Credit Constraints and Impact on Rural Farm Household Welfare: The case of Vietnam's North Central Coast region

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My Minh Chau Tran

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Abstract of a thesis submitted in partial fulfilment of the requirements for the Degree of Master of Agricultural Commerce

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This study aims to identify the factors affecting formal credit constraint status of rural farm households in Vietnam and their impact on the household welfare. Despite the effort of the subsidised financial institutions to expand their credit coverage to almost every rural Vietnam communes, rural farm households are found to remain credit constrained by these institutions. Using the Direct Elicitation Method, our survey uncovers more than 40% of the rural farm households in Vietnam's North Central Coast region are credit constrained by formal financial institutions. Quantity constraint accounts for the highest proportion of these cases, followed by transaction cost constraint. No case of risk constraint is reported.

The empirical evidences reveal that young and less educated households with female head are less likely to receive sufficient loan from the formal financial institutions. Similarly, farm land size, labour resources and non-farm income play important roles to relax household's credit constraint status. The findings also raise the concern that subsidised credit allocation favours better off households but farm households in wealthier areas have disadvantages to obtain subsidised credit. The maximum loan size offered by the formal financial institutions is still lower than the household's actual credit demand. Further, our results clearly show that credit constraints have negative impact on the household welfare in the North Central Coast region and this impact can be alleviated by informal credit.

With regards to implications, our results recommend that apart from enhancing credit allocation regime, the government should focus on improving the households' education and developing non-farm economic activities in the rural area, which not only ease formal credit restriction but also promote household welfare. It is also important that policy makers and formal financial institutions pay more attention on developing relevant credit policies for the poor and

disadvantaged households in lower poverty rate communities to assure that they receive sufficient loan for production and consumption. The loan size limit set by Vietnam Bank for Social Policies needs to match with the actual households' credit demand. Relaxing credit constraints is essential not only to enhance the household welfare but also narrow the welfare gap between the poor and non-poor households. The substitute effect of informal credit on the household welfare supports the idea of integrating the two credit sectors into one well-functioning credit market.

Keywords: credit constraints, determinants, rural farm households, North Central Coast, welfare impact

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Abbreviations

2SLS	Two-stage least squares
ADB	Asian Development Bank
DD	Double Difference
DEM	Direct Elicitation Method
ESR	Endogenous Switching Regression
GSO	General Statistics Office
IV	Instrumental variable
MFI	Microfinance institution
MOLISA	Ministry of Labour and Invalid Social Affairs
NCC	North Central Coast
NGOs	Non-government organisations
OLS	Ordinary least squares
PCF	Peoples Credit Funds
PSM	Propensity score matching
ROSCA	Rotating Savings Credit Association
VBP	Vietnam Bank for the Poor
VBARD	Vietnam Bank for Agricultural and Rural Development
VBSP	Vietnam Bank for Social Policies
VND	Vietnam Dong
WB	World Bank

Chapter 1

Introduction

1.1. Introduction

Rural credit plays a key role in poverty alleviation programs in developing countries. According to Beck and Demirgüç-Kunt (2008), the improvement of rural household's accessibility to credit is more efficient to resolve growth stagnation and perpetual income inequality than fiscal redistribution as it equalizes earning opportunity while it does not reduce work and savings motivation. However, without the intervention from the government, rural households are usually excluded by formal financial institutions due to high transaction cost and asymmetry information (Hoff & Stiglitz, 1990; Jaffee & Stiglitz, 1989). In addition, lack of collateral, weak credit contract enforcement and underdevelopment of insurance service discourage formal creditors to serve this market (Ghosh, Mookherjee, & Ray, 2000). Low interest rate credit provided by subsidised financial institutions is a solution applied by many developing countries to extend credit to farmers in rural area. However, this policy was criticized for distorting the rural financial market and failing to reach most needy and vulnerable groups as well as exacerbates income inequality (Amin, Rai, & Topa, 2003; Conning & Udry, 2007; Meyer & Nagarajan, 2000; Tsai, 2004). Thus, many poor and small farm households are still constrained from formal credit regardless of how intensive and broad government interventions have been. Credit constraints have serious impact on household welfare and production. Guirkinger & Boucher (2008) indicates that credit constraints negatively affect resource allocation, particularly agricultural productivity of Peruvian farm households and the removal of constraints can increase agricultural production in the studied area by 26%. Similar conclusion can be found in Dong, Lu, and Featherstone (2012) study. Li and Zhi's (2010) study reveals the negative impact of credit constraints on rural household income and consumption expenditure in China.

Vietnam has a high proportion of rural population. At the end of 2011, approximately 68% of Vietnam population lived in the rural area (GSO, 2012b), in which 67.83% of the households was mainly attached to farming. The poverty rate in the rural area is much higher than the urban area (14% compared to 3% (GSO, 2012b)). As savings in rural Vietnam is low (average 6.7 million Vietnam dong (VND) per household annually (GSO, 2012a)), credit is considered to be an essential resource to improve farm household welfare and production. However, similar to many developing countries, Vietnam rural farm households are ruled out by formal financial institutions.

In order to meet credit demand of rural households at affordable interest rate, the government subsidises formal credit supply through three organisations, namely the Vietnam Bank for Agriculture and Rural Development (VBARD), Vietnam Bank for Social Policies (VBSP) and People's Credit Funds (PCFs). In spite of the government's effort to expand subsidised credit institutions rapidly in recent years with the aim to combat poverty, many rural farm households are still constrained from formal credit and forced to borrow from informal lenders (Barslund & Tarp, 2008; Dufhues & Buchenrieder, 2005; Nguyen, 2008; Pham & Izumida, 2002).

Despite the importance of formal credit to rural farm household outcomes in Vietnam, there are limited studies that address the determinants of credit constraints and their impacts. To the best of our knowledge, there has been no study evaluating the impact of credit constraints on rural farm household welfare particularly in Vietnam. In addition, the studies related to credit constraints only considered full quantity rationing (households apply for the loan and then are rejected), omitting the case of partly quantity rationing (loan obtained by the borrowers is less than their demand) and self-rationing.

1.2. North Central Coast region

North Central Coast (NCC) is one of the seven regions in Vietnam located in the middle of the country. The region comprises of six provinces Thanh Hoa, Nghe An, Ha Tinh, Quang Binh, Quang Tri, Thua Thien Hue. It is one of the regions with the highest poverty rate in Vietnam. NCC's percentage of poor households is only lower than Northern Midland and Mountain region which face inherent difficulties in social and economic development (mountainous geography and high proportion of ethnic minorities).

Table 1.1 Poverty Rate by Region in Vietnam 2006 – 2010

Region	2006	2008	2010
Red River Delta	10	8.6	8.3
Northern Midland and Mountain	27.5	25.1	29.4
North Central Coast	**26.6**	**23.1**	**24**
South Central Coast	17.2	14.7	16.9
Central Highlands	24	21	22.2
South East	4.6	3.7	3.4
Mekong River Delta	13	11.4	12.6
Whole country	**15.5**	**13.4**	**14.2**

Source: Adapted from (GSO, 2011)

It can be seen from Table 1.1, compared to other low land regions such as the Red River Delta, South Central Coast or Mekong River Delta, NCC has much higher poverty rate. Majority of NCC's population inhabits in rural area. According to GSO (2012b) in 2011, rural population accounted for 81.83% of the region's total population while the average rate of the country as a whole was only 68.25% (see Table 1.2 for details).

Table 1.2 Percentage of Rural Population by Region

Region	2008	2010	2011
Red River Delta	71.32	69.6	69.1
Northern Midland and Mountain	84.08	83.52	83.07
North Central Coast	**84.55**	**83.06**	**81.83**
South Central Coast	67.02	65.44	64.54
Central Highlands	72.40	71.44	71.12
South East	42.81	42.72	39.12
Mekong River Delta	78.46	76.43	75.72
Whole country	**71.01**	**69.50**	**68.25**

Source: Adapted from (GSO, 2012b)

Although there was a significant increase in NCC's monthly income per capita over the year, it still lagged behind other regions. As illustrated in Table 1.3, NCC's income per capita was significantly lower than Northern Midland and Mountain and only equal to 65.1% of the average income per capita of the whole country, lagged far behind Red River Delta, South East and Mekong River Delta.

Table 1.3 Monthly Income per capita by region

Region	2008	2010
Red River Delta	1048.5	1567.8
Northern Midland and Mountain	657	905
North Central Coast	**641.1**	**902.8**
South Central Coast	843.3	1162.1
Central Highlands	794.6	1087.9
South East	1649.2	2165
Mekong River Delta	939.9	1247.2
Whole country	**995.2**	**1387.1**

Unit: VND 1000

Source: Adapted from (GSO, 2012b)

Relatively low income per capita can be explained by high rate of labour being engaged in farm employment. For example, 63.8% of NCC's labour force worked in agricultural sector, which is

significantly high in comparison with 28.8% of Red River Delta, 42.7% of South Central Coast or 49.2% of Mekong River Delta (GSO, 2011). Furthermore, farming was the main economic activity of 70.2% of the rural households in NCC.

It should be emphasised that NCC is frequently threatened by natural disasters. As calculated by Noy and Vu (2010), from 1996 to 2005, there were 125 natural disasters observed directly affecting this region. The total damage caused by natural disasters to North Central Coast accounted for 11.85% of regional GDP which is worse than any other areas in Vietnam. Strong dependence on farming is a reason why this area is economically vulnerable to natural disasters. It also explains why NCC's is the lowest income per capita region in Vietnam.

It is assumed that the improvement of accessibility to credit can increase income and improve consumption for rural farm households in Vietnam. For the regions which have high poverty rate, high rural population, are significantly dependent on farm income and exposed to natural disasters like NCC, credit is a remedy to reduce poverty and enhance rural farm household welfare. In order to make formal credit more reachable for rural farm households in this area, it is important to identify their credit constraint condition, factors determining their credit constraint status and its impact on their welfare.

1.3. Research objectives

This study aims to identify the factors determining farm household's credit constraint status in rural North Central Coast region of Vietnam. The study also examines the impact of credit constraints on farm household welfare in the studied region. Results from the study are expected to show the extend subsidised credit penetrates rural farm households in NCC, which is considered to be one of the poorest regions in Vietnam and whether there is any difference in welfare between those who are credit constrained and unconstrained.

The specific objectives of this study include:

1. To provide an overview of Vietnam rural credit market and credit constraints
2. To identify the factors affecting household's access to formal credit in Vietnam rural market
3. To evaluate the effects of credit constraints on rural farm household welfare

1.4. Significance of the study

This is the first study to address different types of credit constraint on farm households and their determinants in rural Vietnam. Previous studies (Boucher, Carter, & Guirkinger, 2008; Guirkinger &

Boucher, 2008) have showed that failure to take into account all types of credit constraint leads to under-representation of rural credit demand as well as credit constraint condition. Results from this study help to answer the question - when the price constraint eases (low interest rates), what other constraints affect farm households to access formal credit. Another contribution of the study is to measure the impact of credit constraints on rural farm household welfare in Vietnam, which has not been discussed in previous studies. If the impact is significant, then an adjustment of the government policy on rural credit for farm households is necessary to improve their welfare.

1.5. Structure of the study

Chapter One introduces the research which includes rationale, research purpose, research objectives, significance of the study and background information of rural poverty and development in Vietnam. An overview of the rural credit market and related literature are presented in Chapter Two. Chapter Three presents the research methods. Descriptive data and results from the empirical models are discussed in Chapter 4. Chapter 5 summarises the major findings, proposes policy implications, highlights limitation of the research and provides recommendations for future studies.

Chapter 2

Review of related literature

Section 2.1 provides an overview of Vietnam rural credit market, followed by the characteristics of credit market suppliers. In addition, literatures related to credit constraints, such as definition, causes and determinants of credit constraints are discussed in section 2.2. Results from previous studies on impact of credit constraints on farm households are also discussed in this section. The final section provides a summary of the review.

2.1. Overview of Vietnam rural credit market

Like other developing countries, Vietnam rural credit market is featured by fragmented lenders coexisting namely formal, semi-formal and informal credit providers (see Figure 2.1) (Ho, 2004; Nguyen, 2007; Pham & Izumida, 2002; Pham & Lensink, 2007)

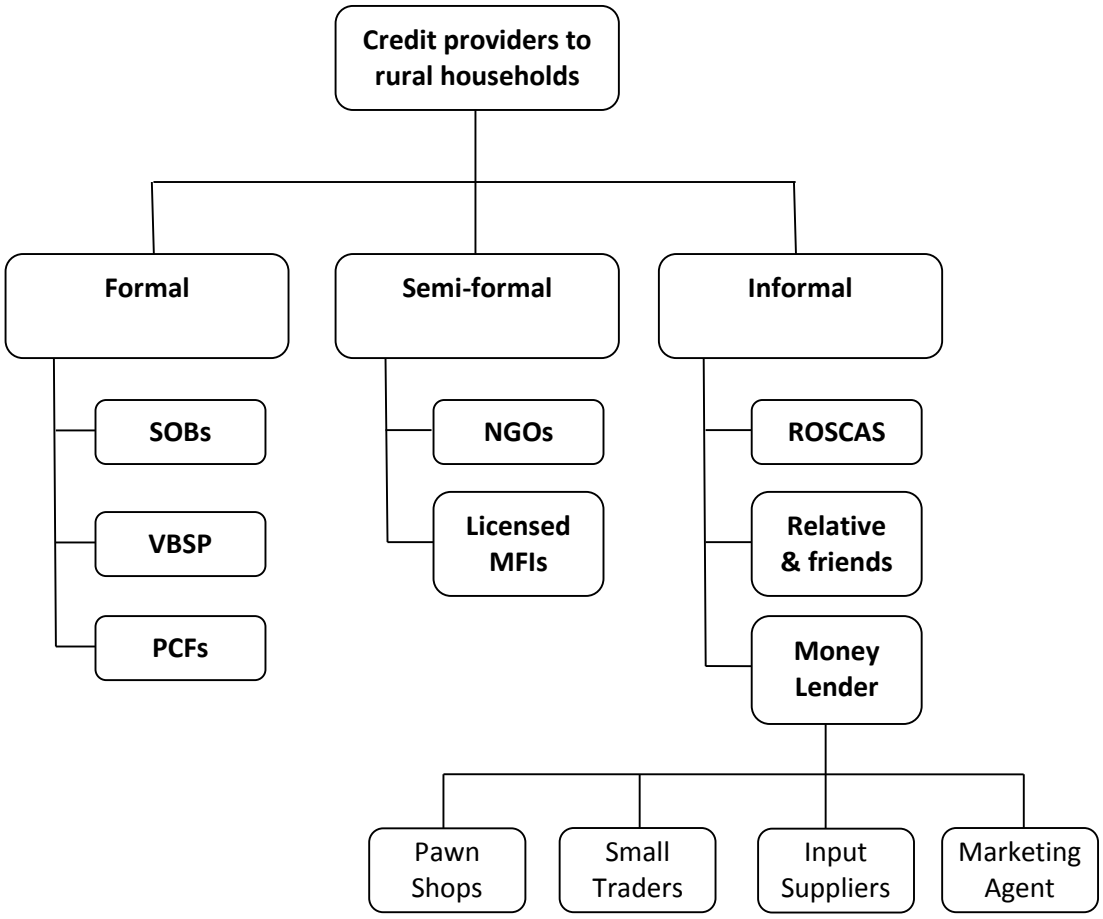

Figure 2.1 Structure of credit system for rural households

Source: Adapted from (ADB, 2010)

Each lender imposes different rate of interest and contract terms as well as serves for specific borrowing purposes. By 1993, informal lenders dominated about 73% of the rural credit market in Vietnam. The establishment of People Credit Funds (PCFs) in 1993 and the Vietnam Bank for the Poor (VBP) under the administration of Vietnam Bank for Agriculture and Rural Development (VBARD) in 1995 was the turning point for the expansion of the formal credit sector, which led to the contraction of informal credit sector's market share to 51% (McCarty, 2001). Another factor that contributed to the prevalence of formal over informal lenders in the rural credit market was the transformation of Vietnam Bank for Social and Policies (VBSP) from Vietnam Bank for the Poor in 2002. At the end of 2008, formal lenders apparently dominated over informal counterparts (see Table 2.1 for more details). Formal credit providers are highly subsidised by the government because of high transaction cost and high risk that exclude commercial financial institutions from the rural market (Barslund & Tarp, 2008; Nguyen, 2007). The semi-formal credit sector is in the development stage and is gradually legalised, but, plays a modest role in credit provision (ADB, 2010). Relatives and friends are still important informal credit sources for rural households (see Table 2.1).

Table 2.1 Percentage of households borrowing or having debt in the past 12 months by source of loan and areas

Year	Area	Total	VBSP	VBARD	Other bank	Political & social organisation	Private money lender	Relative/ friend	Others*
2004	**Urban**	27.7	9.4	33.7	8.3	6.7	11.5	32.5	4.4
2006		27.5	17.8	31.6	9.6	8.6	9.0	25.5	4.0
2008		26.6	23	28.3	9.9	7.4	8.5	29.5	3.6
2004	**Rural**	41.7	12	48.6	2.9	6.2	11.1	24.8	3.1
2006		41.6	20.4	46.7	2.5	7.4	8.1	21.4	2.4
2008		41.2	31	37.6	3.0	6.7	8.6	24.6	2.6

*Note: * means other informal credit sources in rural area*

Source: Adapted from (GSO, 2009)

Results from the Vietnam Household Living Standards survey (GSO, 2009) show the substantial dependence of rural households on credit. In 2008, 41.2% of rural households was in debt whereas the proportion of indebted urban households was 26.6%. Particularly, rural households were more reliant on formal lenders, especially VBSP and VBARD while relatives and friends became one of the main credit sources of their urban counterparts. In addition, 9.9% of urban households compared to 3% of rural households accessed other bank's credit, exhibiting the disadvantage of

rural households to approach to other formal sources of credit rather than subsidised ones (see Table 2.2).

Table 2.2 Percentage of poor households selected by localities borrowing or having debt by source of loan in rural area

Year	Rural area	VBSP	VBARD	Other bank	Political & social organisation	Private money lender	Relative/ friend	Others*
2005	53.9	53	20.1	0.8	8.3	9.3	26	3.2
2006	54.8	53.8	20.4	0.8	7.7	9.5	26.1	3.1
2007	55.1	55.1	19.7	0.6	7.9	9.7	25.9	3.3

*Note: * means other informal credit sources in rural area*

Source: Adapted from (GSO, 2009)

Table 2.3 Average amount of outstanding debts per household borrowing or having debts in the past 12 months by sources of loan and regions

Year	Area	Total	VBSP	VBARD	Other bank	Political & social organisation	Private money lender	Relative/ friend	Others *
2006	Urban	36,032	5,980	44,821	121,733	4,629	13,598	25,822	8,180
2008		47,936	8,251	46,503	163,598	6,321	28,500	25,904	28,684
2006	Rural	12,010	5,567	14,791	31,824	4,092	7,277	8,314	5,647
2008		18,383	7,754	22,891	56,790	5,737	10,530	13,129	7,708

*Note: * means other informal credit sources in rural area*

Unit: VND 1000

Source: Adapted from (GSO, 2009)

In terms of loan size, Table 2.3 shows average loan size offered by unsubsidised commercial banks was substantially bigger than subsidised credit institutions. It is understandable since commercial banks prefer to serve big customers with high value transaction to reduce transaction cost. The loan size provided by VBSP is relatively small compared to other sources, but there is no difference in terms of loan size between urban and rural customers, which implies that loan amount offered by the bank is regulated by the policy rather than based on actual demand.

2.1.1. Formal lenders

Vietnam Bank for Agriculture and Rural Development, Vietnam Bank for Social and Policies and People Credit Funds are main suppliers in the rural formal credit market. Although these institutions are under the support of the government, there are differences in their borrowing

policies, procedure, interest rate and collateral requirement. It is important to note that while VBARD and VBSP are available in almost every communes, PCFs only can be found in specific areas.

a) The Vietnam Bank for Agriculture and Rural Development (VBARD)

VBARD is the first commercial bank providing credit to households in rural area. It is also the only bank offering both commercial and preferential loans to rural households. Although separated from Vietnam Bank for the Poor (later renamed as Vietnam Bank for Social Policies) in 2002, VBARD still pursues the poverty reduction objective and has its own lending policy for rural farm households, which is neither as strict as other commercial banks nor as easy as VBSP. Despite the fact that the proportion of borrowers served by VBARD has decreased over the years, it is still the biggest lender in the rural area. However, the proportion of poor households receiving loan from VBARD is much lower than that from VBSP (19.7% compared to 55.1%) (see Table 2.2). In terms of loan size, loan amounts offered by VBARD are much larger than those offered by VBSP (see Table 2.3). There is no limitation on VBARD's loan whereas the maximum amount a borrower can receive from VBSP is VND 30 million. However, the average loan amount obtained by urban households from VBARD is relatively larger than that of rural households. According to the decree 41/ND-CP/2010, banks are allowed to lend a maximum of VND 50 million to farm households without collateral requirement. In return, households have to present their land title certificate to the credit institutions. As commented by Putzeys (2002) the loan application procedure and evaluation of VBARD are complicated, which implies high transaction cost for both borrowers and the bank when small sized loans are processed. Therefore, the bank would prefer to serve large borrowers.

b) Vietnam Bank for Social Policies (VBSP)

Among the three main formal credit institutions, VBSP is the biggest loan provider to rural poor households. The bank was transformed from Vietnam Bank for the Poor (VBP) established in 1995 and operated under the administration of VBARD. The purpose of separating VBSP from VBARD is to enhance the banks' capacity in implementing social policies assigned by the government. VBSP has developed rapidly in terms of commune coverage and the number of borrowers served. In 2004, only 12% of rural households obtained loan from VBSP, this increased to 31% in 2008 (see Table 2.1). Up to the end of 2009, the bank has reached 99% of total communes and covered 7.54 million borrowers, becoming the prevailing lender in rural areas (ADB, 2010). It is also the predominant creditor for the rural poor with a market share of 55.1 % in 2007 (see Table 2.2).

