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Factors affecting credit accessibility of farm households in rural areas of Vietnam: A case study in Haiphong city

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Abstract

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Abstract

The role of agriculture sector in the economic development in general as well as in rural development in particular is undeniable, especially in transforming/developing and agriculture-based economies. Agriculture is source of food security, increasing national income, export earnings and poverty reduction. Vietnam is known as an emerging country with more than 70% population residing in rural areas, in which employment in agricultural production make up around 50%. The main production unit of Vietnam agricultural sector is household which accounts for approximately 98% among three types of production unit, i.e. enterprise, cooperative and household. In reality, there are about 54% of rural households whose main income sources come from agriculture-related activities. Despite the important role of agricultural production, households' access to credit in Vietnam remains a confounding problems because of the nature of agricultural credit markets strictly correlating with typical characteristics of small-scale and traditional agricultural production. Formal lenders are hesitant to lend to agricultural sector due to its production-related risks. The agricultural loans offered by formal credit institutions are limited in terms of quantity and size. It is the fact that leads to the prevalence of informal credit sources in agricultural production, especially in rural regions.

The two main focusing topics of the thesis are analyzing the use of credit of households in Haiphong city and then determining the factors affecting their credit access. Among the sample size of 180 surveyed households, the number of households using both formal and informal credit stays highest and followed by those borrowing from informal credit only. The number of informal-only borrowers is even higher than formal-only borrowers. This description actually enhances the dominant role of informal credit markets in agricultural production. It is risks in agricultural production and high urbanization that make a ageing crisis in farming and agriculture. The most common age group of farming household heads is 43 to 56, accounting for about 58%. Younger people increasingly choose city life or city jobs rather than farm jobs. Male and female in a family have the same role in deciding to borrow loans. The results of the study state that larger-scale-production households demand more credit from both formal and informal credit markets. Similarly, households whose main income from agricultural activities also borrow large loan amounts to expand production and then increase their income. Meanwhile those with main income from non-farm jobs are not going to increase farm income, so they just want to borrow a small credit amount to pay off current expenditures rather than expand production. It is surprising that in the study site, households' risk

aversion on borrowings is also affected by location. In other words, people in some regions find borrowing for agricultural production risky so they do not borrow large amounts to invest in agriculture. They increase their income by non-farm jobs.

Survey households give many reasons for choosing formal or informal credit sources or both. In addition, their choice of formal lenders or informal lenders are much different. Basically, these choices depend on amounts borrowers demand, interest rate offered, loan term, loan application costs or sometimes just the popularization of the lenders at their location. Households who demand large formal amounts prefer VBARD (Vietnam Bank for Agriculture and Rural Development) or PCFs (People' Credit Funds) meanwhile those approaching VPSB (Vietnam Bank for Social Policies) often need smaller amounts. The maximum amount VPSB offers is just 50 million VND meanwhile VBARD and PCF can offer much larger amounts based on collateral value. The average interest rate of PCFs is highest and it is followed by VBARD and VBSP with lowest ones. The branch networks of VBARD and PCFs are much more popular than PCFs. PCFs mainly offer loans to local people in the communes they are located.

The study points out external and internal factors that have effects on households' credit accessibility. In terms of external factors, rural credit markets, systemic risk in agricultural production, urbanization and lenders' behavior are reveal. Among those, rural credit markets with imperfect information problems and systemic uncontrolled risk in production are most common in Vietnam as well as other developing countries. Urbanization may be characterized in highly urbanized areas. In addition the external factors, internal factors that are households' socio-economic characteristics also have impacts on households' credit market participation, received amounts as well as level of credit rationing, such as: age, land area with certificate, farming land, dependency ratio, social networks, total and agricultural income or total people in a family.

In order to increase households' formal credit accessibility and reduce their dependence on informal credit, some policies from both central and local government should be taken into account in terms of production collaboration: (1) local government should support the development of cooperatives by management training, technology, funding and exploring stable consumption markets; (2) central government is also responsible for cooperating with local government in encouraging production collaboration through ensuring appropriateness of and high synchronization between policies in order to boost integration in agricultural sector; (3) both central and local government should have proper policies and incentives to enhance households' awareness of the adoption of production collaboration in agriculture.

