respectively. Informal microcredit are strongly associated with trade and consumption purposes. The demand for informal loans to finance consumption is more than 60% higher than informal loan for other purposes, followed by demand for trading activities, which is 50% higher than loan for other purposes. Interestingly, this high demand for informal microcredit, however, can be reduced by 31.2% if rural household have savings as discussed earlier.

The informal interest (IF_INT) and (IF_DUR) duration coefficients are postive significant at the 1% level. The formal loan duration coefficient indicates that informal microcredit tend to change proportionately with changes in loan duration; rural households consider the importance of the flexibility of informal microcredit rather than the interest rate. Because an informal loan is a flexible contract, borrowers can either terminate or extend the loan duration according to their repayment capacity; the longer the loan duration, the larger loan size they borrow. Informal interest, on the other hand, is significant but opposite sign to the hypothesised sign. We hypothesised that a higher interest rate tend to reduce the demand for informal microcredit; however, this hypothesis is significantly rejected. This relationship may be explained by the fact that the households facing credit constraints are most likely rejected by the formal credit sector. In addition, the informal microcredit market is likely to be a momopolistic market where a few lenders can actually manipulate the supply of the informal credit. Therefore, obtaining an informal microcredit with a relatively higher interest rate is the only choice.

[23]The new poverty line was set by the Prime Minister in the Resolution 170/2005/QD-TTg issued on July 8th, 2005: "...where households in rural areas having income less than 300,000 VND/person/month are classified as poor".

For geographic factors, both DRA_VIL and URB_COM variables are significant at the 1% level. The negative coefficient of URB_COM indicatesthat the household residing in communes that are adjacent to industrial zones tend to demand 40% less for informal microcredit than the household residing in the other communes. While the positive coefficient of DRA_VIL shows that households in villages that have direct road access demand as much as 34.4% higher for informal microcredit than households in other village with poor transportation. This result does not support our hypothesis that households in remote rural areas with difficult road access are likely to borrow more from informal sources. In fact, higher demand for informal microcredit in the rural credit market in the MRD is probably attriubuted to road condition improvement which enables the rural household greater accessibility to different forms of informal microcredit such as cash in advance from input suppliers or seed and fertiliser from marketing agents.

6.2.2 Determinants of Accessibility to Formal Microcredit

Table 6.2 presents the determinants of accessibility to formal microcredit, including the parameter estimates and marginal effects. As for the endogeneity model for informalmicro credit, the likelihood ratio test ($\chi^2_{(23)}$ =207.6) rejects the null hypothesis that the parameter estimates for the probit model are equal to zero; the model can be used to explain the probability of accessing formal microcredit by rural households. Overall, the probit model successfully predicts the possibility of the household's accessibility to formal microcredit for 73.10% of cases (see Appendix A-3). Given the relatively high predictive power, calculation of marginal effects for the regressors will give a direct interpretation of the influence of these variables on the household's accessibility to formal microcredit.

The estimated results show that the assessibility to formal microcredit (B) is significantly explained by the following factors: ln AGE, MARRIED, ETHNIC, GOV_EMP, CRE_MEM, POOR_CER, INCL_1, MI_FARM, MI_LIVES, MINC_6, DRA_VIL, ECO_COM, URB_COM and ln IFL (see Table 6.3). The significant positive informal loan (ln IFL) at the 1% level means that the informal microcredit positively influences the probability of access to formal microcredit. As the test for endogeneity confirmed the simultaneous effect of the unobserved factors of the informal microcredit on accessibility to formal microcredit, the significant informal microcredit coefficient indicates that a 1% increase in the informal microcredit will likely increase the probability of accessibility to formal microcredit by 5%.

This positive relationship is expected because informal microcredit are costly while formal microcredit are much cheaper. As the survey results showed, the average interest rate of informal microcredit is five times higher than the formal microcredit interest rate. Therefore, the household who happened to borrow an informal loan might seek a loan from the formal microcredit sector to repay or roll over the informal credit. This turns out to be true in many cases whereby poor and low-income households try to participate in formal microcredit programmes to borrow at a preferable rate and use the formal microcredit to pay the informal loan. Currently, these households are found in the overdue payment status in the microcredit schemes. This switching status is refered to as the *moral hazard* problem in the rural credit market; it occurs in many formal microcredit programmes with a poverty reduction objective targeting the rural poor and low-income groups. Wherein, microloans are often expected as given and repayment is expected to be low.

Among individual characteristics, age (ln AGE), marital status (MARRIED), ethnicity (ETHNIC), government employee (GOV_EMP), and member of credit group (CRE_MEM) are significant postive predictors of accessibility to formal microcredit (see Table 6.3). The age of household head proportionately influences the probability of accessibility to formal microcredit at the 1% level. Holding other factors constant, a proportionate change in age group increases as much as 20.3% probability of accessibility to formal microcredit. This proportionate change contrasts with Barslund and Tarp's (2008) finding that reports a negative effect of age on the probability of access to formal microcredit in Vietnam. However, our finding is consistent with Zeller's result where age likely increased the probability of access to formal microcredit in rural Madagascar. This relationship is reasonably explained in our study because the age of household head is believed to relate to controlling over a household's resources. In Vietnam, the age of the household head involves in the formal microcredit participation as a proxy for accountability which indiates a commitment to repay loan to microcredit providers. Similarly, the significant positive sign for the marital status (MARRIED) and ethnicity (ETHNIC) variables at the 5% level implies that married household heads and ethnic family are more likely to access a microcredit programme. This latter positive relationship is expected in the Vietnam rural credit market because many microcredit programmes are designed to provide microcredit particularly to ethnic groups.

Table 6.3 Determinants of Accessibilityy to Formal Microcredit and Its Marginal Effects

	Coefficient	R.S.E.	P_value	Marginal effect[b]
ln Formal microcredit *(results omitted)*				
Accessibility to formal microcredit (B)				
Constant	-3.144***	0.773	0.000	
Individual characteristics				
ln AGE	0.585***	0.186	0.002	0.203
MARRIED	0.336**	0.154	0.030	0.124
ETHNIC	0.327**	0.159	0.039	0.107
NOEDUC	-0.127	0.200	0.524	-0.045
PRI_SCH	-0.032	0.153	0.835	-0.011
MID_SCH	-0.117	0.170	0.493	-0.041
GOV_EMP	0.413***	0.133	0.002	0.132
CRE_MEM	0.370**	0.153	0.016	0.119
Household characteristics				
POOR_CER	0.643***	0.123	0.000	0.201
INCL_1	-0.342*	0.177	0.054	-0.123
INCL_2	-0.026	0.163	0.874	-0.009
INCL_3	-0.025	0.156	0.872	-0.009
MI_FARM	0.577***	0.127	0.000	0.197
MI_LIVES	0.598***	0.136	0.000	0.188
MI_NONF	0.149	0.132	0.260	0.051
MINC_9 [a]	-0.168	0.117	0.151	-0.060
MINC_6 [a]	0.300*	0.180	0.096	0.097
MINC_3 [a]	-0.209	0.233	0.369	-0.076
MINC_1 [a]	0.009	0.262	0.972	0.003
Geo-economic factors				
DRA_VIL	0.659***	0.155	0.000	0.235
ECO_COM	0.643***	0.184	0.001	0.195
URB_COM	-0.255**	0.120	0.033	-0.089
Endogenous variable				
ln IFL	0.143***	0.052	0.006	0.050
ρ_{23}	-0.380*	0.222	0.087	
Number of observations†		896		
Log likelihood		-1132.0		
Chi2		207.6		
Predicted probability		70.98%		

Note: 1. R.S.E. stands for Robust Standard Errors.
2. *, **, and *** indicate significance level at 10%, 5%, and 1%, respectively.
3.[a] indicates months/year
4. b Marginal effect is evaluated at the mean value and is interpreted differently for dummy variables
5. † is smaller than the number of respondents in the sample due to missing data

The local government employee coefficient is positive and significant at the 1% level, indicating that the government employee is a significant contributor to rural households' accessibility to formal microcredit. A household having a member working as a village or township official will have access to greater amount of information about microcredit programmes than other household in the village. The result shows these households have 13.2% higher probability of accessing a microcredit than other households. In addition, in

Vietnam the employees' contribution to the local village or commune is highly recognised by the commune leaders. This work relationship enables an easier approval from the commune leader in the screening process. The result is consistent with the finding in Li et al.'s (2011) study in which households with members working as local officials in China seem to have easier access to microcredit due to good personal relationships with the local financial institutions (see Table 6.3).

The positive and significant CRE_MEM coefficient indicates that, if a household is a member of a credit group in a village, he or she has an11.9% higher probability to receive a microcredit than non-members. As a member of a credit group is designed to capture the mixture of lending policies in formal microcredit, many microcredit programmes have followed *lending through group*[24] method (individual lending is also available). Lending through group practice seems to be working in Vietnam because it employs social sanctions, self-incentives and self-monitoring but does not strictly follow joint-liability group lending. Thus, an improvement in formal microcredit accessibility can be achieved for rural households, provided they are organised in a microcredit group (see Table 6.3).

Four income-related factors, INCL_1, MI_FARM, MI_LIVES, and MINC_6, are signficant in explaining the borrowing status. For household income levels, the results show that income level 1 (INCL_1) is negative and significant at the 10% level. As one of the formal criteria for credit rationing, the income level particularly differentiates the lowest income borrowers from the group of borrowers. This means the poorest group receives a significantly lower loan amount, 12.3% less than other brrowers. Microcredit programmes favourably select rural households that have main income sources from farming (MI_FARM) and livestock feeding (MI_LIVES). At 1% significance level, farming households have a 19.7% higher probability and livestock feeding households have an 18.8% higher probability to access microcredit than other households based on main income sources. In addtion, at the 10% level, households that

[24]In Vietnam, lending through a group is popular in making loans to rural poor households. This lending practice is adapted from the group lending technique but does not strictly follow the joint-liability principle. The borrowers are required to form a group including a number of certified poor members and a group leader without joint specification. The group leader's tasks are: (i) to provide information about group members to microcredit officers; (ii) to collect loan applications from group members and disperse the loans, and (iii) to convince members to repay their loans. In case of default, the responsibility of dealing with default borrowers is the microcredit officer; the group leader helps persuade them to repay. As a result, lending through a group is popular but it is simply a mechanism to reduce transaction costs rather than to reduce default risk. However, lending through a group is more effective in dealing with asymmetric information than in individual lending (Quach, 2005).

have income flow of 6 to 9 months a year (MINC_6) have a 10% higher probability to access microcredit than other households.

The above findings exhibit important evidence in the microfinance literature. As microcredit programmes are designed to target the lowest income group so that microcredit can help households at the bottom of the population pyramid to improve their livelihoods and get out of poverty. Our finding indicates that the lowest income group faces more credit rationing than other groups in the selection process. This finding is consistent with the study of microcredit in Bangladesh by Amin, Rai and Topa (2003) who concluded that microcredit successfully reached the poor, but is less successful at reaching the vunerable. Moreover, microcredit is unsuccessful at reaching the group most prone to destitution, the vulnerable poor. The findings reflect the paradox in microfinance that "Why doesn't capital naturally flow to the poor?" addressed by Aghion and Morduch (2005). The question provides a foundation to why many countries need policy intervention in rural credit markets, particularly the credit market to serve the poor and low-income households (see Table 6.3).

Interestingly, our findings reveal that, although microcredit programmes are not successfully reaching the lowest income group, government intervention is effective in adjusting the defect of microlending. The poor certificate coefficient is positive and significant at the 1% level and its effect shows that the certified poor households have as much as a 20.1% higher probability of obtaining a formal microcredit. The result supports our hypothesis that having a poor certificate is one important criterion to access to formal microcredit. The result also shows the consistency of the National Poverty Reduction Programme in targeting and ensuring a wider outreach of microcredit programmes to rural households, particularly the rural poor in Vietnam, in general, and the MRD in particular.

All geographic factors coefficients have the anticipated signs and are significantly associated with the probability of access to formal microcredit. The significant positive DRA_VIL coefficient implies that households residing in villages with direct road access have as much as a 23.5% higher possibility in participating in microcredit programmes than other households. Similarly, the significant positive URB_COM coefficient implies that households living in urbanised communes are 10% less likely to participate in microcredit programmes than other households. Conversely, rural households in ethnic concentration communes have

as much as a 20% probability to access formal microcredit. The findings strongly support the development finance view that underdevelopment of physical infrastructure highly contributes to credit inaccessibility (see Table 6.3).

Finally, the estimated coefficient ρ_{23} is significant at the 10% level. A sample selection model (Heckman, 1979) suggests that there are always unobserved factors such as entrepreneurship, accountability, and attitude of household heads that might influence them to participate in a microcredit programme. This means participation in a formal microcredit programme significantly determines the formal microcredit equation. The results of the microcredit model are discussed in the following subsection.

6.2.3 Determinants of Formal Microcredit

Table 6.4 summarises the results of formal microcredit using the Heckman two-step model and *cmp*. Tests for sample selection, equivalent to the null hypothesis $\lambda = 0$, significantly comfirm that a selection bias problem is present in the three models and this problem is appropriately addressed in the first step. The presence of sample selection bias is consistent with Pham and Izumida's (2002) study of the Vietnam rural credit market. We can also estimate the formal microcredit using the conditional maximum likelihood mixed process. This estimation technique provides more desired estimates because the *cmp* method includes more observations in the estimating procedures to allow more variation in the covariates as well as increasing the robustness of the power of tests for endogeneity of informal microcredit. Moreover, the inclusion of more observations in the model makes the results more consistent with the estimated results in previous steps in terms of the number of observations. The likelihood ratio test ($\chi^2_{(23)}$ =207.6) gives this model an identical conclusion to the Hecknan model's. As a result, the estimated results using the *cmp* method are used to explain the determinants of formal microcredit in the subsequent analysis.

The formal microcredit (ln FL) is significantly explained by the following factors: NOEDUC, RI_FARM, UN_SKILL, ln AGRI_LAND, ln HEA_EXP, ln SUB_INT, F_EDUC, and URB_COM (see Table 6.4).

The significant negative sign of the rice farmer and unskilled worker coefficients at the 1% level indicate that rural households receive 27.6% less than the average formal microcredit if they were rice farmers (RI_FARM) and receive 23.5% less microcredit if they were in the unskilled worker group (UN_SKILL) (see Table 6.4). Since different sources of income explain the loan purpose in the screening process, the variables rice farmer (RI_FARM), unskilled worker (UN_SKILL) and orchard farmer (OR_FARM) explain the repayment capacity in determining the loan amount. These occupations reflect a lower payment capacity than other occupations such as skilled-labourer or non-farm activities. Although most microcredit schemes provide relatively the same amount of small loans to rural households, a significant difference in loan size can be found in the formal loan determining stage if the household head's occupation is considered.

The no education (NOEDUC) coefficient is negative significant at the 5% level in the formal microcredit determining stage. Holding other factors constant, having any form of education attainment gives the applicants a 17% higher loan than no education applicants. The consistent negative sign for education on the informal microcredit, formal microcredit accessibility and formal microcredit models implies that education attainment is particularly important. Head's education reflects creditworthiness in the rural credit market. Meanwhile, being illiterate is one of the biggest disadvantages in getting access to any form of microcredit. These disadvantaged households likely face external credit rationing in that they tend to be excluded from the selection process of microcredit programmes. However, these households also face credit rationing in the informal sector. As a result, these households are likely to be internally rationed. If internal credit rationing becomes dominant, the households tend not to borrow. This is reflected in the interview that many poor households answered they currently have a demand for a microloan but they could not get access to the microcredit programme. Similarly, when asked about the future demand for microcredit, they indicated a zero demand.

Under household characteristics, the ln AGRI_LAND and ln HEA_EXP variables significantly influence formal microcredit. First, agricultural land is positive significant at the 1% level which implies that a 1% increase in agricultural land increases formal microcredit by 8.8%. The result reconfirms the positive relationship between agricultural land and demand for formal microcredit; this is also true for the informal credit. That reflects the important role of land in the rural credit market where households with land always have an advantage over

landless households once they join the credit group. The result is consistent with Zeller (1994) in Madagascar and Pham and Izumida (2002) in Vietnam (see Table 6.4).

The health expenses (ln HEA_EXP) coefficient is positive and significant, which indicates that formal microcredit changes proportionately with the demand for health expenses in the household although the proportionate change is relatively small in magnitude. In particular, if health expenses increases by 1%, the demand for a formal microcredit is likely to increase by 8.4%. One possible explanation is that health expenditure represents a living cost and therefore borrowing from a formal microcredit source at a low interest rate for health care expenditure is reasonable. Demand for health expenditure sometimes is urgent for emergency purposes so many households cannot wait to borrow from formal microcredit sources. However, many formal microcredit programmes provide loans for health and medical treatment as long as the borrower can provide evidence of health expenses when they apply for such a loan. The finding implies that there is a substitution of credit between the formal and informal credit sectors; households can borrow from the informal credit sector for urgent needs then they apply for a formal microcredit to pay off the informal loan. In other words, coexisting formal and informal credit sectors helps reduce credit constraints of the rural household.

The subsidised formal interest is negative significant at the 1% level. Subsidised interest is defined as the difference between the average interest rate of commercial loans in 2009 compared with the interest on formal microcredit given to rural households in the survey. A negative relationship indicates that the subsidised interest rate is associated with small microcredit; microcredit is 36.2% smaller than the average loan amount if that loan has a 1% subsidised interest rate per month. Given the estimated average loan in the model, a 1% change in the interest subsidy per month for a loan amount, the formal loan amount borrowed reduced by 9.83 million VND. This finding strongly supports the evidence that most microcredit programmes providing preferential loans are small loans compared with the average microloan in the country. A small loan amount is less likely to be demanded and they are mainly given to poor and low-income households such as poor subsidised and drug rehabilitation loans (see Table 6.4).

Table 6.4 Determinants of Formal Microcredit in Using the Conditional Mixed Process and Heckman Two-step Method

	ln Formal Loan (1)			ln Formal Loan (2)		
	Coefficient	R.S.E.	P_value	Coefficient	S.E.	P_value
ln Formal microcredit (ln FL)						
Constant	3.308***	0.699	0.000	3.351***	0.659	0.000
Individual characteristics						
ln AGE	-0.127	0.171	0.459	-0.134	0.159	0.401
GENDER	0.080	0.063	0.206	0.078	0.063	0.212
NO_EDUC	-0.170**	0.083	0.042	-0.169*	0.100	0.092
GOV_EMPL	0.117	0.082	0.150	0.115	0.081	0.161
RI_FARM	-0.276***	0.087	0.002	-0.282***	0.079	0.000
UN_SKILL	-0.235***	0.091	0.010	-0.237**	0.101	0.019
OR_FARM	-0.131	0.109	0.228	-0.139	0.108	0.2007
Household characteristics						
ln HH_SIZE	-0.154	0.105	0.141	-0.154	0.108	0.155
ln NUM_CHILD	0.014	0.068	0.837	0.015	0.071	0.833
ln NUM_EARN	0.076	0.074	0.302	0.077	0.078	0.322
ln AGRI_LAND	0.088***	0.014	0.000	0.089***	0.014	0.000
ln HEA_EXP	0.084**	0.043	0.049	0.084**	0.040	0.037
Formal credit						
ln SUB_INT	-0.362***	0.090	0.000	-0.364***	0.082	0.000
F_SHO	0.013	0.111	0.907	0.012	0.103	0.905
F_MED	0.149	0.128	0.244	0.143	0.121	0.238
F_AGRI	0.128	0.093	0.168	0.124	0.081	0.124
F_TRAD	-0.020	0.123	0.874	-0.019	0.109	0.866
F_EDUC	0.199*	0.115	0.084	0.201*	0.120	0.093
F_CONS	0.002	0.075	0.978	-0.003	0.081	0.976
Geo-economic factors						
DRA_VIL	-0.099	0.135	0.465	-0.097	0.119	0.415
ECO_COM	-0.072	0.137	0.598	-0.078	0.122	0.522
URB_COM	-0.184**	0.077	0.017	-0.186**	0.078	0.017
ρ_{23}	-0.380*	0.222	0.087			
λ				-0.276*	0.159	0.083
Number of observations	896			879		
Rho	Na			-0.371		
Sigma	Na			0.744		
Log likelihood	-1132.0			Na		
Chi2	207.6			173.9		

Note: 1. S.E. and R.S.E. stand for Standard Errors and Robust Standard Errors, respectively.
2. *, **, and *** indicate significance level at 10%, 5%, and 1%, respectively
3. (1) and (2) are conditional mixed process and Heckman two-step method, respectively.
4. † is smaller than the number of respondents in the sample due to missing data

The loan purpose for education variable is positive significant at the 10% level, indicating that demand for education loan is covered by microcredit programmes. Given a subsidised interest rate, a loan for education tends to receive an additional 20% increase in loan value compared with other loan purposes. This finding supports the evidence that microcredit programmes are likely to expand in providing credit to rural areas, not only agricultural loans but also for education and health purposes. This finding also supports the fact that providing loans for

education purposes, such as student loans or vocational training, is one of the main objectives of many microcredit schemes. This lending implementation is consistent with the long-term strategy of the poverty reduction programmes of the government by ensuring credit availability and sustainability to rural households through the formal microcredit sector (see Table 6.4).