Although the poor is the target group of VBSP but the proportion of poor households in the bank's borrower pool was only 32.9% in 2004 (Nguyen, 2008). According to VBSP's loan distribution plan, this number was 39.8% in 2010 (ADB, 2010). In general, the biggest bank for the poor only covered 12% of poor households in rural areas (Nguyen, 2008). The reason for the low coverage is that apart from serving poor households, VSPB has to support 13 other governmental programs such as supporting disadvantageous students, clean water and rural sanitation and job creation. The difference between the poverty definition of World Bank and VBSP is another explanation for the low coverage (Nguyen, 2008). The poor recognised by VBSP are those who meet the criteria regulated by the Ministry of Labour, Invalids and Social Affairs (MOLISA) and are certified by local authorities. Therefore, some households who are certified to be poor by local authorities are not recognised as poor according to the World Bank's definition and vice versa. Furthermore, although VBSP was established to support the poor to access credit, it is also under pressure over the repayment requirement. In other words, if a VBSP branch bank has a high rate of overdue loans, financial support from the government for that branch bank would be contracted, then the poorest are more likely to be excluded (Nguyen, 2008). In terms of interest rate and loan size, interest rate charged by VBSP is relatively low, 0.65% compared to 1-1.08% and 1.25% charged by VBARD (for the poor) and PCFs, respectively. Similarly, the average loan size is also the smallest (USD 521 compared to USD 1,094 and USD 769 offered by VBARD and PCFs, respectively) (ADB, 2010).

c) People's Credit Funds (PCFs)

Established in 1995, PCFs are organised as financial cooperatives which provide financial services to commune based members. As reported by ADB (2010), at the end of 2009, the membership of total funds were 1.5 million, of which 953,736 members were borrowers. Women and the poor constitute 30% and 10% of the total borrowers, respectively. Only members of PCFs have the right to obtain loan from the Funds, but a household only needs to contribute VND 50,000 to be a member. The ease of entry allows the funds to expand outreach to poor households. However, it is worth noting that based on the members' contribution, PCFs in poor areas often have weak financial status and their lending capacity is limited, thus, households in the rural poor find it difficult to obtain loan from PCFs. Moreover, PCFs operate as banks which prefer to offer loan to large scale borrowers to lower transaction cost. Since the poor is not the target group of PCFs, they are more likely to be refused (Putzeys, 2002).

2.1.2. Semi-formal lenders

Semi-formal lenders in Vietnam are mainly microfinance institutions managed by Non-government Organisations (NGOs) and funded by international donors. Before 2005, microfinance institutions were not recognised by Law as a part of Vietnam credit system. Not until the Decree 28 in 2005 and then revised by Decree 165 issued in 2007, the organisation and operation of microfinance in Vietnam had been regulated. In addition, these documents instructed the process for non-governmental entities to set up formal credit institutions in Vietnam or formalise existing semi-formal institutions. However, up to the end of 2012, only two out of 50 semi-formal institutions operating in Vietnam have been licensed (ADB, 2010).

In general, the target group of semi-formal lenders is poor households residing in disadvantaged areas such as mountainous and remote areas, or minority ethnic group. Coverage of these institutions are still limited in small and dispersed communities, therefore, the total borrowers served by semi-formal credit is still low (less than 1% of total borrowers) (ADB, 2010). As observed by Quach (2005) the strength of semi-formal institutions is capacity development through technical assistance for political and social organisations such as woman union, youth union and farmer union. The poor and women are efficiently reached by these institutions and less likely to be excluded since they are identified as the target group. However, semi-formal institutions still encounter high operating cost and limited outreach due to small scale.

2.1.3. Informal lenders

The role of informal lenders in rural credit market is still a controversial issue. On one hand, money lenders are criticised for charging exploitative interest rate, behave optimistically, and are attributed to vicious indebted circle of rural households. On the other hand, it is argued that interest rate charged by informal lenders reflects accurately the transaction cost and risk of rural credit transaction. Informal credit is also distributed more efficiently than formal credit and meet promptly household's consumption need, which is often omitted by formal credit (Ghate, 1992). In Vietnam, although the predominance of informal credit came to an end with the expansion of subsidised credit, its importance to rural households is still affirmed.

a) Relatives and Friends

Conventionally, relatives and friends are the first source of credit households seek when they have income shocks or unexpected events. Free Interest rate, prompt delivery, flexible duration and payment schedule are the characteristics of this type of credit. However, not every households

have good network of well-off relatives and friends, and poor households are unlikely to borrow from this source due to the complicated social implications (Quach, 2005) . Since there are limited studies on this source of credit in Vietnam, stability and availability of credit from relatives and friends are still questionable.

b) Money lenders

Money lenders in the rural area often live in the same communes with borrowers and may provide loans in form of cash or goods. They can be permanent or seasonal lenders. According to Quach (2005), each village in Vietnam has 2 to 3 permanent and 5 to 10 seasonal lenders. They do not require collateral and offer flexible term of payment but usually charge high interest rate. Money lenders have their own methods to force borrowers to repay. Similar to formal lenders, money lenders also encounter adverse selection, therefore, they tend to limit their lending to certain number of creditworthy clients (Bell, 1990). As reported by GSO (2009), the percentage of households obtaining loan from money lender is relatively low (8.5% in 2008) and on the downward trend. However, we should analyse this number with caution. In Vietnam, money lenders are often referred to "black credit" which has a negative connotation that transaction is dubious. Households are reluctant to report their loans from money lenders because it implies they are in not good financial standing.

c) Rotating Savings Credit Associations (ROSCAs)

ROSCAs are known under different names such as "Ho" in the North, "Phuong" in the Middle and "Hui" in the South. They are referred to groups of members who have acquaintanceship and trust each other, contributing property to form periodic saving and lending process. Interest rate, loan amount and distribution are determined by mutual agreement among members, group leaders or by bidding. The scale of ROSCAs varies, depending on the number of members and members' fund contribution. Since ROSCAs' operation is not regulated, right and liability of members are not protected by Law. When the associations collapse due to borrowers' failure to repay, all members have to bear the loss (Quach, 2005).

In summary, the overview of Vietnam rural credit market confirms its uniformity with the structure of rural credit market in developing countries in terms of main market players and the role of the government interventions. Analysis on characteristics of formal lenders shows the prominent role of VBSP, VBARD and PCFs in providing loan to rural households. However, it also raises the concerns that although the poor is the primary target group of the governmental program related to rural credit, they still encounter difficulties in accessing credit from the

subsidised institutions. Limitation on loan size and collateral requirement imposed by some formal financial institutions show the signs of credit constraints.

2.2. Review of related literature

2.2.1. Definition of Credit constraints

The term "credit constraint" used in this study is different from credit rationing defined in Stiglitz and Weiss's (1981) study. Credit rationing theory developed by Stiglitz and Weiss (1981) focuses on the supply side while credit constraint covers both supply and demand side or external and internal rationing (Fenwick & Lyne, 1998). In other words, credit rationing is a particular case of credit constraint. However, the two terms can be used interchangeably without causing any misunderstanding.

According to Barham, Boucher, and Carter (1996) and Boucher, Guirkinger, and Trivelli (2009), credit constraints can be categorised into three groups: quantity constraint, risk constraint and transaction cost constraint. Quantity rationing involves the supply side while the two are associated with the demand side. Quantity constraint refers to those whose loan applications are rejected or successful but the total amount of credit obtained is below the requested amount. Households are considered to be risk rationed when they have demand for credit, but do not apply for the fear of losing their collaterals. The disappearance of insurance market and idiosyncratic shocks such as natural disasters and price violation discourage rural households from using their asset to gain credit especially when the collateral is housing or land, which is their most important production inputs. Transaction cost constraint implies that the households have positive notional demand for loan but due to the high transaction cost of loan application and process, their investments become non-profitable. Additional case studied by Kumar, Turvey, and Kropp (2013) reveals that farmers do not access credit market perhaps for the fear of rejection (since they have experienced rejection before). It can be categorised as quantity rationing.

Conventionally, loan non-applicants are assumed to have no demand for credit, therefore they are categorised to be credit unconstrained. However, it is evidenced that failure to consider the demand side constraint may underestimate the demand for credit as well as credit constraint situation in the rural area. Assuming "nonparticipation in the credit market stems from either an effective constraint on access to formal sector or low demand" (Kochar, 1997b, pp. 349-350), Kochar (1997b) concludes that credit demand of rural households in India is rather low and credit constraints are not serious. On the contrary, other studies have shown that internal rationing is the main hindrances of the households' participation in the credit market. The result from the

survey conducted by Bashir and Azeem (2008) in Pakistan suggests that loan procedure and delay in providing loan are the main constraints confronted by the farmers. Barham et al. (1996) identify internal rationing in Guatemala is more serious than external rationing. Fenwick and Lyne (1998) provide empirical evidences of the significant relationship between high transaction cost as well as risk perception and farm household's likelihood to borrow. Yu (2008) argues that the demand side constraint is as serious as supply side constraint in China. Examining credit constraints in Peru, Honduras and Nicaragua, Boucher et al. (2008) find risk rationing account for 20% to 40% of non-price rationing cases.

2.2.2. Causes of credit constraints

Classical theories attribute asymmetric information to credit rationing (Jaffee & Modigliani, 1969; Jaffee & Stiglitz, 1990; Stiglitz & Weiss, 1981). In a world of imperfection information, when there is excessive demand of credit over supply, banks are reluctant to increase interest rate from the prevailing interest rate r^* to the rate of r^c equating supply and demand, which may lead to the increase of loan defaults (see Figure 2.1A).

The defaults arise from adverse selection and moral hazard behaviour that reduce repayment rate which then reduce their total revenue from RE^* to RE^c (see Figure 2.2B). Since high interest rate excludes risk-adverse borrowers who often invest in safe but low return projects, the pool of borrowers becomes worse off (Stiglitz & Weiss, 1981). The remaining borrowers in the pool are risky borrowers. High interest rate also encourages borrowers to invest in high risk projects which lead to higher probability of defaults (Ravallion & Wodon, 1999; Stiglitz & Weiss, 1981). Requiring more collaterals yields similar effects (Stiglitz & Weiss, 1981). As a result, at the prevailing interest rate some borrowers are excluded by banks.

In rural area, credit constraints not only result from information asymmetry but also high transaction cost and high risk that prevent formal financial institutions from providing credit to the market (Meyer & Nagarajan, 2000; Petrick, 2005; Zeller & Sharma, 1998). Geographical dispersal and small loan size are the causes of high transaction cost. Moreover, due to uncertainty in agricultural production, lack of collaterals, the absence of insurance market for rural households and enforcement issue, banks are therefore reluctant to lend to rural households (Hoff & Stiglitz, 1990; Meyer & Nagarajan, 2000). Although subsidised credit in developing countries aims at relaxing credit constraints for rural farm households, it is blamed to favour better off farmers because high cost of obtaining information from small-scale borrowers discourages banks to offer loan to them (Carter, 1988; Conning & Udry, 2007). The credit constraints are also attributed to

transaction cost impeding farm households from approaching formal lenders (Adams & Graham, 1981)

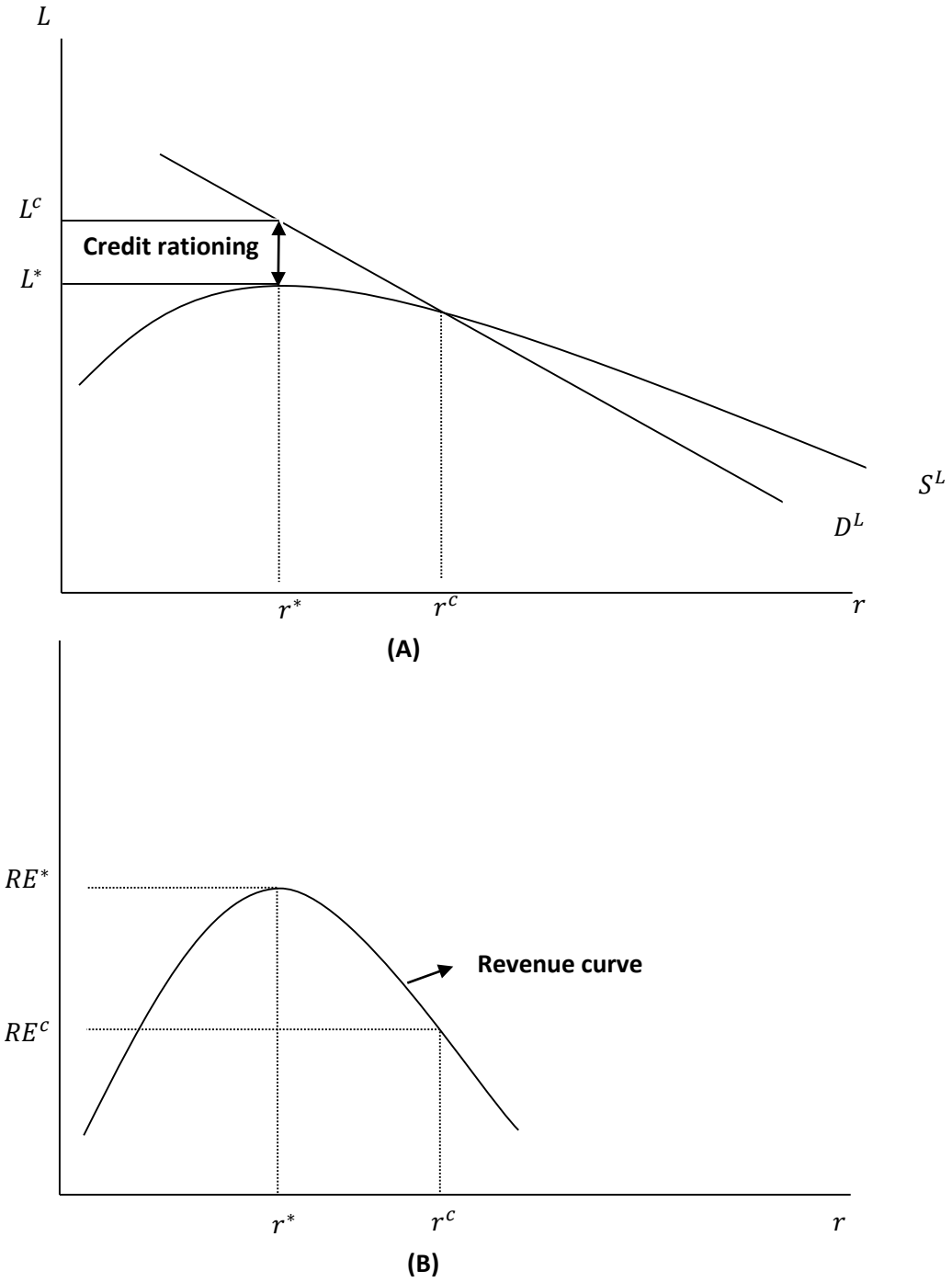

Figure 2.2 Interest rate at market equilibrium and credit rationing

Source: Adapted from (Stiglitz & Weiss, 1981)

2.2.3. Methods to identify and measure credit constraints

Methods to identify credit constraints are grouped into indirect and direct method (Diagne, Zeller, & Sharma, 2000; Gilligan, Harrower, Quisumbing, & Sharma, 2005). Indirect method is based on the theoretical difference of key parameters between credit constrained and unconstrained households. An example of indirect method is life cycle model which assumes that "in the absence of liquidity and borrowing constraints, transitory income shocks should not affect consumption" (Diagne et al., 2000, p. 4). However, there is ambiguity on the conclusiveness of this method since precautionary households may reduce consumption expenditure to cope with negative income shock regardless of whether they are credit constrained or not (Diagne et al., 2000). Direct method or so called Direct Elicitation method (DEM) (Boucher et al., 2009) is associated with information collected from household surveys with a set of questions to identify whether a household is credit constrained. While the validity of this method is questionable (Petrick, 2005), it is proven by Gilligan et al. (2005) and Boucher et al. (2009) to be reliable. Using consumption smoothing and farm labour demand model, Gilligan et al. (2005) confirm the consistency of DEM result. Results from the multinomial logit regression model developed by Boucher et al. (2009) show that DEM classification is accurate. Similarly, Gilligan et al. (2005) emphasise that the validity and effectiveness of the survey on credit rationing depend on the quality of questions. The irrefutable drawback of this method is that it cannot recognise efficient versus inefficient excluded demand. Another shortcoming of this method is inability of measuring the extent households are constrained (Diagne et al., 2000). Petrick (2004b, 2005) recommends a combination of qualitative information from survey and static household models which is of twofold: identify credit rationing and measure the efficiency of credit rationing. The latter can be achieved by comparing the willingness to pay (marginal production of capital), market interest rate and actual interest rate (equal to sum of market interest rate and transaction cost). However, the mixed method is data demanding and time consuming. Methods to identify credit constrained households will be discussed in greater detail in Chapter 3.

2.2.4. Determinants of credit constraints

Studies on determinants of credit constraints focus on three groups of factors namely characteristics of household head, household characteristics and geography related factors.

2.2.4.1. Characteristics of household head

The most frequent variables related to household head used to explain the credit constraint status are age, gender and education. The hypothesised sign of age is ambiguous. In terms of demand

side, older farmers may have higher demand for credit since they are more experienced, then are more likely to invest. However, they may require less credit if they are more conservative and accumulate enough wealth (Freeman, Ehui, & Jabbar, 1998; Pham & Izumida, 2002). In light of the supply side, older farmers may be more trusted by the banks (Franklin, Diagne, & Zeller, 2008), or considered to be less labour capable than younger borrowers (Winter-Nelson & Temu, 2005), thus, they may be more or less rationed by the banks. Empirically, previous studies show mixed results. Freeman et al. (1998) and Jia et al. (2010) find a negative relationship between age and possibility of being credit constrained which is consistent with Barslund and Tarp (2008) in the case of Vietnam. Baiyegunhi et al. (2010), Chaudhuri et al. (2011), show inverse result which is confirmed by studies of Omonona, Akinterinwa, and Awoyinka (2008) and Omonona, Jimoh, and Awoyinka (2008). Some studies use age square variable to examine the nonlinear relationship with credit constraint status of farm households (Kuwornu, Ohene-Ntow, & Asuming-Brempong, 2012; Zeller, 1994), but neither of the studies show the significant effect of age square on household's credit constraint status.

Similarly, the expected effect of gender on credit constraints is theoretically ambiguous. On one hand, male-headed households seem to have higher demand for credit (Mpuga, 2010) since they have better access to production resources. Further, they are disadvantaged to approach subsidised credit which is often in favour of women, thus, they are more likely to be credit constrained. On the other hand, they are more self-financed than their female counterparts (Franklin et al., 2008). Nevertheless, empirical studies show that male is more likely to be credit constrained (Chaudhuri & Cherical, 2011; Freeman et al., 1998; Kuwornu et al., 2012; Omonona, Akinterinwa, et al., 2008; Zeller, 1994). Studies on rural Vietnam show similar results (Barslund & Tarp, 2008; Pham & Izumida, 2002).

Education of household head is expected to improve the accessibility to formal credit since more educated farmers are believed to allocate credit more efficiently (Kuwornu et al., 2012; Pham & Izumida, 2002). However, previous studies showed education to be significant only in Barslund and Tarp's (2008), Jia et al.'s (2010), Omonona, Akinterinwa, et al.'s (2008) and Zeller's (1994) studies. Surprisingly, Zeller (1994) shows households to have higher propensity of being credit constrained when they have more years of formal education. It may be due to the fact that the purpose of subsidised loan is for disadvantaged and illiterate households (Franklin et al., 2008)

Another household head characteristic considered in credit constraint assessment is farm experience (Freeman et al., 1998; Petrick, 2004a; Reyes, 2011). However this variable is statistically significant only in Reyes's (2011) study. Thus cautions should be taken to use both age

and farm experience variables in a model as the two variables may be highly correlated.

2.2.4.2. Household's characteristics

2.2.4.2a. Physical capital related factors

Physical capital can reduce the probability of being credit constrained since it can be used as collateral to minimise repayment default and evidence of household production capacity. Land title, land area, value of house, asset and livestock are popular indicators for physical capital. In general, households having land title are less likely to be credit constrained (Baiyegunhi, 2008; Boucher et al., 2009; Foltz, 2004). It should be emphasised that the effect of land title is clear, but the effect of land area is ambiguous. In some countries, farm land cannot be used as a collateral for example in China (Jia et al., 2010), thus, land area may have positive, negative, or no effect on credit constraints, depending on its effect on demand for credit. In fact, Foltz (2004) argues that land title can loosen credit restriction, but land area has insignificant effect. In China, Peru and Malawi, more farm land area means higher propensity to be credit rationed (Boucher et al., 2009; Jia et al., 2010; Simtowe, Diagne, & Zeller, 2008) which is also reported in Petrick's (2004a) study on the effect of rented land. On the contrary, Reyes (2011) and Omonona, Akinterinwa, et al. (2008) find the contributory effect of land area to ease credit rationing. Both land area and land use right (red book) in Vietnam have insignificant effect on the bank's decision to provide credit (Barslund & Tarp, 2008; Nguyen, 2007; Pham & Izumida, 2002).