Keywords: credit access, credit accessibility, credit constraints, agricultural production, farm households, developing countries, Vietnam

Résumé

TA Nhat Linh (2022). Facteurs affectant l'accès au crédit des ménages agricoles dans les zones rurales du Vietnam : une étude de cas dans la ville de Hai Phong. (Thèse de doctorat en anglais). 184p., 55 tabl., 59 fig, 19 boîtes.

Résumé

Le rôle du secteur agricole pour le développement économique en général et le développement des zones rurales en particulier est indéniable, en particulier pour les pays agricoles ou en développement. L'agriculture contribue à assurer la sécurité alimentaire, à augmenter le revenu national, à accroître les recettes d'exportation et à réduire la pauvreté. Le Vietnam est connu comme l'une des économies en développement avec plus de 70% de la population vivant dans les zones rurales, dont jusqu'à 50% sont engagés dans la production agricole. La principale unité de production des zones rurales au Vietnam est le ménage, le nombre d'unités étant des ménages représente 98% des trois types d'unités de production. Ces trois types comprennent : les ménages, les entreprises et les coopératives. En fait, jusqu'à 54% des ménages ruraux tirent leur principale source de revenus de la production agricole. Malgré un rôle aussi important dans la production agricole, l'accès des ménages au crédit pour la production agricole au Vietnam reste difficile car la nature du marché du crédit agricole est étroitement liée aux caractéristiques de la production traditionnelle et à petite échelle. Les institutions financières officielles ont souvent peur de prêter au secteur agricole en raison des risques liés à la production agricole. Les prêts agricoles accordés par ces institutions sont souvent limités en matière de nombre de prêts et de taille des prêts. Ce fait a conduit à la popularité du crédit informel dans la production agricole, en particulier dans les zones rurales.

Les deux thèmes principaux de la thèse consistent à analyser l'utilisation du crédit par les ménages de la ville de Hai Phong et à déterminer les facteurs affectant l'accès au crédit des ménages. Parmi les 180 ménages sélectionnés pour l'étude, le nombre de ménages utilisant à la fois le crédit formel et informel représente la proportion la plus élevée, et est suivi par la proportion de ménages empruntant auprès de sources de crédit informel. Le nombre de ménages empruntant uniquement à des sources informelles est supérieur au nombre de ménages empruntant à des sources formelles. Ce chiffre confirme vraiment le rôle important du crédit informel dans la production agricole. Ce sont les aléas de la production agricole et la forte urbanisation qui ont provoqué la crise de l'âge dans le domaine de la production agricole. Le groupe d'âge le plus courant des chefs de ménages agricoles est de 43 à 56 ans, représentant environ 58 %. Les jeunes choisissent de plus en plus de vivre en ville ou de travailler en ville plutôt que dans l'agriculture. Les hommes ou les femmes chefs de ménage ont le même rôle dans la décision de prêt. Les résultats de l'étude indiquent que les ménages ayant une production à grande échelle ont tendance à avoir un plus grand besoin de crédit auprès de sources formelles et informelles. De même, les ménages

dont le revenu principal provient d'activités agricoles souhaitent également emprunter de grosses sommes d'argent pour accroître leur production et augmenter leurs revenus. Alors que les ménages dont le revenu principal ne provient pas de l'agriculture n'ont souvent pas besoin d'augmenter leurs revenus issus de l'agriculture à l'avenir, ils ne souhaitent donc emprunter qu'une petite somme d'argent pour payer leurs dépenses de production actuelles plutôt que d'augmenter la production. Fait intéressant, dans la zone d'étude, l'aversion au risque des ménages est influencée par l'endroit où ils vivent. En d'autres termes, certains ménages dans certaines régions trouvent la production agricole trop risquée, ils ne veulent donc pas emprunter de grosses sommes d'argent pour investir dans la production agricole. Ils augmenteront leurs revenus en recherchant des emplois non agricoles.