With regard to geographic factors, only the urbanised commune coefficient is negative significant at the 1% level. Holding other factors constant, rural households residing in an urbanised commune received 18.4% less than the average formal microcredit in the region. Given the estimated average microcredit in the model, the result indicates a variation of 4.92 million VND in loan size between urbanised and rural communes. The result supports our hypothesis that households residing in an urbanised commune are likely to demand less for formal microcredit. This finding is consistent with Kochar's (1997b) finding in India.

However, the local government employee (GOV_EMP) variable is insignificant in affecting formal microcredit although it has a positive effect on the probability of access to formal microcredit. This finding indicates that there might be bias toward households having member working for the government in the selection process for formal microcredit. However, there is no statistical evidence to conclude that bias toward government employees presents in the determining stage of formal microcredit.

6.3 Chapter Summary

This chapter identifies the factors influencing the household's access to the informal and formal microcredit sectors under credit constraint and the coexistence of two credit sectors. Our results show that an informal microcredit can alter the decision of the household to participate in a formal microcredit programme. The informal microcredit, considering endogeneity, positively influences the probability of accessibility to formal microcredit. Ignoring this interaction may result in the less desirable properties of the determinants that explain the household's decision to participate in a microcredit programme.

Our results confirm that the use of informal microcredit is positively influenced by the following factors: land holding status, informal loan purposes, informal interest, informal

microcredit duration, and direct road access to the village. Rural households residing in areas with direct road access to a town centre and with land ownership can obtain credit from the suppliers or traders but while others with a higher demand for consumption might borrow more from friends, relatives or money lenders. Flexible informal microcredit duration can compensate for the high interest rate hence both factors result in a positive relationship with the informal microcredit. Informal microcredit is a prevalent source of trade and consumption credit for the rural household, particularly the poor and low-income household as the informal microcredit is accessible for this group.

The positive contributors to formal microcredit accessibility are local government employee, membership of credit group, and a poor certificate. Working as a local government employee improves accessibility to formal microcredit through work relationship and it is considered as a bias in the selection process; improving accessibility to formal microcredit using poor certificate is a social policy intervention. Lending through a group is considered a more appropriate improvement of accessibility to formal microcredit because it is cost-effective in overcoming the problem of asymmetric information in individual lending. Direct road access and ethnic concentration commune also improve the accessibility to formal microcredit for rural households. These factors can be used in designing formal microcredit schemes that provide a good coverage to the target poor household in rural areas. In addition, agricultural land ownership positively increases microloan demand; capital for agricultural production results in a greater loan demand. Providing for agricultural production and education purposes are the main coverage of the microcredit programme; microcredit for other purposes are given but are of a smaller loan size.

The research findings show a strong link between the informal and formal microcredit sectors in the rural credit market and both sectors play important roles in serving the rural households. Credit constraint and information asymmetry are the main problems that the rural household face in obtaining credit although each problem plays different roles in different credit sectors. Different lenders employ different risk assessment mechanisms to select borrowers. Improving formal microcredit access can start from the government; it can improve physical infrastructure and provide a consistent microcredit policy to ensure the bottom poor have adequate access to formal microcredit. Improved formal microcredit accessibility can also start from the household themselves by actively participating in a credit group and improving their education and work skills because education essentially builds up

creditworthiness for collateral-free borrowers and work skills promise repayment. As the informal and formal credit sectors coexist and interact, an appropriate credit policy is to direct both sectors to work better towards the rural development goal. A better linkage between the two credit sectors would enable one sector to overcome its weaknesses by gaining from other's strengths. Particularly, lending through group without joint-liability helps improve participation rate of poor households. Expanding this lending to some informal lenders in the group would reduce transaction costs of screening but likely increase the repayment rate because the borrowers can roll over their loans using the available alternative credit.

Chapter 7
Impact Evaluation of Access to Formal Microcredit Programme

This chapter assesses the impact of formal microcredit on rural households. The impact of a formal microcredit programme on target households is subject to two main sources of bias, the observed and unobserved bias. The Propensity Score Matching (PSM) approach and Fixed Effects (FE) model are applied to assess the microcredit programme impact using the 2010 survey data in the Mekong River Delta and the 2006 and 2008 VietnamHousehold Living Standard Surveys, respectively. Because the VBSP microcredit programme is the biggest microcredit institution providing the poor with preferential credit, the VBSP microcredit programme's impact is examined in this study. The interest in assessing the microcredit impact does not stem from econometric curiosity rather it provides useful justification for policy makers and microcredit providers in designing, implementing and monitoring microcredit programmes. The chapter is organised as follows. Section 7.1 discusses the impact of the VBSP microcredit programme on the consumption and income outcomes of rural households using the PSM method; Section 7.2 dicusses the impact of the VBSP microcredit programme using the FE model. Section 7.3 summarises the results and findings.

7.1 Impact of Access to Formal Microcredit Programme on Rural Households: An Impact Evaluation of Cross Sectional Data

7.1.1 Data for Impact Evaluation

The data used for impact evaluation of the VBSP microcredit programme on the rural households were collected in the MRD in 2010 (see discussion of the characteristics of borrowers and non-borrowers in Chapter 5). The survey particularly targeted rural households that are considered to be in the low-income bracket, including poor families. Special consideration was given to data collection to ensure that the collected data contained the treated and control groups of households that can be used in the matching methods. The purpose of the impact assessment is to compare the outcomes of the borrowers – the treated group with the control group – the non-borrowers. The treated group is the target group and selection of the target group is strictly based on the borrowing status under credit constraint conditions. The control group includes non-borrowers who might or might not face credit

constraint, but we excluded the group of credit unconstrained households in the sample. Excluding the unconstrained household allows the control group to be more comparable with the treatment group in terms of demand for credit because the credit unconstrained households might not borrow any credit in a defined period but the credit constrained might borrow later. Defining the control group as those who did not participate in the microcredit programme at the survey period but would have participated in the microcredit programme later under time invariant condition provides a better assessment for the impact estimator (Sianesi, 2004). The comparison is then between the borrowers and the non-borrowers who did not borrow microcredit but would have borrowed credit in the next period. Therefore, our sample excludes the credit unconstrained households to help redefine the control group for matching purposes, given the time invariant household's characteristics.

In addition, as the defined sample includes households that were eligible to participate in a microcredit programme, this selection of the respondents maximises the possibility of collecting data that show accessibility to microcredit is highly associated with the observed factors. Given the self-selection bias in the sample (discussed in Chapter 6), the observed bias due to self-selection can be controlled for using the available observed factors. However, self-selection into a microcredit programme due to unobserved factors possibly occurs. For example, household heads having business skills or ability to start a small business tend to participate in microcredit programmes to obtain loans at a preferential interest rate. This unobserved factor not only biases the prediction of credit borrowing but also leads to bias in the impact evaluation of a microcredit programme on the households' outcomes such as income or consumption. Because such households can earn additional income that significantly improves their income level, this unobserved bias should be netted out in a programme impact evaluation. Treatment of the unobserved bias in the microcredit programme evaluation is beyond non-experiment data, particularly cross-sectional data. Because of individual heterogeneity and time varying effects one cannot construct the counterfactual for the treatment object to yield an unbiased comparison. However, minimising the bias from unobserved factors can be attained by using data on pre-treatment variables of interest in a cross sectional data survey (Lee, 2005).

To measure the consumption and income impact, this section uses the household monthly expenditure and income as the measurement of the outcomes. The pre-treatment household monthly consumption and income of a one year period before the impact evaluation are used

to test whether there is a relationship between the pre-treatment outcome and the unobserved factors, conditional on the observed factors. Mosley (1997) shows that the unobserved factors can be controlled for by using the pre-treatment outcome as the observed explanatory variable in the model, under the condition that the unobserved factor is a time-invariant effect on the outcome. Therefore, the pre-treatment data of household consumption and income were collected in the survey and are used in the impact evaluation to control for unobserved bias.

Table 7.1 Descriptive Statistics of Pre-treatment and Outcome Variables

Variables	Formal Borrowers (1)		Non-borrowers (2)		Difference (1)-(2)	Test statistics
	Mean	S.D.	Mean	S.D.		
Pre-treatment variables						
Pre-treatment monthly consumption	1.527	0.936	1.388	0.861	0.139	2.103**
Pre-treatment monthly income	2.705	2.642	2.589	2.620	0.115	0.607
Outcome variables						
Monthly expenditure	1.963	1.823	1.686	1.135	0.277	2.346**
Monthly income	3.086	3.106	2.854	2.889	0.234	1.064
Number of observations	598		282			

Source: The author's survey data

Notes: 1. Mean values are measured in 1,000 VND.

2. *, **, and *** indicate significance level at 10%, 5%, and 1%, respectively.

Table 7.1 compares the means of houssehold monthly expenditure and income in the pre and post-treatment periods. The pre-treatment monthly expenditure is significantly different at the 5% level between the two groups but the pre-treatment monthly income difference is statistically insignificant. This means the initial household monthly expenditure is greater in the borrower than the non-borrower group. Similarly, the difference in household monthly expenditure in the post-treatment period between the borrower and non-borrower is significantly different at the 5% level but is not significantly different for household monthly income. This result is similar to Setboonsarng and Parpiev's (2008) study in Pakistan where the borrower group was initially wealthier in terms of household consumption and food expenditure than the non-borrower group. The authors argued that if these initial differences are not controlled for in estimating the impact, it is likely that one would overestimate the impact of microcredit.

7.1.2 Estimation Strategies

The coefficient of the average impact of treatment on the treated of microcredit programme δ_{PSM}^{ATT} is obtained using the PSM method, based on the following specficiation:

$$\delta_{PSM}^{ATT} = E(Y_1 \mid X, D=1) - E_X[E(Y_0 \mid X, D=0) \mid D=1] \quad (7.1)$$

where Y is the outcome of interest, i.e., household's monthly expenditure and income (measured in million VND). D is programme participation; $D=1$ if a household is a programme participant; $D=0$ otherwise. X is a covariate of the observed factors including the household head's characteristics (such as age, gender, ethnicity, married, education), the household's characteristics (credit group member, poor certificate, household size, number of children, land holding status, main income source), and geographic factors (village and commune factors). In addition, the pre-treatment household consumption and income in 2008 are also included in the covariate to explain the programme impact estimator for each outcome of interest. The chosen variables in the covariates are drawn from the previous chapter, which showed a high predictive power of credit participation (equation 6.2) conditional on the explanatory variables.

Selection of the covariates to control for individual heterogeneity follows the rules that the variable should simultaneously influence the programme participation and the outcome (Caliendo & Kopeinig, 2008). Therefore, our covariates are selected from the variables that were significant in determining credit participation in the previous analysis and they were reported to be correlated with the consumption and income outcomes in other empirical studies. For example, household characteristics such as education and household size were strongly associated with income and consumption outcome in microcredit studies (see Imai, Arun, & Annim, 2010; Nguyen, 2008 for detail). Given the covariates significantly control for the fact that borrowers are not a random group of participants, households are assumed to be time invariant during the comparison period. Once the conditions are satisfied, the impact estimators can be obtained from different matching procedures.

The matching procedure consists of the following steps. The estimation begins with selecting the variables for the covariates to define the probability of participation in a microcredit programme. Three different sets of covariates are defined for the consumption and income

estimators. The base covariate (C_1) for the consumption estimator includes: AGE, GENDER, ETHNIC, MARRIED, NO_EDUC, PRI_SCH, MID_SCH, HIG_SCH, GOV_EMP, CRE_MEM, POOR_CER, HHSIZE, NUM_CHIL, OWN_LAND, MI_FARM, MI_NONF, DRA_VIL, ECO_COM, and URB_COM. Covariate C_2 equals C_1 plus PRE_CONS, the pre-treatment consumption, which is expected to control for the unobserved factors that are likely to correlate with consumption in the pre-treatment period. Covariate C_3 equals C_2 plus ln IFL, which is expected to control for the external credit that affects the programme outcome. Because IFL significantly influences the probability of access to microcredit, this specification is also used to check for the sensitivity of the effect of the microcredit programme whether there is another lower level of treatment likely to affect the outcome (Lee, 2005). Similarly, the covariates I_1, I_2, and I_3 are specified for the income estimator, except that the PRE_INC is replaced for the PRE_CONS variable in the covariates I_2 and I_3.

Once the covariates are selected, the probabilities of participating in the VBSP microcredit programme are calculated using the probit model. Following this, the propensity scores are calculated based on these probabilities. Different distributions of the propensity scores obtained from the six covariates are documented in Appendices B-5 and B-6, and tests for balancing the group should be conducted to ensure that the mean propensity score is not different for the treated and control groups in each block for each model. This ensures a good comparison group is constructed from the selected covariates. If the balancing property is satisfied, common support is defined and used for matching purposes. Finally, Kernel (with the default bandwidth of 0.06) and Radius matching (with the default radius of 0.1) are used to perform the PSM for the credit impact on consumption and income. The estimated results for the microcredit programme impact estimators are presented and discussed in the following section.

7.1.3 Results and Discussion

7.1.3.1 Impact of VBSP Microcredit on Household Consumption

The estimated results of the probit models for propensity scores are reported in Appendices B-1 and B-2. Among the variables determining the propensity of participation in the VBSP microcredit programme, MARRIED, ETHNIC, GOV_EMP, CRE_MEM, POOR_CER, OWN_LAND, URB_COM, ECO_COM, and DRA_VILL are significant at the 10% level. In addtion, PRE_CONS and ln IFL are positive and significant at the 5% and 10% level,

respectively, in the covariates of the consumption models. For the income model, ln IFL is positive and significant at the 10% level but the PRE_INC is not significant in determining the propensity score. The Chi square test for each model shows statistical significance at the 1% level, indicating that the variables included in the model statistically explain the propensity scores used in the matching steps (see Appendices B-1 and B-2).

Based on the results of the probit models, the propensity scores for each covariate were estimated and all three specifications were balanced based on the balancing tests. The propensity distributions are shown in Figure 7.5 a, b, and c in Appendix B-5. To avoid repetition, only the kernel densities of the propensity scores when the pre-treatment expenditure and informal microcredit are included in the controlling covariate C_3 are discussed. The solid and long dash lines in Figure 7.1 describe the distribution of the propensity scores of the non-borrowers and borrowers, respectively. The propensity score ranges from 0.182 to 0.958 and from 0.254 to 0.994 for borrowers and non-borrowers, respectively; the mean scores are 0.578 and 0.727 for borrower and non-borrower groups, respectively. Given a substantial overlap in the distributions, the common support region is defined in the range from 0.250 to 0.994. This means the average treatment effect is restricted to the overlapping area whereby the non-borrowers are comparable with the borrowers based on their observed characteristics. Some non-borrowers who are not similar to borrowers in terms of the observed characteristics were not used in the comparison.

The estimates of the average treatment effect of the VBSP microcredit programme participation on the treated (ATT) are summarised in Table 7.2 for the three specifications using Kernel and Radius matching routines. The first column in Table 7.2 specifies the control variables in the propensity score function and the second column reports the treated and control used in the matching process. The last two columns display the ATT for household monthly consumption by Kernel and Radius matching; the standard errors are provided in parentheses. According to these PSM estimates, borrowers on average spent 265,000 to 274,000 VND per month more than their similar non-borrower counterparts. This comparison is based on matching 595 borrowers and 274 non-borrowers using the controlling variables in C_1. The matching results are statistically significant at the 1% level.

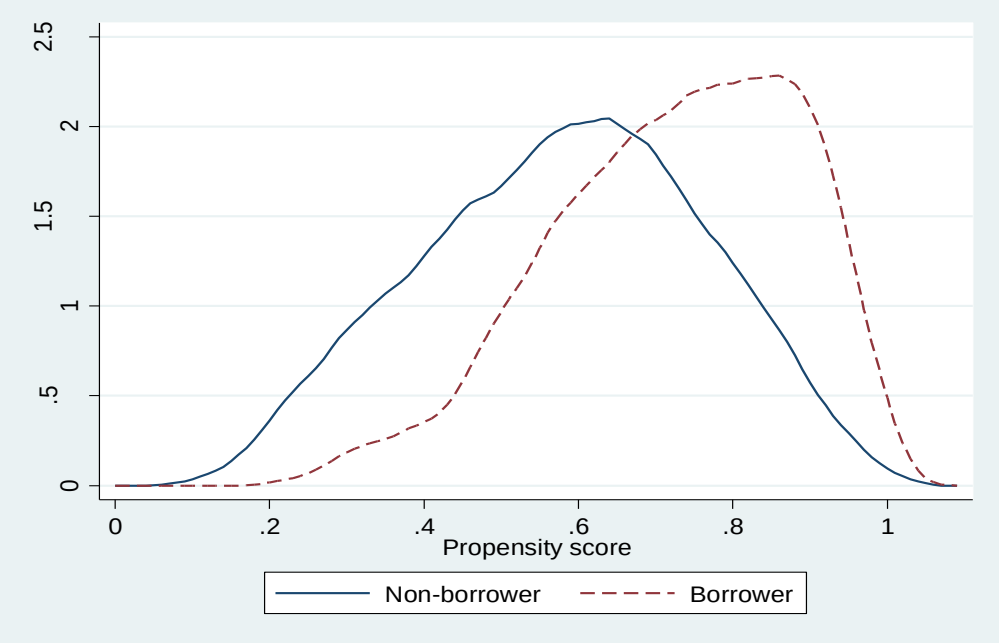


Figure 7.1 Propensity Scores of Borrowing Status Based on Covariate C3 for Household Monthly Consumption Impact

However, if pre-treatment consumption is included in the covariate to control for the unobserved factors then the difference in consumption declines to 138,000 VND and 196,000 VND for Kernel and Radius matching estimators, respectively (see Table 7.2). Although Kernel matching reduces the significance of the statistical test, both impact estimators are statistically significant at the 10% level. The results are similar to Doan (2011) whose study evaluating the impact of microcredit on the education spending of poor households indicates that the more pre-treatment included in the covariates will result in both the magnitude of the education spending impact and the significance level being reduced but the results are still statistically significant at the 10% level. Given the small trade-off between the reduced number of observations in the treated and control groups, including the household consumption in the pre-treatment period allows the observed variables to control for more differences and similarities in both groups, which generates a more reliable impact estimator.

The matching results for covariate C_3 show that both Kernel and Radius matching matched 592 borrowers to 270 non-borrowers and the programme is significant at the 10% level. The programme impact on household consumption ranges from 130,000 to 186,000 VND per month on the borrowers. The informal loan controls for the lower level of treatment effect; it slightly reduces the impact of the microcredit programme on household consumption. The

results provide two implications. First, households participating in microcredit have significant gains in consumption over non-participants. Secondly, the pre-treatment factors can also be used to control for unobserved factors that influence the probability of access to a microcredit programme. Including these pre-treatment factors allows the matching methods to control for unobserved bias in impact evaluation of a microcredit programme.

Table 7.2 The Average Treatment Effect on Household Monthly Consumption (in million VND) Using Matching Estimators

Control variables in the propensity score estimation	Treated/ control	Kernel matching	Radius Matching
Covariate 1 in probit estimation (C_1)	595/274	0.274 (0.113)***	0.265 (0.110)***
$C_2=C_1$+ PRE_CONS	595/274	0.138 (0.092)*	0.196 (0.093)**
$C_3=C_2$ + ln IFL	592/270	0.130 (0.092)*	0.186 (0.093)**

Notes: 1. Bootstrapped standard errors in parentheses with 1,000 replications.
2. *, **, and *** indicate significance level at 10%, 5%, and 1%, respectively.
3. C_1: AGE, GENDER, ETHNIC, MARRIED, NO_EDUC, PRI_SCH, MID_SCH, HIG_SCH, GOV_EMP, CRE_MEM, POOR_CER, HHSIZE, NUM_CHIL, OWN_LAND, MI_FARM, MI_NONF, DRA_VIL, ECO_COM, and URB_COM.
4. ln informal loan is obtained from Tobit estimation.

The findings are consistent with previous studies that employed a similar PSM. For example, Setboonsarng and Parpiev (2008) provide evidence of the microcredit impact on the poor in Pakistan. The impact of microcredit programmes significantly improved agricultural production, particularly animal raising. Similarly, Arun et al., (2006) find evidence of the impact of microfinance institutions on household poverty in India. Microcredit significantly reduces the poverty rate in all cases; borrowing for productive purposes has a larger impact in raising the index-based ranking (IBR) indicator for those above the poverty threshold. Furthermore, the findings support Pitt and Khandker (1998) whose study indicates that microcredit significantly improves a household's annual consumption and Nguyen's (2008) study that reveals a positive impact of microcredit programmes on household per capita consumption in Vietnam.

7.1.3.2 Impact of VBSP Microcredit on Household Income

Figure 7.2 shows the kernel densities of the propensity scores estimated for evaluating the impact of credit on household monthly income. The solid and dashed lines illustrate the distribution of the propensity score of the non-borrowers and borrowers, respectively. The

propensity scores range from 0.207 to 0.966 and from 0.274 to 0.994 for borrowers and non-borrowers, respectively; the mean scores are 0.583 and 0.724 for borrower and non-borrower groups, respectively. Given the substantial overlap in the distributions, the defined common support region ranges from 0.274 to 0.994; the average treatment effect is restricted to the overlapping area where the non-borrowers are comparable with the borrowers based on their observed characteristics.