Asset (including wealth) can be a proxy for household's physical capital. It is expected that households possessing more valuable asset are less dependent on credit and have more capacity to repay debt, therefore, are more likely to be credit unconstrained (Baiyegunhi et al., 2010; Boucher et al., 2009). Depending on the studied area, indicators for assets may be availability of durable assets (Fenwick & Lyne, 1998), age of collateral assets (Petrick, 2004a), value of durable or total assets (Baiyegunhi et al., 2010; Boucher et al., 2009; Chaudhuri & Cherical, 2011) or weighted average durable assets (Winter-Nelson & Temu, 2005). Pham et al. (2002) and Barslund (2008) find insignificant effect of total asset value on lending decision of financial institutions in Vietnam. This independent relationship can be explained by the weak enforcement of credit contract in Vietnam that makes physical collateral an ineffective screening device. The statistically insignificant relationship between livestock value and credit constraints implies that livestock is rarely accepted as collateral by formal financial institutions (Chaudhuri & Cherical, 2011; Fenwick & Lyne, 1998). Some physical capital related indicators representing production capacity rather than collateral value such as herd size or farm size also significantly affect credit restriction (Freeman et al., 1998; Kuwornu et al., 2012).

2.2.4.2b. Human capital related factors

Indicators for human capital include household size, dependency ratio, number of labours, number of males, and number of females. Families with higher number of persons are expected to have higher consumption expenditure which decreases available capital to production and increases their dependence on credit. The effect of family size on the supply side of credit is vague. Therefore, households with larger family size are more inclined to be credit constrained (Chaudhuri & Cherical, 2011; Kuwornu et al., 2012). Other studies pay attention on dependency ratio on which the hypothesised sign is unanticipated. Households with fewer labours seem to invest less, and have less demand for credit. However, higher dependency ratio may mean higher demand for credit due to high ratio of expenditure to income, especially in poor families (Jia et al., 2010). Empirically, this variable can have a negative (Pham & Izumida, 2002) or positive effect (Freeman et al., 1998) on the accessibility to formal credit. Instead of using dependency ratio, some studies separately examine the effect of the number of dependents and adults on credit constraints (Barslund & Tarp, 2008), while some separate the effect of male and female labours (Boucher et al., 2009; Petrick, 2004a; Simtowe et al., 2008). It is found that families with more adults are more likely to be credit constrained as they have higher demand for credit (Barslund & Tarp, 2008), but the effect of male and female labours are mixed. While households with more female labours are found to experience a disadvantage in attracting credit by Petrick's (2004a), Simtowe et al.'s (2008) study concludes more male labours increase the likelihood of being credit rationed.

In the areas where there are training programs to support farmers to enhance their farm production, participation of farmers in these programs becomes an important variable. Farmers who participate in these programs have a higher probability to obtain credit since they are expected to be more productive (Reyes, 2011). Surprisingly, Freeman et al. (1998) demonstrate opposite finding, but the unexpected result is not explained by the authors.

Another indicator associated with human capital is medical and education expenditures which force households to seek external finance. According to Jia et al.'s (2010) study, the more households spend on medical and education, the more likely they are credit constrained.

2.2.4.2c. Social capital related factors

Social capital plays a crucial role in determining the success of households to attain credit, especially when physical collateral becomes ineffective loan screening device. Social capital can be divided into three types: the social status of households in community, the relationship of

households with financial institutions and social group participation. Reputation, social status or entitlement in community (Jia et al., 2010; Pham & Izumida, 2002) is hypothesised to increase households' accessibility to formal credit. Interestingly, Petrick's (2004b) study shows that households who have conversation with neighbours frequently are more likely to be credit constrained as information related to their creditworthiness is uncovered. The good relationship with financial institutions measured by the length of relationship with banks (Reyes, 2011), connections with bank official (Barslund & Tarp, 2008) or savings account in banks (Gershon, Lau, Lin, & Luo, 1990) also helps households ease credit rationing. Similarly, repayment history can be regarded as a type of social capital. Households with bad credit history are more likely to be credit constrained (Barslund & Tarp, 2008; Chaudhuri & Cherical, 2011; Freeman et al., 1998).

Participating in social groups reduces the probability of being rejected by financial institutions since it decreases transaction cost to screen the household's creditworthiness (Reyes, 2011; Winter-Nelson & Temu, 2005). Dinh, Dufhues, and Buchenrieder (2012) use four indicators such as strong and weak ties to persons of similar (for example friends and family) and higher (for instance local authority) social standing to measure household's social capital in Vietnam. However none of these indicators is found to have effect on the likelihood that farm households are credit constrained.

2.2.4.2d. Economic related factors

Economic indicators such as income, expenditure and savings are used to assess the household's wealth, liquidity and repayment capacity. The effect of income on credit constraints is significant in Gershon et al.'s (1990) and Kuwornu et al.'s (2012) studies, but the hypothesised sign is opposite. Households with high income may exhibit good financial status or depend more on credit since they often deal with capital intensive activities. Foltz's (2004) study is the only study which shows significant effect between household expenditure and credit rationing. A major concern with these studies is the endogenous problem as credit constraints have been proven to have significant impact on income and expenditure (Baiyegunhi et al., 2010; Li & Zhi, 2010). Other studies pay attention to the ratio of debt to income which is evidenced to curtail the households' probability of obtaining formal credit (Baiyegunhi, 2008; Zeller, 1994).

Barslund and Tarp (2008) and Freeman et al. (1998) study the effect of production expenditure on credit constraints but only Barslund and Tarp's (2008) study shows significant positive relationship between expenditure on livestock feed and credit constraints.

It is believed that the main sources of household income are correlated with their credit constraint

status. Economic activities which are prioritised by the government, more familiar to financial institutions and less risky increase the opportunity for households to obtain loan. Jia et al. (2010) and Chaudhuri and Cherical (2011) illustrate that households who are more dependent on farming are less likely to fall into the credit constrained category since farming is prioritised by the government. On the contrary, finding of Stampini and Davis (2009) implies that non-agricultural income reduces the dependence of farm households on credit, thus, relax credit constraints. The fluctuation of farm yields (Boucher et al., 2009), changes in agricultural product prices (Winter-Nelson & Temu, 2005), and engagement with atypical crops (Reyes, 2011) can aggravate credit constraints.

2.2.4.3. Geography related factors

According to Boucher et al. (2009) and Winter-Nelson and Temu (2005), distance to market or formal lenders increases transaction cost on households, therefore, exacerbates credit constraints. In addition, Barslund and Tarp's (2008) and Foltz's (2004) studies show that credit constraints are also determined by activeness of local credit institutions and local production development. Barslund and Tarp's (2008) study indicates in Vietnam, in the areas where formal credit is more prevalent, households are less likely to be credit constrained. However, there is a concern that the result suffers from simultaneity problem as lower probability of being constrained attaches the households to formal credit.

2.2.5. Impact of credit constraint on rural households

Credit plays a crucial role to household production and welfare, however, whether formal credit constraints have adverse impact is still questionable. The studies focusing on productivity show mixed results. By comparing land lease of formal credit borrowers and non-borrowers, Kochar (1997a) concludes that credit has insignificant effect on land lease, and the impact of credit rationing from formal financial sector on production is modest in India. The rationale behind Kochar's result is that credit does not affect input investment (land), then credit restriction also does not affect production. The problem of this finding is that it does not take into account the marginal production of land which determines the investment in land. Another problem is the effect of land on productivity may be insignificant as documented in Reyes's (2011) study. Therefore, it is not convincing to infer negligible impact of credit constraints on production from the insignificant effect of credit on land leasing. The study of Reyes (2011) on credit constraints in Chile shares similar conclusion with Kochar. Result from Reyes's switching regression model

reveals that credit constraints do not directly or indirectly affect productivity. It is explained by the availability of alternative sources of working capital which effectively substitute for formal credit.

Other studies have shown inverse findings. For example, Gershon et al. (1990) reveal liquidity has significant effect on credit constrained households' productivity whereas insignificant on unconstrained households'. The authors' switching regression model also reveals that the lack of credit reduces the contribution of capital and human resources to output. Additional evidence on the diminished marginal effect of human resource on output due to credit restriction is documented in Freeman et al.'s (1998) and Guirkinger and Boucher's (2008) studies. Freeman et al. (1998) and Guirkinger and Boucher (2008) also reveal that for credit constrained farmers, expenditure on input is important to output but has negligible effect on output of credit unconstrained households. This finding is also confirmed by Winter-Nelson and Temu's (2005) and Guirkinger and Boucher's (2008) studies on liquidity constraints in Tanzania and Peru, respectively. Furthermore, Winter-Nelson and Temu (2005) argue that relaxing credit constraints can improve productivity, which is supported by Guirkinger and Boucher's (2008), Dong, Lu, and Featherstone's (2010) and Kumar et al.'s (2013) studies.

Yu's (2008) study is the only study considering the impact of credit constraints on rural household's entrepreneurship. The study suggests that credit constraints have no effect on entrepreneurship of China rural households as capital requirement for establishing enterprise is low and credit shortage can be offset by other sources of fund and resources.

In terms of household welfare, Dong et al. (2010), Li and Zhi (2010) and Kumar et al. (2013) indicate that credit constraints are detrimental to household income. Credit constraints cause a loss of 13.2% of net income in rural China (Li & Zhi, 2010) and removal of constraints in credit can improve income by 23.2% (Dong et al., 2010). Furthermore, credit constraints are attributed to the decrease in household consumption. Credit constrained households suffer a loss of 15.8% and 18.2% in consumption expenditure in Li and Zhi's (2010) and Li, Li, Huang, and Zhu's (2013) studies, respectively. The results are consistent with the findings of Zeldes (1989), Phimister (1995), Baiyegunhi et al. (2010) and Kumar et al. (2013).

Although the importance of credit especially microfinance to Vietnam rural households has been confirmed by many studies (see Nghiem, Coelli, & Rao (2012); Nguyen, Bigman, Van den Berg, & Vu (2007) and Phan (2012)), to the best of our knowledge, there is no study examining the impact of credit constraints on rural household outcomes.

2.3. Chapter Summary

A review of Vietnam rural credit market uncovers the prominent role of formal credit especially subsidised credit provided by VBARD, VBSP and PCFs. Although the establishment of subsidised financial institutions aims at reducing poverty and income inequality by enhancing the accessibility of rural households, particularly the poor to credit, there is a concern that the poor is more likely to be constrained by formal lenders. The lending scheme of VBARD and PCFs seems to be in favour of better off and large farm households. VBSP, on the other hand, is considered to be the bank for the poor, but abundant borrowing projects assigned by the government and limited fund do not allow the bank to offer large loan size. It is rational to believe that in rural Vietnam many farm households are still constrained by formal financial institutions even when formal lenders expand their operation to almost all communes.

It is documented in previous studies that the likelihood farm households are constrained by formal creditors depends on their physical capital, human capital, social capital, economic activities and geographical location. Although the results of these studies on the effect of some factors such as age, farm land area or dependency ratio are mixed, in general, households with female head, high social status, small size, and good relationship with banks are less likely to be credit rationed. Table 2.4 provides a summary of key factors affecting credit constraint status of farm households.

Results from previous studies also reveal the negative impact of credit constraints on the farm household's productivity and welfare. Lack of credit prevents the households from making full use of their physical and human capital. However, some studies postulate that accessibility to informal credit can mitigate adverse effect of formal credit constraints.

Table 2.4 Summary of key factors affecting credit constraint status of farm households

Factors	Expected sign	Authors
Individual level		
Gender (female)	-	Freeman et al. (1998); Jia et al. (2010); Barslund and Tarp (2008); Kuwornu et al. (2012) Pham and Izumida (2002); Zeller (1994)
Age	+/-	
Education	+/-	
Household level		
Land title	-	Baiyegunhi (2008); Boucher et al. (2009); Foltz (2004)
Farm land area	+/-	Boucher et al. (2009); Pham and Izumida (2002); Jia et al. (2010)
Asset	-	Baiyegunhi (2008); Boucher et al. (2009)
Family size	+	Chaudhuri and Cherical (2011); Kuwornu et al. (2012)
Dependency ratio	+/-	Pham and Izumida (2002);Freeman et al. (1998)
Social status	-	Pham and Izumida (2002); Jia et al. (2010)
Social group	-	Winter-Nelson and Temu (2005); Reyes (2011)
Bad repayment history	+	Barslund and Tarp (2008); Freeman et al. (1998)
Relationship with banks	-	Barslund and Tarp (2008); Reyes (2011)
Ratio debt to income	+	Baiyegunhi (2008); Zeller (1994)
Main economic activities	+/-	Jia et al. (2010); Reyes (2011)
Geography		
Distance (market, bank)	+	Boucher et al. (2009); Winter-Nelson and Temu (2005)
Location difference	+/-	Barslund and Tarp (2008); Zeller (1994)

Chapter 3

Methodology

This chapter provides an overview of the methods used to study credit constraints on Vietnam rural farm households and data collection procedure. The chapter is structured as follows. Section 3.1 presents the methods to identify credit constrained households, followed by details of the framework used in this study. Section 3.2 introduces the empirical models to identify the factors influencing the households' credit constraint status and evaluate the impact of credit constraints. Questionnaire design and data collection process are described in Section 3.3. The last section summarises the Chapter.

3.1. Method for identifying credit constrained households

3.1.1. Overview of the methods for identifying credit constrained households

In order to determine the determinants of credit constraints, it is essential to categorise appropriately households into credit constrained and unconstrained groups. As reviewed in Chapter 2, there are two types of method to identify credit constraints, namely, direct and indirect methods. The choice of direct or indirect method depends on the study's objectives and the availability of data. The following sections present the advantages and drawbacks of each method.

3.1.1.1. Indirect method

The indirect method is based on key theoretical differences between credit constrained and unconstrained households' behaviours to determine the presence of credit constraints, especially in consumption and investment. Examples of the indirect method application includes Zeldes's (1989), Hubbard and Kashyap's (1990) and Bell's (1990) studies.

Based on the household's wealth and ratio of financial asset to income, Zeldes (1989) categorises the households into two groups and identifies which groups is more likely to be credit constrained than the other. Subsequently, Euler equation and Lagrange multiplier are used to test the presence of credit constraints in the two groups. The rationale behind the use of Euler equation and Lagrange multiplier is that credit constraints prevent households from transferring resources from tomorrow's to today's consumption, thus, leading to the relatively higher marginal utility of today's consumption than tomorrow's consumption. As a result, Euler equation is violated and Lagrange multiplier always exhibits positive value with the presence of credit constraints. Similarly,

Hubbard and Kashyap (1990) employ Euler equation for farm's investment to detect market imperfection (implying credit rationing). The authors use the farm's net worth as a representative for farm's probability of being credit rationed. The violation of Euler equation in the period of low equity confirms the effect of credit rationing. The drawback in using Euler equation is the equation's inability to recognise non-binding constraints since Euler equation is still satisfied with the presence of non-binding constraints. In addition, Zeldes (1989) acknowledges the possibility that credit constrained households are included in the credit unconstrained group and vice versa as the division of households is only based on the household's financial resources. Moreover, the rejection of permanent income hypothesis may be attributed to aggregation bias rather than the presence of credit constraints (Runkle, 1991). Therefore, the results are sensitive to the method used to analyse the data. Finally, due to the inaccuracy in recognising credit constraint status of each household, the indirect method may lead to incorrect results in identifying the factors influencing credit constraints.

Bell (1990) considers the loan from money lenders to be a sign of formal credit constraints when bank credit is assumed to be preferred. Nevertheless, Bell's method has not been widely used because not every households borrow from money lenders when they are constrained by formal financial institutions, thus, this method fails to capture the credit rationing status of non-borrowers.

In general, the application of the indirect method requires large data set, specifically panel data as it assures the robustness of the tests even when some households are wrongly categorised. However, indirect method is only able to conclude the binding credit constraint status of a group, but unable to identify credit constraint status of an individual household, non-binding credit constraints, as well as provide information related to the causes of credit constraints.

3.1.1.2. Direct method

Due to the questionable accuracy and sensitivity of the indirect method, some authors recommend the use of the direct method or so-called Direct Elicitation Method (DEM) to identify the determinants and measure the influences of credit constraints (Boucher et al., 2009; Diagne et al., 2000; Feder, 1985; Franklin et al., 2008; Zeller, 1994). Different from the indirect method that only considers binding constraint, the direct method covers both binding and non-binding constraints. Credit constraints can be expressed by the direct method as follows. Let L denote the amount of loan household x demands. S^* denotes the amount of credit limited set by the credit institution, which is the amount of credit maximising the lender's return. The total value of asset

possessed by the household is given as A. The probability that the project invested by the household is successful is p, and the probability of failure is $1-p$. The interest rate charged by the lender is i. The collateral requirement per unit loan is k. The return from a unit loan is r. The transaction cost for loan application is T. Then, the household expected return is:

$$R = L\left(r - i - \frac{T}{L}\right)p - kL(1-p) \tag{3.1}$$

The optimal amount of loan L^* requested by the household maximises the household expected return subject to $kL^* < A$. The binding constraint so-called quantity constraint occurs when $L^* > S^*$. The binding constraint is from the supply side.

On the contrary, non-binding constraint includes transaction cost and risk constraints which are from the demand side. The household is considered to be transaction cost constrained when the household's project is notionally profitable ($r - i > 0$), but due to high transaction cost it becomes unprofitable ($r - i - \frac{T}{L} \leq 0$). Risk constraint occurs when the collateral requirement is so high that the benefit the household gains when the project is successful becomes lower than the loss they bear if the project fails, generating non-positive expected return. Households who are demand side constrained do not apply for loan. Therefore, practically, it is difficult to identify credit unconstrained non-borrowers and constrained non-borrowers by observation.

The advantage of the direct method over the indirect method is that the former enables to identify both binding and non-binding constraints. In addition, the credit constraint status of each household can be detected by the direct method as well as the credit constrained group they belong to. However, the drawback of the direct method is that it is unable to differentiate between efficient and inefficient constraints as it does not consider the household's repayment capacity. Petrick (2004b, 2005) proposes the combination of qualitative information from household survey (direct method) and the static household models to examine the efficiency of credit rationing. From the coefficients obtained from estimating output supply model, Petrick (2004b) calculates marginal willingness to pay for credit of credit constrained households. Comparison between willingness to pay rate and nominal interest rate reveals the household's repayment capacity, allows the author to conclude whether the credit rationing is efficient or not. However, in order to apply Petrick's method for cross-sectional data, the loan should be short term because in the long-term, output supply is affected by time variant factors such as crop fluctuation and price. In addition, if the household's loan is used for human capital investment

(education consumption), Petrick's approach cannot capture the household's future income gained from human capital enhancement. Finally, it is difficult to apply Petrick's method when the households are engaged in various income generated activities.

3.1.2. Empirical method for identifying credit constrained households

In this study, we apply the direct method, using a series of questions to identify each type of credit constraints. Detail of our framework is illustrated in Figure 3.1.