Les ménages sélectionnés pour l'entretien seront interrogés sur les raisons pour lesquelles ils choisissent d'emprunter un crédit formel ou informel ou les deux. De plus, le choix des institutions de crédit formel et des prêteurs informels est également très différent. Fondamentalement, leur choix dépend du montant qu'ils veulent emprunter, du taux d'intérêt, de la durée du prêt, du coût du prêt ou simplement de la popularité de ce type de prêt là où ils habitent. Les ménages qui souhaitent emprunter de grosses sommes d'argent préfèrent souvent emprunter à la VBARD (Banque de l'Agriculture et du développement rural) ou aux PCFs (Caisse populaire de crédit), tandis que ceux qui empruntent à l'association VBSP (Banque vietnamienne pour les politiques sociales) ne veulent généralement qu'emprunter une petite quantité. Le montant maximum que VBSP peut prêter est de 50 millions de dongs, tandis que VBARD et PCF peuvent prêter un montant plus élevé en fonction de la valeur de la garantie. Le taux d'intérêt moyen des PCFs est le plus élevé, suivi de la VBARD et de la VBSP étant le plus bas. Le réseau de succursales des VBARD et des PCFs est beaucoup plus répandu que celui des VBSP. Les PCFs prêtent principalement aux habitants de la zone où se trouve PCF.

Cette étude analyse les facteurs internes et externes affectant la capacité du ménage à accéder au crédit. Les facteurs externes comprennent : les marchés du crédit rural, les risques systémiques dans la production agricole, l'urbanisation et le comportement des prêteurs. Parmi ces facteurs, le marché du crédit rural avec un problème d'information asymétrique et un risque systématique dans la production agricole sont deux facteurs communs au Vietnam ainsi que dans d'autres pays en développement. L'urbanisation est fréquente dans les zones à taux d'urbanisation élevés. En plus des facteurs externes, les facteurs internes sont les caractéristiques socio-économiques du ménage, ces facteurs affectent la décision du ménage de participer au marché, le montant d'argent que le ménage peut emprunter, et le montant d'argent que le ménage peut emprunter ainsi que le niveau des restrictions de crédit. Ces facteurs comprennent : l'âge, l'éducation, la superficie avec livre rouge, la superficie des terres agricoles, le taux de dépendance, le réseau social, les revenus de l'agriculture, le revenu total et le nombre total de personnes dans le ménage.

Pour accroître l'accès des ménages au crédit formel et réduire leur dépendance au crédit informel, plusieurs politiques sont envisagées par le gouvernement central et les autorités locales: (1) les autorités locales doivent prendre des mesures pour soutenir le développement des coopératives agricoles, notamment : le soutien à la formation à la gestion, la technique, le capital et l'orientation pour développer les marchés de consommation des produits; (2) Le gouvernement central doit également prendre des mesures de coordination avec les autorités locales pour développer le modèle de liaison de production en s'assurant de l'exactitude et de l'adéquation des politiques pertinentes; (3) le gouvernement central et les autorités locales doivent prendre des mesures pour sensibiliser les agriculteurs aux avantages de participer à des modèles de liaison de production.

Mots-clés : accès au crédit, accessibilité au crédit, limite de crédit, production agricole, ménages agricoles, pays en développement, Vietnam

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List of Abbreviations

ADB	Asian development bank
CGAP	Consultative group to assist the poor
CSG	Credit and saving group
FGD	Focus group discussion
GDP	Gross domestic product
GSO	General statistics office
GO	Gross output
HHa	Households
MFI	Micro-finance institution
MARD	Ministry of agriculture and rural development
NGOs	Non-governmental organization(s)
OECD	Organization for economic co-operation and development
OLS	Ordinary least-squares
PCF	People's credit fund
SBV	State-owned bank
VBARD	Vietnam bank for agriculture and rural development
VBSP	Vietnam bank for social policies
VND	Vietnam currency