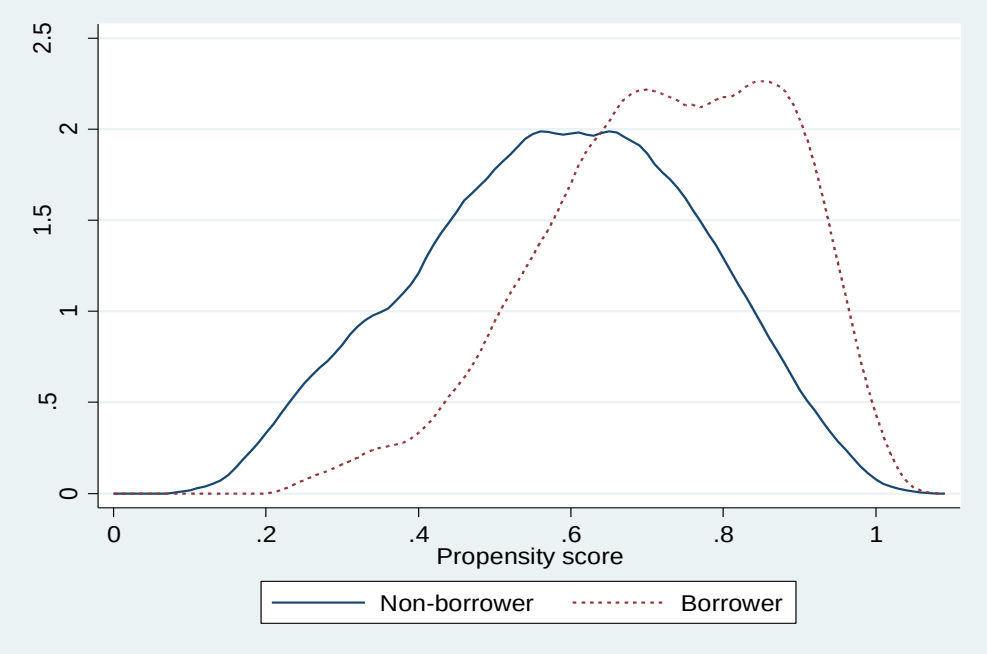


Figure 7.2 Propensity Scores of Borrowing Status Based on Covariate I3for Monthly Income Impact onRural Households

Three estimates of the credit impact on household monthly income are reported in Table 7.3. The results show that the effect of microcredit programme participation on income is not significant no matter which set of covariates and which matching approach is used. Interestingly, the impact of the microcredit programme on income approaches zero if the pre-treatment income and informal microcredit are controlled for in the covariates. The insignificant impact estimators of income is due to the fact that income has more variation than consumption but the mean incomes are approximately equal for the two groups. It is more likely that rural households have an unstable income from many sources, such as farming and non-farm activities, and these incomes vary differently between the borrower and non-borrower groups. As a result, comparing across the poor and low-income groups with large variation will likely yield insignificant results.

Table 7.3 The Average Treatment Effect on Household Monthly Income (in million VND) Using Matching Estimators

Control variables in the propensity score estimation	Treated/ Control	Kernel matching	Radius matching
Covariate 1 (I_1)	595/274	0.087	0.047
		(0.254)	(0.234)
$I_2 = I_1$ + PRE_INC	595/267	0.001	0.003
		(0.145)	(0.171)
$I_3 = I_2$ + ln IFL	592/263	-0.002	0.002
		(0.145)	(0.239)

Notes: 1. Bootstrapped standard errors in parentheses with 1,000 replications.
2. *, **, and *** indicate significance level at 10%, 5%, and 1%, respectively.
3. I_1: AGE, GENDER, ETHNIC, MARRIED, NO_EDUC, PRI_SCH, MID_SCH, HIG_SCH, GOV_EMP, CRE_MEM, POOR_CER, HHSIZE, NUM_CHIL, OWN_LAND, MI_FARM, MI_NONF, DRA_VIL, ECO_COM, and URB_COM.
4. ln informal loan is obtained from Tobit estimation.

Another possible explanation for the insignificant effect of the microcredit programme on income is that a microcredit programme provides small loans to help rural households to cope with risk and shocks in agricultural production. According to Morduch (1995), rural households cope with risk such as income fluctuation or low yield due to weather condition by either smoothing their income or consumption. First, households can smooth their income; this is often achieved by making conservative production or employment choices and diversifying economic activities. In this way, households take steps to protect themselves from adverse risk before they occur. Microcredit is used for non-farm activities such as small trade or stocking materials for handicrafts in order to diversify the household income. Second, the household can smooth consumption by borrowing and saving, depleting and accumulating nonfinancial assets. These mechanisms take force following unexpected events and help insulate consumption patterns from income variability. However, income and consumption smoothing are not tracked easily, tracking depends on how much constraint the household faces when dealing with certain kind of risk wherein one can dominates the other. Our findings imply that loans are likely to be used for the household's consumption needs before they are used for income generating activities. In this study, the consumption smoothing impact is believed to be stronger than the income smoothing impact.

The findings on income impact are consistent with Coleman's (1999) study in Thailand that provides inconsistent evidence of microcredit programme impacts on poor households. The impact was insignificant on a set of outcomes such as physical assets, savings and expenditure. The impact was significant and negative on expenditure for men's health care.

However, our findings contrast with a number of studies that showed a significant positive impact of microcredit on household income. For example, Hossain (1988) shows that Grameen Bank members realised incomes that were 28% higher than non-participants in all the 30 project villages under survey. Hashemi and Morshed (1997) observe that the Grameen Bank not only reduced poverty and improved welfare of participating households, but also enhanced the borrowers 'capacity to sustain their gains over time. Gibbons et al. (2000) report similar findings in Indonesia, Sri-Lanka and India. Recently, Sarangi's (2007) findings in India show a significant positive effect of programme participation by an increase in the income of poor households as the participants in the programme obtained easy access to formal microcredit from a group savings fund.

7.1.3.3 Poverty Targeting of VBSP Microcredit on the Poor

As microcredit targets the poor, our analysis tries to answer the question about the extent microcredit programmes impact the poor's outcomes. To answer the question, we used the subgroup of all households who were certified as poor households by the local authorities[25]. Choosing this subgroup of poor households faces the trade-off between the level of research interest and matching performance. The subgroup allows us to compare the poor's outcomes but it also reduces the number of treated and control observations. As the sample size gets smaller, the trade-off between bias and variance rises. The choice of the matching algorithm becomes important (Heckman et al., 1997). Caliendo and Kopeing (2008) suggest performing matching without replacement when there are a few control observations. Both the Kernel and Radius algorithm can perform multiple matching where the control unit can be matched with the treatment unit more than once. In total, 177 borrowers were matched with 46 non-borrowers.

The matching procedures follow the same steps as the previous matching. However, since the subgroup is the poor, the poor certificate variable is excluded from the covariates. The results of the probit models for the propensity scores are reported in Appendices B-3 and B-4. The informal microcredit coefficient is not significant in defining the probability of access to microcredit. Pre-treatment consumption is positive and significant in the probit model but the

[25]The definition of certified poor household in Vietnam is more stringent than the definition of poor by income bracket. The procedure of defining a poor household goes through the following steps. First, a poor household has to be a permanent residency in the commune in order to apply for a poor certificate and the household has to be recommended by his or her neighbours in the community. Then, a review based on the criteria such as main income, house condition, assets, etc., will be done yearly. If all criteria are met, a poor certificate is issued to the household.

pre-treatment income is not significant. Therefore, the covariates C_1 and I_1 are defined and the average treatment effect of microcredit on the poor is performed over the region of common support [0.327, 0.996].

The estimates of credit impact on income are reported in Table 7.4. The results show that the effect of credit participation on consumption is significant at the 1% level for Kernel matching and the 5% level for Radius matching but the impact on income is not significant. The consumption impact of microcredit is greater for the poor than for the low-income households. Specifically, the microcredit programme produces a consumption impact of 518,000 VND and 463,000 VND by Kernel and Radius matching methods, respectively. Although the income impact is not significant in both matching methods, the impact of the microcredit programme on income is greater than zero. This implies a positive role of microcredit in enhancing the rural poor but the result needs more validation to become conclusive.

There is a notable difference in the results between Table 7.4 and Tables 7.2 and 7.3. The results in sections (7.1.3.1 and 7.1.3.2) show that the microcredit programme has a positive impact on household consumption but it is insignificant on household income; the insignificant income impact is approaching zero. While the results in Table 7.4 also show the positive insignificant impact of microcredit on household consumption but insignificant impact on household income. The comparison shows the magnitude of the impact on consumption for only the rural poor is higher than that result for the rural household. The possible explanation for this result is that microcredit is designed to reduce the credit constraint on poor households under conditions that the relationship between microcredit investment and income is positive, therefore, microcredit is expected to increase household income and consumption. Remenyi et al. (2000) argue that the amount by which income increases due to microcredit cannot be determined easily. The income effect of microcredit is transferred through many stages from technical changes in household production to output changes subject to market conditions, which leads to a savings change in the household. These changes comprise the ‘multiplier effect on income and saving’ before any real income changes can be realised. As a result, the empirical findings of the microcredit impact on household income are usually inconsistent in determining the impact of microcredit (for example, see Coleman, 1999; Pitt & Khandker, 1998). Although our findings do not confirm a

positive impact of microcredit on poor households, the results show a positive sign in income impact from microcredit participation for the poor.

Table 7.4 The Average Treatment Effect on Household Monthly Consumption and Income (in million VND) Using Matching Estimators

Control variables	Treated/ Control	Kernel Matching	Treated/ control	Radius Matching
Covariate C_1 excluding poor certificate	177/46	0.518 (0.226)***	123/38	0.463 (0.201)**
Covariate I_1 excluding poor certificate	177/46	0.434 (0.318)	177/35	0.388 (0.725)

Notes: 1. Bootstrapped standard errors in parentheses with 1,000 replications.
2. *, **, and *** indicate significance level at 10%, 5%, and 1%, respectively.
3. C_1 and I_1: AGE, GENDER, ETHNIC, MARRIED, NO_EDUC, PRI_SCH, MID_SCH, HIG_SCH, GOV_EMP, CRE_MEM, HHSIZE, NUM_CHIL, OWN_LAND, MI_FARM, MI_NONF, DRA_VIL, ECO_COM, and URB_COM.
4. ln informal loan is obtained from Tobit estimation.

Many empirical findings indicate that microcredit programmes do not benefit the poor much in terms of outreach; the proportion of poor participants is smaller than non-poor participants in microcredit programmes (Nguyen, 2008). Once the non-poor group is separated, our results show that the income impact tends to diminish compared with low-income and poor households but the income impact emerges if the poor group is restricted in the comparison. This implies the 'true poor' group is likely to benefit more from involvement with a microcredit programme than low-income households. This finding is consistent with the consensus that a well-designed credit scheme can raise the income of significant numbers of the poor across countries such as Indonesia, Bangladesh, Sri Lanka, and India (Hulme & Mosley, 1996).

While PSM is a useful tool to control for bias due to observed factors in impact evaluation, the results have to be interpreted with caution as shown in the discourse between Smith and Todd (2005) and Dehejia (2005) particularly with matching based on cross-sectional data. First, unmeasured characteristics or time effects cannot be controlled for by cross-sectional data. Second, bias associated with cross-sectional matching estimators may be large without a good set of covariates or if treated and control households are not strictly comparable, for example, located in different markets (Smith & Todd, 2005). Therefore, methods controlling for unobserved bias such as the FE model using panel data are recommended if data are

available. Given the availability of a panel dataset to control for unobserved bias, estimating microcredit programmes using the fixed effect model is discussed in the next section.

7.2 Impact of Access to Microcredit Programme on Rural Houaeholds: An Impact Evaluation of Panel Data

7.2.1 Data for Impact Evaluation

Data used for impact evaluation of the microcredit programme in this section were drawn from the 2006 and 2008 VHLSS surveys. The two datasets form a panel dataset of 4,127 households which are representative of the whole country; the data also form a panel dataset of 866 households that is representative for the MRD (see Table 5.6 for description).

Panel data used to estimate the unbiased programme impact require the two years' data to be collected before and after the programme implimentation, respectively. In other words, we need to have baseline data beforethe VBSP microcredit programme officially established and implemented in 2003 and one postperiod. Since our first dataset was collected in 2006 when the VBSP microcredit programme was already in operation, Nguyen (2008) raises concerns of bias in programme impact using only the post-programme data because there may be significant differences between the control and treated groups in the first period. Therefore, adjustmentsare required before the panel data can be used in the FE model.

7.2.2 Estimation Strategies

To deal with the data issue, we consider estimating PSM in the first period to match the borrowers with the non-borrowers using a set of observed characteristics. The PSM creates a new panel dataset that consists of the borrower and non-borrower groups that are more comparable in terms of the observed characteristics than the original panel data. The comparison between the borrowers and non-borrowers is now performed over a common support region with similar characteristics.

The purpose of this step is to remove the observed heterogeneity in the initial period before using the FE model (see Heckman et al., 1998 for detail). Following the estimation strategies for PSM in chapter 6,the observed characteristics including individual, household, village and commune factors in the covariates are documented in Appendix B-7.

Given the matched pre-programme attributes from the PSM and under exogeneity of programme participation, the programme impact estimator can be obtained from the equation (4.37) in chapter 4. The model is rewritten as follows:

$$Y_{it} = \alpha_0 + \delta_0 D_t + \boldsymbol{X}'_{it}\mu_i + \phi I_{it} + \nu_i + u_{it} \tag{7.2}$$

where the programme participation variable, I_{it} replaces $D_i D_t$ which takes the value of 1 if household i borrows microcredit in the post-programme period and 0 otherwise. The parameter of interest, ϕ, is the impact estimator measuring the effect of microcredit programme on the outcome variables. Y is the outcome of interest, measured by the household consumption or income in natural logarithms. D_i is the programme participation dummy variable which takes the value of 1 if household i belongs to the borrower group and 0 otherwise. D_t is a time dummy variable equal to 1 for t=1 (post-programme period) and 0 for t=0 (pre-programme period). The coefficient δ_0 captures the aggregate time influences on both groups. $\boldsymbol{X}_{it}$ is a vector of household characteristics (e.g., age, gender, household size, etc.); μ captures the effects of the observed covariates on the outcome for each time period, v_i is a time-invariant unobserved error and u_{it} is the idiosyncratic error.

Given the microcredit impact, to what extent does the impact of the microloan size have on the outcomes? Nguyen (2008) shows that when the amount of formal microcredit (ML) replaces I_{it}, the impact estimator ϕ is interpreted as the impact of an addtional amount of microcredit on the participant. In addtion, the specification allows the ML to enter the FE model as an exogeneous variable that indicates a possible correlation between the microcredit and time-invariant individual unobserved factors. The estimated model for a ML in the outcome equation is rewritten as follows:

$$Y_{it} = \alpha_0 + \delta_0 D_t + \boldsymbol{X}'_{it}\mu_i + \phi ML_{it} + \nu_i + u_{it} \tag{7.3}$$

Unbiased estimators in equations (7.2) and (7.3) can be obtained using a FE model that is able to deal with the individual unobserved time invariant errors (Wooldridge, 2005). However,

microcredit participation and formal microcredit are possibly endogenous in equations (7.2) and (7.3). Endogeneity probably occurs if the assumption of unobserved factors at the household, village and commune levels does not remain fixed. For example, time varying unobserved factors of different microcredit schemes such as expanding lending coverage or a change in lending regulations that might jointly influence credit participation and formal microcredit at the borrowing period but also influence households' consumption or income over a longer period of time. Households adjust credit demand and consumption according to such changes. If I and ML are not exogenously defined the households' outcomes, e.g., households within the programme villages self-select into the microcredit programme which depends on differential unobserved trends, biased estimators are likely obtained from the standard FE models (7.2 and 7.3), respectively. Therefore, Khandker (2005) suggests testing for endogeneity to detect whether the FE method is sufficient for the exogenous programme impact or if instrumental variables (IV) are needed for identification of endogenous programme impact.

To overcome the potential endogeneity, this study used two candidate IVs, the commune poverty rate and the distance from village to the nearest bank, to test the endogeneity of ML in the programme impact in equation (7.3). The commune poverty rate provides a correlation between microcredit and households' criteria of programme selection. The poverty rate of the commune is suggested to control for time invariant unobserved factors because it is one criterion that makes a microcredit programme available to poor households. However, a commune that has a large number of poor households will have a large number of potential participants in the programme. Nguyen (2008) argues that when there are many applicants for credit borrowing, credit groups and commune heads tend to screen the applicant list more carefully because they have the responsibility of ensuring the repayment rate of the borrowers. More applicants are likely to be excluded from the borrowing list. As a result, an eligible household that is in a commune with a large number of poor households is likely to face a higher competition in borrowing from the programme.

The second IV is distance from a village where households are located to the nearest bank. Although there is no confirmed information on whether the closest bank branch is a VBSP branch, the nearest bank can be any commercial bank, including VBSP. However, the coverage of VBSP has been expanded to reach rural areas and many bank branches are often

located close to each other in the commune centre. Households in a village that is closer to a VBSP branch are more likely to obtain microcredit than more distant households.

Equations (7.2) and (7.3) were estimated using fixed effects models with the specified instruments. The estimated results are documented in Appendices B-8 and B-9. Before the estimated coefficients could be interpreted, different tests were conducted including tests for underidentification, endogeneity, weak identification and instrument-robust inference. The test results are documented in Appendices B-10 and B-11. First, the test for under-identification concludes that all models are not under identified. Given the potential endogeneity problem of microcredit programme participation and microcredit in equations (7.2) and (7.3), the test for endogeneity confirms that programme participation and microcredit were endogenously defined with consumption and income in the fixed effects model. Therefore, the instrumental variable fixed effects models (IV-FE) were used to obtain the unbiased estimators for the microcredit programme participation and microcredit impacts. The results of the first stage of the FE models show that only the "commune poverty rate" is significantly correlated with microcredit programme participation at the 1% level. The higher the poverty ratio in the commune, the lower is the chance of participation in a microcredit programme. High poverty rate means many eligible households live in the area, thus it increases competition of being selected and reduces the chance of participation in the microcredit programme. Controlling for this factor, the IV-FE estimation can resolve the biased impact estimators due to the endogeneity problem.

Although the IV can be significant in the regressions on the endogenous variables, i.e., the microcredit programme participation and the microcredit, they can be weakly correlated with the endogenous variables. The problem of weak identification causes the traditional 2SLS estimator not to function well and the inference from the estimates will not be reliable. Therefore, a test for weak identification of instruments is suggested using the Cragg-Donald statistic (Cragg & Donald, 1993; Stock & Yogo, 2002). The test results for weak identification of instruments indicate that the instruments are not weak for the Vietnam sample but rather weak for the MRD sample (see Appendices B-10 and B-11). In addition, tests for instrument-robust inference were performed to assure all the coefficients are able to be inferred under the present of heteroskedasticity. All the estimated results are obtained using Generalised Method of Moment (GMM) with IV because the IV-GMM class allows for

arbitrary heteroskedasticity with smaller standard errors hence its estimation gains are more efficient than the 2SLS (Baum, 2009; Wooldridge, 2002).

7.2.3 Results and Discussion

This section presents the empirical findings of the VBSP microcredit programme participation and microcredit impact on household consumption. Tables 7.6 and 7.7 summarise the estimated results of the four IV-FE models for microcredit programme participation and microcredit impact on household consumption and income. Each table has two sets of results, one for the MRD and another for Vietnam. The first set includes the results of the microcredit programme impact on household consumption (model E_1) and microcredit impact on household consumption (model E_2) using the MRD sample and likewise for household income (models I_1 and I_2). The last two columns are the results for microcredit programme impact (model E_3) and microcredit impact (model E_4) using the Vietnam sample and similarly for household income (models I_3 and I_4). The per capita expenditure and income in real terms are used to measure household consumption and income in the models, respectively[26]. Only the significant variables in the models are reported, non-significant variables are documented in Appendices B-8 and B-9. The coefficients of the IV were estimated in the first stage regression but for the purpose of identifying the impact coefficients, the IV will also be discussed. Since the estimated results (models E_1, E_2, and I_1, I_2) for the MRD are subject to weak instrument identification, the estimated results (models E_3, E_4 and I_3, I_4) for Vietnam are mainly discussed. Unless otherwise stated, all explanatory variables are mainly discussed using the results of the IV fixed effects models (E_3 and I_3) for the programme impact. Given that the determinants of consumption and income were identified, the treatment variables microcredit programme participation and microcredit are discussed for the average treatment on the treated (ATT) and the average treatment of additional microcredit on the treated (ATT_M), respectively.

7.2.3.1 Impact of the VBSP Microcredit on Household Per Capita Consumption

Table 7.6 shows that for individual factors, only the ETHNICITY variable is negative and significant at the 1% level. The negative significant coefficient of ethnicity indicates that household heads belonging to an ethnic group have a lower per capita consumption than the

[26] To obtain the real term, first nominal data were adjusted for monthly price changes over the survey periods and then regional price differences over each survey. Next, the annual CPI was used to bring survey data to the base line year. Hence, all results in this section were reported in the real term.

main ethnic group. Economic theory of consumption suggests that ethnicity is included as a heterogeneous individual factor in the determinants of household consumption (Buse & Salathe, 1978). The difference in ethnicity contributes a 2% difference in household expenditure, holding other factors constant. The result implies a difference in per capita consumption by race, which has been documented in empirical research and official reports in Vietnam (see Haughton, Haughton, & Phong, 2001).