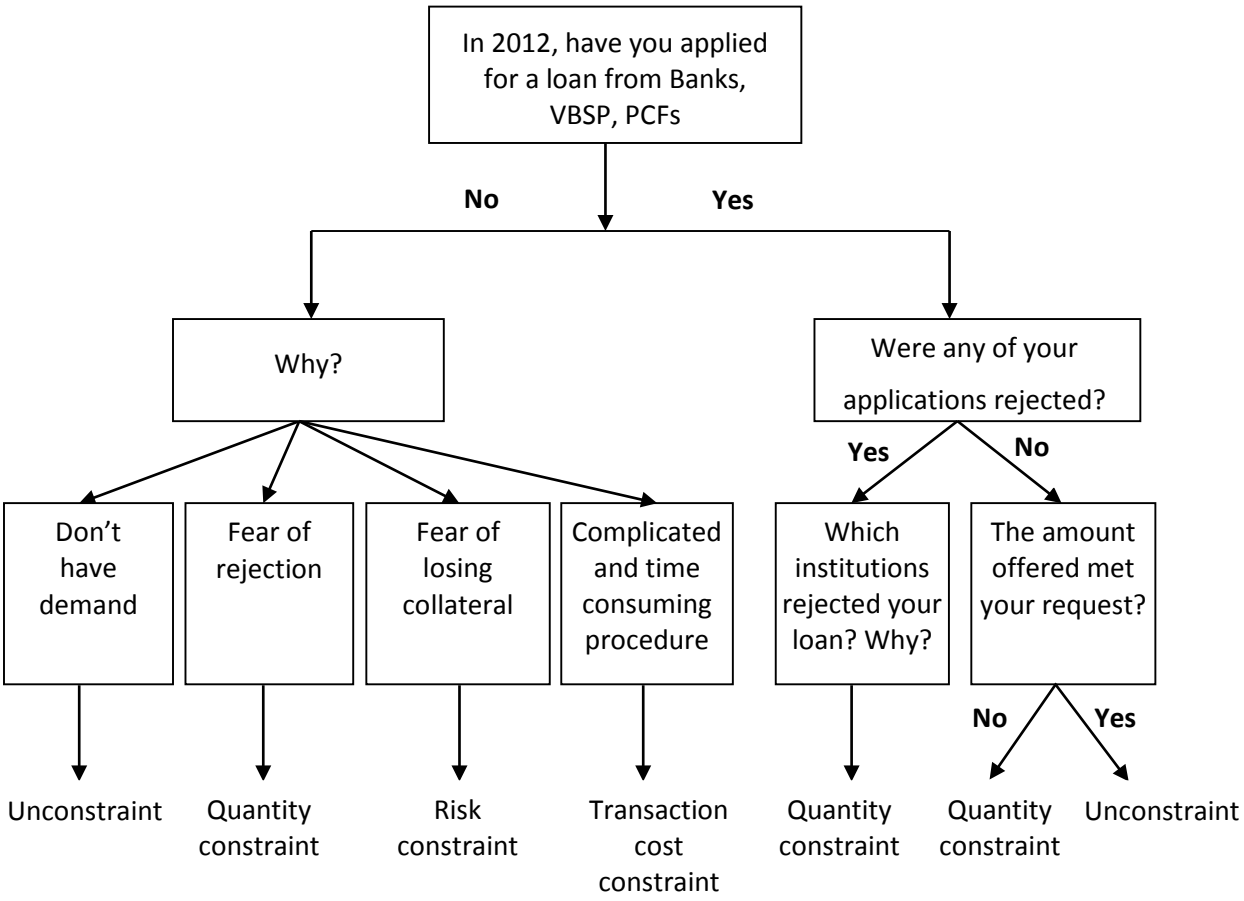

Figure 3.1 Framework for identifying credit constrained households

Source: Boucher et al. (2009)

Based on the household's response to the survey questions "Did you apply for any loan in 2012?" (Question 1), "Were any of your loan applications rejected by formal creditors?" (Question 2) and "Did the loan amount offered meet your request?" (Question 3), quantity constrained households are detected. Households who answer "yes" to question 1 and "yes" to question 2 or "no" to question 3 are considered to be credit constrained. Households who respond "no" to question 1 are then asked "what are the main reasons that you did not apply for loans?" (Question 4). Households will be categorised into transaction cost constrained group if the reason they choose is

"Complicated and time consuming loan application and process procedure". Risk constrained group comprises of the households who respond "fear of losing collateral" or "fear of being in debt" to question 4. If the household's reason for loan non-application is "fear of being rejected", they are considered to be quantity constrained. Credit unconstrained households are those who did not have demand for loan or received sufficient amount of loan they requested for (see Figure 3.1 for details).

In our survey, we focus only on credit constraints from formal financial institutions, however, we do not conceive that formal institutions are the first sources of loan the households are looking for when they need to borrow since they can find a cheaper loan from informal creditors (Kochar, 1997b). Therefore, in our survey, if the households respond that they did not borrow from formal credit institutions because of lower interest rate offered by informal sources (such as from friends, relatives or ROSCA), they are not categorised to be credit constrained by formal financial institutions. Although we do not survey informal credit constraints, we compare between the amount of credit the households needed to borrow and the amount they received to check whether informal credit sufficiently substituted for formal credit in case the households were rationed by formal lenders.

It is acknowledged that the direct method is unable to differentiate between efficient and inefficient constraints, however, we cannot use the static household models recommended by Petrick (2004b) to test the classification of the direct method for three reasons. First, our data is cross-sectional and many surveyed households applied for long-term loans (see Table 4.6). Second, our sample households are heterogeneous in terms of main income generating activities, thus it is complicated to form an output supply model. Finally, in our sample, some households borrowed money for their children's tertiary study and they only have to pay back four years after their children graduate. Petrick's model cannot capture the willingness-to-pay of these households because it depends on the expected income their children will receive rather than the production yield.

3.2. Empirical models

3.2.1. Model for identifying factors influencing credit constraint status of rural farm households

Since the dependent variable in the model for identifying determinants of credit constraints is binary, either logit or probit model is preferred over linear probability model because the linear

probability model cannot assure the probability value is in the range between 0 and 1 (Hill, Griffiths, & Lim, 2011). The difference between logit and probit model is the assumption of random term distribution. The error term in logit model is assumed to have cumulative distribution while normally distributed in the probit model (Greene, 2003). However, in most cases, marginal probabilities and the predicted probabilities obtained from the two models exhibit little differences (Hill et al., 2011). In this study, we choose logit model because of its simplicity and the availability of odds ratios which is not available with the probit model. In addition, the probit model is the first step of endogenous switching regression model used to measure the impact of credit constraints on rural farm household welfare. Therefore, we can compare the results of the two models later. Since our survey covers both credit constrained borrowers and credit constrained non-borrowers, selectivity bias is not a major concern, thus we do not need to apply two stage procedure suggested by Heckman (1979). According to Wooldridge (2002), the use of two stage procedure in this case results in large standard errors.

The credit constraint condition of the borrower i is defined by:

$$\begin{aligned} &CC = 1 \;\; if \; CC = \alpha Z_i + \varepsilon_i \geq 0 \\ &CC = 0 \;\; otherwise \end{aligned} \tag{3.2}$$

where CC is credit constraint status of the household which is equal to 1 if the household is credit constrained, zero otherwise; Z is a vector of the household head, household and geography characteristics; ε is error term; α is parameter to be estimated. The probability the household is credit constrained or $CC = 1$ can be written as:

$$\text{Prob}(CC = 1) = \Lambda(\alpha Z_i) = \frac{1}{1 + e^{-(\alpha Z_i)}} = \frac{\exp(\alpha Z_i)}{1 + \exp(\alpha Z_i)} \tag{3.3}$$

And the probability that the household is credit unconstrained or $CC = 0$ is:

$$1 - \text{Prob}(CC = 1) = \frac{1}{1 + \exp(\alpha Z_i)} \tag{3.4}$$

Odds ratios and marginal effects will also be calculated after estimating equation (3.2). Odds ratio represents the change in odds of an outcome given one unit change in an independent variable, holding all other variables constant. Odds of an outcome is the ratio of probability that an event occurs to the probability that event does not occur. In this study, an odds ratio means the change in odds that a household is credit constrained given one unit change in an explanatory variable,

holding all other variables constant. Let $\Omega(Z)$ denotes odds that a household is credit constrained given independent variable Z. $\Omega(Z)$ can be expressed as:

$$\Omega(Z) = \frac{\Pr(CC = 1 / Z)}{\Pr(CC = 0 / Z)} = \frac{\Pr(CC = 1 / Z)}{1 - \Pr(CC = 1 / Z)} \quad (3.5)$$

The odds ratio is:

$$\Psi(Z) = \frac{\frac{\Pr(CC = 1 / Z+1)}{\Pr(CC = 0 / Z+1)}}{\frac{\Pr(CC = 1 / Z)}{\Pr(CC = 0 / Z)}} = \exp(\alpha) \quad (3.6)$$

Odds ratios reveal the relationship between the dependent (probability of being credit constrained) and independent variables (Z). If an odds ratio is larger than 1, there is a positive relationship between the dependent and independent variable and vice versa. If an odds ratio is equal to 1, it can be concluded that the independent variable has no effect on the probability the event occurs.

Marginal effects reflect the change in probability that a household is credit constrained given one unit change in the independent variables. Different from odds ratios, marginal effects are not constant, as the relationship between the probability that a household is credit constrained and an explanatory variable is non-linear. Popularly, the marginal effects are calculated at the mean of the independent variables. The limitation of this measure is that the mean value might not correspond to any observed values (Long, 1997). Therefore, in this study we only use marginal effects to compare the effect magnitude of the independent variables. Moreover, only marginal effects of continuous variables are computed as marginal effects of dummy variables may not be meaningful (Peng, Lee, & Ingersoll, 2002).

3.2.2. Model for measuring the impact of credit constraints on household welfare

Although the impacts of credit constraints vary, in this study, we only consider the impact on household welfare. We do not evaluate the impact of credit constraints on productivity because of the heterogeneity of household production in the studied areas.

3.2.2.1. Outcome indicators of welfare impact evaluation

Household welfare can be measured by monetary and non-monetary indicators. Monetary indicators are more widely used in welfare analysis in general, while non-monetary indicators are

suitable for studies focusing on particular dimensions of welfare such as health or education (Coudouel, Hentschel, & Wodon, 2002). The most popular monetary indicators are income and consumption expenditure, in which consumption expenditure is considered to be the better indicator (Chaudhuri & Ravallion, 1994; Coudouel et al., 2002). Consumption expenditure is preferred since it can reflect actual "standard of living" while income is more likely to measure the opportunity for consumption, which is also affected by the household's wealth and saving. In addition, incomes of households in developing economies fluctuate erratically due to the yield and price violation, while consumption expenditure is relatively stable. Therefore, consumption expenditure is a better indicator for the household's long-term well-being (Coudouel et al., 2002; Ravallion, 1992).

Since the households vary in terms of size and composition, total household consumption expenditure is criticised to overstate welfare of large sized households, thus, an adjusted indicator is required. Per capita consumption expenditure is commonly used to correct household size difference but it fails to adjust composition deviation. A number of studies suggest the application of equivalence scales which take into account of the difference in consumption expenditure among age and gender groups. Although individual welfare is more accurately measured by applying equivalent scales adjustment, it requires information of each individual's consumption demand, and the way resources are allocated to each individual in the family (Laderchi, Saith, & Stewart, 2003). There is no consensus among the methods used to calculate such scales which leads to the inconsistency in the results (Glewwe & Van der Gaag, 1990; Laderchi et al., 2003). Pollak and Wales (1979) also cast the aspersions on the feasibility and meaningfulness of the adjustment for household demographic profile in household welfare comparison as a reference for welfare programs. Due to the complexity and controversy of the equivalent scale approach, we only consider the difference in household size by using the per capita indicator which assumes all members in the households have equal consumption levels. The study of Glewwe and Van der Gaag (1990) confirms that in some cases results obtained from the use of per capita consumption and adjusted per capita consumption are only slightly different.

In summary, compared to income, consumption expenditure is a preferred indicator for household welfare. To adjust for household size difference, per capita consumption expenditure should be applied. Although this indicator cannot compare welfare among individuals from different household compositions, there are lack of persuasive evidences that it generates less accurate results than equivalence scale adjusted indicators.

3.2.2.2. Empirical model for measuring the impact of credit constraints on household welfare

Khandker, Koolwal, and Samad (2010) summarise six impact evaluation methods for development programmes in which Propensity Score Matching (PSM), Double difference (DD) and Instrumental variable (IV) are widely applied. Another popular method is Endogenous Switching Regression (ESR) model. Since our data is cross-sectional, we cannot apply DD method. PSM method can be a good choice for cross-sectional data (Dehejia & Wahba, 2002), however, the method still suffers from bias due to insufficient data of control group (Khandker et al., 2010). Since our study is non-experimental and the sample size is rather small, seeking for sufficient credit unconstrained observations which are best matched with credit constrained observations is challenging. Therefore, PSM method is not supported by the data. IV can effectively solve the selection bias induced by both observable and unobservable factors. Nonetheless, Carrasco (2001) and Dubin and Rivers (1989) argue that the IV which is popularly estimated by two stage least square method (2SLS) is not a good choice since our endogenous variable is discrete while the first step in 2SLS model treat endogenous variables as continuous variables. In addition, the application of IV requires the availability of at least an appropriate instrumental variable which is questioned by Maddala (1977, p. 154) "where you get such a variable".

In this study, we choose ESR model to address selection bias and endogeneity. The choice of ESR model is supported by Kiefer (1978), Poirier and Ruud (1981), Maddala (1983a) and Mare and Winship (1987). The model is also used by previous studies on the impact of credit constraints (Baiyegunhi et al., 2010; Dong et al., 2010; Foltz, 2004; Freeman et al., 1998). An advantage of ESR model is the ability to capture both direct and indirect effect, although it is unable to measure the magnitude of the direct effect. According to Maddala (1983b), the usual exclusion restrictions or instrumental variables are not required when there are enough observations in the selection equation, but there should be at least one exogenous variable excluded from the outcome equations so that the parameters of the outcome equations can be identified. Hamilton and Nickerson (2003) argue that in the absence of instrumental variables the model still suffers from bias caused by unobserved factors. However, the problem is how we evaluate the appropriateness of instrumental variables when there is lack of available tests for the validity of instrumental variables specified for ESR model. In the study of García Pérez and Rebollo Sanz (2005) and Neal (1995), the authors only test the strength of instrumental variables by Likelihood Ratio test. Further, García Pérez and Rebollo Sanz (2005) admit the lack of over-identification test. To the best of our knowledge, there is no study conducting the test for the exogeneity of instrumental

variables particularly for two step switching models.

The Endogenous Switching Regression model can be expressed as follow (Maddala, 1986):

$$Y_{1i} = \delta_1 X_{1i} + \varepsilon_{1i} \qquad \text{iff} \quad CC = 1 \tag{3.7-1}$$

$$Y_{0i} = \delta_0 X_{0i} + \varepsilon_{0i} \qquad \text{iff} \quad CC = 0 \tag{3.7-2}$$

Where Y_{1i} and Y_{0i} represent the welfare function of credit constrained and unconstrained households respectively; X is a set of explanatory variables; $\delta_1$and δ_2 are vectors of parameters; ε_{1i} and ε_{0i} are error terms. We assume ε_{1i}, ε_{0i} and ε_i (in equation (3.2)) are normally distributed and have covariate matrix:

$$\Sigma = \begin{pmatrix} \sigma_1^2 & \rho_{10} & \rho_{1\varepsilon} \\ \rho_{10} & \sigma_0^2 & \rho_{0\varepsilon} \\ \rho_{1\varepsilon} & \rho_{0\varepsilon} & 1 \end{pmatrix}$$

where σ_1^2, σ_0^2 are variances of the error terms in equation (3.7-1) and (3.7-2); $\rho_{1\varepsilon}$ and $\rho_{0\varepsilon}$ are correlation terms between the household's credit constraint status in equation (3.2) and the welfare impact in equation (3.7-1) and (3.7-2); ρ_{10} is correlation terms between equation (3.7-1) and (3.7-2) (ρ_{10} does not occur in all times (Maddala, 1983a)). If $\rho_{1\varepsilon} = \rho_{0\varepsilon} = 0$, it can be concluded that there is no problem with selection bias in the welfare impact model and the model can be estimated by Ordinary Least Square method. However, if $\rho_{1\varepsilon}$ or $\rho_{0\varepsilon}$ is different from zero, the model suffers from selection bias. This means the expected value of the error terms ε_{1i} or ε_{0i} are different from zero, leading to inconsistent estimates from the OLS estimation. As suggested by (Lee, 1978), a two stage method is used where expected values of the error terms ε_{1i} and ε_{0i} are:

$$E\left(\varepsilon_{1i}|\varepsilon_i\right) = E\left(\sigma_{1\varepsilon}\varepsilon_i|\varepsilon_i \le \alpha Z_i\right) = -\sigma_{1\varepsilon}\frac{\phi\left(\widehat{\alpha Z_i}\right)}{\Phi\left(\widehat{\alpha Z_i}\right)} \tag{3.8-1}$$

$$E\left(\varepsilon_{0i}|\varepsilon_i\right) = E(\sigma_{0\varepsilon}\varepsilon_i \mid \varepsilon_i \ge \alpha Z_i) = \sigma_{0\varepsilon}\frac{\phi\left(\widehat{\alpha Z_i}\right)}{1-\Phi\left(\widehat{\alpha Z_i}\right)} \tag{3.8-2}$$

where ϕ and Φ are the probability density function and the cumulative distribution function of the standard normal, respectively. $\widehat{\alpha Z_\iota}$ is fitted value of CC calculated by estimating equation (3.2). The

ratios ϕ/Φ in equation (3.8-1) and (3.8-2) are inverse Mills ratio terms, which can be written as:

$$\lambda_{1i} = -\frac{\phi(\widehat{\alpha Z_1})}{\Phi(\widehat{\alpha Z_1})} \tag{3.9-1}$$

$$\lambda_{0i} = \frac{\phi(\widehat{\alpha Z_i})}{1-\Phi(\widehat{\alpha Z_i})} \tag{3.9-2}$$

Including λ_{1i} and λ_{0i} in equation (3.7-1) and (3.7-2) yields:

$$Y_{1i} = \delta_1 X_{1i} + \sigma_{1\varepsilon}\lambda_{1i} + \mathrm{v}_{1i} \qquad \text{iff} \qquad CC = 1 \tag{3.10-1}$$

$$Y_{0i} = \delta_0 X_{0i} + \sigma_{0\varepsilon}\lambda_{0i} + \mathrm{v}_{0i} \qquad \text{iff} \qquad CC = 0 \tag{3.10-2}$$

where v_{1i} and v_{0i} are new error terms having zero expected value. Equation (3.10-1) and (3.10-2) are estimated by weighted least squares as v_{1i} and v_{0i} are heteroscedastic. The set of explanatory variables in equation (3.10-1) and (3.10-2) will be the same with the set of independent variable in equation (3.2) except an exclusion restriction as suggested by Maddala (1983b). The choice of explanatory variables will be discussed in Chapter 4.

Based on the value of $\rho_{1\varepsilon}, \rho_{0\varepsilon}$ and Likelihood Ratio test obtained from estimating ESR model, we can determine whether ESR model is appropriate. If $\rho_{1\varepsilon}$ or $\rho_{0\varepsilon}$ is significantly different from zero and the Likelihood ratio test rejects the null hypothesis that exogenous is better than endogenous, then the use of ESR model is necessary to address selection bias. Otherwise, OLS will be applied since the selection bias is not a major concern.

3.3. Data

3.3.1. Questionnaire design

The questionnaire was designed to collect information related to credit status of rural farm household as well as household demographic characteristics, income and expenditure. Furthermore, the households were asked to give their opinion on the operation of formal credit institutions and the impact of credit constraints on household production and consumption. The questionnaire comprises of four sections.

The first section contains a series of questions aiming to detect credit constraint status of the

surveyed households. Apart from key aforementioned questions discussed in section 3.1.2, we add two questions “How much did you need to borrow in 2012” and “how much did you actually borrow in 2012”. The answers to these two questions would also confirm the household’s credit constraint status. In addition, this section is designed to obtain the information of the household’s behaviour towards formal credit constraints.

The second section consists of questions related to the household’s borrowing status. The households are asked to provide details of the loan they received in 2012, such as the purpose of loan, interest rate, loan duration, payment schedule, and loan status. In this section, the difficulties faced by households, the fees they had to pay and assistances they were offered during the loan application process would be revealed. Only households receiving loans in 2012 are required to complete this section.

The third section comprises of a series of Likert scale questions focusing on the household’s perception of the impact of credit constraints on their production and consumption. Additional aim of this section is to study the extent the households were satisfied with formal creditor’s services. Further, the household’s expected loan terms would be uncovered in this section.

Questions of household’s demographics, income and expenditure are presented in the last section. Besides age, gender, education, and occupation of household heads, house size and composition, the household’s main source of income, consumption and production expenditure and savings are important information acquired from this section.

3.3.2. Data collection

3.3.2.1. Sample technique

Farm households in rural Vietnam North Central coast region is the target group of our study. The region comprises of six provinces Thanh Hoa, Nghe An, Ha Tinh, Quang Binh, Quang Tri, Thua Thien Hue. A survey at household level was conducted in three provinces out of the six identified provinces. The sample households were selected using multi-staged stratified random sampling technique. In the first stage, three provinces namely Ha Tinh, Nghe An and Thua Thien Hue which are representatives of low, medium and high income per capita groups, respectively, were chosen.

In the next stage, two districts from Nghe An (Yen Thanh and Thanh Chuong) were randomly selected while only one district was selected from Thua Thien Hue (Huong Thuy) and Ha Tinh (Thach Ha) because we would like to compare the likelihood of being credit constrained among

the households in the same and different provinces. From the lists of communes[1] provided by the District People Committees, a commune from each district was also randomly selected. However, we exclude communes with no agriculture activity from the random lists. As a result, four communes namely Van Thanh, Thanh Yen, Thach Tien and Thuy Thanh were chosen from four districts Yen Thanh, Thanh Chuong, Thach Ha and Huong Thuy, respectively.

In the final stage, the sample households were randomly selected from the list of households provided by the Commune People Committees. Similarly, only farm households were included in the list. A total of 550 households were interviewed, yielding 479 usable questionnaires (87.1%).

3.3.2.2. Sample size

The sample size was determined by the formula suggested by Cochran (1977):

$$n_0 = \frac{z^2 pq}{e^2} \qquad (3.\ 11)$$

Where n_0 is sample size

z^2 is the abscissa of the normal curve that cuts off an area at the tails

e is the desired level of precision

p is the estimated proportion of an attribute that is present in the population

q is 1 - p

The level of confidence is determined to be at 95% where z=1.96 and e=0.05. p is assumed to be 0.5 (q =0.5). The sample size determined by the standard Cochran formula is 385 farm households. However, 550 households were interviewed to assure the required number of completed and valid questionnaires.

3.3.2.3. Pretest

Following Zikmund's (2013) suggestion, a pre-test of 30 rural farm households was conducted in Thanh Yen commune to obtain feedback to improve the instruction, clarity, wording, possible bias caused by the content of the questions and layout of questionnaire. The comments from each participant from the pre-test sample were taken into consideration to amend the questionnaire

[1] Commune is the lowest administrative unit in Vietnam which is a subdivision of a district.

before the survey questionnaire was administered to the selected respondents. The final version of questionnaire is attached in Appendix B.

3.4. Chapter Summary

In this chapter, we analyse the methods used to identify credit constrained households and the category of credit constraint they belong to. In spite of its drawbacks, Direct Elicitation Method is the optimal choice since it enables to accurately categorise the household's credit constraint status and determine the causes of credit constraints. In addition, the empirical models used to identify the determinants of credit constraints and to evaluate the impact of credit constraints are specified. Logit model is selected to classify the profile of households who are more likely to be credit constrained. The effect of credit constraints on the household welfare is evaluated by the Endogenous Switching Regression model.

Data for analysis was collected from the survey conducted in three out of six identified provinces in North Central Coast region of Vietnam. Multi-staged stratified random sampling technique was applied to choose the sample households. A four-section questionnaire was developed to obtain information related to the household's credit constraint status; the characters of their loan; their behaviour towards and perception of credit constraints as well as their impacts; and the household demographic profiles. The questionnaire was pilot tested on 30 rural farm households for revision. A total of 550 farm households were interviewed, yielding 479 usable questionnaires.

Chapter 4

Descriptive Statistic and Empirical Results

This Chapter describes the NCC household survey data and reports the empirical results from the logit and Endogenous Switching Regression (ESR) models. Section 4.1 presents the profiles of the surveyed rural farm households in terms of credit constraint status, demographics, socio-economic and loan characteristics. Section 4.2 discusses the determinants of credit constraints obtained from the logit model and the impact of credit constraints on household welfare from the ESR model. Section 4.3 summarises the chapter.

4.1 Descriptive Statistics

This section provides an overview of the surveyed household's credit constraint status, followed by the household's characteristics and the characteristics of household's loans. The descriptive statistics aim to clarify the differences in characteristics of the credit constrained and unconstrained households. The descriptive statistics also justify the selection of the explanatory variables used in the logit model. In addition, the characteristics of informal and formal credit in the surveyed area are presented and compared in this section.

4.1.1 Credit constraint status of the NCC survey respondents

Table 4.1 shows the credit constraint status of the surveyed households. According to the households' survey responses, there were 310 households (64.72% of total surveyed households) seeking formal credit, in which 53 households were rejected by formal financial institutions. The main reason for their credit rejection was the lack of collateral (37 households). Other reasons included "not in the target groups of the bank" (6 households), "incurred previous loans" (2 households), "lack of revenues" (6 households) and "inappropriate purpose" (5 households).

Among the 257 households who successfully obtained formal loan, the survey result shows 89 households did not receive sufficient amount of loan requested mainly because of the bank's limitation (62 households) and lack of collateral (17 households). Further, 169 households who did not apply for formal credit, 52 households reported that they had demand for formal credit but they did not apply due to either administrative difficulties to process the loan (40 households) or fear of rejection (12 households) and the remaining households had no demand for credit (114 households) or found a cheaper source of credit (3 households). Based on the information provided by the households and the Direct Elicitation framework suggested by Franklin et al.

(2008) and Boucher et al. (2009), 194 households were categorised to be credit constrained, accounting for 40.51% of the total surveyed households, in which 40 households were considered to be transaction cost constrained, the remaining were quantity constrained (154 households), constituting 32.15% of the total surveyed households. No household was identified to be risk constrained. This may be due to the fact that in rural Vietnam, when the households fail to pay their debts on due date, banks prefer to restructure their loans rather than to foreclose the household's property because their property has low liquidity.

Table 4.1 Reasons for Household's formal credit constraint condition

Description	Credit application status		Total
	Households who applied for formal credit	Households who did not apply for formal credit	
Number of respondent households	310 (64.72%)	169 (35.28%)	479 (100%)
Number of credit constrained households	142 (29.65 %)	52 (10.86 %)	194 (40.51%)
Reason for formal credit constraints:			
• **Constrained non-applicants and reason**		**52 (10.86 %)**	
- Administrative difficulties to process loan		40 (8.35%)	
- Fear of being rejected		12 (2.51%)	
• **Rejected applicants and reason**	**53 (11.06%)**		
- Rejected due to lack of collateral	37 (7.72%)		
- Other reasons	16 (3.34%)		
• **Non-rejected applicants who received insufficient amount and reason**	**89 (18.58%)**		
- Lack of collateral	17 (3.55%)		
- The amount requested exceeded limitation set by the bank	62 (12.94%)		
- Reason other than those sited above	10 (2.09%)		

Source: Author's calculations from the 2013 household survey

The results reported in Table 4.1 confirms that a high proportion of the rural farm households had demand for formal credit (75.58%), but only 35.08% of the households were sufficiently satisfied

and 40.5% of the households were credit constrained. The rural farm households in NCC were more likely to be quantity and transaction cost constrained but less likely to be risk constrained.

4.1.2 Characteristics of credit constrained and unconstrained households

4.1.2.1 Household head characteristics

Table 4.2 Profile of the NCC Survey Respondents (Household head characteristics)

Characteristics	Credit constrained households		Credit unconstrained households		All respondents		Statistical test
	Count	Percent	Count	Percent	Count	Percent	
Gender							
Male	131	67.53	249	87.37	380	79.33	
Female	63	32.47	36	12.63	99	20.67	
Total	194	100	285	100	479	100	χ^2=27.72***
Marital status							
Married	167	86.08	272	95.44	439	91.65	
Other	27	13.92	13	4.56	40	8.35	
Total	194	100	285	100	194	100	χ^2=13.02***
Age group							
Below 35	25	12.89	20	7.02	45	9.39	
35-45	70	36.08	94	32.98	164	34.24	
45-55	71	36.60	107	37.54	178	37.16	
Above 55	28	14.43	64	22.46	92	19.21	
Total	194	100	285	100	479	100	χ^2=8.69*
Education level							
Primary school	18	9.28	22	7.72	40	8.35	
Middle school	137	70.62	189	66.32	326	68.06	
High school	36	18.56	74	24.21	105	21.92	
Higher education	3	1.55	5	1.75	8	1.67	
Total	194	100	285	100	479	100	χ^2=2.36
Occupation							
Crop farmer	93	47.94	86	30.18	179	37.37	
Livestock and poultry raiser	5	2.58	6	2.11	11	2.30	
Fisher folk	1	0.52	2	0.70	3	0.63	
Trader	34	17.53	49	17.19	83	17.33	
Government employee	0	0	25	8.77	25	5.22	
Private sector worker	15	7.73	34	11.93	49	10.23	
Handicraft	9	4.64	28	9.82	37	7.72	
Mixed occupation	37	19.07	55	19.30	92	19.21	
Total	194	100	285	100	479	100	χ^2=32.96***

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

Source: Author's survey data, 2013

The characteristics of the household heads of credit constrained and unconstrained groups are summarised in Table 4.2. The differences in terms of gender, marital status, age and occupation between the credit constrained and unconstrained households are statistically significant at 1% and 10% level. This indicates the household's credit constraint status is associated with gender, marital status, age and occupation. Although the Chi square test implies weak relationship between education and credit constraint condition, the descriptive statistics show that the proportion of household heads who obtained high school degree or higher education in the credit unconstrained group is higher than that of the credit constrained group.

Majority of the respondents were male accounting for 79.33%. It is common in rural Vietnam that males usually make important decisions since they are the main income earners. Although male constitutes the majority of the respondents, only 34.47% of them (138/380) was credit constrained. The percentage of the female respondents was 20.67%, however 63.64% of them (63/99) was found to be credit constrained. Thus, our result shows female was more likely to be credit constrained.

Marital status is associated with the distribution of credit constrained and unconstrained groups. Although married respondents constitute the majority of both groups, the portion of married respondents in the unconstrained group was 7% higher than the constrained group. "Other" group including single, divorce and widow respondents showed higher probability of being credit constrained.

The age of the respondents was categorised into four groups in which most of the respondents belonged to the age group of 35 to 55 years old. Table 4.2 shows that the percentage of credit constrained households descended with the increase in age. The proportion of the credit unconstrained respondents older than 45 years old was larger than that of the credit constrained counterparts. This means the older farmers are associated with lower likelihood to be credit constrained.

All the surveyed respondents attained at least one form of education, where majority of them completed middle school as the highest education attained (68.06%). Although education attainment shows a weak association with credit constraint status, Table 4.2 exhibits the different pattern of the two groups in light of education level distribution. The proportion of the credit constrained respondents with primary and middle school was higher than that of the credit unconstrained respondents (9.28% and 70.62 versus 7.72% and 66.32%). On the contrary, the proportion of household heads with high school or higher education in the credit constrained

group was lower than that of the credit unconstrained group (18.56% and 1.55% versus 24.21% and 1.75%).

The respondents' occupations were classified into 8 groups including crop farmer, livestock and poultry raiser, fisher folk, trader, government employee, private sector worker, handicraft and mixed occupation. The descriptive statistics illustrate the credit constrained respondents were more likely to be engaged in agriculture related activities while the opposite was revealed for the credit unconstrained respondents. Noticeably, no government employees was credit constrained, which implies that government employees have advantage to access formal credit. The Chi square test is significant at 1% level, which implies that the occupation of the household head was strongly associated with the household's likelihood to be credit constrained.

In summary, the household's credit constraint status can be explained by the characteristics of household heads. Households with male, older and married household heads who were less involved in agriculture based activities were less likely to be credit constrained. Although the Chi square test shows a weak relationship between the household head's education and household's credit constraint status, the descriptive statistics show a lower probability that the households with more educated household heads were credit constrained.

4.1.2.2 Household characteristics

The characteristics of the households, namely, household size, number of income earners, number of off-farm earners, number of children, land holding status, agricultural land size, poor status, household income and consumption expenditure are described in Table 4.3. Except for household size and land holding status, all characteristics exhibit statistical difference between the credit constrained and unconstrained groups.

The average household size was approximately five members per household. Most households had four to six members (71.82%), only 5.22% of the households had more than 6 members. In comparison, the t-test shows insignificant difference between household size of the credit constrained and unconstrained groups in terms of average size and distribution.

Majority of the surveyed households had one to two income earners. Only 26.52% of the households had more than two labours. Although the mean household size is not statistically different between the credit constrained and unconstrained households, the average number of income earners of the two groups is significantly different at 1% level. The proportion of the credit constrained households with more than two income earners was much lower than the credit

unconstrained counterparts (16.5% versus 33.33%). Similarly, another advantage of the credit unconstrained households over the constrained households in term of labour force is exhibited by the significant difference in the average number of off-farm labours at 1% level. Furthermore, 22.16% of the credit constrained households had no off-farm labour compared to 11.58% in the credit unconstrained group. We can conclude that the credit unconstrained households had advantages over the constrained households in terms of labour force.

The average number of children of the surveyed families was two children per household. More than half of the households had an average of one to two children (56.99%). The average number of children of the credit constrained group was significantly higher than the credit unconstrained group at 1% level. In addition, the percentage of the credit unconstrained households who did not have children was 13.33% which is much higher than the credit constrained group (2.58%), whereas, the proportion of the credit constrained households who had more than two children outnumbered the credit unconstrained group (41.23% versus 29.12%) (see Table 4.3). With relatively higher number of children, the credit constrained households tend to have more dependents, which implies they were more likely to be under financial stress.

Our target group is farm households in the rural area, where majority of the households owned land, however, some of them also rented land out. The result shows 30% of the surveyed households both owned land and rented land and the proportion between the credit constrained and unconstrained groups differ slightly (29.9% versus 27.77%). In general, the Chi square test shows negligible difference between land holding status of the credit constrained and unconstrained households. Nevertheless, the difference in size of agricultural land between the two groups is statistically significant at 1% level. The average agricultural land size of the credit constrained group was 0.33 ha while the credit unconstrained group was 0.36 ha. Majority of the household's land size was between 0.1 and 0.5 ha. Only 17% of the credit constrained households compared to 22.81% of the credit unconstrained households possessed more than 0.5 ha of agricultural land (see Table 4.3). Although agricultural land is rarely accepted as collateral in Vietnam, it can be a proxy for the household's production capacity.

Table 4.3 Profile of the NCC Survey Respondents (Household characteristics)

Characteristics	Credit constrained households		Credit unconstrained households		All respondents		Statistical test
	Count	Percent	Count	Percent	Count	Percent	
Household size							
1-3	42	21.65	68	23.86	110	22.96	
4-6	143	73.71	201	70.53	344	71.82	
6 and more	9	4.64	16	5.61	25	5.22	
Total	194	100	285	100	479	100	
Mean household size	4.43		4.4		4.41		t=-0.22
Number of income earners							
1-2	162	83.50	190	66.67	352	73.49	
3-4	31	15.98	85	29.82	116	24.22	
5 and more	1	0.52	10	3.51	11	2.3	
Total	194	100	285	100	479	100	
Mean income earners	2.11		2.48		2.33		t=4.99***
Number of off-farm earners							
None	43	22.16	33	11.58	76	15.87	
1-2	148	76.29	233	81.75	381	79.54	
3-4	3	1.55	17	5.96	20	4.18	
5 and more	0	0	2	0.7	2	0.42	
Total	194	100	285	100	479	100	
Mean off-farm earners	0.98		1.46		1.27		t=6.44***
Number of children							
None	5	2.58	38	13.33	43	8.98	
1-2	109	56.19	164	57.54	273	56.99	
3-4	74	38.14	79	27.72	153	31.94	
5 and more	6	3.09	4	1.40	10	2.09	
Total	194	100	285	100	479	100	
Mean number of children	2.32		1.92		2.08		t=-3.80***
Land holding status							
Owner	136	70.10	203	71.23	339	70.77	
Both owner and leasee	58	29.9	82	28.77	140	29.23	
Total	194	100	285	100	479	100	χ^2=0.071
Agricultural land size (ha)							
Less than 0.1	9	4.64	20	7.02	29	6.05	
0.1 to less than 0.5	152	78.35	200	70.18	352	73.49	
0.5 to less than 1.0	28	14.43	46	16.14	74	15.45	
1.0 and above	5	2.58	19	6.67	24	5.01	
Total	194	100	285	100	479	100	
Mean Agricultural land	0.33		0.38		0.36		t=1.96**
Poor certification							
Poor certified households	71	36.60	28	9.82	99	20.67	
Non-poor households	123	63.40	257	90.18	380	79.33	
Total	194	100	285	100	479	100	χ^2=50.46***

Characteristics	Credit constrained households		Credit unconstrained households		All respondents		Statistical test
	Count	Percent	Count	Percent	Count	Percent	
Household income (million VND)[2]							
Less than 10	2	1.03	1	0.35	3	0.63	
10 to less than 50	108	55.67	84	29.47	192	40.08	
50 to less than 100	80	41.24	168	58.95	248	51.77	
100 to less than 200	4	2.06	31	10.88	35	7.31	
200 and above	0	0	1	0.35	1	0.21	
Total	194	100	285	100	479	100	
Mean household income	48.61		65.54		58.68		*t*=6.24***
Household consumption expenditure (million VND)							
Less than 20	6	3.09	2	0.70	8	1.67	
20 to less than 40	89	45.88	71	24.91	160	33.40	
40 to less than 80	99	51.03	207	72.63	306	63.88	
80 and above	0	0	5	1.75	5	1.04	
Total	194	100	285	100	479	100	
Mean consumption expenditure	40.31		48.02		44.89		*t*=6.42***

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

Source: Author's survey data, 2013

[2] Exchange rate in 2013: 1 USD = 21,000 VND

Table 4.3 illustrates the large income gap between the credit constrained households and credit unconstrained households which is statistically significant at 1% level. The average annual income of the credit constrained households was 48.61 million VND which was much lower than average annual income of the credit unconstrained households (65.54 million VND). Further, majority of the credit constrained households earned between10 to 50 million VND (55.67%) while most of the credit unconstrained households belonged to the group earning from 50 to 100 million VND. The result shows more than 10% of the credit unconstrained households have income of more than 100 million VND compared to 2.06% of the credit constrained households. However, the correlation between income and the household's credit constraint status should be interpreted with caution since there may be a mutually causal relationship between them.

Similar to annual income, there was a wide gap in consumption expenditure between the credit constrained and unconstrained households. The deviation of annual consumption expenditure between the two groups is statistically significant at 1% level. The proportion of the credit unconstrained households spending from 40 to 80 million VND was 72.63% compared to 51.03% of the credit constrained households. The remaining portion of the credit constrained households (48.97%) spent less than 40 million VND annually on consumption. Although the household consumption expenditure indicator does not take into account of household size, however, as discussed above there was no difference in household size between the two groups, thus, it is rationale to conclude that consumption per capita of the credit unconstrained households was significantly higher than that of the credit constrained households.

Table 4.3 also reveals the credit constraint status of the poor households in the surveyed areas. Among the 99 households certified as the poor, 71 households were identified to be credit constrained, only 28 households were credit unconstrained. The significance of the Chi square test at 1% level indicates the poor households were more likely to fall into the credit constrained group.

In summary, the descriptive statistics provide an overview of the household's characteristics in the surveyed area and reveal the differences between the credit constrained and unconstrained households in terms of household size, number of income earners and off-farm earners, number of children, land holding status and agricultural land size, household poor status, household income and expenditure. In general, the credit unconstrained households had more income earners and off-farm labours, larger agricultural land size, fewer children and were less likely to be poor. They also had higher income and consumption expenditure. However, the relationship between the credit constraint status and the household income and expenditure is inconclusive

since the relationship between the credit constraint status and the household economic outcomes may be mutual.

4.1.2.3 Geography related factors

Table 4.4 shows the geographic distribution of the credit constrained and unconstrained households in the surveyed area. Among the four communes namely Van Thanh, Thanh Yen, Thach Tien and Thuy Thanh randomly selected from three provinces in NCC region, the highest proportion of the credit constrained households inhabited in Van Thanh (32.47%) which is also the commune with the highest poverty rate (14.7%).

Table 4.4 Geography related characteristics in the surveyed area

Characteristics	Poverty rate[(A)]	Credit constrained households		Credit unconstrained households		All respondents		Statistical test
		Count	Percent	Count	Percent	Count	Percent	
Geographic characteristics								
Van Thanh	14.7	63	32.47	58	20.35	121	25.26	
Thanh Yen	11.5	51	26.29	66	23.16	117	24.43	
Thach Tien	13.1	55	28.35	67	23.51	122	25.47	
Thuy Thanh	7.5	25	12.89	94	32.98	119	24.84	
Total		194	100	285	100	479	100	χ^2=27.01***

*Note: *, **, *** indicate significance at 10%, 5% and 1 %, respectively*

[(A)]The commune poverty rate was obtained from the interviews with commune officials at the survey sites.

Source: Author's survey data, 2013

Conversely, the proportion of the credit constrained households living in Thuy Thanh, the commune with the lowest poverty rate was much lower than other communes (12.89%). As discussed above, the poor households had higher propensity to be credit constrained, thus, the communes with high poverty rate is more likely to have higher rate of credit constrained households.

The Chi square test is significant at 1% level, confirming the difference in the likelihood to be credit constrained of the households living in different geographical locations. However from Table 4.4, it is unclear to ascertain which location exhibits the highest likelihood that the households were credit constrained. The influence of geographical characteristics should be considered with other household's characteristics.

4.1.3 Characteristics of rural credit

This section provides an overview of the characteristics of formal and informal credit in the surveyed area. Table 4.5 illustrates the borrowing status of the surveyed households and the sources of their credit in 2012. The results showed 69.52% of the households borrowed from at least one source of credit in 2012, the remaining 30.48% did not borrow from any source. Among the borrowing households, 39.67% of the households received credit only from formal credit institutions, 20.46% of the households obtained loan from two sources and 9.39% accessed only informal credit. Non-borrower households accounted for 30.48% of the total interviewed households, in which 6.68% of the households could not access any credit due to credit constraints.

Table 4.5 Borrowing status of the surveyed households

Description	Source of loans			Total
	Formal	Informal	Mixed formal and Informal	
Borrower households	190 (39.67%)	45 (9.39%)	98 (20.46%)	333 (69.52%)
Non-borrowers households			146 (30.48%)	
- Credit constrained Non-borrowers			32 (6.68%)	32 (6.68%)
- Credit unconstrained Non-borrowers			114 (23.80%)	114 (23.80%)

Source: Author's survey data, 2013

The data (see Table 4.5) confirms the dependence of the rural farm households on credit. Results from our survey indicate that only 23.80% of the households could self-finance their production and consumption, 76.20% of the households needed some form of external financial support. In addition, the survey affirms the prevalence of formal financial institutions in providing credit to the rural farm households. According to the survey results, the proportion of the households involved in formal credit accounted for 60.63% and formal credit was the only source of finance for 39.67% of the households. However, we cannot deny the importance of informal creditors who provided credit to more than 30% of the rural farm households and the only source of credit for 9.39% of the households. These results share many similarities with the statistics of Vietnam rural household's borrowing discussed in Chapter 2 and the survey conducted by Barslund and Tarp (2008).