Table 7.5 Summary of Significant Variables of IV Fixed Fffects Estimations for Household Per Capita Expenditure

	The MRD		Vietnam	
	ln per capita Expenditure (E1)	ln per capita Expenditure (E2)	ln per capita Expenditure (E3)	ln per capita Expenditure (E4)
Impact estimators				
Participation in VBSP	2.1150***		1.4140***	
ln Microcredit		0.3530**		0.3120***
Individual factors				
ETHNIC	0.0210	0.0963	-0.0199***	-0.0246*
SEC_SCHO	0.0522	-0.0758	0.0768	0.1620*
UNI_DEGRE	0.4710***	0.2950	0.1450	0.5990**
POST_GRAD	0.5470**	0.2250	0.2730	0.3810
Household factors				
HHSIZE	-0.0704**	-0.1040**	-0.0917***	-0.1100***
R_FEMALE	-0.4380*	-0.6410*	-0.0121	-0.0765
R_BELOW 16	-0.4330	-0.5570	-0.3780***	-0.5590***
R_PRI_SCHO	0.00562	-0.1800	0.1460*	0.1140
R_SEC_SCHO	-0.0628	-0.2150	0.1970*	0.1560
R_HIG_SCHO	0.5030	0.8060*	0.2070	-0.0080
NUM_SDAYS	0.0081*	0.0036	0.0028	0.0031
LAND_ACROP	3.32e-06*	3.53e-06**	3.08e-06**	2.15e-06
LAND_PCROP	2.52e-05*	1.95e-05	2.32e-07	-7.73e-08
LAND_WSURF	1.02e-05**	1.25e-05***	1.01e-05***	8.73e-06***
RE_OVERSEAS	7.25e-06	1.06e-05	2.97e-06**	4.41e-06**
RE_DOMESTIC	2.32e-05***	3.03e-05***	1.31e-05***	1.37e-05***
PENSSION	4.12e-05**	5.40e-05**	1.56e-05**	2.40e-05*
SAVINGS	2.56e-05**	2.38e-05	1.64e-05***	1.65e-05***
POOR_CER	-0.0311	-0.2160	-0.1410**	-0.2620**
Village and commune				
DE_CENTER	0.0102	0.0189*	0.0009	0.0034*
NF_ENTER	-0.0591	-0.0054	0.0904***	0.1740***
Instrumental variables				
D_NBANK	0.0307	0.2260	-0.0239**	0.0683
R_POVERTY	-0.8520***	-4.5710**	-0.8000***	-3.2730***
Number of observations	1,052	1,052	5,096	5,096

Notes: 1. *, **, and *** indicate significance level at 10%, 5%, and 1%, respectively.
2. The coefficients of instrumental variables are estimated in the first stage.
3. [a] in (million VND)

Among the household factors, the variables HHSIZE, R_BELOW16, R_PRI_SCHO, R_SEC_SCHO, LAND_ACROP, LAND_WSURF, RE_OVERSEAS, RE_DOMESTIC, PENSSION, SAVINGS, and POOR_CER significantly explain household expenditure (see Table 7.6). The negative coefficients of the HHSIZE and R_BELOW16 are significant at the 1% level. Household size and number of household members below 16 years old are negatively correlated with household per capita expenditure. An increase in family members in a household significantly reduces 10% of per capita expenditure whereas an increase of 10 percentage points of the ratio of member below 16 years old decreases as much as 5% per capita expenditure. The significant negative coefficient of POOR_CER at the 5% level indicates that poor certified households also have less per capita consumption than non-poor households. Holding other variables constant, the households with a high ratio of members below 16 years old spend 37.8% per capita expenditure less than the average per capita expenditure.

The coefficients of the R_PRI_SCHO and R_SEC_SCHO are both positive and significant at the 10% and 5% level. The results show that the expenses of children's primary and secondary schooling are important expenses in a household's expenditure. Households having children in primary and secondary school require 14.5% and 19.7% more spending, respectively. The results reflect the common spending pattern in the Vietnamese households that suggests spending on education takes an important share of the household budget because most Vietnamese families expect higher return from education (Doan, 2011). Therefore, they tend to prioritise human capital investment in their total spending, including in rural poor families.

The contributors to household expenditure are LAND_ACROP, LAND_WSURF, RE_OVERSEAS, RE_DOMESTIC, PENSION, and SAVINGS. The significant positive coefficients of LAND_ACROP and LAND_WSURF at the 5% and 1% levels suggest that annual crop land and areas of water surface for aquaculture positively increases the household per capita expenditure. The other significant positive coefficients, RE_OVERSEAS, RE_DOMESTIC, PENSSION, and SAVINGS, indicate that household per capita expenditure is supported by overseas remittances, domestic remittances, pensions, and savings. The remittances – money and goods – sent back home by overseas migrant workers have a profound impact on the living standards of people in developing countries in Asia (Adams & Page, 2005). Consistently, the coefficients of both overseas and domestic remittances are

positive and significant at the 5% level. Overseas remittances suggest an external source of money sent from family members working or living overseas to support household consumption in Vietnam. On the other hand, the significant positive coefficient of RE_DOMESTIC at the 1% level indicates that domestic remittances from family members working away from home largely support household spending, particularly rural households. International remittances reflect the economic relationship between high income and low income countries and the internal remittances suggest a wage discrepancy and job opportunities between the rural and urban areas in a country. Our results indicate a greater weight of domestic remittances over overseas sources in the determinants of household consumption in rural Vietnam. Additionally, the significant positive coefficients of pensions and savings at the 5% and 1% level, respectively, show they are two important contributors to the determinants of household consumption (see Table 7.6).

The coefficient of commune with the non-farm enterprises is positive and significant at the 1% level. This means having non-farm enterprises located in the commune significantly contributes to household consumption. This finding is consistent with the view of the role of non-farm sectors in economic development. Lanjouw and Lanjouw (2001) emphasise that the non-farm sector potentially absorbs a growing rural labour force in slowing rural-urban migration and improves equitable income distribution. Consistent evidence is also found for the significant positive coefficient of non-farm enterprises affecting household per capita income (see Table 7.6). The combined results are consistent with Oostendorp, Trung and Tung's (2009) study which shows non-farm enterprises play an important role in increasing income and reducing income inequality in Vietnam (see Table 7.6).

For the two IVs, the D_BANK and R_POVERTY coefficients are negative and significant at the 5% and 1% level, respectively (see Table 7.6). The results indicate that the ratio of poverty rate at the commune and distance to the nearest bank are negatively correlated with credit accessibility. The result strongly supports our hypothesis that a higher poverty ratio reduces the possibility of being selected in a microcredit programme and households in a village that is closer to a VBSP branch are more likely to obtain microcredit than more distant households. The findings are consistent with Nguyen's (2008) finding in Vietnam that shows a negative relationship of the two IVs, therefore, they are significantly valid IVs for microcredit impact in our study.

The impact estimator for household per capita expenditure is positive and significant at the 1% level. The result indicates that the VBSP microcredit programme participation significantly helps increase the participants' consumption in Vietnam. The result reconfirms the positive impact of a microcredit programme on the consumption indicator of welfare. Our finding is consistent with a number of findings in microcredit literature such as Pitt and Khandker (1998), Mosley(2001), Setboonsarng and Parpiev (2008), and Islam (2010), among others. Particularly, the result is consistent with Nguyen's (2008) findings in Vietnam and it also supports Khandker's (2005) findings in Bangladesh.

7.2.3.2 Impact of the VBSP Microcredit on Household Per Capita Income

Table 7.7 shows the HIG_SCHO and POST_GRAD coefficients are positive and significant at the 10% and 1% levels, respectively. This indicates that a significant increase in the household income is associated with higher education attainment of the household head. The result is consistent with Doan and John (2010) who indicate that the trend of returns on education had sharply increased after Vietnam's economic transition. Particularly, the returns to education significantly contributed to income growth at their peak rate.

In the household factors, three negative and significant contributors to the determinants of household income are HH_SIZE, R_BELOW16, and POOR_CER. The negative effect of the household size, ratio of household member below 16 years old, and household having a poor certificate is derived in a similar manner as the determinants of consumption. The remaining positive and significant factors are R_WINDUS, R_WSERV, LAND_ACROP, RE_OVERSEAS, RE_DOMESTIC, PENSION, and SAVINGS. Significant differences in the results of the consumption and income models are the ratio of members working in industry and services that are positive and significant at the 1% level. The results indicate that households with members working in the industry or service sectors significantly increases the per capita income. This result strongly supports the trend since the mid 1990s of the shifting of labour supply in agriculture to the other sectors. The main reasons were documented by Haughton et al. (2001) that the share of hired farm workers without annual cropland was only 55% of the agriculture work and that landless households were forced to work outside the agriculture sector. The share of workers in the agriculture sector has been declining. As a result, the share of income from the non-agriculture sector significantly constitutes the rural household income and the bulk of poor and low income households are still among self-employed farmers.

Table 7.6 Summary of Significant Variables of IV Fixed Effects Estimations for Household Income Per Capita

	The MRD		Vietnam	
	ln per capita Income (I_1)	ln per capita Income (I_2)	ln per capita Income (I_3)	ln per capita Income (I_4)
Impact estimators				
Participation in VBSP	1.6660**		0.8370***	
ln Microcredit		0.2540**		0.1620***
Individual factors				
ETHNIC	0.0843	0.1370*	-0.0116	-0.0137
HIG_SCHO	0.3340*	0.3200	0.0600	0.0880
POST_GRAD	1.3010***	1.0690***	0.1860	0.2200
Household factors				
HHSIZE	-0.0552*	-0.0819**	-0.0889***	-0.1000***
R_FEMALE	-0.6120**	-0.7690**	-0.1200	-0.1550
R_BELOW 16	-0.5230*	-0.5820	-0.3650***	-0.4560***
R_WINDUS	0.1040	0.2140	0.3200***	0.3230***
R_WSERV	0.0909	0.1200	0.3770***	0.3440***
R_PRI_SCHO	0.0207	-0.1120	0.1850**	0.1650
R_SEC_SCHO	0.1110	0.03210	0.2110**	0.1980
R_UNI_DEGRE	-1.5380**	-1.5200**	0.3360	0.3110
LAND_ACROP	1.28e-05***	1.30e-05***	1.16e-05***	1.12e-05***
LAND_PCROP	2.77e-05*	2.33e-05*	2.44e-06	2.54e-06
LAND_WSURF	5.26e-06	6.99e-06*	5.64e-06	5.11e-06
RE_OVERSEAS	1.47e-05***	1.69e-05**	1.43e-05***	1.49e-05***
RE_DOMESTIC	2.21e-05***	2.74e-05***	1.73e-05***	1.76e-05***
PENSSION	6.66e-05***	7.47e-05***	2.41e-05***	2.79e-05***
SAVINGS	1.34e-05	1.21e-05	1.64e-05***	1.65e-05***
POOR_CER	0.0199	-0.1190	-0.1540***	-0.2120***
Village and commune				
CR_COMMUNE	0.1160	0.2300	0.1150	0.1940*
NF_ENTER	0.0374	0.0817	0.0831***	0.1270***
GEO_MIDLAND			-0.1840**	-0.1620
Instrumental variables				
D_NBANK	0.0323	0.2390	-0.0236**	0.0702
R_POVERTY	-0.8200***	-4.2970**	-0.7980***	-3.2530***
Number of observations	1,050	1,050	5,094	5,094

Notes: 1. *, **, and *** indicate significance level at 10%, 5%, and 1%, respectively.
2. The coefficients of instrumental variables are estimated in the first stage.
3. [a]in (million VND)

There are some notable differences between the results in Table 7.7. First, the ETHNIC coefficient has mixed signs, which shows an inconsistent relationship between ethnicity and income. Ethnicity is positively significant at the 10% level in model I_2 and positive but insignificant in model I_1, and it is negative and insignificant in the other models (I_3 and I_4). The results imply that ethnicity is significantly correlated with household income in the MRD where there are few numbers of ethnic minorities such as Khmer, Chinese and Cham whose income levels are significantly unequal. However, when ethnicity is investigated at the

national level with a wider range of ethnic minorities with different geographic and economic conditions from mountainous and remote areas, the impact is insignificant and inverse. The finding is consistent with Nguyen et al.'s (2007) findings that show ethnicity is one of the determents of the income gap. In addition, the coefficient of geographic factors is negative and significant at the 1% level for mid land and hilly land areas. If we consider the MRD only, geographic factors do not vary but geographic effects become significant at the national level. The result indicates that a lower income is closely related to mid land or hilly land areas across the country.

The positive and significant coefficients R_PRI_SCHO and R_SEC_SCHOO both at the 5% level indicate a similar explanation for income model. As education expenses are higher, these households are believed to earn a significant higher income that are 18.5% and 21.1% higher than households without having primary and secondary schooling children (see Table 7.7). It is noted that the ratio of household member schooling can have an inverse effect if more household resources have been allocated for higher education level. For example, the negative and significant coefficients of the R_UNI_DEGRE are reported in models I_1 and I_2. This is expected because the coefficient of the ratio of university degree means household members engaging in higher education level have used more household resources but have yet contributed to per capita income.

For the two IVs, both the D_NBANK and R-POVERTY coefficients are negative and significant at the 5% and 1% level, respectively. Their signs and significance levels remain consistent with the expenditure models; therefore, similar possible explanations apply. However, the D_NBANK is negative and significant in both E3 and I3 (see Table 7.6 and 7.7) but it is positive and non-significant in the rest of the models. The repeated inconsistent results may arise from two possibilities. First, the inconsistency may arise from missing data at the commune level because of mismatched communes from merging the commune and household datasets. Some communes in the VHLSS survey data for commune were not interviewed in the same VHLSS surveys for households. As a result, D_NBANK is a valid instrument for the credit participation at the national level but may be invalid for the microloan and for the MRD models. In addition, as pointed out by Nguyen (2008), the distance from a village where the households are located to the nearest bank does not guarantee that the bank branch is a VBSP branch; the nearest bank can be any commercial bank, including VBSP. The distance is probably an inaccurate proxy for many observations.

Moreover, the coverage of the VBSP microcredit programme has been expanded over time. Increased lending to groups has been organised in villages where microcredit groups can be formed by credit group members with the presence of village heads or local authorities rather than just lending to individuals at the VBSP branch. Therefore, the time varying effects could possibly make this variable an inappropriate proxy for VBSP credit availability in the current context.

The impact estimator for household per capita income is positive and significant at the 1% level. As real income data were used, the result indicates that the VBSP microcredit programme significantly increases the participants' real income. The result confirms the positive impact of microcredit programmes on real income of welfare. This evidence is consistent with the findings of Zaman (1999), Sarangi (2007), Nguyen (2008), among others but contradicts with Coleman (2006) whose finding show an unclear impact of a microcredit programme on income indicators in Thailand.

7.2.3.3 A Summary of Impact Estimators in the Models

Table 7.8 summarises the impact estimators of the VBSP microcredit programme to provide a comparison between the programme and microloan impacts on household consumption and income. It also compares the microcredit programme participation and microcredit impacts between the MRD and Vietnam. All the impact estimators are positive and significant relative to the household per capita expenditure and income. This finding suggests two important points: participation in a microcredit programme has benefited the target households and the marginal effect of microloan significantly contributed to either household consumption or income. There is a large difference in the magnitude of the impact, provided that endogeneity has been significantly controlled for in the models. The greater impacts of microcredit are found in the MRD than in the whole country for both the consumption and income models.

All the impact estimators are significant at the 1% level, while the MRD impact estimators of microcredit on consumption and income are significant at the 5% and 10% level, respectively. The significantly high magnitude of the MRD impact estimators at lower significance levels is largely due to two possibilities. The first is the smaller sample size of MRD that produces larger variances of the impact estimators in the model. Another possibility can be explained based on Morduch's (1998) claim about the weak instrument identification problem. As the

instruments were supposed to pick up any systematic heterogeneity such as land ownership, entrepreneurship skills, etc., that are correlated with programme participation, weak instrument identification found in models E_2 and I_2 indicates that the instruments fail to do so. As a result, the unobserved heterogeneity, for example, 'better borrowers' get bigger loans, yield what appears to be positive non-significant marginal impacts in the models.

Table 7.7 Summary of Impact Estimators of the VBSP Microcredit Programme Using IV-FE Models

Impact variable	The MRD		Vietnam	
	ln per capita Expenditure	ln per capita Income	ln per capita Expenditure	ln per capita Income
Programme participation	2.115***	1.666***	1.414***	0.837***
	[0.616]	[0.583]	[0.16]	[0.135]
Microloan (1,000 dong)	0.353**	0.254**	0.312***	0.162***
	[0.147]	[0.129]	[0.073]	[0.046]
Number of observations	1,052	1,050	5,096	5,094

Notes: 1. *, **, and *** indicate significance level at 10%, 5%, and 1%, respectively.
2. Robust S.E. (with sampling weight error corrected) are in brackets.

7.3 Chapter Summary

Using the cross sectional survey in 2010, the PSM estimates show that VBSP microcredit programme has a significant positive impact on household monthly consumption but no significant impact on household monthly income. Both kernel and radius matching estimators display similar estimates that are statistically significant at different levels. To account for possible unobserved bias, pre-treatment monthly consumption and pre-treatment monthly income were included. In addition, a lower level of microcredit impact was considered by including the informal microcredit in the covariates of PSM. Therefore, the matching should be less biased than the results from the OLS regression because matching compares borrowers with similar non-borrowers. In addition, the findings show a greater monthly consumption and income impact for the 'true poor' when only the poor group is included in the comparison. This implies the 'true poor' benefits more from involvement with a microcredit programme than low-income households.

Using the panel data of the 2006 and 2008 VHLSS surveys, the IV-FE models produce four impact estimators of VBSP microcredit on household consumption and income for the MRD and Vietnam. Controlling for heterogeneity at individual, household, village, commune, and

regional levels, the results document a positive and significant effect of the microcredit programme participation and microcredit on household per capita consumption and income at the national level. In addition, greater impacts were found in the MRD, assuming that the endogeneity was significantly controlled for in the models.

Policy implications from these findings require extra caution. Because the consistent impact estimators are estimated from the IV-FE models, instruments to counter endogeneity likely face weak instrument identification due to time varying effects. The IV, the poverty rate of the commune, remains valid but the IV distance to the nearest bank is not significant. Besides missing data at the commune level, other possible explanations for the invalidity of the instrument are because the economic condition dramatically changed or there was a significant improvement in institutional settings in the rural credit market.

Chapter 8
Conclusions

This chapter summarises the study. Section 8.1 presents a summary of the research objectives, data and methodology and Section 8.2 summarises major findings. Section 8.3 discusses the implications of the research findings and Section 8.4 discusses the research limitations and provides directions for future research.

8.1 Summary

The overall objective of this study was to address two main issues that explain how accessibility to microcredit, including formal and informal microcredit sectors and to what extent formal microcredit has impacts on rural households. There are four research objectives: (i) to review the Vietnam rural credit market and microcredit programmes targeting the rural poor household; (ii) to identify factors affecting microcredit accessibility, both loan amount of formal and informal microcredit; (iii) to evaluate the impact of the microcredit programme on rural household, including impact on income and consumption; and (iv) to identify policy implications towards improving microcredit accessibility and impact to rural households through improving government policies towards the rural credit market and rural household.

Chapter 2 provides an overview of the Vietnam rural credit market and microcredit programmes targeting rural poor households. The rural credit market in Vietnam is characterised as a segmented and emerging market wherein the growing demand for credit by poor and low-income households is unmet. There are three types of credit providers: formal, informal and semi-formal. The formal credit sector was driven by a series of institutional changes and credit policies designed to cover the credit demand of rural households, particularly the rural poor. An increasing number of loans in formal microcredit have been recorded but a large proportion of the poor are still unable to borrow from the formal microcredit sector hence seek an alternative source of credit. The informal credit sector, traditionally an alternative source to formal credit, is prevalent as the alternative for many rural households; it exists alongside the formal credit sector. The semi-formal microcredit sector, dominated by NGOs and donor support funds, began in the market in late 1990s, and has an increasingly important role in providing microcredit and microfinance services to the

poor but on a small scale. Limited access to formal credit not only constrains the rural households from expanding their production scales but also prevents farmers from improving their living conditions. Credit inaccessibility in the rural areas thus impedes the development of the rural sector, which potentially decelerates the development of the Vietnam rural economy.

Chapter 3 reviews the literature on accessibility to microcredit and microcredit programme impact on rural households. The review of literature on microcredit for both theoretical and empirical models suggests that asymmetric information (i.e., transaction costs) plays an important role in accessibility to credit and hence imposes credit rationing on borrowers. The government microcredit programme is designed to provide more microcredit access to the rural borrowers with collateral free using the third party's screening (i.e., the Peoples Committee of the village), but credit rationing still persists in lending due to third party's incentives (e.g., commission and responsibility to deal with default loans). Rural households, particularly the poor and landless households still have no access to many microcredit programmes; therefore, they seek alternative sources of credit. Informal microcredit relies on simple and flexible lending practices supplies credit to a large proportion of rural borrowers. The informal credit sector exists in the rural credit market; however, the literature shows a gap that there is little focus on how these two credit sectors interact to serve a wider range of rural borrowers. The gap is closely attributed to modelling and estimating issues. On one hand, including informal credit in the formal credit equation is not feasible because in the formal lending practice, loans are not given to a borrower based on the household's informal debt. On the other hand, specifying separate borrowing and loan amounts for both sectors in the model generates a multi-distributional problem in estimation.