Table 4.6 summarises the characteristics of formal and informal credit in terms of loan value, interest rate, the processing time, loan duration, repayment procedure and loan purpose. In general, formal credit institutions offered higher amount of loan, lower interest rate, provided more long term and medium term loans but were more rigid in repayment schedule and spent more time on loan processing.

In light of loan value, the amount of loan provided by formal financial institutions and informal creditors were divided into 5 categories: less than 10 million VND, from 10 million to less than 30 million VND, from 30 million to less than 50 million VND, from 50 million to less than 100 million VND and 100 million VND and above. Majority of the households received loans valued from 10 to less than 30 million VND from either formal creditors (45.49%) or informal creditors (53.85%) (see Table 4.6). In comparison, a larger proportion of the households obtained loan valued 50 million VND or above from formal credit institution than from informal creditors. This means formal credit institutions are still the main providers of large loans to rural farm households. The average value of formal loan was 35.06 million VND which was bigger than the average value of informal loan (25.67 million VND). In fact, formal credit is dominant in Vietnam rural credit market in terms of coverage and loan size.

As expected, the interest rate charged by informal creditors was much higher than formal financial institutions. It is understandable since formal loan is subsidised by the government. Our results are similar to the findings of Barslund and Tarp (2008) and Pham and Lensink (2007). Most of the households paid an interest rate of less than 1% per month for formal loan (70.49%) whereas majority of the households was charged an interest rate of 1.5% per month or above by informal creditors (73.42%). Further, more than 30% of the households paid an interest rate of 2% per month or above for informal loan. On average, interest rate applied to informal loan was 2.3 times higher than average interest rate charged by formal loan providers (1.98% versus 0.86%) (see Table 4.6). With regards to the effect of subsidised credit, some studies (for example Hoff and Stiglitz (1998) and Bose (1998)) raise the concerns that while some households benefit from low interest rate, others would suffer from increase in interest rate charged by moneylenders. The expansion of subsidised credit results in the downsizing of money lenders as the market becomes more risky for them. As a consequence, interest rate in the informal sector would be pushed up. In fact, only households who are not constrained by formal financial institutions are beneficiaries of subsidised credit, whereas credit constrained households may suffer from negative effect of such subsidised programs since they are forced to borrow from informal sources. According to Ghate

(1992), high interest rate charged by rural moneylenders do not necessarily reflect monopoly but actual risk of the market.

With regards to loan duration, most of the households (87.85%) were offered medium and long term loans by formal creditors, where 12.05% of the households borrowed short term. Meanwhile, majority of the households borrowing from the informal sector received short term loans (67.83%) (see Table 4.6). This is because informal credit is much more expensive than formal credit, the households may be able to handle informal debt in a short term basis while prefer to keep formal loan in medium and long term.

Table 4.6 also exhibits the difference in loan processing time between formal and informal credit. The survey result shows 55.24% of the borrowers waited for less than a day to receive loans from informal creditors. The remaining borrowers waited for less than a week (28.67%) or a month (16.8%) by informal creditors. No informal loan was processed for more than a month. On the contrary, more than half of the formal loans were processed for more than a week (54.17%) and 5.56% of the loans were processed for more than a month. Only 1.39% of the formal loans was processed within a day. The longer loan processing time implies higher transaction cost. This means the households bear more transaction cost when they borrow from the formal sector.

The payment schedule described in Table 4.6 refers to interest payment schedule. In Vietnam, loan principles are usually paid on the due date while interests are paid periodically. Table 4.6 shows that the households paid interest monthly (37.15%), quarterly (28.82%) or annually (30.56%) when they borrowed from formal financial institutions based on their loan duration and the creditors' regulations. The informal creditors required the households to pay interest monthly (36.36%) or annually (30.07%). Some households (33.57%) were offered flexible interest payment schedule. The interest payment schedule of formal credit is regulated and rigid while households can compromise with informal lenders on both payment schedule and duration.

The main purposes of the formal and informal loans are illustrated in Table 4.6. Agricultural production was chosen by most of the households as the main purpose they borrowed from formal financial institutions (68.75%), followed by paying tuition fee (38.54%) small investment (27.43%) and house repair (18.06%). Similarly, informal loans were used for agricultural production (20.98%), small investment/trade (18.88%), and house repair (18.88%). The households also used informal loan to pay other loans while only a few of them used formal loan for that purpose.

Table 4.6 Characteristics of formal and informal credit in the surveyed area

Informal loan characteristics	Informal credits		Formal loan characteristics	Formal credit	
	Count	Frequency		Count	Frequency
Informal loan value (in million VND)			**Formal loan value (in million VND)**		
Less than 10	7	4.90	Less than 10	10	3.47
From 10 to less than 30	77	53.85	From 10 to less than 30	131	45.49
From 30 to less than 50	47	32.87	From 30 to less than 50	76	26.39
From 50 to less than 100	11	7.69	From 50 to less than 100	59	20.49
100 and above	1	0.70	100 and above	12	4.17
Mean	25.67			35.06	
Informal interest rate (%/month)			**Formal interest rate (%/month)**		
Less than 1%	25	17.48	Less than 1%	203	70.49
From 1% to less than 1.5%	26	18.18	From 1% to less than 1.5%	80	27.78
From 1.5% to less than 2%	62	43.35	From 1.5% to less than 2%	5	1.74
2% and above	43	30.07			
Mean	1.98		Mean	0.86	
Informal loan duration (months)			**Formal loan duration**		
Short term (up to 12 month)	97	67.83	Short term (up to 12 month)	35	12.15
Medium term (more than 12 and up to 36 month)	38	26.57	Medium term (more than 12 and up to 36 month)	214	74.31
Long term (More than 36 month)	8	5.59	Long term (More than 36 month)	39	13.54
Mean	17.45		Mean	39.55	
Processing time for informal loan			**Processing time for formal loan**		
Within a day	79	55.24	Within a day	4	1.39
Less than a week	41	28.67	Less than a week	112	38.89
More than a week and less than a month	23	16.08	More than a week and less than a month	156	54.17
			More than a month	16	5.56

(Table 4.6 continued next page)

Informal loan characteristics	Informal credits		Formal loan characteristics	Formal credit	
	Count	Frequency		Count	Frequency
Payment schedule for informal loan			**Payment schedule for formal loan**		
Monthly	52	36.36	Monthly	107	37.15
Annually	43	30.07	Quarterly	83	28.82
Others	48	33.57	Semi-annually	10	3.47
			Annually	88	30.56
Loan purposes			**Loan purposes**		
Production capital (Farming)	30	20.98	Production capital (Farming)	198	68.75
Small investment/trade	27	18.88	Small investment/trade	79	27.43
Pay tuition fee	10	6.99	Pay tuition fee	111	38.54
Emergencies	9	6.29	Emergencies	10	3.47
House repair	27	18.88	House repair	52	18.06
Purchase durable assets	14	9.79	Purchase durable assets	13	4.51
Payment of other loans	22	15.38	Payment of other loans	6	2.08
Others	7	4.90	Others	18	6.25

Source: Author's survey data, 2013

4.2 Empirical results

This section presents the empirical results obtained from the logit and Endogenous Switching Regression models. The specification of each model will be discussed, followed by the result analysis and discussions.

4.2.1 Determinants of household's credit constraint status

4.2.2.1 Definitions of the explanatory variables used in the Logit model

The logit model used to identify the factors influencing the NCC household's credit constraint status is specified in equation (3.2). Household's credit constraint status is a function of the household head's characteristics, characteristics of households and geographic related factors. The household head characteristics include age (AGE), education (EDU) and gender (GENDER). Agricultural land size (LANDSIZE), the ratio of income earners to total household members (LARATIO), number of off-farm labours (OFFFARM) and the ratio of income from non-farm activities to total household income (INRATIO) represent the characteristics of the households. VANTHANH, THACHTIEN, THUYTHANH are dummy geography variables to capture the location characteristics. We also add two dummy variables namely poor certificate (POOR) and household's credit demand (DEMANDUM) to examine the effectiveness of the subsidised credit institutions in implementing the government policy.

According to previous studies, age (Barslund & Tarp, 2008; Chaudhuri & Cherical, 2011), gender (Freeman et al., 1998; Zeller, 1994) and education (Jia et al., 2010; Pham & Izumida, 2002) are the main characteristics of household head affecting household's likelihood of being credit constrained. In our study, age is a dummy variable which is equal to 1 if the household head is more than 55 years old and 0 otherwise. Education is also a discrete variable which equals 1 if the household head completed high school or higher education, 0 otherwise. Agricultural land size variable is a proxy of the household physical capital. The ratio of income earners is an indicator of the household human capital. The role of number of off-farm labours variable is twofold: it can be a proxy of the household human capital and also an indicator of the household economic characteristics. The households with more off-farm labours are expected to be less dependent on credit. Another household economic related variable is income ratio. As reported by Stampini and Davis (2009), non-farm income helps to relax credit rationing on farm households. In terms of geography variables, our survey covers four areas THANHYEN and VANTHANH (Nghe An), THACHTIEN (Ha Tinh) and THUYTHANH (Thua Thien Hue). THANHYEN has a higher poverty rate

than HUONGTHUY, but lower poverty rate than THACHTIEN, and the same provincial location with VANTHANH, therefore, it is used as the reference geography dummy variable in the logit model.

Table 4.7 Determinants of the household's credit constraint status in the NNC

Variables	Description	Mean	S.D.	Min	Max
CONSTRAINED	1 if household is credit constrained, 0 = unconstrained	0.40	0.49	0	1
GENDER	1 if household head is male, 0 = female	0.79	0.40	0	1
AGE	1 if household head is older than 55; 0 = otherwise	0.19	0.39	0	1
EDU	1 if household head gets high school degree or higher, 0 = otherwise	0.24	0.42	0	1
DEMANDDUM	1 if the amount of loan household needed to borrow is larger than 30 million VND, 0 = otherwise	0.41	0.49	0	1
LANDSIZE	Size of household farm land (1000m^2)	3.63	2.69	0.3	20
INRATIO	Ratio of non-farm income to farm income	1.99	2.34	0	18
LARATIO	Ratio of labours to total family members	0.55	0.19	0.25	1
OFFFARM	Number of off-farm labours	1.27	0.83	0	5
POOR	1 if household has poor certificate, 0 = otherwise	0.20	0.40	0	1
VANTHANH	Geography dummy variable	0.25	0.43	0	1
THACHTIEN	Geography dummy variable	0.25	0.43	0	1
THUYTHANH	Geography dummy variable	0.24	0.43	0	1
Number of observations 477†					

Note: † A total of 477 observations was used, 2 observations were excluded for the concern of outliers. Appendix A-1 provides the evidence of outliers.

Source: Author's survey data, 2013

The presence of poor certificate (POOR) variable examines whether the poor households can access sufficient formal credit as expected by the government's subsidy policy. In addition, we add the dummy variable DEMANDUM which equals 1 if the households need to borrow more than 30 million VND and 0 otherwise. This enables us to test whether the loan size of 30 million VND set by the Vietnam Bank for Social Policies can meet the farm household's demand for credit.

Details of the explanatory variables are described in Table 4.7. We exclude two observations from the data analysis for the fear of outliers which may increase the sample variance and reduce the precision of the estimations (Cochran, 1977).

4.2.2.2 Determinants of credit constraints

Table 4.8 presents the determinants of the household's credit constraint status, including the parameter estimates, odd ratios and marginal effect. The VIF test (mean VIF=1.49) confirms the absence of multicollinearity from the model. High p value (p=0.30) obtained from Hosmer-Lemeshow's goodness of fit test indicates the model is well-fitted with the data (Janosz, LeBlanc, Boulerice, & Tremblay, 1997). Details of the VIF and Hosmer-Lemeshow's goodness of fit tests are presented in Appendix A-2 and Appendix A-3, respectively. The percentage of observations that are correctly predicted by the model is 77.36% and the expected percentage of observations correctly predicted by the model is 70.60%. The likelihood ratio test (LR test) with $\chi^2(12)$=215.45 rejects the null hypothesis that all the parameter estimates of the model jointly equals zero and confirms the model as a whole is significant at 1% level. Marginal effects are reported only for continuous variables since they may not be meaningful for discrete variables (Greene, 2003, p. 668).

Table 4.8 shows the significant effect of gender, age, education, demanded size of loan, size of farm land, labour ratio, off-farm labour, poor certificate and one geography dummy variable (THUYTHANH) on the household's likelihood of being credit constrained.

All three characteristics of household head have significant effects on the household's credit constraint condition. The significantly negative effect of age on the household's credit constraint status at 1% level indicates that household heads who are older than 55 have lower propensity of being credit constrained. This may be due to the fact that older farmers often accumulate enough capital and they are less likely to invest in new projects. The result is supported by findings of Barslund and Tarp (2008) and Freeman et al. (1998) where older farmers are more creditworthy and less dependent on credit to finance their production. The odds ratio of 0.31 implies that the odds that the households with household head older than 55 years old are credit constrained is 3.23 times (1/0.31) lower than households with household head younger than 55 years old.

However, contrary to Barslund and Tarp's (2008) study, our result indicates that female-headed households are more likely to be credit constrained than their male counterparts. It should be noted that Barslund and Tarp's study only covers loan rejected households, not partially constrained borrowers and constrained non-borrowers. In other words, the result from Barslund and Tarp's (2008) study is only able to confirm that female applicants' request for loan are more likely to be approved by formal financial institutions, which does not mean that they are likely to obtain sufficient credit. In addition, in Barslund and Tarp's study, the respondents who are

responsible for applying for credit are not necessarily the household heads. The odds ratio of 0.46 implies that the odds that female-headed households are credit constrained is 2.17 times (1/0.46) higher than their male counterparts (see Table 4.8).

Table 4.8 Logit model for credit constraint determinants

Variable	Coefficient	Odd Ratios	Marginal effect
GENDER	-0.775	0.46	
	(2.56)*		
AGE	-1.160	0.31	
	(3.04)**		
EDU	-0.590	0.55	
	(1.99)*		
DEMANDDUM	2.316	10.13	
	(8.47)**		
LANDSIZE	-0.072	0.93	-0.016
	(2.27)*		
INRATIO	-0.207	0.81	-0.046
	(2.18)*		
LARATIO	-1.886	0.15	-0.426
	(2.59)**		
OFFFARM	-0.627	0.53	-0.141
	(3.03)**		
POOR	0.753	2.12	
	(2.30)*		
VANTHANH	0.444	1.55	
	(1.29)		
THACHTIEN	0.231	1.26	
	(0.60)		
THUYTHANH	0.888	2.43	
	(2.17)*		
Constant	1.599	4.95	
	(2.54)*		
Number of observation	477		
Likelihood ratio	215.45**		
Pseudo R^2	0.3347		
PCP	77.36		
EPCP	70.60		

*Note: ** and* denotes significance at 1% and 5% level respectively; figure in parenthesis are t-ratios; PCP is percentage correctly predicted; EPCP is expected percent correctly predicted.*

The effect of education on the household's likelihood to be credit constrained is significant at 5% level with the expected sign (see Table 4.8). The finding is consistent with the studies of Barslund and Tarp (2008), Pham and Izumida (2002) and Jia et al. (2010). Barslund and Tarp (2008) explain that households with more education are capable of making better investment decision, thus, they

are less likely to be rationed by formal financial institutions. It is supported by Pham and Izumida (2002) that educated individuals are generally respected and trusted by the society, therefore, they are considered to be more creditworthy than the less educated counterparts. Similarly, Jia et al. (2010) reveal that education of household heads can be an indicator of household human capital which plays an important role in relaxing credit constraints in China. The odd ratio of 0.55 indicates that the odds that the household heads who completed high school or higher are credit constrained is 1.82 (1/0.55) times lower than those who only completed secondary or primary school.

The influence of human capital on the likelihood of being credit constrained is confirmed by the significant effect of labour ratio and the number of off-farm labours on the household's credit constraint condition. The result is consistent with Petrick's (2004b) study, which indicates that households having more income earners are more likely to receive sufficient loans. The marginal effect of LARARIO is -0.426 implies that at the mean value, if the labour ratio increases by 10%, the household's likelihood to be constrained decreases by 4.26% (see Table 4.8). In addition, the household with more non-farm labours have lower propensity to be credit constrained. Based on the marginal effect at the mean value, an addition off-farm labour can reduce the probability that the farm households were credit constrained by 14.1%. The presence of off-farm labours can be a proxy of positive non-farm income which can substitute for credit to purchase agricultural input (Stampini and Davis (2009)).

The effect of farm land area is negative and significant at 5% level, indicating that the households possessing larger farm land size had more advantages to approach formal credit. The finding contradicts the results reported by Boucher et al. (2009) where farm size have positive relationship with the likelihood of being credit constrained. According to Boucher et al., households cultivating in larger area of land have to cover relatively higher input cost, therefore they are more likely to depend on credit and fall into the credit constrained group. However, our finding supports Reyes's (2011) study who reveals that the households possessing more land is evaluated to be more creditworthy. Thus, the impact of farm land size on the household's propensity to be credit constrained is determined by the magnitude effect on the demand side and supply side. It is important to emphasise that in Vietnam, farm land is an indicator for production capacity rather than being treated as collateral.

Table 4.8 also shows that the negative relationship between the ratio of non-farm income to farm income and the propensity to be credit constrained is statistically significant at 1% level. This implies that the more the family depends on farm income, the more likely they are credit

constrained. This finding supports Stampini and Davis's (2009) result which reveals that non-agricultural income reduces the dependence of the households on credit, thus, relax credit constraints in rural Vietnam. Furthermore, according to Reardon et al. (1998), similar to credit, non-farm income ensures that the household consumption is not affected by the fluctuation of farm income.

In terms of geography variables, the results show that only THUYTHANH is significantly different from the reference location. Table 4.4 shows the poverty rate of THUYTHANH is much lower than other communes. This means the households living in the communes with low poverty rate find it more difficult to access formal credit. It is understandable since disadvantaged areas are often prioritised by subsidised credit institutions.

Although the poor is considered to be the target group of subsidised credit, the result described in Table 4.8 reveals that they are more likely to be credit constrained than non-poor households. The odds ratio of 2.12 indicates that the odds that the poor households are rationed is 2.12 times higher than their non-poor counterparts. This supports the findings of Nguyen (2008) who postulates that poor households are more likely to be excluded by formal financial institutions. According to the policy of Vietnam Bank for Social and Policies, households who are certified to be poor by the commune authority are prioritised to borrow from the bank but they cannot borrow more than 30 million VND. Vietnam Bank for Social and Policies is the only bank willing to lend to the poor. Thus, the maximum amount the poor can borrow from the formal sector is only 30 million VND. It is worth noting that the poor considered in our study are those certified by the authority, which does not necessarily follow the World Bank's definition as discussed in Chapter 2. Therefore, the result should be interpreted with caution and cannot be concluded for the poor in general but only for the certified poor households.

We add a demand dummy variable which is equal to 1 for households that need to borrow more than 30 million VND and 0 otherwise to test whether the limitation of loan size at 30 million VND set by the Vietnam Bank for Social Policies can meet the farm household's demand for credit. The significantly negative relationship between this variable and credit constraint status (at 1% level) reveals that subsidised credit only satisfy partially the farm household's demand for credit. In addition, if the household demand exceeds 30 million VND, their odds of being credit constrained is 10.13 times higher than those whose demand is lower than 30 million VND (see Table 4.8).

The marginal effects presented in Table 4.8 reveal that among the factors affecting the household credit constraint condition, human resources may be the most important determinants since

labour ratio and number of off-farm labours have strongest marginal effects on the probability of being credit constrained while the marginal effects of farm land size and income ratio are modest.

In conclusion, the results obtained from the logit model confirm the influence of physical capital, human capital, economic related factor and geography related factors on the household credit constraint status. The loan size limit set by Vietnam Bank for Social and Policies is a major obstacle for the households to obtain sufficient credit. For the poor, although they are prioritised by the credit subsidy policy, the results show that they are more likely to be credit constrained.

4.2.2 Impact of credit constraints on household welfare

4.2.2.1 Definitions of the explanatory variables used in the Endogenous Switching Regression model

The estimation of the ESR model for credit constraint impact evaluation follows two stages. In the first stage, we estimate equation (3.2) using the probit method. Inverse Mills ratios are calculated from the probit model and added to equation (3.10-1) and (3.10-2). In the second stage, we estimate equation (3.10-1) and (3.10-2) by weighted least squares method.

The dependent and independent variables of the probit model are similar to the logit model discussed above. The dependent variable in equation (3.10-1) and (3.10-2) is consumption per capita in logarithm form as the form fits the data better in the consumption function (Campbell & Deaton, 1989). All the explanatory variables of the probit model are the independent variables in equation (3.10-1) and (3.10-2) except for DEMANDDUM treated as the exclusion restriction. The reason we choose DEMANDDUM to be the exclusion restriction is because it can satisfy two conditions: it is strongly associated with the household likelihood to be credit constrained and it does not affect actual household consumption expenditure. The first condition is proven by the significant relationship between the credit amount the households demanded and their likelihood to be credit constrained (see Table 4.8). Further, comparing the likelihood ratio of the probit model with and without DEMANDDUM variable we realise the likelihood ratio of the probit model with the presence of the DEMANDDUM is higher than the model without DEMANDDUM (217.12 versus 129.39) (details of the estimations are reported in Appendix A-4). This means DEMANDDUM is an important independent variable in the probit model. For the second condition, it is rational to believe that the amount of credit a household demand for does not affect their actual consumption expenditure. However, we do not have specific test for the second condition (test for exogeneity).

Table 4.9 Descriptive statistics of variables of Endogenous Switching Regression model

Variables	Description	Mean	S.D.	Min	Max
CONSTRAINED	1 if household is credit constrained, 0 = unconstrained	0.40	0.49	0	1
CON_PER	Household's consumption per capita (Million VND)	10.60	3.07	3.6	25.5
GENDER	1 if household head is male, 0 = female	0.79	0.40	0	1
AGE	1 if household head is older than 55, 0 = otherwise	0.19	0.39	0	1
EDU	1 if household head gets high school degree or higher, 0 = otherwise	0.24	0.42	0	1
DEMANDDUM	1 if the amount of loan household needed to borrow is larger than 30 million VND, 0 = otherwise	0.41	0.49	0	1
LANDSIZE	Size of household farm land (1000m^2)	3.63	2.69	0.35	20
INRATIO	Ratio of non-farm income to farm income	1.99	2.34	0	18
LARATIO	Ratio of labour to total family members	0.55	0.19	0.25	1
OFFFARM	Number of off-farm labours	1.27	0.83	0	5
POOR	1 if household has poor certificate, 0 = otherwise	0.20	0.40	0	1
HH_SIZE	Household size	4.41	1.31	2	9
CHILDSTU	1 if household has child/children being tertiary student, 0 = otherwise	0.28	0.45	0	1
INFORMAL	1 if household gets insufficient credit from informal source, 0 = otherwise	0.22	0.41	0	1
VANTHANH	Geography dummy variable	0.25	0.43	0	1
THACHTIEN	Geography dummy variable	0.25	0.43	0	1
THUYTHANH	Geography dummy variable	0.24	0.43	0	1
Total number of observations 477					

Source: Author's survey data, 2013

Apart from the independent variables used in the probit model, two explanatory variables children tertiary study (CHILDSTU) and number of household members (HH_SIZE) are added to the consumption function of both credit constrained and unconstrained households (equation (3.10-1) and (3.10-2)). In rural Vietnam, tertiary education expense accounts for a substantial proportion of the household consumption. Thus, households having child/children studying at tertiary schools are expected to incur higher education expenditure. The number of household member variable controls for the difference in household size. Further, we add a dummy variable INFORMAL, which

is equal to 0 if the household received sufficient amount of credit from the informal sector, otherwise 1, to the consumption function of credit constrained households (equation (3.10-1)). The purpose of adding this dummy variable is to examine the importance of informal credit to household welfare in case they are credit constrained by the formal financial institutions. The descriptive statistics of the model are presented in Table 4.9.

4.2.2.2 Impact of credit constraints on household welfare

The results obtained from the first stage (probit model) is presented in Appendix A-4. In general, the estimated parameters and the statistical significance of the explanatory variables from the probit model are similar to the results obtained from the logit model. The results from the second stage (weighted least squares models) are summarised in Table 4.10. In addition, we also present the output of OLS estimations to compare the results from the models with and without treating selection bias.

The Wald test reported in Table 4.10 confirms the significance of all regressors except the constant term. The likelihood ratio test (LR test) with $\chi^2(2) = 5.04$ which is significant at 10% level indicates that the endogenous switching model is better than the exogenous model. The significance of ρ_1 implies that the sample may suffer from selection bias and OLS estimation would result in biased estimates. Since ρ_1 is negative and significant at 1% level, we can conclude that the credit constrained households have lower consumption per capita than a random household. The positive sign of ρ_0 suggests that the credit unconstrained households have higher consumption per capita than a random household, however the coefficient is insignificant and thus inconclusive. Our findings are supported by the Li and Zhi's (2010) and Li et al.'s (2013) studies which reveal that credit constraints have detrimental effect on household consumption expenditure. Similarly, Baiyegunhi et al. (2010) argue that credit constrained households have lower monthly per adult consumption expenditure than credit unconstrained counterparts. Some studies that use income as the proxy of household welfare share similar conclusion (Dong et al., 2010; Li & Zhi, 2010). Therefore, regardless of the indicators used to measure household welfare, the literature confirms the detrimental effect of credit constraints on rural farm household welfare.

The predictors of consumption per capita are similar to the case of credit unconstrained and constrained households in terms of significance and sign except for the variable INFORMAL appearing only in the consumption equation (3.10-1) of the credit constrained households. The negative significant effect of this variable on consumption per capita implies that the credit

constrained households who received sufficient amount of credit from informal sources can improve their consumption per capita by 8.4% (see Table 4.10).

Table 4.10 Impact of credit constraints on the household consumption per capita

Variable name	Endogenous switching model		OLS	
	Credit unconstrained	Credit constrained	Credit unconstrained	Credit constrained
POOR	-0.134	-0.174	-0.138	-0.152
	(3.84)***	(6.16)***	(3.71)***	(5.18)***
LANDSIZE	0.016	0.019	0.016	0.014
	(4.20)***	(2.60)***	(3.92)***	(1.91)*
HH_SIZE	-0.104	-0.133	-0.104	-0.127
	(10.21)***	(10.99)***	(9.80)***	(9.70)***
LARATIO	0.289	0.271	0.293	0.252
	(4.59)***	(3.03)***	(4.66)***	(2.29)**
INRATIO	0.011	0.020	0.011	0.010
	(2.38) **	(1.32)	(2.22)**	(0.76)
GENDER	-0.025	0.043	-0.020	0.031
	(0.76)	(1.59)	(0.68)	(1.09)
AGE	-0.011	-0.030	-0.009	-0.069
	(0.47)	(0.70)	(0.37)	(0.91)
EDU	0.031	0.018	0.033	0.014
	(1.38)	(0.60)	(1.56)	(0.64)
CHILDSTU	0.132	0.245	0.131	0.242
	(6.12)***	(8.96)***	(5.67)***	(7.05)***
OFFFARM	0.088	0.125	0.089	0.117
	(5.48)***	(5.28)***	(4.83)***	(4.91)***
VANTHANH	0.079	-0.015	0.078	-0.003
	(2.52) **	(0.42)	(2.26)**	(0.10)
THACHTIEN	0.063	0.070	0.063	0.076
	(2.18)**	(1.65)	(1.91)*	(2.20)**
THUYTHANH	0.066	-0.024	0.066	-0.036
	(2.43)**	(0.60)	(2.12)**	(0.53)
INFORMAL		-0.084		-0.085
		(3.63)***		(2.88)***
Constant	2.415	2.508	2.398	2.473
	(28.47)***	(27.01)***	(35.45)***	(26.81)***
$\sigma_{0\varepsilon}$	0.150 (23.44)***			
$\sigma_{1\varepsilon}$	0.158 (12.85)***			
ρ_0	0.0892 (0.315)			
ρ_1	-0.617 (3.53)***			
Log likelihood	24.58			
Wald test	441.84***			
LR test	$\chi^2(2)$ =5.04* (p = 0.08)			

*Note:; ***, ** and * denote significance at 1%, 5% and 10% level respectively; figures in parenthesis are t-ratios; $\sigma_{0\varepsilon}$ and $\sigma_{1\varepsilon}$ are the square root of the variances of the residuals of consumption per capita*

models; ρ_0 and ρ_1 are correlation between the error terms of credit constraint condition equation and equations of consumption per capita of credit unconstrained households and constrained households, respectively. Following the suggestion of Long and Ervin (2000), estimations of OLS model applied HC3 option by STATA to solve heteroskedasticity issue.

Table 4.10 also shows the difference in the significance of income ratio and geography variables between the consumption equations of the credit constrained and unconstrained households. The insignificant effect of the income ratio variable on consumption per capita of credit constrained households implies that for credit constrained families, the role of non-farm income in improving household welfare is negligible. This could be due to the lack of credit, income generated from non-farm activities becomes unstable, thus, is unable to improve their household consumption. Regarding the geography variables, the significance of the three dummy variables in the credit unconstrained household consumption equation reflects the deviation in living standard between THANHYEN and the three remaining locations. However, there is no difference among the consumption per capita of the credit constrained households in THANHYEN and other locations. The lack of credit may be the reason that prevents the households from utilising location advantages.

Noticeably, an addition member in the credit constrained households reduces consumption per capita by 13.3% compared to 10.4% in the credit unconstrained households. Children's tertiary expenditure is also a big burden for the credit constrained households than the credit unconstrained households. The presence of children studying at tertiary level increases the consumption per capita of the credit constrained households by 24.5%, but only 13.2% in the case of credit unconstrained households (see Table 4.10).

Consumption per capita of the poor households is lower than their non-poor counterparts in the credit constrained group by 17.4% while the difference in consumption per capita between the poor and non-poor households in the credit unconstrained group is only 13.4% (see Table 4.10). In other words, sufficient credit contributes to narrow the welfare gaps between the poor and non-poor households. The result can be explained by Phan (2012) finding that the impact of subsidised credit on poor household welfare is larger than on non-poor household welfare.

In Table 4.10 we also present the results obtained from OLS estimations which show minor differences from the ESR model results. The difference between the two models is the deviations of coefficients between the credit constrained and unconstrained groups in the ESR model are larger than those in the OLS model. For example, the difference between the POOR coefficients in

the consumption function of the credit constrained households and unconstrained households obtained from the ESR model is 0.04 (-0.134 versus -0.174) compared to 0.014 in the OLS model (-0.138 versus -0.152).

In summary, the estimation results from the ESR model indicate the impact of credit constraints on the rural farm household welfare. Credit constraints are found to impede the households to employ the location advantages and non-farm income to improve their consumption. In addition, the results reveal the credit constrained households financially stressed when their families have an addition member or children studying at tertiary school. The results also indicate that the poor households can narrow their consumption gap with their non-poor counterparts if they are provided with sufficient credit.

4.3 Chapter Summary

The first section of the chapter provides an overview of the household credit constraint status in the surveyed area as well as the profiles of the credit constrained and unconstrained households. Further, the section describes the characteristics of formal and informal credit in the rural credit market. The second section presents the empirical results from the logit and ESR models.

From our survey, 40.5% of the 479 households were identified to be credit constrained, in which majority of them was quantity constrained, and 40 households were transaction cost constrained. No risk constrained case was detected. Among the quantity constrained households, 53 households were rejected by the formal credit institutions, 89 households received loans but with insufficient amount. By comparing the profiles of the two household groups, we recognise that the female-headed households are more likely to belong to the credit constrained group. On average, the head of credit constrained households are younger and attained lower level of education than the head of the credit unconstrained group. In addition, the credit unconstrained group possessed larger farm land area, had more income earners and off-farm labours. They had less children and were more likely to be engaged in off-farm income-generating activities. Moreover, the credit unconstrained group had higher average income and consumptions. The households living in different geography location are expected to have different propensity of being credit constrained.

The rural credit market is characterised with differences between formal and informal credit. Formal financial institutions are more likely to provide larger loan size, lower interest rate with longer duration. However, formal credit is associated with longer processing time and rigid payment schedule. The households tend to use credit to invest in agricultural production and small

investment/trade. Besides, the households are more likely to borrow from the informal sector to pay other loans while spend formal credit on their children education.

The logit model is applied to identify the factors influencing the household credit constraint status. The results from the model indicate that the household likelihood to be constrained in the surveyed area is determined by gender, age and education of the household head, physical capital, human capital, income generating activities and geography location. Female-headed households are more likely to be rationed by the formal creditors. The households with young and less educated household heads share the same status. Farm land size, labour resources and non-farm income play a determining role to relax the household credit constraint status. The findings also raise the concern that the allocation of subsidised credit favours better off households but farm households in lower poverty rate areas have disadvantages to obtain subsidised credit. The maximum loan size offered by the formal financial institutions is still lower than the household actual demand.

Empirical evidences also suggest the impact of credit constraints on rural farm household welfare. The credit constrained households have significantly lower consumption per capita than their unconstrained counterparts. Another disadvantage faced by the credit constrained households is that they are unable to utilise location advantage and non-farm income to enhance their welfare. The ESR model uncovers the financial burden encountered by the farm households when they are credit constrained. Credit constraints seriously affect the poor household consumption, widening the welfare gap between them and their non-poor counterparts.

Chapter 5

Conclusions

The summary of the study is presented in this Chapter. Sections 5.1 summarises the major findings of the study. Section 5.2 discusses the implications of the study and Section 5.3 identifies the limitations and proposes recommendations for future studies.

5.1 Major findings

Since credit plays a vital role in enhancing rural farm household production and consumption, the government support is necessary for rural farm households to access formal credit through subsidised financial institutions. In spite of the presence of subsidised banks and funds in almost every communes, Vietnam rural farm households are still reported to be credit constrained. In this study, we aim to identify the determinants of credit constraint status of rural farm households and evaluate the impact of credit constraints on household welfare.

Our study confirms that credit is a vital external financial resource for rural farm households in Vietnam and formal financial institutions are primary credit providers in the rural credit market. However, 40.5% of the farm households were still credit constrained. Majority of the households were quantity constrained, only 8.35% were transaction cost constrained. No household was found to be risk constrained. The studies of Boucher et al. (2009), Gershon et al. (1990) and Reyes (2011) also reveal that farm households are more likely to be quantity constrained than transaction cost or risk constrained. The reason farm households in Vietnam are less likely to be risk constrained is because of weak contract enforcement. Among the quantity constrained households, most of them were partly quantity constrained, which means their loan application was approved by the banks but the amount of credit they received was insufficient.

Our study also identifies that the credit constraint condition of the rural farm households is significantly associated with household head characteristics, household characteristics and geography related factors. The households with female head are more likely to be credit constrained than the male-headed households. It may be because males are more likely to be self-financed than their female counterparts. In addition, household age and education also determine the credit constraint status of the farm households. The households with young and less educated household heads have higher probability of being credit constrained since they are less creditworthy and more dependent on credit.

The household characteristics determining the household credit constraint status includes agricultural land size, income ratio, labour ratio and off-farm labours. The results indicate that the households with larger agricultural land size are less likely to be credit constrained by formal financial institutions since agricultural land represents the household production capacity. The negative relationship between labour variables and the household credit constraint status implies that the households with human capital advantages (for example, number of labours, off-farm labours, and household education) have lower propensity of being credit constrained. Further, non-farm income also contributes to relax credit constraints on the rural farm households since it reduces the household dependence on credit to invest in agricultural input.

Households living in different geographical locations may have different probability of being credit constrained. The households living in lower poverty rate communes are found to have higher propensity to be credit constrained as high poverty rate areas are given more attention from subsidised financial institutions. However, this does not imply that the poor households are more likely to receive sufficient credit. In fact, on the contrary, our findings indicate that the poor are more likely to be credit constrained. Subsidised credit is the only financial source accessible to the poor since they are considered to be less creditworthy by other creditors. However, subsidised credit providers always set credit limit on the poor. As a result, the poor who have credit demand exceeding the credit limit find themselves credit constrained. In this study we also examine whether the credit limit at 30 million VND set by Vietnam Bank for Social Policies can satisfy farm household credit demand. The result reveals that the households demanding for more than 30 million VND are more likely to be constrained. This implies that the credit limit set by the bank is lower than actual credit demand of the farm households.

Our result shows credit constraints negatively impact on household welfare. The credit constrained households have significantly lower consumption per capita than the credit unconstrained counterparts. Further, due to credit constraints, the farm households cannot employ the local advantages (for example, land and distance to the market), and non-farm income to improve their consumption. The credit constrained households are also under financial stress when they have an additional member or child/children pursuing tertiary study. The poor can narrow the welfare gap with non-poor households if they are provided with sufficient credit. Paradoxically, they are more likely to be credit restricted by formal financial institutions. In addition, our study identifies that the welfare of the credit constrained households would be improved if they can access informal credit to supplement the shortage of formal credit. Thus, informal credit can be a substitute for formal credit. Compared to formal creditors, informal

lenders offer flexible repayment schedule, shorter loan processing time, however, charge considerably higher interest rate. Informal loan is also characterised by smaller loan size and short term duration.

5.2 Implications of the Study

5.2.1 Academic Implications

Studies on credit constraints should consider both binding and non-binding constraints. The literature has shown that focusing only on binding constraint may result in underestimating credit demand and credit constraint condition of rural farm households (Boucher et al., 2009). In term of binding constraint, some studies assume households whose loan application is accepted by creditors are credit unconstrained, however, majority of the credit constrained households in our study received credit from formal financial institutions but with insufficient amount. The results suggest that credit constraints can occur even when households can access credit. With regards to non-binding constraint, it is difficult to distinguish between households with and without credit demand in the non-borrower group. The only way to detect credit constrained households in this group is to question whether they had demand for credit and if they had, why they did not apply for the loan.

The design of Direct Elicitation Method is to assure that researchers can identify all types of credit constraints discussed above. As recommended by Gilligan et al. (2005), the effectiveness of DEM is determined by the quality of the questions. However, DEM users must acknowledge that DEM is unable to detect between the effective and ineffective credit constraints. If applicable, this method should be used in parallel with other methods such as static household models to evaluate the effectiveness of credit constraints since effective and ineffective credit constraints contain different implications.

Results from the Endogenous Switching Regression model suggest studies on credit constraints and their impact may encounter selection bias. This implies that the use of household welfare indicators such as expenditure or income as explanatory variables for the household credit constraint status may results in bias estimations since there may be causal mutual relationship between the explanatory and dependent variables. Furthermore, impact evaluation models should be designed to test and solve the selection bias problem.

5.2.2 Policy implications

While the impact of subsidised credit on Vietnam rural household welfare has been confirmed by a

number of studies (see Nguyen (2008), Nghiem et al. (2012) and Phan (2012)), how preferential credit is allocated is given a paucity of attention. Studies on formal credit constraints on rural farm households identify who are more likely to benefit from the credit subsidy program. In addition, different from accessibility approach, credit constraint approach not only examines whether formal credit is accessible to rural households but also measure the extent this source of finance satisfies their demand.

Results from this study indicate that disadvantaged households (female, small size farmers, the poor) remain constrained by formal financial institutions in spite of the fact that they are the target groups of subsidised credit institutions. In other words, subsidised credit designed to support needy households may end up benefiting better-off groups as criticised by Braverman and Guasch (1986), Gonzalez-Vega (1984) and Burgess and Pande (2005). This raises the concern that preferential credit may exacerbate welfare inequality in the rural area, which is contradictory to Vietnamese government's desire. In addition, as discussed by Hoff and Stiglitz (1998) and Bose (1998), apart from creating excessive demand, cheap formal credit may lead to the increase in interest rate charged by informal lenders since some of money lenders will exit the market because the pool of borrowers left are riskier than the conventional pool. As a result, credit constrained households may suffer from the adverse effect of cheap credit since they are forced to borrow from informal lenders.

The government should be aware of and have solutions to relax credit constraints for rural farm households, otherwise, the credit subsidy policy would bring about unexpected consequences regardless the effort to improve the household's accessibility to formal credit. Further, if farm households cannot access sufficient credit, loan efficiency would be reduced. Our results recommend that it is necessary to enhance the credit allocation regime to reduce the transaction cost and provide target households with sufficient credit. It should be emphasised that high transaction cost and the mismatch between credit demand and supply stem from information asymmetry. The government can help formal financial institutions to reduce information cost by encouraging the active role of social organisations such as Women Unions, Youth Unions and Veteran Unions in bridging rural farm households with formal lenders. Another government intervention to facilitate rural credit market is to create a market for agricultural land so that households can use agricultural land as a collateral. (Hoff & Stiglitz, 1990; Meyer & Nagarajan, 2000; Seibel, 1997)

It is also important that policy makers and formal credit institutions pay more attention to develop relevant credit policy for the poor and disadvantaged households in lower poverty rate

communities to assure that they can receive sufficient loan for production and consumption. Relaxing credit constraints is essential not only to enhance household welfare but also narrow the welfare gap between the poor and non-poor households. The loan size limit set by Vietnam Bank for Social Policies may be a big obstacle for rural farm households to obtain sufficient credit. An understanding of the actual households' credit demand to adjust the credit limit or apply more flexible policy would help the banks to relax the credit constraints on rural farm households (Pham & Izumida, 2002).

Due to scarce resources, the government cannot address the credit constraint issue solely by providing credit to the targeted households. Investing in the households' education and developing non-farm activities in rural areas are other solutions to mitigate the credit constraint issue. Results from our study suggest that households with strong human capital are less likely to be dependent on credit and more favoured by creditors. In addition, human capital is also a key factor to promote rural household welfare (Nguyen, Albrecht, Vroman, & Westbrook, 2007; Van de Walle & Cratty, 2004). Similarly, non-farm activities contribute to relax credit constraints and improve rural household welfare. Ellis (2000) and De Brauw and Harigaya (2007) reveal that farm households with diversified income sources are more able to encounter adverse incidents, thus, are less reliant on credit and have higher consumption expenditure.

The substitute effect of informal credit on the household welfare supports the idea about the integration of two credit sectors into one well-functioning market as documented in Le (2011) and Phan, Gan, Nartea, and Cohen's (2013) studies. Informal lenders have been conventionally criticised for charging monopoly interest rate and trapping rural households into indebted circle, however, recent studies suggest that informal lenders can overcome the weakness of formal credit such as low transaction cost and effective credit allocation. Therefore, the government should have relevant policies to regulate and direct the informal sector to serve the rural households effectively instead of attempting to diminish its operation (Ghate, 1992; Seibel, 1997).