In addition, the review focusing on the impact of formal microcredit programmes on rural households demonstrates microcredit programme impact on households remains questionable due to contradictory results from empirical studies. In fact, the results of microcredit programme impact studies are subject to biases because of missing data problem. In general, impact evaluation methods such as Matching or *DinD* deal with either observed or unobserved biases. Provided there is non-experimental data in the microcredit survey, no single method can entirely overcome bias; a combined method, therefore, can improve unbiased estimators of the impact evaluation.

Chapter 4 discusses a number of important issues in microcredit literature including asymmetric information, credit constraint and credit rationing, and consumption and established the empirical models for the research objectives 2 and 3. Various economic relationships have been established for empirical estimation in the theoretical models. Information asymmetry including transaction cost is the core of the lending principle that explains why lenders always select a certain borrower to grant a loan contract and hence there is always a mismatch between credit supply and demand in the formal rural credit market. This credit rationing creates credit constraints on the rural household, particularly the rural poor. Subsequently, the household consumption model shows that credit helps reduce constraints to working capital in agricultural production or in non-farm income generating activities, hence, enhances the household's consumption growth. Following the defined economic relationship, different empirical models were discussed. First, the credit accessibility model was specified to determine factors affecting the household's decision to borrow from the formal credit sector under the conditions that the informal sector exists and interacts with the formal sector in the credit market. The model is expected to achieve consistent estimators for the determinants of the household's access to the formal and informal credit under the credit rationing assumption, selection bias and interaction between the informal and formal credit. Next, the PSM method and the *DinD* approach used to assess the impact of a microcredit programme on household consumption and income were also discussed. These estimation strategies were proposed to obtain unbiased and consistent estimators, depending on the types of dependent variables as well as the nature of the dataset.

Chapter 5 supplements Chapters 2, 6 and 7. The description of the survey data and respondents provides an overview of the data obtained and used in the analysis of credit accessibility in chapter 6 and impact evaluation of cross sectional data in Chapter 7. Descriptive statistics provide variations and preliminary relationships of the explanatory variables in the models. Chapter 5 also provides an overview of how the rural credit market actually operates in the MRD. Particularly, the formal and informal lending were analysed based on individual, household, microcredit, and geographic factors. The descriptive analysis reflects the rural credit market in the MRD.

The research findings were obtained from Chapters 6 and 7 where accessibility to microcredit, amount of formal microcredit, amount of informal microcredit, and impact evaluation of microcredit programmes were investigated. Different estimation strategies were used in the

analysis. First, to obtain the determinants of informal microcredit, credit accessibility to formal microcredit, and formal microcredit, the conditional mixed process was applied. We used the conditional mixed process method to mimic the estimation strategies of the probit RHS, Tobit and Heckman 2step models in which the probit RHS and Tobit strategies were used to account for truncated and endogenous problems of informal microcredit in the accessibility to formal microcredit and the Heckman 2step strategies were applied to account for sample selection bias in the formal microcredit. Secondly, to obtain the impact estimators, the PSM method and *DinD* approach were chosen to counter with observed and unobserved bias. Under the condition that bias is controlled for using the observed covariates and pre-programme attributes, Kernel and Radius Matching were applied to estimate the impact of the microcredit programme on rural households using cross sectional data. To relax the assumption that allows both observed and unobserved factors to bias the impact estimators of the microcredit programme, the IV-FE model was applies on the panel dataset. Before the IV-FE was estimated, the PSM was applied to remove bias possibly due to data issue (i.e., post-programme implementation data). The findings from this study are summarised in the next section.

8.2 Major Findings

In the analysis of credit accessibility, we found that accessibility to microcredit programmes and informal microcredit are subject to endogeneity problems; informal microcredit positively influence accessibility to a formal microcredit programme. If a financially constrained household with high entrepreneurial skills has borrowed an informal loan, there is a higher probability that he or she will be able to access formal microcredit. The finding confirms the interaction between the formal and informal credit sectors where there is a positive relationship between the informal microcredit and access to formal microcredit. Given a particular informal debt, the household is more inclined to participate in a formal microcredit programme. Ignoring this interaction may result in the less desirable properties of the determinants that explain the households' decisions to participate in a microcredit programme.

Given the credit constraint and the coexistence of two credit sectors, the use of informal microcredit is positively influenced by the following factors: land holding status, informal loan purposes, informal interest, informal loan duration, and direct road access to the village.

Rural households in areas with direct road access to a town centre and with land ownership can obtain credit from the suppliers or traders but others with a higher demand for consumption might borrow more from friends, relatives or moneylenders. The flexible informal loan duration can compensate for the high interest rate. Hence, both factors result in a positive relationship with the informal loan. Informal credit is a prevalent source of trade and consumption credit for rural households, particularly the poor and low-income households because informal loans are accessible for this group. The findings indicate that informal credit plays an important role in meeting the credit needs of rural households. This includes not only households that fail to obtain financial support through formal channels (such as VBSP's microcredit programme), but also those who may be able to obtain formal credit but choose to borrow from informal lenders due to flexible lending schemes. Therefore, the existence of informal credit may not simply be a result of insufficient supply of formal microcredit or credit rationing by formal institutions but it may result from the development of the rural credit market itself. As the rural credit market evolves, the informal lenders' lending practice has been adjusted to suit the demand of distinct groups of borrowers. This also explains the persistent co-existence of formal and informal credit sectors in Vietnam.

The positive contributors to microcredit accessibility include being a local government employee, membership of credit group, and having a poor certificate. Working as a local government employee improves accessibility to formal microcredit through work relationship and it is considered as a bias in the selection process; improving accessibility to microcredit using the poor certificate is a social policy intervention. Lending through a group is considered a more appropriate improvement of accessibility to microcredit. Direct road access and ethnic concentration commune also improve accessibility to microcredit for rural households. These factors can be used in designing microcredit schemes that provide a good coverage to targeted poor household in rural areas. In addition, agricultural land ownership positively increases microcredit demand; capital for agricultural production results in a greater microcredit demand. Providing for agricultural production and education purposes are the main coverage of the formal microcredit programme; loans for other purposes are given but are of a smaller size.

From the PSM estimates using the 2010 cross sectional survey, we found that the VBSP microcredit programme has a significant positive impact on household consumption but no significant impact on household income. Both Kernel and Radius matching estimators

displayed similar estimates that were statistically significant at different levels. The findings are consistent even if a lower level of credit impact and pre-treatment consumption and income were included in the covariates of PSM to account for possible unobserved bias. The matching results should be less biased than the results from the OLS regression because matching compares borrowers only with similar non-borrowers.

Focussing on the poor, our results show a greater consumption and income impact for the 'true poor' when the comparison is restricted only to the poor group. This implies the 'true poor' benefit more from involvement with a microcredit programme than non-poor households. The findings reflect the paradox in microfinance that "Why doesn't capital naturally flow to the poor?" addressed by Aghion and Morduch (2005). This finding is consistent with the consensus that a well-designed credit scheme can raise the income of significant numbers of the poor across countries such as Indonesia, Bangladesh, Sri Lanka, and India (Hulme & Mosley, 1996). This suggests/provokes a need for many microcredit programmes in Vietnam with a poverty reduction aim to re-define their target clients.

From the IV-FE models using the panel data of the 2006 and 2008 VHLSS surveys, we find a significant impact of VBSP microcredit on household consumption and income. Controlling for heterogeneity at individual, household, village, commune, and regional levels, the results conclude a positive and significant effect of the microcredit programme and microcredit on household per capita consumption and income at the national level. Greater impacts were found for the microcredit programme in the MRD compared to its country average, assuming that the endogeneity was significantly controlled for in the models. This greater impact is largely attributed to the observed factors at the regional level; however, unobserved factors such as, individual heterogeneity, are also believed to contribute to the differences. This is because the people in the MRD region are more business oriented than other regions, access to microcredit helps reduce the capital constraint, which likely improves marginal productivity of capital hence increases income and consumption. This occurs even in micro and small-scale business at the rural household level.

One unexpected finding arising from this study is that the instrumental variable's validity is subject to a time varying effect. The instrumental variables used to account for unobserved endogeneity in impact evaluation likely change with changes of economic conditions where

microcredit programmes are implemented. This is particularly so when the poverty rate of the commune remains valid but the distance to the nearest bank is inconsistent and insignificant. The inconsistency of IV may cause inconsistent impact estimators from the IV-FE models because instruments encountering endogeneity likely face weak instrument identification. This time varying effect requires extra caution when IV-FE models are used to evaluate programme impact.

8.3 Implications of the Study

The findings provide several implications for academics and microcredit policy.

8.3.1 Academic Implications

Capital does not naturally flow from rich to poor in rural credit markets, particularly rural credit markets in developing countries because of market imperfection and asymmetric information (Aghion & Morduch, 2010; Stiglitz & Weiss, 1981). Risk assessment toward borrowers defines credit accessibility which, in turn, is determined by adverse selection and moral hazard behaviours. Given limited credit worthiness (e.g., collateral), the poor can hardly borrow from formal credit institutions in the rural credit market. Pro-government intervention advocates that public policies are needed to correct market malfunctioning, expanding credit outreach; however, these theories if they stand alone cannot assure a better solution for the rural credit market. Pro-poor policies, starting with implementing microcredit programmes, face a trade-off between profit maximisation and government subsidy, and with third party's incentives in the lending practice (Adams & Vogel, 1986). Profit maximisation and third party's incentives help explain inaccessibility to microcredit programmes. Reflected from this study, the interlinked relationship of different parties in the rural credit market is embraced by different economic theories but a theory that is sufficiently robust to justify the rural credit market and for it to work efficiently towards the goal of poverty reduction and rural development needs to be evolved, together with the rural economy development.

Endogenous informal microcredit in accessibility to formal microcredit reflects that the degree to which informal credit influence depends on its the prevalence in a particular credit market. Together with selection bias, coexisting credit sectors influence borrowing behaviour (see also Bell, 1990; Guirkinger, 2008; Heckman, 1979). Therefore, the structural relationship

between the informal and formal credit sectors should be considered appropriately in assessing accessibility to a particular microcredit programme and the programme impact.

8.3.2 Policy Implications

The results show a positive relationship between accessibility to the VBSP microcredit programme and its impacts on rural households' income and expenditure, indicating that the microcredit programme effectively works toward improving the rural livelihoods and poverty reduction. The results also reveal various factors that influence both credit accessibility and households' outcomes that includes monitoring the programme implementation. Therefore, different policiy implications related to improving microcredit accessibility and impacts can start from the government to microcredit providers and rural households.

For rural households, improving microcredit accessibility can start from the household themselves by actively participating in a credit group and improving their education and work skills because education essentially builds up creditworthiness for collateral-free borrowers and work skills promise repayment. The poor, in this case, are physically poor due to capital contraint; they lack of land and working capital to generate a sufficient income level for a living. Given that pre-condition, microcredit shows its positive impact on the targethousehold. However, it isdifficult for the extremely poor to benefit from microcredit because they need pre-support (e.g., special aids, communinity support) to overcome internal rationing. Extremely poor people like people suffering from under and/or malnourishment, illnesses, lack of skills, etc., cannot be a target of microcreditthat aims to provide small credit for income generating activities. Intervention in the form of microcredit will not be an efficient solution but a mixture of welfare and a microcredit programme is required for this target group. Microcredit should always be seen as the next step after they [the poor] are able to work (Gibbons et al., 2000; Seibel, 1997).

As the informal and formal credit sectors coexist and interact, an appropriate credit policy is to direct both sectors to work better towards the rural development goal. A better linkage between the two credit sectors would enable one sector to overcome its weaknesses by gaining from other's strengths (for example, see Li et al., 2011; Seibel, 1997). Particularly, lending through group without joint-liability helps improve the participation rate of poor households. Expanding this lending to some informal lenders in the group would reduce the

transaction costs of screening but likely increase the repayment rate because the borrowers can roll over their loans using the available alternative credit. On the other hand, the government and VBSP should reinforce the lending policy on individual contracts to reduce the leakage rate while keeping the programme more cost effective (Nguyen, 2008).

Given the persistence of asymmetric information, direct intervention of government into the provision of financial services is not an 'optimal' solution because the government faces the same problems of asymmetric information as the financial institutions. Therefore, to make microcredit markets work, government and financial institutions should focus on the solutions to reduce the problem of asymmetric information and transaction costs associated with microlending (see Adams & Vogel, 1986; Bardhan & Udry, 1999). For the government, it is important to enhance the development of financial infrastructure and informational intermediation while improving physical infrastructure and providing a consistent microcredit policy to ensure the bottom poor have adequate access to microcredit (see Navajas et al., 1998; Seibel, 1997). For the financial institutions, it is essential to develop and employ the innovations in financial technologies such as tailored lending contracts (e.g., group lending) or partnership based lending (e.g., with credit rating, credit scoring agencies).

The downgrading strategy that separated larger scale loans from VBA to small scale loans from VBSP shows the effectiveness gained from adapting innovation in lending practice to expand credit to the rural area (see also Le, 2011; Nguyen, 2008; Pham & Izumida, 2002). Rural and poor households have had greater access to preferential microcredit inthe past decade and the positive impact of microcredit programmeshas been ducumented. However, as the rural credit market evolves, including the development of credit demand and credit supply, and other microfinance services, thereis a question of whether the VBSP setting is sustainably operating in the changing environment. The development strategy of VBSP operation should, however, reflect its predecessor's failure. Divesting VBA microfinance operations by setting up a heavily subsidised VBSP to disburse preferential loans targeting the poor contravenes the principles of sound banking practice and sustainable poverty alleviation. Moreover, highly regulated banking operataions lack the dynamics of adequately responding to the growing demands of vast numbers of the poor for a full range of financial services (Dufhues, Heidhues, & Buchenrieder, 2004; Seibel, 1997). This issue should be seriousely re-addressed in the long-term stragey of agricultural and rural development, and poverty reduction.

8.4 Limitations and Future Research

The empirical model of microcredit accessibility relies on the assumption that informal microcredit is more prevalent and less rationed hence the choice of between formal and informal microcredit is arbitrarily defined. To our belief, this is likely true for the Vietnam rural credit market hence the result may also hold for other rural credit markets in developing countries. However, the assumption can be verified by modelling the choice between the two different credit sectors in which the interaction influences the borrowing decision, using an ordered multinomial choice model (e.g., ordered probit or logit, conditional logit) considering the order of decision to borrow from a certain credit sector. This research direction could provide an insightful explanation of the nature of accessibility and borrowing behaviour in the rural credit market. In addition, as lending practice evolves through the developement process and the financial intermediaries become more diverse in the rural market, empirical studies on lending mechanisms such as screening, risk assessment, and social contract will benefit rural development objectives, particularly in improving the accessibility of the poor as well as expanding financial outreach from the formal credit providers.

Informal microcredit interacts with the formal microcredit sector; however, this interaction was not accounted for in the impact evaluation of the formal microcredit programme in our study. Therefore, to make the research findings generalisable, an expansion of the research scope that include the informal microcredit in the impact evaluation model further reduces bias that the outcome is potentially simultaneously attributed to informal microcredit. Another similar direction for future research is to investigate the heterogeneity of microcredit programmes. This is important because, in reality, the VBSP runs different microcredit programmes targeting the poor. Different microcredit programmes have different target clients and lending scales, and some programmes even overlap others. In our study, these programmes were treated homogeneously as the "VBSP microcredit programme", therefore, evaluation of microcredit impact under programme heterogeneity can significantly improve understanding of microcredit programme impact evaluation.

One limitation arises from the cross-sectional data used in the impact evaluation of the VPSB microcredit programme. This study used the 'non-borrowers group' as the comparison group in the impact assessments and the outcomes (such as income and consumption) of non-borrowers to approximate the counterfactual outcomes of borrowers in the absence of programme participation. However, over the sampling period, there were significant

government policy changes that may have impacted the income and/or consumption of the rural poor in Vietnam. For example, the government policies such as interest subsidy and food price subsidy programmes implement to respond to the global financial crises may have influenced the rural poor. Failing to control for such potential impact in evaluating the VPSB microcredit programme may lead to biased estimate of the impact. The impact of such policies can be examined in future research.

As the current study limits investigating the impact of the formal microcredit programme to the rural area, future research in Vietnam can expand to sample peripheral urban and urban areas because urbanisation has been expanding over the country along with economic integration. There has been concern about the increasing urban poverty and many microcredit programmes have also been implemented to provide credit to urban households within the framework of the national poverty reduction strategy. Another research direction could look at the dynamic impact of microcredit programmes. For example, an impact study that takes in to account the effect of past credit and the length of microcredit participation can be helpful because the impact of microcredit programme on households is believed to be attributed to past loans as well as different lengths of programme participation. The confirmation of the dynamic impact of microcredit programmes provides further evidence whether the programme impacts accrue beyond the participation period.

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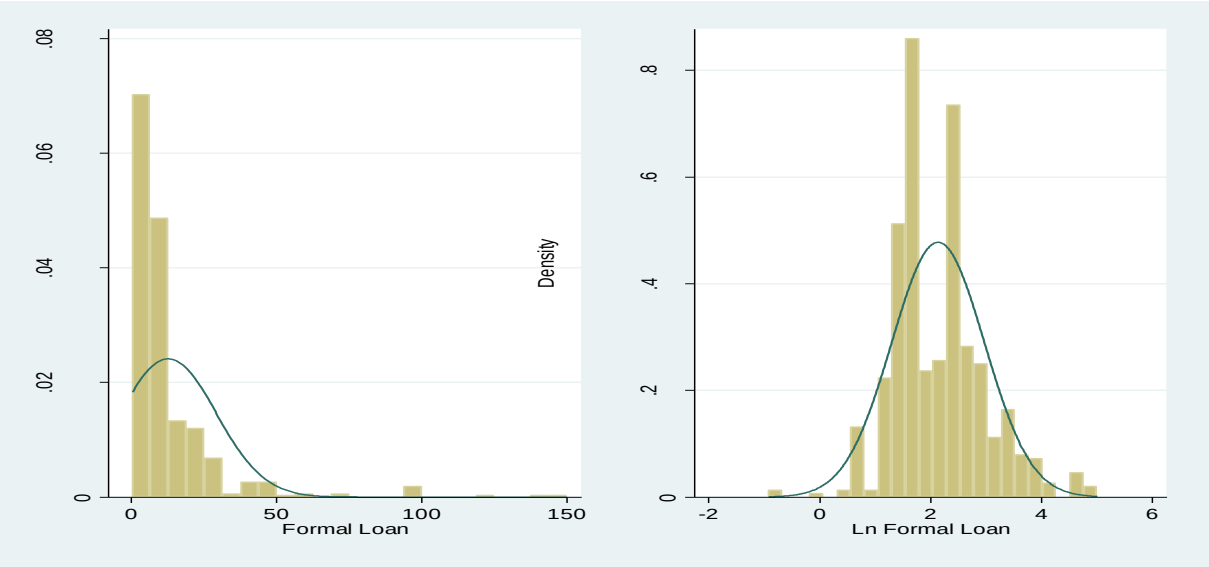
Appendices

Appendix A-1 Distribution of Formal Loan and ln Formal Loan



Appendix A-2 Tests for Heteroskedasticity and Multicollinearity

	Amount of Informal Microcredit	Access to Formal Microcredit	Amount of Formal Microcredit
Breusch-Pagan/Cook-Weisberg	7.28 (0.007)	34.57(0.000)	7.57(0.006)
Reject/Not reject H_0	Reject at 1%	Reject at 1%	Reject at 1%
Mean VIF for multicollinearity	1.45(<10)	1.58(<10)	1.59(<10)
Reject/Not reject H_0	Not reject	Not reject	Not reject

Note: Numbers in parentheses are the probability > chi2 for BP/CW test and VIF values greater than 10 might need further examination.

Appendix A-3 Actual and Predicted Outcomes of Probit Models for Accessibility to Microcredit

	Actual Respondents		
	Borrower	Non-borrower	Total
Number of correct predictions	535	191	726
% of correct predictions	88.58	34.59	81.03
Number of incorrect predictions	69	101	170
% of incorrect predictions	65.41	11.42	18.97
Predicted probability (%)		70.98	

Note: The numbers are obtained from the probit model.

Appendix B-1 Probit Results for the Propensity Scores for Household Consumption Impact

Control variables	Specification (C_1)		Specification (C_2)		Specification (C_3)	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Constant	-1.202***	0.350	-1.440***	0.363	-1.638***	0.382
AGE	0.005	0.005	0.005	0.005	0.007	0.005
GENDER	0.071	0.100	0.051	0.101	0.077	0.102
MARRIED	0.323*	0.171	0.321*	0.171	0.350**	0.173
ETHNIC	0.310*	0.160	0.324**	0.161	0.359**	0.162
NO_EDUC	0.149	0.238	0.212	0.241	0.211	0.242
PRI_SCH	0.005	0.150	0.048	0.151	0.058	0.152
MID_SCH	-0.002	0.160	0.016	0.161	0.012	0.162
GOV_EMP	0.411***	0.135	0.404***	0.136	0.427***	0.137
CRE_MEM	0.412***	0.148	0.401**	0.149	0.433***	0.150
POOR_CER	0.621***	0.138	0.660***	0.140	0.695***	0.143
HHSIZE	0.009	0.033	-0.006	0.033	-0.009	0.033
NUM_CHIL	0.031	0.034	0.031	0.034	0.031	0.034
OWN_LAND	0.391***	0.134	0.363***	0.135	0.353***	0.136
MI_FARM	0.190	0.126	0.211*	0.126	0.262**	0.129
MI_NONF	0.008	0.134	0.016	0.134	0.022	0.135
POOR_NOEDUC	-0.340	0.317	-0.369	0.314	-0.365	0.316
URB_COM	-0.229*	0.119	-0.210*	0.119	-0.207*	0.121
ECO_COM	0.552***	0.176	0.572***	0.177	0.610***	0.178
DRA_VIL	0.550***	0.150	0.577***	0.151	0.605***	0.153
PRE_CONS			0.145**	0.056	0.139**	0.056
ln IFL					0.085*	0.048
Number of obs.	877		877		872	
Log likelihood	-487.6		-484.2		-479.7	
Chi2	126.5		133.3		135.4	

Note: *, **, and *** indicate significant level at 10%, 5%, and 1%, respectively.