5.3 Limitations and Future Research

A limitation of our study arises from the use of the Direct Elicitation Method to identify credit constrained households. As discussed in the study, the method cannot detect effective and ineffective credit constrained households. Our categorisation of the households into credit constrained and unconstrained groups is based on the households' responses to the key questions whether they are satisfied with the amount of loan they received. However, we are unable to use static household models suggested by Petrick (2004b) to examine whether households are

effectively credit constrained as most of the sample borrowers in our study obtained medium and long term loan from formal creditors. Further, 38.54% of the households used loan to pay their children's tuition fees and the return of this investment is unmeasurable in the short term. Another limitation lies in the use of cross-sectional data which allows to detect credit constraints and measure their impact only in the short run. Further research is required to observe credit constraints and their impact in the long-run. Finally, the causes of credit constraints reported in our study are from the borrower's views, while the lender's view of credit constraints cannot be observed. However, it is worth noting that studies on credit constraints are rarely able to obtain lender's opinions since banks must conform to the strict regulation of keeping their clients' records confidential.

This study only examines the credit constraint status of rural farm households and the impact on their consumption. Future research can address credit constraints on rural non-farm households and urban households since the credit subsidy program also expands its coverage to urban poor areas. Future research can explore in greater details the role of social networks (family, friends and relatives) in ameliorating formal credit constraints. The influence of social networks is direct or indirect through their impact on other factors such as the households' human capital or livelihood diversification, which in turn contribute to relax credit constraints. Furthermore, resources from social networks (such as family, friends and relatives) may be the supplementary financial support for formal credit constrained households to secure their welfare.

Future studies can also take into consideration the impact of credit constraints on the household's productivity and other aspects of household welfare such as education and healthcare. Credit constraint status of rural farm households and their impact in the long run can be studied since they can offer important implications for the government policies on rural financial market in the long run. In addition, studies on credit constraints in long run are able to shed light on the inter-linkages between the determinants of credit constraints such as the relationship between education and off-farm income, social capital and education, which are difficult to capture in the short run. In this study, we only surveyed the sources and purposes of the rural farm households' credit, their borrowing behaviours such as how they recognise their need for credit, how they prioritise their activities and the first source of loan they seek for, require further investigation and analysis. This yields more insightful understanding of the rural credit market and generate more robust policies for the government to improve and develop the rural credit market.

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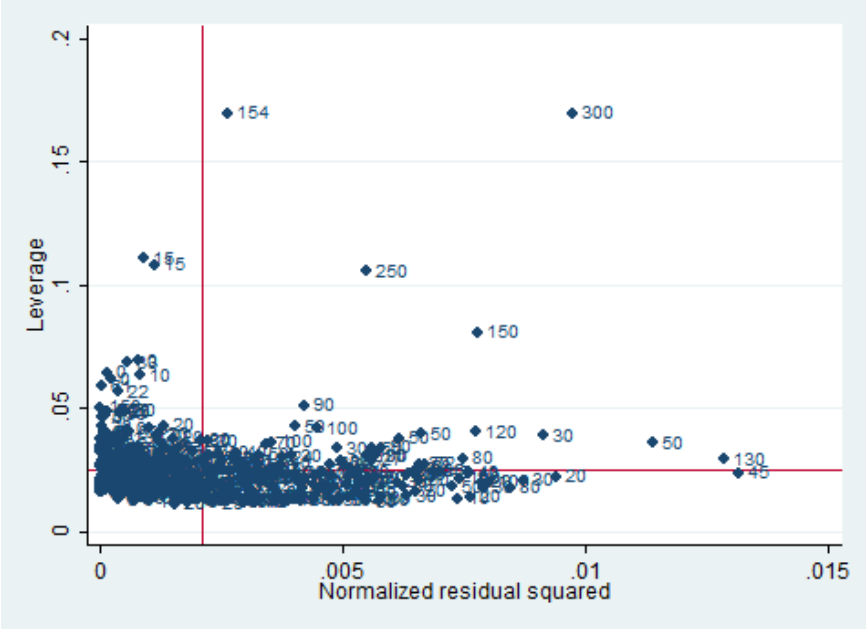
Appendix A

Appendix A-1 Leverage versus residual squared plot



Appendix A-2 Test for Multicollinearity

Variable	VIF
GENDER	1.18
AGE	1.25
EDU	1.11
DEMANDDUM	1.21
LANDSIZE	1.53
INRATIO	1.83
LARATIO	1.27
OFFFARM	1.54
POOR	1.30
VANTHANH	1.71
THACHTIEN	1.91
THUYTHANH	2.02
Mean VIF	**1.49**

All VIF values < 10 so the hypothesis of Multicollinearity is rejected

Appendix A-3 Test for Goodness of fit

Number of observations	=	477
Number of groups	=	10
Hosmer-Lemeshow chi2(8)	=	9.58
Prob > chi2	=	0.2954

Appendix A-4 Results from the first step of the Endogenous Regression switching model (Probit model)

Variable	Model with DEMANDDUM		Model without DEMANDDUM	
	Coefficient	t-ratio	Coefficient	t-ratio
GENDER	-0.434	-2.48*	-0.481	2.93**
AGE	-0.669	-3.07**	-0.567	2.87**
EDU	-0.338	1.97*	-0.267	1.71
DEMANDDUM	1.382	8.87**		
LANDSIZE	-0.087	2.37*	-0.066	2.01*
INRATIO	-0.124	2.23*	-0.125	2.46*
LARATIO	-1.132	2.68**	-1.024	2.67**
OFFFARM	-0.358	3.07**	-0.254	2.40*
POOR	0.441	2.34*	0.435	2.52*
VANTHANH	0.274	1.36	0.271	1.46
THACHTIEN	0.150	0.68	-0.039	0.19
THUYTHANH	0.531	2.25*	-0.168	0.82
Constant	1.599	2.54*	1.495	4.64**
Number of obs	477		477	
Likelihood ratio	217.12**		129.39**	
Pseudo R^2	0.3372		0.2010	
PCP	77.57		72.54	
EPCP	70.69		63.39	

*Note: ** and* denotes significance at 1% and 5% level respectively; PCP is percentage correctly predicted; EPCP is expected percent correctly predicted.*

Appendix B

Survey Questionnaire

Household Credit

Instructions: For each question with brackets provided, please tick your answer(s); otherwise, please follow the instructions given to answer the questions. Only summary measures and conclusions from this survey will be reported. Your participation is voluntary and your anonymity will be assured.

Section 1. General Information about household credit status in 2012

1.1. Did you need to borrow money from any credit sources in 2012?

a. Yes [ ]
b. No [ ]

If YES please go to the Q 1.2, NO please go to Section 3.

1.2. How much did you need to borrow in 2012? _____Million VND

1.3. How much did you actually borrow in 2012 _____Million VND

1.4. Which source(s) of credit did you apply for credit in 2012 (You can tick more than one)

Formal sources		**Informal**	
a. State owned commercial banks	[ ]	f. Non – governmental Organisation	[ ]
b. Private rural commercial banks	[ ]	g. Private money lender	[ ]
c. People Credit Fund	[ ]	h. Trade credit	[ ]
d. Bank for Social Policies	[ ]	i. Relatives/ Friends	[ ]
e. Political and Social Organisations	[ ]	k. Other (please specify _____)	[ ]

If you have **applied for a loan(s) from formal sources** in 2012

- Please go to **Q 1.5**
- **No** $\rightarrow$ Please go to **Q 1.10**

1.5. Were any of your loan applications rejected by formal creditors?

a. Yes [ ] (please specify name of the formal creditors_____)
b. No [ ]

If YES please go to the Q 1.6, NO please go to Q1.7.

1.6. If Yes, what were the reasons for rejection? (You can tick more than one)

a. Not in target group of the banks [ ]
b. Incurred previous loan [ ]
c. Lack of information [ ]
d. Lack of collateral [ ]
e. Lack of revenues [ ]

f. Inappropriate purpose [ ]
g. Business too small [ ]
h. The agricultural activity is risky [ ]
i. Lack of accountability [ ]
j. Others (please specify): _____ [ ]

Please go to Q1.9

1.7. Did the total loan amount you received meet your needs?

a. Yes [ ] b. No [ ]

If YES please go to the Section 2, NO please go to Q1.8.

1.8. What were the reasons for the inadequate loan amount you applied for?

a. For the fear of rejection, requested amount was less than needed [ ]
b. Lack of collateral [ ]
c. Lack of information [ ]
d. The amount requested exceeded limitation set by the bank [ ]
e. Currently in debt to banks [ ]
f. High interest rates [ ]
g. Others (please specify): _____ [ ]

1.9. What did you do when you didn't receive the total loan amount requested from formal creditors?

a. Borrowed from informal sources [ ]
b. Adjusted my household expenditure [ ]
c. Adjusted my business plan [ ]
d. Others (please specify): _____ [ ]

Please go to Section 2

1.10. Why didn't you apply for credit from formal sources?

a. Inadequate collateral [ ]
b. Thought application would be rejected [ ]
c. Fear of being in debt [ ]
d. Fear of losing collateral [ ]
e. Have cheaper sources of credit [ ]
f. Complicated government regulations [ ]
g. Administrative difficulties to process the application [ ]
h. Interest rate was too high [ ]
i. Ignorant of lending procedures [ ]
j. Other (please specify _____) [ ]

1.11. If you borrowed only from informal sources, did the total loan amount received meet your needs?

a. Yes [ ] b. No [ ]

If YES please go to Section 2, NO please go to Q1.12

1.12. What were reasons for the inadequate loan amount you applied for?

a. Exceed capacity of lenders [ ]
b. Lack of collateral [ ]
c. For the fear of being unable to repay, requested amount was less than needed [ ]
f. High interest rates [ ]
g. Others (please specify): _____ [ ]

Section 2. Borrowing behaviour of Household (from formal or/and informal credit sources)

In questions 2.1 to 2.10, we would like to know about the characteristics of your loans in 2012 from each source of credit. Please tick in brackets or fill in blanks corresponding to the appropriate source(s) you obtained the loan(s) from.

2.1 How much did you borrow from each sources of credit in 2012? (Million VND)

Formal _____ Million VND
Informal_____ Million VND

2.2 What were the sources of your loans for the following activities?	**Formal**	**Informal**
a. Production capital	[ ]	[ ]
b. Small investment/trade (non-farm)	[ ]	[ ]
c. Paying for children education expenses	[ ]	[ ]
d. Emergencies (i.e. medical, wedding, burial)	[ ]	[ ]
e. Housing (i.e. repair, construction)	[ ]	[ ]
f. Purchasing durable assets (TV, machine)	[ ]	[ ]
g. Payment of other loans	[ ]	[ ]
h. Others (please specify: _____)	[ ]	[ ]

2.3 What is the average interest rate per month charged by each sources of credit in 2012?

Formal _____%
Informal_____ %

2.4 What was the loan payment schedule for the largest loan in 2012?

	Weekly	Monthly	Semi - annually	Annually	Others
Formal					
Informal					

2.5 For the largest loan, what was the loan duration?

Formal _____ Months
Informal_____ Months

2.6 What kinds of collateral did you use to obtain the loans?

	Land certificate	Asset	Housing	Equipment Capital	Others
Formal					
Informal					

2.7 What is the status of your loan(s) in 2011-2012?

	Fully paid	Current outstanding	Past due	Restructured	Others
Formal					
Informal					

2.8 How long did it take to process your loan for the credit providers you applied?

	Within a day	Less than a week	1 week – less than 2 weeks	2 week – less than 3 weeks	3 week – 1 month	More than a month
Formal						
Informal						

2.9 Were there any charge(s) on the formal loan(s)?

a. Yes [ ] b. No [ ]

If Yes please go to Q 2.10, No please go to Q 2.11

2.10 If yes, what were these charges? (You can tick more than one)

a. Administrative or service fee [ ]
b. Insurance fee [ ]
c. Guarantee fee [ ]
d. Others, please specify_____

2.11 Did you receive any assistance (eg. from government, credit officials, business associations, acquaintances, etc.) in obtaining the loan?

a. Yes [ ] b. No [ ]

2.12 What were the difficulties, if any, you faced when borrowing from formal lender(s)?

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. Late provision of loan [ ]
g. Inconsistence credit rules, laws, regulations [ ]
h. Others (please specify): _____ [ ]
i. No difficulty [ ]

2.13 Why did you obtain loan from informal creditors?

a. Inadequate loans from formal credit [ ]
b. Fast loan processing [ ]
c. Flexible in term of payment schedule [ ]
d. Lower interest rate [ ]
e. No collateral requirement [ ]
f. Others (please specify): _____ [ ]

Section 3. Opinions on credit constraints and impact of credit constraints

Below is a series of statements pertaining to your opinions towards impact of credit constraints. Please CIRCLE how strongly you disagree or agree with each of the following statements on a scale of 1 to 7. **1-you strongly disagree (SD), 7-you strongly agree (SA).**

	SD			Neutral			SA
3.1. If I faced credit constraint, I would use less input than is required	1	2	3	4	5	6	7
3.2. If I faced credit constraint, I would downsize my cultivation area	1	2	3	4	5	6	7
3.3. If I faced credit constraint, I would not be able to provide a strong education for my children	1	2	3	4	5	6	7
3.4. If I faced credit constraint, I would not be able to provide adequate health care for family's members	1	2	3	4	5	6	7
3.5. If I faced credit constraint, I would have to sell my asset to meet consumption demand	1	2	3	4	5	6	7
3.6. If I faced credit constraint, I would have to borrow from informal lenders at high interest rate	1	2	3	4	5	6	7

3.7. If I could get adequate credit I would

a. Leave agriculture and start a non-farm business
b. Remain in agriculture and expand agricultural production
c. Remain in agriculture and start a non-farm business
d. Other (please specify) _____

3.8. If I could get adequate credit I could improve (You can tick more than one)

a. My children's education
b. My family's health
c. My household consumption
d. Other (please specify) _____

3.9. What is the maximum interest rate acceptable to you when you need a loan?

_____ (%) per month

3.10. What is the optimal loan duration acceptable to you when you need a loan?

a. 6 months [ ]
b. 1 year [ ]
c. 2 years [ ]
d. 3 years [ ]
e. 5 years or above [ ]

3.11. What is the optimal repayment period acceptable to you when you need a loan?

a. 6 months [ ]
b. 1 year [ ]

c. Lump-sum repayment at maturity [ ]

3.12. What are you willing to provide as collateral? (You can tick more than one)

a. Consumer durables [ ]
b. Certificate of land use right [ ]
c. Livestock [ ]
d. Certificate of deposit [ ]
e. House [ ]
f. Other(s) please specify_____

3.13. Do you have intention to borrow in the future?

a. Yes [ ] b. No [ ]

3.14. The following factors may be important in **choosing creditors**, please circle the suitable number from 1 to 5 where 1 indicates "strongly disagree" and 5 indicates "strongly agree"

	Strongly disagree		**Neutral**		**Strongly agree**
a. No collateral required	1	2	3	4	5
b. Lower interest-rate	1	2	3	4	5
c. Immediate loan release/faster processing	1	2	3	4	5
d. Having borrowing relationship with the creditor	1	2	3	4	5
e. No/less complicated lending procedure	1	2	3	4	5
f. Better lending terms	1	2	3	4	5
g. Others, please specify ……	1	2	3	4	5

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

Formal sources		**Informal**	
a. State owned commercial banks	[ ]	f. Non – governmental Organisation	[ ]
b. Private rural commercial banks	[ ]	g. Private money lender	[ ]
c. People Credit Fund	[ ]	h. Trade credit	[ ]
d. Bank for Social Policies	[ ]	k. Relatives/ Friends	[ ]
e. Political and Social Organisations	[ ]	l. Other (please specify _____)	[ ]

Below is a series of statements pertaining your perceptions towards formal financial institutions. Please CIRCLE how strongly you disagree or agree with each of the following statements on a scale of 1 to 7. 1-you strongly disagree (SD), 7-you strongly agree (SA).

	SD			**Neutral**			**SA**
3.16. Formal financial institutions control loans not to be used for other purposes than those stated in the loan contract	1	2	3	4	5	6	7
3.17. The loan size from formal financial institutions does not satisfy farmers needs	1	2	3	4	5	6	7

3.18. Female headed household borrowers are rejected by formal financial institutions	1	2	3	4	5	6	7
3.19. The interest rates charged by formal financial institutions are competitive	1	2	3	4	5	6	7
3.20. Formal lenders are too strict; they are not as flexible as informal ones	1	2	3	4	5	6	7
3.21. Formal lenders do not offer refinancing	1	2	3	4	5	6	7
3.22. Formal lenders should simplify loan procedure	1	2	3	4	5	6	7
3.23. Formal lenders should be more flexible for urgent loans	1	2	3	4	5	6	7

Section 4. Household's Demographics and Economic Activities

4.1. Are you the household head?

a. Yes [ ] b. No [ ]

4.2. What is your gender?

a. Male [ ] b. Female [ ]

4.3. Which age group do you belong to?

a. Below 25 [ ]
b. 25-35 [ ]
c. 36-45 [ ]
d. 46-55 [ ]
e. 56-65 [ ]
f. Above 65 [ ]

4.4. What is your marital status?

a. Single/Never Married? [ ]
b. Married [ ]
c. De factor relationship [ ]
d. Divorced/separated [ ]
e. Widow [ ]

4.5. How many children do you have? _____

4.6. What is your highest level of education?

a. No education [ ]
b. Primary school [ ]
c. Middle school [ ]
d. High school [ ]
e. Vocational training [ ]
f. College [ ]
g. Other(s) please specify_____

4.7. Was your household certified as the poor by the local authority in the following year?

a. Yes [ ] Year 2011 Year 2012 (please circle the year)

b. No [ ]

4.8. Which union(s), if any, did you belong to in 2011-2012? (You can tick more than one)

a. Farmer Union [ ]
b. Woman Union [ ]
c. Veteran Union [ ]
d. Youth Union [ ]
e. None of them [ ]

4.9. Were you a member of People Credit Fund in 2011-2012?

a. Yes [ ] b. No [ ]

4.10. What is your main occupation?

a. Crop farmer [ ]
b. Livestock and poultry raiser [ ]
c. Fisher folk [ ]
d. Trader [ ]
e. Governmental - sector worker [ ]
f. Private sector worker [ ]
g. Other (please specify_____)

4.11. The number of people living in your household (please state):_____persons

4.12. The number of income earners in your household (please state):_____persons

4.13. Do you have any child/children studying at tertiary schools?

a. Yes [ ]
b. No [ ]

4.14. The number of people having off-farm income in your household (please state):_____persons

4.15. What is the status of your land ownership?

a. Owned my land [ ]
b. Leased land [ ]
c. I do not own or lease any land [ ] Please go to **Q4.17**
d. Other(s) please specify_____

4.16. What is size of your household farm land?_____ha

4.17. In 2012, did you receive any support from (You can tick more than one)

a. Government [ ]
b. Cooperative [ ]
c. Non-governmental Organisation(s) [ ]
d. Political and Social Organisation(s) [ ]
e. None of them [ ]

4.18. What is the main source of your household income?

a. Farming/cropping [ ]
b. Livestock [ ]
c. Fishery [ ]
d. Farm labourer [ ]
e. Non-farm labourer [ ]
f. Family business [ ]
g. Other(s) please specify [ ]

4.19. What was your household total annual income for the year 2012

Sources of income	Amount (VND)
a. Farm	
b. Non - farm	

4.20. Did your household have any subsidiary income in the past 12 months?

a. Yes [ ] please specify: _____ VND b. No [ ]

If YES please go to Q4.21. If NO please go to Q4.22

4.21. What were sources of subsidiary household income? (You can tick more than one)

a. Relief payment from government [ ]
b. Domestic remittances [ ]
c. Overseas remittances [ ]
d. Others_____

4.22. Do you have savings?

a. Yes [ ] b. No [ ]

If YES please go to Q4.23. If NO please go to Q4.24

4.23. What are your total savings in 2012? [ ]

a. Less than VND 1 million [ ]
b. VND 1 million to VND 5 million [ ]
c. More than VND 5 million to VND 10 million [ ]
d. More than VND 10 million to VND 15 million [ ]
e. More than VND 15 million to VND 20 million [ ]
f. More than VND 20 million [ ]

4.24. Do you have deposit at any banks?

a. Yes [ ] please specify name of the banks: _____
b. No [ ]

4.25. What was your household annual consumption expenditure for the year 2012?

_____Million VND

4.26. What was your household annual farming expenditure for the year 2012?

Expenditure	Amount (VND)/Year
a. Land rental	
b. Input for farming	
c. Feed expenditure for livestock	
d. Other	
Total	

4.27. Were there any adverse incidents (hospitalization, wedding, burial…) that affected your income or expenditure?

a. Yes (please specify) _____[ ]
b. No [ ]

4.28. How long does it take you from your house to the nearest bank?

_____minutes

Your participation in this survey is greatly appreciated. Thank you for your time and if you have further comments about credit card, please feel free to comment in the space provided below. Once again, we assure you that your identity will remain ***STRICTLY CONFIDENTIAL.***