Appendix B-2 Probit Results for the Propensity Scores for Household Income Impact

Variable	Specification (I_1)		Specification (I_2)		Specification (I_3)	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Constant	-1.202***	0.350	-1.228***	0.354	-1.438***	0.374
AGE	0.005	0.005	0.005	0.005	0.006	0.005
GENDER	0.071	0.100	0.066	0.101	0.095	0.102
MARRIED	0.323*	0.171	0.323*	0.171	0.354**	0.172
ETHNIC	0.310*	0.160	0.317**	0.161	0.352**	0.162
NO_EDUC	0.149	0.238	0.160	0.239	0.157	0.240
PRI_SCH	0.005	0.150	0.010	0.150	0.019	0.151
MID_SCH	-0.002	0.160	0.001	0.160	-0.006	0.161
GOV_EMP	0.411***	0.135	0.403***	0.136	0.429***	0.137
CRE_MEM	0.412***	0.148	0.412***	0.148	0.446***	0.149
POOR_CER	0.621***	0.138	0.630***	0.139	0.667***	0.143
HHSIZE	0.009	0.033	0.007	0.033	0.004	0.033
NUM_CHIL	0.031	0.034	0.030	0.034	0.030	0.034
OWN_LAND	0.391***	0.134	0.382***	0.136	0.374***	0.136
MI_FARM	0.190	0.126	0.187	0.126	0.240*	0.129
MI_NONF	0.008	0.134	0.008	0.134	0.016	0.134
POOR_NOEDUC	-0.340	0.313	-0.345	0.313	-0.343	0.314
URB_COM	-0.229*	0.119	-0.231*	0.119	-0.225*	0.120
ECON_COM	0.552***	0.176	0.555***	0.177	0.595***	0.178
DRA_VIL	0.550***	0.150	0.559***	0.151	0.586***	0.153
PRE_INC			0.010	0.019	0.007	0.019
ln IFL					0.089*	0.048
Number of obs.	877		877		872	
Log likelihood	-487.6		-487.4		-482.7	
Chi2	126.5		126.7		129.3	

Note: *, **, and *** indicate significant level at 10%, 5%, and 1%, respectively.

Appendix B-3 Probit Results for the Propensity Scores of Poor Household Consumption Impact

Variable	Specification (C_1)		Specification (C_2)		Specification (C_3)	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Constant	0.206	1.017	-0.150	1.053	-0.264	1.073
AGE	-0.012	0.011	-0.011	0.011	-0.009	0.012
GENDER	0.240	0.243	0.236	0.246	0.255	0.247
MARRIED	-0.027	0.369	-0.092	0.375	-0.100	0.376
ETHNIC	0.340	0.329	0.397	0.332	0.425	0.334
NO_EDUC	-0.293	0.702	-0.356	0.721	-0.346	0.722
PRI_SCH	-0.268	0.676	-0.319	0.695	-0.296	0.698
MID_SCH	-0.208	0.708	-0.250	0.726	-0.218	0.729
GOV_EMP	0.368	0.334	0.386	0.339	0.408	0.340
CRE_MEM	0.687**	0.343	0.644*	0.346	0.660*	0.350
HHSIZE	0.049	0.078	0.015	0.081	0.006	0.082
NUM_CHIL	0.038	0.080	0.033	0.082	0.035	0.082
OWN_LAND	0.298	0.299	0.290	0.305	0.233	0.314
MI_FARM	0.036	0.353	0.100	0.358	0.158	0.363
MI_NONF	-0.246	0.308	-0.173	0.315	-0.169	0.317
URB_COM	-0.197	0.266	-0.151	0.269	-0.194	0.276
ECO_COM	1.076***	0.402	1.143***	0.407	1.207***	0.422
DRA_VIL	1.067***	0.387	1.128***	0.391	1.163***	0.395
PRE_CONS			0.394**	0.200	0.393*	0.204
ln IFL					0.069	0.135
Number of obs.	223		223		222	
Log Likelihood	-95.30		-93.23		-92.78	
Chi2	36.41		40.54		40.99	

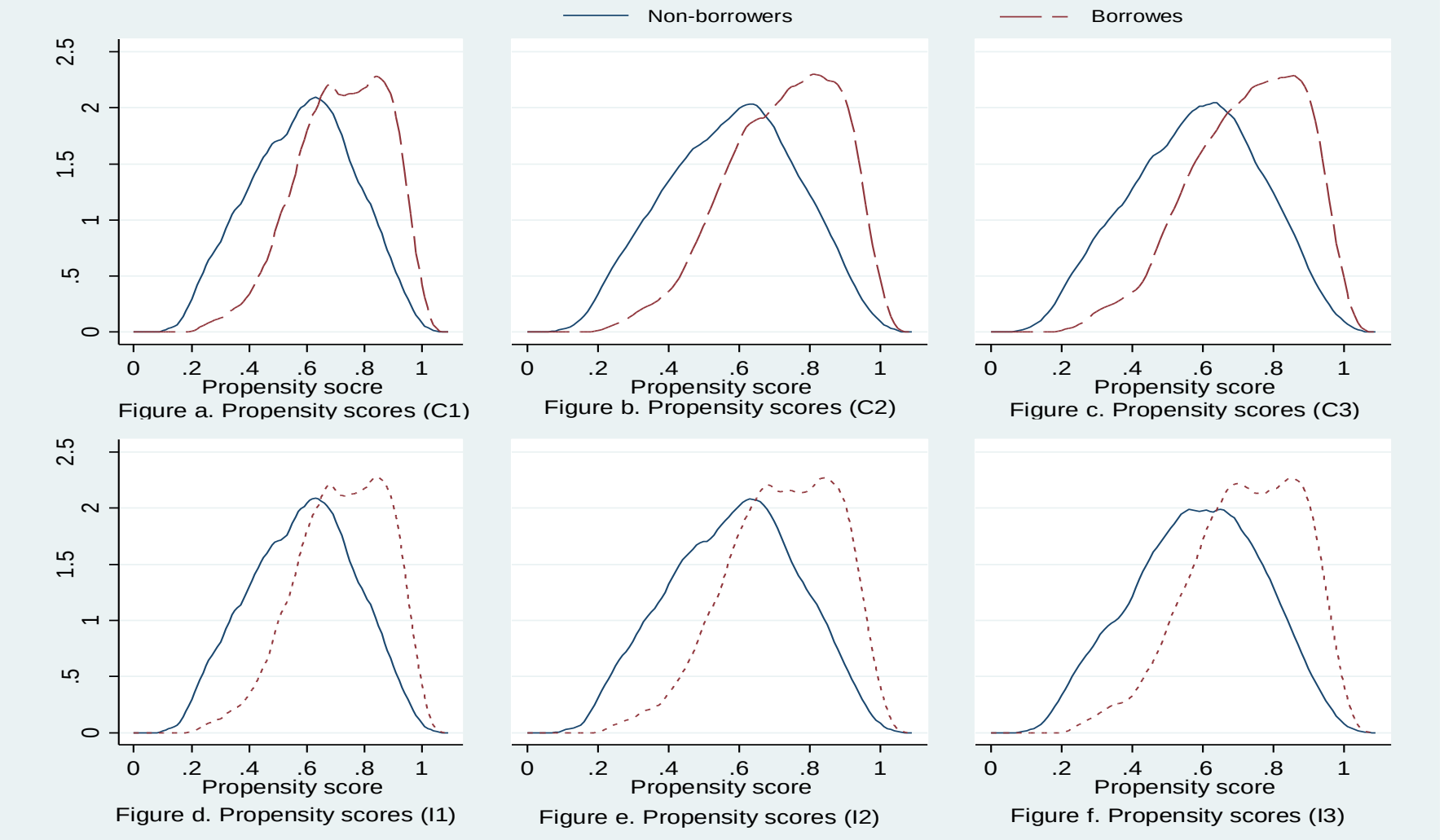
Note: *, **, and *** indicate significant level at 10%, 5%, and 1%, respectively.

Appendix B-4 Probit Results for the Propensity Scores of Poor Household Income Impact

Variable	Specification (I_1)		Specification (I_2)		Specification (I_3)	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Constant	0.206	1.017	0.263	1.018	0.038	1.046
AGE	-0.012	0.011	-0.012	0.011	-0.008	0.012
GENDER	0.240	0.243	0.242	0.243	0.276	0.246
MARRIED	-0.027	0.369	-0.070	0.373	-0.073	0.375
ETHNIC	0.340	0.329	0.389	0.334	0.438	0.337
NO_EDUC	-0.293	0.702	-0.337	0.710	-0.310	0.711
PRI_SCH	-0.268	0.676	-0.305	0.683	-0.253	0.686
MID_SCH	-0.208	0.708	-0.267	0.716	-0.206	0.719
GOV_EMP	0.368	0.334	0.349	0.336	0.364	0.335
CRE_MEM	0.687**	0.343	0.609*	0.348	0.643*	0.353
HHSIZE	0.049	0.078	0.024	0.082	0.012	0.083
NUM_CHIL	0.038	0.080	0.042	0.081	0.042	0.081
OWN_LAND	0.298	0.299	0.291	0.301	0.219	0.310
MI_FARM	0.036	0.353	0.018	0.355	0.076	0.360
MI_NONF	-0.246	0.308	-0.257	0.312	-0.277	0.314
URB_COM	-0.197	0.266	-0.216	0.268	-0.278	0.275
ECO_COM	1.076***	0.402	1.042***	0.404	1.146***	0.419
DRA_VIL	1.067***	0.387	1.048***	0.388	1.103***	0.392
PRE_INC			0.118	0.108	0.124	0.110
ln IFL					0.127	0.134
Number of obs.	223		223		222	
Log Likelihood	-95.30		-94.64		-94.07	
Chi2	36.41		37.72		38.39	

Note: *, **, and *** indicate significant level at 10%, 5%, and 1%, respectively.

Appendix B-5 Distributions of Propensity Scores for Consumption Impact Estimators Using the Specified Covariates



Appendix B-6 Distributions of Propensity Scores for Income Impact Estimators Using the Specified Covariates

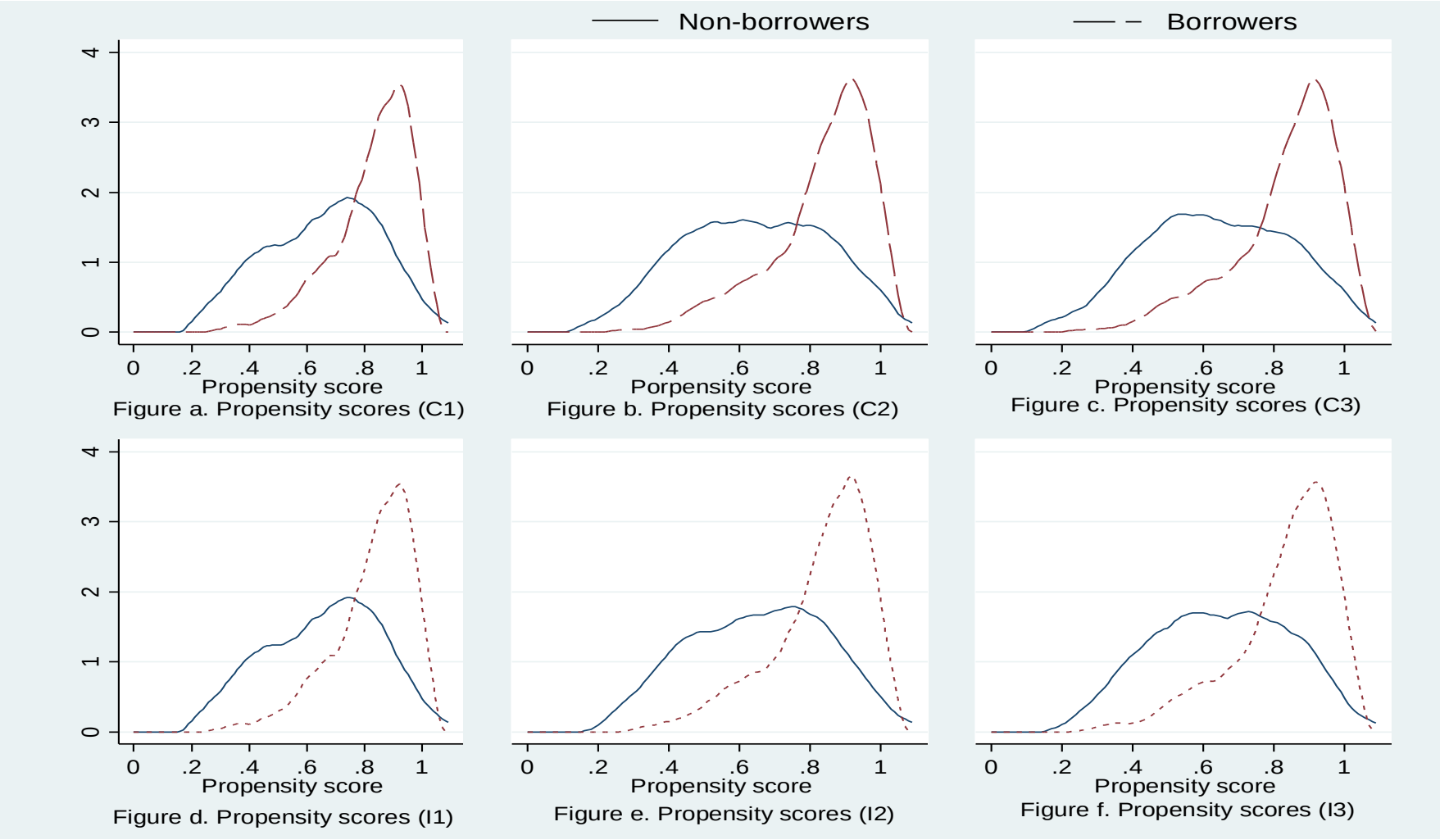


Figure a. Propensity scores (C1)

Figure b. Propensity scores (C2)

Figure c. Propensity scores (C3)

Figure d. Propensity scores (I1)

Figure e. Propensity scores (I2)

Figure f. Propensity scores (I3)

Appendix B-7 Covariates Used in the Estimation of Propensity Score

Individual factors: Age of household head, Gender of household head, Head is ethnic minority, Marital status of household head, Education level of household head (primary school, secondary school, high school, technical degree, university degree, post-grad degree).

Household factors: Household size, Ratio of female members, Ratio of members below 16, Ratio of members above 60, Ratio of members working in agriculture, Ratio of members working in industry, Ratio of members working in services, Ratio of member with primary school, Ratio of members with secondary school, Ratio of members with high school, Ratio of member with tertiary education, Number of average sick days per member per year, Area of annual crop land, Area of perennial crop land, Area of aquaculture water surface, Overseas remittances, Domestic remittances, Pensions, Savings, Poor certificate in 2006.

Village and commune factors: Having car road village, Having traditional village commune, Having car road commune, Distance to extension centre, Having nonfarm enterprises commune, Having primary school commune, Having secondary school commune, Having high school commune, Having inter-communal market commune, Having irrigation plant commune, Commune land area, Number of hamlet in commune, Poverty ratio, Coastal region, Delta region, Midland and hilly land region, Low mountainous region.

Appendix B-8 Results for IV Fixed Effects Models for VBSP Microcredit Impact on Household Per Capita Expenditure

Variable	First-Stage Regression				Second-Stage Regression ln per capita Expenditure			
	Programme		Amount of Formal Microcredit		Programme		Amount of Formal Microcredit	
	The MRD	Vietnam	The MRD	Vietnam	The MRD	Vietnam	The MRD	Vietnam
Participation in VBSP					2.1150***	1.4140***		
					[0.6160]	[0.1630]		
ln Formal Microcredit							0.3530**	0.3120***
							[0.1470]	[0.0728]
1. ***Individual factors***								
AGE	0.0010	0.0029***	0.0051	0.0124	-0.0015	0.0010	-0.0013	0.0013
	[0.0014]	[0.0010]	[0.0119]	[0.0111]	[0.0041]	[0.0024]	[0.0049]	[0.0042]
GENDER	0.1190	0.0112	0.8210	0.0535	-0.1070	-0.0528	-0.1450	-0.0532
	[0.0830]	[0.0519]	[0.7540]	[0.4650]	[0.2180]	[0.0941]	[0.2980]	[0.148]
ETHNIC	-0.0066	0.0056	-0.2560*	0.0364	0.0210	-0.0199***	0.0963	-0.0246*
	[0.0237]	[0.0056]	[0.1440]	[0.0573]	[0.0515]	[0.0068]	[0.0660]	[0.0137]
MARRIED	-0.0355	0.0099	-0.3050	0.2540	0.0110	0.0848	0.0441	0.0148
	[0.0444]	[0.0350]	[0.4490]	[0.3670]	[0.1520]	[0.0805]	[0.2050]	[0.1260]
PRI_SCHO	0.0291	0.0209	0.3420	0.1430	-0.0787	0.0906	-0.1480	0.0849
	[0.0517]	[0.0639]	[0.3700]	[0.6450]	[0.2180]	[0.1380]	[0.2370]	[0.2330]
SEC_SCHO	-0.0223	-0.0037	0.2250	-0.2990	0.0522	0.0768	-0.0758	0.1620*
	[0.0429]	[0.0257]	[0.3550]	[0.2610]	[0.1090]	[0.0513]	[0.1310]	[0.0970]
HIG_SCHO	-0.1180	-0.0198	-0.7340	-0.2750	0.2420	0.0733	0.2480	0.1300
	[0.0778]	[0.0369]	[0.7310]	[0.3390]	[0.1960]	[0.0666]	[0.3050]	[0.1150]
TEC_DEGRE	-0.1000	-0.1090**	-0.1400	-0.5920	0.1330	0.1410	-0.0337	0.1700
	[0.0686]	[0.0475]	[0.6520]	[0.4330]	[0.2010]	[0.0915]	[0.2600]	[0.1500]
UNI_DEGRE	-0.0381	0.0260	0.3030	-1.2650	0.4710***	0.1450	0.2950	0.5990**
	[0.0691]	[0.0789]	[0.5860]	[1.0220]	[0.1590]	[0.1670]	[0.2190]	[0.2790]
POST_GRAD	-0.0440	-0.2450**	0.7000	-1.4180	0.5470**	0.2730	0.2250	0.3810
	[0.1000]	[0.0953]	[0.8540]	[0.9370]	[0.2580]	[0.1990]	[0.3400]	[0.3250]
2. ***Household factors***								
HHSIZE	-0.0138	-0.0132*	0.0077	-0.0064	-0.0704**	-0.0917***	-0.1040**	-0.1100***

	[0.0131]	[0.0069]	[0.1270]	[0.0789]	[0.0341]	[0.0136]	[0.0461]	[0.0271]
R_FEMALE	0.0076	0.0131	0.6160	0.2750	-0.4380*	-0.0121	-0.6410*	-0.0765
	[0.1170]	[0.0590]	[0.9310]	[0.6030]	[0.2580]	[0.1170]	[0.3610]	[0.2050]
R_BELOW 16	0.0857	0.0037	0.8430	0.5850	-0.4330	-0.3780***	-0.5570	-0.5590***
	[0.1330]	[0.0645]	[1.1980]	[0.570]	[0.2940]	[0.1150]	[0.4370]	[0.1920]
R_ABOVE 60	-0.0352	-0.0805	-0.9620	-0.7550	0.1280	0.1720	0.3990	0.2990
	[0.0917]	[0.0498]	[0.9430]	[0.4910]	[0.2390]	[0.1200]	[0.3540]	[0.1920]
R_WAGRI	-0.0632	0.0012	-0.4620	-0.1160	0.0961	-0.0867	0.1220	-0.0486
	[0.0651]	[0.0310]	[0.5670]	[0.3040]	[0.1510]	[0.0591]	[0.2220]	[0.1020]
R_WINDUS	0.0756	0.0771**	0.0778	0.3850	-0.1860	0.0200	-0.0522	0.0082
	[0.0597]	[0.0376]	[0.5510]	[0.3600]	[0.1480]	[0.0685]	[0.1990]	[0.1190]
R_WSERV	0.0430	-0.0147	0.0516	0.0882	-0.1380	0.1280	-0.0688	0.08110
	[0.0797]	[0.0465]	[0.6530]	[0.4230]	[0.2060]	[0.0898]	[0.2520]	[0.1470]
R_PRI_SCHO	0.0345	-0.0127	0.7360	0.0735	0.00562	0.1460*	-0.1800	0.1140
	[0.0882]	[0.0443]	[0.7920]	[0.4520]	[0.1860]	[0.0843]	[0.3080]	[0.1540]
R_SEC_SCHO	0.2280*	0.0585	1.8140	0.4480	-0.0628	0.1970*	-0.2150	0.1560
	[0.1250]	[0.0568]	[1.1230]	[0.5630]	[0.3030]	[0.1100]	[0.5000]	[0.1950]
R_HIG_SCHO	0.1380	0.2690***	0.0382	1.9520**	0.5030	0.2070	0.8060*	-0.0080
	[0.1220]	[0.0704]	[1.264]	[0.731]	[0.3190]	[0.1410]	[0.4730]	[0.2880]
R_UNI_DEGRE	0.0818	0.3570*	0.4330	2.1180	-0.6230	0.2140	-0.5930	0.0849
	[0.1390]	[0.2080]	[1.0130]	[1.8920]	[0.4770]	[0.3500]	[0.5190]	[0.6000]
NUM_SDAYS	-0.0037*	-0.0010	-0.0101	-0.0062	0.0081*	0.0028	0.0036	0.0031
	[0.0019]	[0.0010]	[0.0159]	[0.0086]	[0.0047]	[0.0017]	[0.0057]	[0.0028]
LAND_ACROP	8.80e-08	8.63e-07	7.62e-08	7.18e-06	3.32e-06*	3.08e-06**	3.53e-06**	2.15e-06
	[2.63e-07]	[8.94e-07]	[2.28e-06]	[7.92e-06]	[1.76e-06]	[1.57e-06]	[1.79e-06]	[2.43e-06]
LAND_PCROP	-1.63e-06	1.68e-06*	7.20e-06	9.77e-06	2.52e-05*	2.32e-07	1.95e-05	-7.73e-08
	[7.55e-07]	[9.73e-07]	[3.36e-05]	[9.41e-06]	[1.45e-05]	[2.41e-06]	[1.50e-05]	[3.23e-06]
LAND_WSURF	-8.65e-07	4.43e-07	-1.22e-05*	6.51e-06	1.02e-05**	1.01e-05***	1.25e-05***	8.73e-06***
	[1.12e-07]	[1.04e-06]	[6.97e-06]	[6.84e-06]	[3.99e-06]	[2.97e-06]	[3.54e-06]	[3.26e-06]
RE_OVERSEAS	-1.19e-07	-8.04e-07	-1.64e-05	-8.02e-06	7.25e-06	2.97e-06**	1.06e-05	4.41e-06**
	[1.80e-07]	[7.03e-07]	[1.49e-05]	[6.49e-06]	[5.49e-06]	[1.23e-06]	[7.25e-06]	[2.20e-06]
RE_DOMESTIC	9.23e-07	-6.23e-07	-1.51e-05	-4.63e-06	2.32e-05***	1.31e-05***	3.03e-05***	1.37e-05***
	[2.08e-06]	[5.81e-07]	[2.17e-05]	[4.47e-06]	[4.86e-06]	[3.36e-06]	[8.20e-06]	[3.71e-06]
PENSSION	-9.26e-06	-6.56e-06**	-8.97e-05	-5.56e-05	4.12e-05**	1.56e-05**	5.40e-05**	2.40e-05*
	[8.09e-06]	[2.76e-06]	[6.66e-05]	[3.46e-05]	[1.61e-06]	[6.15e-06]	[2.40e-05]	[1.27e-05]

SAVINGS	-2.40e-06	-1.14e-06	-7.90e-06	-3.81e-06	2.56e-05**	1.64e-05***	2.38e-05	1.65e-05***
	[3.76e-06]	[9.29e-07]	[3.78e-05]	[8.35e-06]	[1.24e-05]	[4.56e-06]	[1.69e-05]	[5.62e-06]
POOR_CER	-0.0365	0.0502	0.2960	0.6150**	-0.0311	-0.1410**	-0.2160	-0.2620**
	[0.0746]	[0.0325]	[0.7270]	[0.3130]	[0.1630]	[0.0533]	[0.2440]	[0.1090]
3. ***Village and commune***								
CR_COMMUNE	0.0038	0.0345	-0.3820	-0.2300	0.0662	0.1170	0.2150	0.2530
	[0.0617]	[0.0681]	[0.5510]	[0.4980]	[0.1410]	[0.0998]	[0.1980]	[0.1460]
DE_CENTER	-0.0075**	-0.00361**	-0.0693**	-0.0265*	0.0102	0.0009	0.0189*	0.0034*
	[0.0032]	[0.0017]	[0.0268]	[0.0151]	[0.0074]	[0.0027]	[0.0113]	[0.0052]
NF_ENTER	0.0297	-0.0022	0.0187	-0.2850*	-0.0591	0.0904***	-0.0054	0.1740***
	[0.0395]	[0.0177]	[0.3610]	[0.1680]	[0.0990]	[0.0320]	[0.1300]	[0.0590]
TR_VILLA	-0.0110	0.0229	0.5010*	0.2840	0.0410	-0.0342	-0.1520	-0.0929
	[0.0378]	[0.0265]	[0.2720]	[0.2450]	[0.1010]	[0.0485]	[0.1360]	[0.0818]
CR_VILLA	0.0367	0.0242	0.8480**	0.3320	0.0335	-0.0596	-0.1800	-0.1190
	[0.0473]	[0.0258]	[0.4120]	[0.2600]	[0.1120]	[0.0507]	[0.2080]	[0.0931]
Regional dummy								
GEO_CSTAL		-0.2220**		-0.3910		0.1920		0.3330
		[0.1100]		[1.0750]		[0.1570]		[0.3010]
GEO_DELTA		-0.2420**		0.5450		0.1270		0.1070
		[0.1160]		[1.1040]		[0.1170]		[0.2240]
GEO_MIDLAND		-0.1780*		0.4910		-0.0594		-0.0240
		[0.0998]		[0.9550]		[0.0977]		[0.1920]
GEO_LMOUNT		-0.1580*		0.2340		0.1290		0.1930
		[0.0844]		[0.7960]		[0.0807]		[0.1570]
4. ***Instrumental variables***								
D_NBANK	0.0307	-0.0239**	0.2260	0.0683				
	[0.0272]	[0.0105]	[0.2120]	[0.0972]				
R_POVERTY	-0.8520***	-0.8000***	-4.5710**	-3.2730***				
	[0.2360]	[0.0886]	[2.1290]	[0.7500]				
Number of observations	1,052	5,096	1,052	5,096	1,052	5,096	1,052	5,096

Note: 1. Robust Standard Errors are in the brackets
2. *, **, and *** indicate significant level at 10%, 5%, and 1%, respectively.

Appendix B-9 Results of IV Fixed Effects Models for VBSP Microcredit Impact on Household Per Capita Income

Variable	First-Stage Regression				Second-Stage Regression			
					ln per capita income			
	Programme		Amount of Formal Microcredit		Programme		Amount of Formal Microcredit	
	The MRD	Vietnam	The MRD	Vietnam	The MRD	Vietnam	The MRD	Vietnam
Participation in VBSP					1.6660**	0.8370***		
					[0.5830]	[0.1350]		
ln Formal Microcredit							0.2540**	0.1620***
							[0.1290]	[0.0459]
1. ***Individual factors***								
AGE	0.0007	0.0028***	0.0035	0.0120	0.0010	0.0006	0.0013	0.0012
	[0.0013]	[0.0010]	[0.0118]	[0.0111]	[0.0040]	[0.0026]	[0.0044]	[0.0033]
GENDER	0.1090	0.0117	0.7350	0.0580	0.0397	0.0604	0.0309	0.0592
	[0.0814]	[0.0518]	[0.7410]	[0.4650]	[0.2320]	[0.0850]	[0.2740]	[0.1040]
ETHNIC	-0.0057	0.0057	-0.2480*	0.0369	0.0843	-0.0116	0.1370*	-0.0137
	[0.0241]	[0.0056]	[0.1470]	[0.0574]	[0.0700]	[0.0088]	[0.0805]	[0.0115]
MARRIED	-0.0299	0.0096	-0.2580	0.2510	-0.0845	0.0210	-0.0645	-0.0129
	[0.0437]	[0.0349]	[0.4400]	[0.3660]	[0.1730]	[0.0772]	[0.2000]	[0.0944]
PRI_SCHO	0.0287	0.0208	0.3390	0.1420	0.0102	-0.0372	-0.0403	-0.0371
	[0.0506]	[0.0639]	[0.3640]	[0.6460]	[0.1920]	[0.1100]	[0.1870]	[0.1490]
SEC_SCHO	-0.0260	-0.0047	0.1940	-0.3080	0.1510	0.0386	0.0562	0.0838
	[0.0427]	[0.0256]	[0.3530]	[0.2610]	[0.1060]	[0.0458]	[0.1150]	[0.0664]
HIG_SCHO	-0.1180	-0.0202	-0.7350	-0.2780	0.3340*	0.0600	0.3200	0.0880
	[0.0773]	[0.0368]	[0.7280]	[0.3390]	[0.1770]	[0.0587]	[0.2440]	[0.0771]
TEC_DEGRE	-0.0949	-0.1080**	-0.0965	-0.5850	0.2460	0.1230	0.1060	0.1260
	[0.0684]	[0.0475]	[0.6500]	[0.4330]	[0.2080]	[0.0877]	[0.2330]	[0.1060]
UNI_DEGRE	-0.0331	0.0265	0.3450	-1.2600	0.1720	0.1630	0.0420	0.4050
	[0.0685]	[0.0789]	[0.5810]	[1.0190]	[0.2790]	[0.1840]	[0.2970]	[0.2560]
POST_GRAD	-0.0466	-0.2450**	0.6790	-1.4160	1.3010***	0.1860	1.0690***	0.2200
	[0.0998]	[0.0954]	[0.8490]	[0.9370]	[0.3360]	[0.1820]	[0.3530]	[0.2340]
2. ***Household factors***								

HHSIZE	-0.0146	-0.0133*	0.00123	-0.0071	-0.0552*	-0.0889***	-0.0819**	-0.1000***
	[0.0130]	[0.0069]	[0.1260]	[0.0788]	[0.0303]	[0.0124]	[0.0372]	[0.0179]
R_FEMALE	0.0273	0.0180	0.7810	0.3150	-0.6120**	-0.1200	-0.7690**	-0.1550
	[0.1160]	[0.0589]	[0.9150]	[0.6010]	[0.2420]	[0.1060]	[0.3040]	[0.1390]
R_BELOW 16	0.0365	-0.0063	0.4320	0.5030	-0.5230*	-0.3650***	-0.5820	-0.4560***
	[0.1250]	[0.0639]	[1.1400]	[0.5660]	[0.2720]	[0.1020]	[0.3430]	[0.1290]
R_ABOVE 60	-0.0455	-0.0822*	-1.0480	-0.7700	0.0333	0.0101	0.2340	0.0700
	[0.0909]	[0.0498]	[0.9370]	[0.4910]	[0.240]	[0.1130]	[0.2990]	[0.1420]
R_WAGRI	-0.0888	-0.00436	-0.6750	-0.1620	0.1890	-0.0217	0.2100	0.0002
	[0.0616]	[0.0306]	[0.5450]	[0.3020]	[0.1460]	[0.0533]	[0.1950]	[0.0677]
R_WINDUS	0.0723	0.0756**	0.0504	0.3720	0.1040	0.3200***	0.2140	0.3230***
	[0.0593]	[0.0376]	[0.5490]	[0.3590]	[0.1500]	[0.0587]	[0.1730]	[0.0781]
R_WSERV	0.1030*	-0.0021	0.5500	0.1930	0.0909	0.3770***	0.1200	0.3440***
	[0.0580]	[0.0454]	[0.4750]	[0.4160]	[0.1880]	[0.0805]	[0.2020]	[0.1000]
R_PRI_SCHO	0.0439	-0.0101	0.8150	0.0958	0.0207	0.1850**	-0.1120	0.1650
	[0.0878]	[0.0442]	[0.7850]	[0.4520]	[0.1830]	[0.0786]	[0.2680]	[0.1060]
R_SEC_SCHO	0.2380*	0.0591	1.8990*	0.4530	0.1110	0.2110**	0.03210	0.1980
	[0.1230]	[0.0568]	[1.1130]	[0.5630]	[0.2950]	[0.1040]	[0.4290]	[0.1320]
R_HIG_SCHO	0.1440	0.2680***	0.0938	1.9470***	0.3220	0.1580	0.5680	0.0770
	[0.1200]	[0.0704]	[1.2490]	[0.7310]	[0.3290]	[0.1320]	[0.4050]	[0.1940]
R_UNI_DEGRE	0.1280	0.3590*	0.8180	2.1380	-1.5380**	0.3360	-1.5200**	0.3110
	[0.1370]	[0.2080]	[0.9770]	[1.8920]	[0.7280]	[0.3480]	[0.7420]	[0.4150]
NUM_SDAYS	-0.0030	-0.0009	-0.0043	-0.00508	0.0014	0.0006	-0.0027	0.0005
	[0.0018]	[0.0010]	[0.0151]	[0.00857]	[0.0042]	[0.0015]	[0.0045]	[0.0019]
LAND_ACROP	8.43e-08	8.57e-07	4.49e-08	7.13e-06	1.28e-05***	1.16e-05***	1.30e-05***	1.12e-05***
	[2.61e-07]	[8.91e-07]	[2.38e-06]	[7.89e-06]	[2.36e-06]	[1.89e-06]	[2.43e-06]	[2.18e-06]
LAND_PCROP	-1.49e-06	1.68e-06*	8.36e-06	9.79e-06	2.77e-05*	2.44e-06	2.33e-05*	2.54e-06
	[7.53e-06]	[9.74e-07]	[3.38e-05]	[9.43e-06]	[1.67e-05]	[2.67e-06]	[1.21e-05]	[2.06e-06]
LAND_WSURF	-1.07e-06	2.40e-07	-1.39e-05**	4.82e-06	5.26e-06	5.64e-06	6.99e-06*	5.11e-06
	[1.19e-06]	[1.07e-06]	[6.84e-06]	[6.83e-06]	[4.07e-06]	[3.68e-06]	[4.03e-06]	[3.73e-06]
RE_OVERSEAS	-1.28e-06	-7.95e-07	-1.71e-05	-7.94e-06	1.47e-05***	1.43e-05***	1.69e-05**	1.49e-05***
	[1.80e-06]	[7.01e-07]	[1.50e-05]	[6.47e-06]	[5.47e-06]	[1.44e-06]	[6.94e-06]	[1.58e-06]
RE_DOMESTIC	6.35e-07	-6.31e-07	-1.75e-05	-4.69e-06	2.21e-05***	1.73e-05***	2.74e-05***	1.76e-05***
	[2.05e-06]	[5.82e-07]	[2.14e-05]	[4.50e-06]	[5.69e-06]	[2.54e-06]	[7.26e-06]	[2.70e-06]
PENSSION	-8.84e-06*	-6.61e-07**	-8.62e-05	-5.60e-05	6.66e-05***	2.41e-05***	7.47e-05***	2.79e-05***

	[8.05e-06]	[2.76e-06]	[6.64e-05]	[3.45e-05]	[1.38e-05]	[5.40e-06]	[1.90e-05]	[7.86e-06]
SAVINGS	-2.36e-06	-1.14e-07	-7.52e-06	-3.82e-06	1.34e-05	1.64e-05***	1.21e-05	1.65e-05***
	[3.72e-06]	[9.32e-07]	[3.75e-05]	[8.34e-06]	[9.32e-06]	[4.53e-06]	[1.22e-05]	[5.00e-06]
POOR_CER	-0.0396	0.0504	0.2700	0.6170**	0.0199	-0.1540***	-0.1190	-0.2120***
	[0.0743]	[0.0325]	[0.7280]	[0.3120]	[0.1470]	[0.0475]	[0.1980]	[0.0722]
3. ***Village and commune***								
CR_COMMUNE	0.0052	0.0345	-0.3710	-0.2310	0.1160	0.1150	0.2300	0.1940*
	[0.0607]	[0.0679]	[0.5450]	[0.4960]	[0.1460]	[0.1020]	[0.1780]	[0.1140]
DE_CENTER	-0.0075**	-0.0036*	-0.0693***	-0.0265*	-0.0075	-0.0030	-0.0020	-0.0020
	[0.0032]	[0.0017]	[0.0267]	[0.0151]	[0.0069]	[0.0026]	[0.0100]	[0.00345]
NF_ENTER	0.0292	-0.0021	0.0147	-0.2850*	0.0374	0.0831***	0.0817	0.1270***
	[0.0395]	[0.0177]	[0.3600]	[0.1680]	[0.0950]	[0.0265]	[0.1100]	[0.0374]
TR_VILLA	-0.0123	0.0233	0.4900*	0.2870	0.0566	-1.11e-05	-0.0807	-0.0286
	[0.0375]	[0.0265]	[0.2660]	[0.2450]	[0.1030]	[0.0406]	[0.1240]	[0.0521]
CR_VILLA	0.0364	0.0242	0.8460**	0.3320	-0.0128	-0.0367	-0.1600	-0.0627
	[0.0475]	[0.0258]	[0.4120]	[0.2600]	[0.1130]	[0.0435]	[0.1830]	[0.0616]
Regional dummy								
GEO_CSTAL		-0.2210**		-0.3800		-0.0633		0.0040
		[0.1110]		[1.0760]		[0.1340]		[0.1800]
GEO_DELTA		-0.2390**		0.5690		-0.0785		-0.0896
		[0.1160]		[1.1050]		[0.0914]		[0.1330]
GEO_MIDLAND		-0.1760*		0.5120		-0.1840**		-0.1620
		[0.0997]		[0.9550]		[0.0781]		[0.1170]
GEO_LMOUNT		-0.1570*		0.2500		0.0274		0.0619
		[0.0843]		[0.7960]		[0.0607]		[0.0937]
4. ***Instrumental variables***								
D_NBANK	0.0323	-0.0236**	0.2390	0.0702				
	[0.0272]	[0.0105]	[0.2110]	[0.0972]				
R_POVERTY	-0.8200***	-0.7980***	-4.2970**	-3.2530***				
	[0.2320]	[0.0885]	[2.1060]	[0.7500]				
Number of observations	1,050	5,094	1,050	5,094	1,050	5,094	1,050	5,094

Note: 1. Robust Standard Errors are in the brackets

2. *, **, and *** indicate significant level at 10%, 5%, and 1%, respectively.

Appendix B-10 Tests for Underindentification, Endogeneity, Weak Instruments, and Weak Instrument-Robust Inference for IV Fixed Effects Models Using the VietnamSample

	IV Equation	Consumption Equation	Income Equation
1. Underidentification test	Programme	$Chi2_{(2)} = 88.09^{***}$	$Chi2_{(3)} = 87.69^{***}$
Kleibergen-Paap LM statistic		*p*-value = 0.000	*p*-value = 0.000
	Microcredit	$Chi2_{(2)} = 19.25^{***}$	$Chi2_{(2)} = 19.09^{***}$
Kleibergen-Paap LM statistic		*p*-value = 0.000	*p*-value = 0.000
2. Test of endogeneity	Programme	$Chi2_{(1)} = 111.81^{***}$	$Chi2_{(1)} = 42.08^{***}$
Durbin-Wu-Hausman statistic		*p*-value = 0.000	*p*-value = 0.000
	Microcredit	$Chi2_{(1)} = 116.63^{***}$	$Chi2_{(1)} = 39.49^{***}$
Durbin-Wu-Hausman statistic		*p*-value = 0.000	*p*-value = 0.000
3. Weak IV identification test:	Programme		
Cragg-Donald F statistic		43.27	43.08
	Microcredit		
Cragg-Donald F statistic		9.76	9.68
4. Weak instrument-robust inference	Programme	$Chi2_{(2)} = 139.53^{***}$	$Chi2_{(2)} = 64.47^{***}$
Anderson-Rubin Wald test	Microcredit	*p*-value = 0.000	*p*-value = 0.000

Note: 1. *, **, and *** indicate significance level at 10%, 5%, and 1% that Ho is not true, respectively.

2. Critical values for the Weak IV identification tests are based on Stock and Yogo (2005) tables.

- Given the desired maximal bias of IV estimator relative to OLS estimator (5%), Cragg-Donald F statistics reject Ho of Weak IV identification at the 5% level for IV fixed effect models of programme impact on the consumption and income equations.
- Given the desired maximal bias of IV estimator relative to OLS estimator (20%), Cragg-Donald F statistics reject Ho of Weak IV identification at the 5% level for IV fixed effect models of microcredit impact on the consumption and income equations.

Appendix B-11 Tests for Underidentification, Endogeneity, Weak Instruments and Weak Instrument-Robust Inference for IV Fixed Effects Models Using the MRD Sample

	IV Equation	Consumption Equation	Income Equation
1. Underidentification test	Programme	$Chi2_{(2)} = 15.53^{***}$	$Chi2_{(3)} = 14.86^{***}$
Kleibergen-Paap LM statistic		*p*-value = 0.000	*p*-value = 0.000
	Microcredit	$Chi2_{(2)} = 6.40^{**}$	$Chi2_{(2)} = 5.85^{*}$
Kleibergen-Paap LM statistic		*p*-value = 0.041	*p*-value = 0.054
2. Test of endogeneity	Programme	$Chi2_{(1)} = 33.85^{***}$	$Chi2_{(1)} = 19.87^{***}$
Durbin-Wu-Hausman statistic		*p*-value = 0.000	*p*-value = 0.000
	Microcredit	$Chi2_{(1)} = 35.95^{***}$	$Chi2_{(1)} = 19.31^{***}$
Durbin-Wu-Hausman statistic		*p*-value = 0.000	*p*-value = 0.000
3. Weak IV identification test:	Programme		
Cragg-Donald F statistic		7.27	6.80
	Microcredit		
Cragg-Donald F statistic		2.97	2.80
4. Weak instrument-robust inference	Programme	$Chi2_{(2)} = 51.78^{***}$	$Chi2_{(2)} = 35.16^{***}$
Anderson-Rubin Wald test	Microcredit	*p*-value = 0.000	*p*-value = 0.000

Note: 1. *, **, and *** indicate significance level at 10%, 5%, and 1% that Ho is not true, respectively.

2. Critical values for the Weak IV identification tests are based on Stock and Yogo (2005) tables.
Given the desired maximal bias of IV estimator relative to OLS estimator (5%), Cragg-Donald F statistics do not reject Ho of Weak IV identification at the 5% level for IV fixed effect models of programme and microcredit impact on the consumption and income equations.

Appendix C Survey Questionnaire

MICROCREDIT SURVEY

*The survey data shall be kept strictly confidential and used for no other purposes than analytical basis for the PhD research entitled "**An Empirical Analysis of Accessibility and Impact Evaluation of Microcredit: The Rural Credit Market in the Mekong River Delta of Vietnam**". The survey questionnaire asks several questions about your household's activities over the past 2 years as we are trying to understand the fundamental behaviours of households activities associated with microcredit programmes in the rural credit market. The survey will take about 30 to 45 minutes of your time to complete.*

Instruction: For each question with brackets provided, please tick *[√]*your answer(s); otherwise, please follow the instructions given to answer the questions.

Section 1. Accessibility to the Formal, Semi-formal, and Informal Credit in the Rural Credit Market (*You can tick [√] more than one for the answers of each question*)

1.1 What types of rural credit providers are available in your area?

a. State-owned commercial banks	**[ ]**	f. Non-Government Organisations	**[ ]**
b. Private rural commercial banks	**[ ]**	g. Money lenders	**[ ]**
c. Peoples Credit Fund	**[ ]**	h. Input Suppliers	**[ ]**
d. Women Unions	**[ ]**	k. Middlemen (fruits collectors)	**[ ]**
e. Farmer's Associations	**[ ]**	l. Others (please specify):_____	

1.2 Did you need to borrow money at any one time in the last 12 months?

a. YES [ ] b. NO [ ] *please skip Q.1.3 and go to Q1.4*

1.3 Were you able to borrow money from any source of credit providers in the last 12 months?

a. YES **[ ]** *please skip Q1.4* b. NO **[ ]**

1.4 If NO in Q.1.3, why not? And go to **Section 3**.

a. Afraid of having a debt	**[ ]**
b. Interest rates were not affordable	**[ ]**
c. Too many required documents to submit	**[ ]**
d. Uncertainty in paying the loan	**[ ]**
e. Lack of collateral	[ ]
f. Others (please specify): _____	

1.5 Did you borrow money from banks in the last 12 months?

a. YES **[ ]** b. NO **[ ]**

1.6 If NO in Q1.5, why not?

a. Lack of information **[ ]**
b. Lack of collateral **[ ]**
c. Lack of ability to pay back the loan **[ ]**
d. Interest rates were still not affordable **[ ]**
e. Too many required documents to submit **[ ]**
f. Currently in debt to banks **[ ]**
g. Other(s), please specify: _____

1.7 Did you borrow money from non-bank institutions in the last 12 months?

a. YES **[ ]** b. NO **[ ]**

1.8 If NO in Q1.7, why not?

a. Lack of information **[ ]**
b. Lack of collateral **[ ]**
c. Lack of ability to pay back the loan **[ ]**
d. Interest rates were not affordable **[ ]**
e. Too many required documents to submit **[ ]**
f. Currently in debt to banks **[ ]**
g. Other(s), please specify: _____

1.9 Do you have access to a formal microcredit with the preferential interest rates?

a. YES **[ ]** b. NO **[ ]** please skip Q.1.10 and Q1.11, and go to Q1.12

1.10 Please provide name of the microcredit programmes and year that you have participated in.

Microcredit Programmes	Year
1……	……
2……	……
3……	……

1.1 From what source of information did you learn about the microcredit programme(s)?

	Programme 1	Programme 2	Programme 3
a. Public channel (newspapers, radio, TV)	**[ ]**	**[ ]**	**[ ]**
b. Local authority at commune level	**[ ]**	**[ ]**	**[ ]**
c. Head of village	**[ ]**	**[ ]**	**[ ]**
d. Friends and relatives	**[ ]**	**[ ]**	**[ ]**
e. Other(s), *please specify:*	_____	_____	_____

1.12 If NO in Q1.5, why not?

a. Lack of information **[ ]**
b. Lack of collateral **[ ]**
c. Lack of ability to pay back the loan **[ ]**
d. Interest rates were still not affordable **[ ]**
e. Too many required documents to submit **[ ]**
f. Currently indebted to banks **[ ]**
g. Other(s), please specify: _____

Section 2. Borrowing Behaviour of Household

	A. Formal (Banks and People Credit Funds)	**B. Semi-formal (Non-bank institutions)**
2.1 What types of loans did you borrow?		
a. Individual lending	**[ ]**	**[ ]**
b. Group lending	**[ ]**	**[ ]**
2.2 What are the purposes of your loans?		
a. Production capital (*farming activities*)	**[ ]**	**[ ]**
b. Small investment/trade (*non-farm*)	**[ ]**	**[ ]**
c. Pay tuition fees for children education	**[ ]**	**[ ]**
d. Emergencies (*i.e. medical, hospitalization*)	**[ ]**	**[ ]**
e. Housing (*i.e. repair, construction*)	**[ ]**	**[ ]**
f. Purchasing durable assets (*TV, machine*)	**[ ]**	**[ ]**
g. Payment of other loans	**[ ]**	**[ ]**
h. Others (*please specify*):_____	_____	_____

	A. Formal (Banks and People Credit Funds)	**B. Semi-formal (Non-bank institutions)**
2.3 Who did you borrow from for the largest loan?	**[ ]**	**[ ]**
2.4 For the largest loan, what was the loan duration? (months)	..……	……
2.5 What was the payment schedule for the largest loan?		
a. Weekly	[ ]	[ ]
b. Monthly	[ ]	[ ]
c. Semi-annually	[ ]	[ ]
d. Annually	[ ]	[ ]
e. Others (*please specify*):_____	……	……
2.6 What was the loan amount (largest loan)?	……	……
2.7 Who did you borrow from for the new loan(s)?	**[ ]**	**[ ]**
2.8 For the new loan, what was the loan duration? (months)	……	……
2.9 What is the payment schedule for the new loan?		
a. Weekly	**[ ]**	**[ ]**
b. Monthly	**[ ]**	**[ ]**
c. Semi-annually	**[ ]**	**[ ]**
d. Annually	**[ ]**	**[ ]**
e. Others (*please specify*):_____	_____	_____
2.10 What was the loan amount (new loan)?	……	……
2.11 What is the average interest rate per month? (%)	……	……
2.12 What kinds of collateral did you use to obtain the loans?		
a. Land certificate	**[ ]**	**[ ]**
b. Asset	**[ ]**	**[ ]**

c. Others (*please specify*):_____ _____ _____

2.13 What is the status of your existing loan?

a. Fully paid	[ ]	[ ]
b. Current loan	[ ]	[ ]
c. Past due	[ ]	[ ]
d. Restructured	[ ]	[ ]

2.14 How long did it take to process your loan from the formal credit provider?

a. Less than a week	[ ]	[ ]
b. 1 week	[ ]	[ ]
c. 2 weeks	[ ]	[ ]
d. 3 weeks	[ ]	[ ]
e. 1 month	[ ]	[ ]
f. More than a month	[ ]	[ ]

2.15 What are the difficulties you face when borrowing from formal and semiformal institutions?

a. Many steps in processing loan application	[ ]	[ ]
b. High administration fees	[ ]	[ ]
c. Unfriendly credit officers	[ ]	[ ]
d. Being requested extra money for approval	[ ]	[ ]
e. High value of collateral	[ ]	[ ]
f. Inconsistent credit rules, laws, regulations	[ ]	[ ]
g. Others (*please specify*):_____	_____	_____

C. Informal

2.16 Did you borrow money from the informal microcredit sources (such as relatives, friends, and money lenders) in the last 12 months?

a. YES [ ] b. NO [ ] *please go to part 3*

2.17 What are the purposes of your loans?

a. Production capital (*farming activities*)	[ ]
b. Small investment/trade (*non-farm*)	[ ]
c. Pay tuition fees for children education	[ ]
d. Emergencies (*i.e. medical, hospitalization*)	[ ]
e. Housing (*i.e. repair, construction*)	[ ]
f. Purchasing durable assets (*TV, etc*)	[ ]
g. Payment of other loans	[ ]
h. Others (please *specify*)_____	

2.18 What was the loan amount? ……

2.19 What is the duration of the loans(s)? (months) ……..

2.20 What is the average interest rate per month? ……..

2.21 What is the schedule of payment?

a. Weekly	[ ]
b. Monthly	[ ]
c. Semi-annually	[ ]
d. Annually	[ ]

e. Others (*please specify*):_____

2.22 What kinds of collateral did you use for the informal microcredit?

a. Land certificate **[ ]**
b. Asset **[ ]**
c. Others (*please specify*):_____

2.23 What is the status of your existing loan?

a. Fully paid **[ ]**
b. Current loan **[ ]**
c. Past due **[ ]**
d. Restructured **[ ]**
e. Others (*please specify*):_____

2.24 How long did it take to process a loan from the informal source?

a. Instantly **[ ]**
b. Within a day **[ ]**
c. 1 weeks **[ ]**
d. Others (*please specify*):_____

2.25 Why did you obtain additional loan from informal microcredit?

a. Inadequate loans from formal credit **[ ]**
b. Collateral not required **[ ]**
c. Pay tuition fees for children education **[ ]**
d. Emergencies (i.e. medical, hospitalization) **[ ]**
e. Housing (i.e. repair, construction) **[ ]**
f. Purchasing durable assets (e.g. TV, machine) **[ ]**
g. Payment of other loans **[ ]**
h. Others (*please specify*):_____

Part 3. Opinions about participating in a microcredit programme

Below is a series of statements that pertain to your opinion towards participating in a microcredit programme. Please indicate your level of agreement on a scale of 1 to 5, where 1 means "Strongly Disagree" and 5 means "Strongly Agree" and 6 means "Not Available."

	A. Credit Availability	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	N/A
1	I am aware of formal financial institutions available in my area	1	2	3	4	5	6
2	My village is classified "poor" so that I can easily obtain a formal microcredit	1	2	3	4	5	6
3	There only one financial institution (VBSP) for me to obtain formal microcredit	1	2	3	4	5	6
4	The financial institutions are able to meet my loan demand and request	1	2	3	4	5	6
5	It is easy for me to meet the microcredit officer to discuss my credit borrowing	1	2	3	4	5	6
	B. Decision to Borrow Credit						
1	I myself decide to borrow money for my family's need	1	2	3	4	5	6
2	My spouse and I decide to borrow money for my family's need	1	2	3	4	5	6
3	I make decision to borrow and use the money only for the defined purpose	1	2	3	4	5	6
4	I have to use the money for the defined purpose because I have been monitored	1	2	3	4	5	6
5	Using money for other purposes is acceptable in formal microcredit	1	2	3	4	5	6
6	Sufficient loan helps me to generate money which can cover the interest charged and repay the principle	1	2	3	4	5	6
7	I do not have any opportunity to generate income because I do not have enough capital	1	2	3	4	5	6
	C. Credit Affordability						
1	Interest rates charged by formal financial institutions are reasonable	1	2	3	4	5	6
2	Costs of processing formal microcredit are reasonable	1	2	3	4	5	6
3	Formal microcredit procedure is easy for me to follow	1	2	3	4	5	6
4	Financial institutions provide assistance for me to get formal microcredit	1	2	3	4	5	6
5	Can borrow up to 100% of the asset's value	1	2	3	4	5	6
6	The administrative and underwriter expenses are reasonable	1	2	3	4	5	6
7	Flexibility of formal microcredit limit	1	2	3	4	5	6
	D. Credit Conditions						
1	There are many types of formal microcredit available for me	1	2	3	4	5	6
2	There are many loan sizes of formal microcredit available for me	1	2	3	4	5	6
3	Duration of the formal microcredit is reasonable	1	2	3	4	5	6
4	Term of repayment is reasonable	1	2	3	4	5	6
5	Financial institutions need business plan to provide formal microcredit to households	1	2	3	4	5	6
6	Penalty for late repayment is reasonable	1	2	3	4	5	6
7	Renegotiating formal microcredit terms prior to the existing renewal date	1	2	3	4	5	6

Section 3. Welfare Impact (before and after) for households have participated in the microcredit programme

3.1 Has any formal microcredit programme helped you cope with the unexpected event(s)?
a. YES **[ ]** b. NO **[ ]**

3.2 If "Yes" in Q3.1, what was the event? (*you may tick more than one*)
a. Serious illness **[ ]**
b. Unexpected accident **[ ]**
c. Poor harvest of crops **[ ]**
d. Other(s) please specify _____

3.3 How did you respond to the unexpected event? (*you may tick more than one*)
a. Used savings **[ ]**
b. Liquidated household assets **[ ]**
c. Engaged in other income earning activities **[ ]**
d. Reduced expenditure **[ ]**
e. Pawned items **[ ]**
f. Other(s) please specify_____

3.4 Did you have a plan for saving BEFORE the formal microcredit?
a. YES **[ ]** b. NO **[ ]**

3.5 If "Yes" in Q3.4, how often did you save?
a. Weekly **[ ]** b. Monthly **[ ]** c. Yearly **[ ]**

3.6 Do you have a plan for saving AFTER the formal microcredit?
a. YES **[ ]** b. NO **[ ]**

3.7 If "Yes" in Q3.6, how often do you save?
a. Weekly **[ ]** b. Monthly **[ ]** c. Yearly **[ ]**

3.9 With the formal microcredit, I am more optimistic about the future. Do you agree with that statement?
a. Agree **[ ]** b. Disagree **[ ]**

3.10 If "Agree" in Q3.9, what are the reasons? (*you can tick more than one*)
a. Formal microcredit improves my business **[ ]**
b. Formal microcredit helps me accumulate wealth **[ ]**
c. Formal microcredit increases my financial security **[ ]**
d. Formal microcredit gives me more confidence in my business decision making **[ ]**
e. Others *please specify* _____

3.11 If "Disagree" in Q3.9, what are the reasons? (*you can tick more than one*)
a. Formal microcredit is insufficient for me to generate earnings **[ ]**
b. Formal microcredit contributes only a small percentage to my farming **[ ]**
c. It is hard to be positive in the current economic condition **[ ]**
d. Others (*please specify*)_____

The following questions will ask you to compare changes of your household BEFORE and AFTER joining the microcredit programme. If you think that AFTER joining the microcredit programme your household has been significantly improved then it means "Increased", if you think that joining microcredit loan has significantly reduced your indicators then it means "Decreased", otherwise "Unchanged".

3.12 Compared with your household's income without the formal microcredit, has your total household income(s) in the last 12 month been _____(please tick in the brackets)

	Increased	**Decreased**	**No changed**
T**otal Income**	[ ]	[ ]	[ ]
a. Farming	[ ]	[ ]	[ ]
b. Non-farm	[ ]	[ ]	[ ]

3.13 If your total income "Decreased" in Q3.12, what are the reasons? (you can tick more than one)

a. I or other household members were sick [ ]
b. Someone in the household lost a job [ ]
c. Poor harvest from farming [ ]
d. Increase in inflation [ ]
e. Others_____

3.14 Compared with the household's assets without the formal microcredit, has your household's assets with microcredit in the past 12 months_____

	Increased	**Decreased**	**No changed**
Total Assets	[ ]	[ ]	[ ]
a. Land	[ ]	[ ]	[ ]
b. House	[ ]	[ ]	[ ]
c. Appliances	[ ]	[ ]	[ ]
d. Savings	[ ]	[ ]	[ ]
e. Cropping	[ ]	[ ]	[ ]
f. Livestock	[ ]	[ ]	[ ]

3.15 If your total assets "Decreased" in Q3.14, what are the reasons? (you can tick more than one)

a. Liquidated some of the household's assets [ ]
b. Livestock die [ ]
c. Poor harvest (flood, drought) [ ]
d. Low market price of farming products [ ]
e. Increased in inflation [ ]
f. Other(s) please specify_____

3.16 Compared with your total expenditures without the microcredit programmes, has your total expenditures with the microcredit programme in the last 2 years been _____

	Increased	**Decreased**	**No changed**
Total Expenditures	[ ]	[ ]	[ ]
a. Food expenditures	[ ]	[ ]	[ ]
b. Children Education	[ ]	[ ]	[ ]
c. Health care	[ ]	[ ]	[ ]

3.17 If your total expenditure "Decreased" in Q3.16, what are the reasons? (you can tick more than one)

a. Household members have been decreased [ ]
b. I plant vegetables and raise livestock for my family consumption [ ]
c. My children education is free (subsidised) [ ]
d. Tuition fees have been incurred to the formal microcredit [ ]
e. Health care fees have been uncured to the formal microcredit [ ]
e. Others (*please specify*)_____

3.18 Compared with your overall living standard without the microcredit programme, has your living standard been _____ in the last 2 years

a. Increased **[ ]**
b. Remain the same **[ ]**
c. Decreased **[ ]**

Section 4. Household's Demographics and Economic Activities

4.1 Are you the household head? (*Note: Interviewers have to make sure that the participants are household head in order at the beginning of the survey*)

a. YES **[ ]** b. NO **[ ]**

4.3 Was your household classified as a poor one of the commune/ward in the following years?

a. YES **[ ]** (*please circle the year*) Year 2007 Year 2008 Year 2009
b. NO **[ ]**

4.4 What is your gender?

a. Male **[ ]** b. Female **[ ]**

4.5 What is your age? (*Please state*)_____

4.6 Which ethnic group are you belong to?

a. Vietnamese **[ ]**
b. Khmer **[ ]**
c. Cham **[ ]**
d. Chinese **[ ]**
e. Others (*please specify*):_____

4.7 What is your marital status?

a. Single/Never Married **[ ]**
b. Married **[ ]**
d. De factor relationship **[ ]**
e. Divorced/Separated **[ ]**

4.8 How many children do you have? Male:_____ Female: _____

4.9 What is your highest educational or professional qualification?

a. No education **[ ]**
b. Primary school **[ ]**
c. Middle school **[ ]**
d. High school **[ ]**
e. Vocational training **[ ]**
f. College **[ ]**
g. Other(s) please specify _____

4.10 What is your main occupation? (*Please state*)_____

4.11 The number of people living in your household is (*please state*):_____ persons

4.12 The number of income earners in your household is (*please state*):_____ persons

4.13 What is the status of your land ownership?

a. Owned my land **[ ]**
b. Leased land **[ ]**
c. Other(s) please specify _____

4.14 What is the size of your household farm land?

a. Less than 0.1 hectare **[ ]**
b. Between 0.1 – 0.5 hectare **[ ]**
d. More than 0.5 hectare **[ ]**
e. Other(s) please specify _____

4.15 What are your main crops in the past 12 months? (*please tick all if applicable*)

a. Rice **[ ]**
b. Vegetable **[ ]**
d. Perennial industrial crops **[ ]**
e. Other(s) please specify _____

4.16 What is the main source of your household income?

a. Farming/cropping **[ ]**
b. Livestock **[ ]**
c. Farm labourer **[ ]**
d. Non-farm labourer **[ ]**
e. Family business (vendor) **[ ]**
f. Other(s) please specify _____

4.17 How many months do you engage in generating the main income per year?

a. 12 months **[ ]**
b. 9 to less than 12 months **[ ]**
c. 6 to less than 9 months **[ ]**
d. 3 to less than 6 months **[ ]**
e. 1 to less than 3 months **[ ]**

4.18 What is your household annual income for the years 2008 and 2009?

Income (VND/Year)	**2008**	**2009**
a. Farming		
b. Livestock		
c. Farm labourer		
d. Non-farm labourer		
e. Family business (vendor)		
f. Other		
Total		

4.19 Does your household have any subsidiary income in the past 12 months?

a. YES **[ ]** *please specify:* _____VND b. NO **[ ]**

4.20 If "Yes" in Q4.19, what are sources of subsidiary household income? (*You can tick more than one*)

a. Casual labour **[ ]**
b. Handicraft **[ ]**
c. Relief payment from government **[ ]**
d. Remittances from other family members or relatives **[ ]**
e. Others_____

4.21 What is your household annual consumption for the years 2008 and 2009?

Consumption (VND/Year)	**2008**	**2009**
a. Food		
b. Drink (alcohol, coffee, etc)		
c. Children education		
d. Health care		
e. Household appliances		
f. Others		
Total		

4.22 What is your household annual farming and non-farming expenditures for the years 2008, and 2009?

Expenditures (VND/Year)	**2008**	**2009**
a. Land rental		
b. Inputs for farming (seed, fertilisers, etc)		
c. Tax		
d. Health care		
e. Household appliances		
f. Others		
Total		

Your participation in this survey is greatly appreciated. Thank you for your time and if you have further comments about microcredit, please feel free to comment in the space provided below. Once again, we assure you that your identity will remain ***STRICTLY CONFIDENTIAL.***

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