1

INTRODUCTION

1.1. Background and rationale of the study

Agriculture has been considered as one of the most economic sectors of many economies, especially, in developing countries. The agriculture sector is vital to not only internal food security, but also employment growth as well as poverty reduction. Agriculture which is now defined by the presence of both rural and urban areas widely mainly known as the root of rural development, contributing to total economic development and poverty reduction. Some channels through which agriculture could affect economic development and poverty reduction are: food security, increased income of households via domestic and international trade, provision of public goods (health, education...)(Conway 2004). These roles of agriculture even become more prevalent in developing nations whose agricultural sector constitutes a big proportion of GDP value as well as a vast number of labor force.

Vietnam as well as other Southeast Asia developing countries have undergone a dramatically economic transformation over the past five decades. Vietnam is well-known as a developing country that has made significant development progress since the launch of its economic reform in 1986 (known as "Doi Moi"), shifting from a centrally-planned to a market economy. It is the significant economic growth that has transformed the nation from status of poor to middle-income according to World Bank's report. The journey of Vietnam becoming one of the most dynamic emerging countries in the East Asia region has witnessed a big leap of more than 45 million people lifted out of poverty from 2002 to 2018, of which poverty rates significantly decrease from 70% to less than 6%. These changes are remarkably contributed by agricultural sector. Vietnam which was a food-insecure nation in the past now has transformed to one of the world's leading exporter in food commodities (FAO 2018). Almost 40% of total land areas of Vietnam is used for agricultural production and 43% of population are engaged in agricultural sector, making the sector the major employer compared to service and industry sector (GSO, 2019).

GDP of Vietnam in 2019 achieved impressive results with growth rate of 7.02%, in which the agricultural sector just contributed 13.96% compared to 34.49% of the industrial sector and 41.64% of the services sector (GSO 2019). In reality, Vietnam GDP share of agriculture has been decreasing in recent years meanwhile GDP value of agricultural sector gradually increases year by year. However there is a large percentage of population living in rural areas, accounting for nearly 70% of total and 47.9% of total rural households have main income from agricultural activities (GSO, 2019).

Although agricultural production and agriculture-related activities are main source of rural people's income, small-scale production is still common. Households with small production are fundamental production units, accounting for about more than 99% (GSO, 2016). Therefore, access to credit for smallholders is a primary ingredient in the development process. In other words, capital constraints are one of

obstacles for farmers to enlarge their production scale. On the other hand, in some cases, it is risk aversion in agricultural production that make them reluctant to take part in credit markets though they meet lenders' requirements.

In practice, agricultural and rural credit access for commercial agriculture (two main types of agriculture: commercial and subsistence) in Vietnam still remains limited in terms of quantity and quality. This credit restriction is attributed to the nature of credit markets and lending procedure (Khoi et al. 2013). The credit markets in Vietnam are quite segmented, in which formal and informal markets are observed to commonly exist in rural Vietnam (ADB 2010, Bao Duong and Izumida 2002). In practice, informal credit markets in some rural areas seem to be dominant because of the limitation of the formal markets. Farming households are likely to be credit constrained from formal credit because of insufficient collateral value or income for debt repayment. Farmers often have lower values of collateralized fixed assets and banks rarely make use of these lower collateral requirements. Recently, there are many governmental policies targeting on agricultural and rural credit policies via interest rate caps or interest subsidized programs.

Hai phong now is the second largest city in the north of Vietnam, which is also known as one of five municipalities of Vietnam and administratively on the same level as a province. Despite the status as a big city, Haiphong has a high proportion of their population living in the rural areas, accounting for more than 50% of the total. Moreover, 53.03% of total land area is dedicated to agricultural production (HaiphongSO 2019). On the other hand, around 20% of total work force are employed in agricultural sector (HaiphongSO, 2019), which implies the important role of agriculture in rising income and enhancing farmers' livelihood.

The number of studies aiming at the importance of rural credit in some provinces in Vietnam has significantly gone up in recent years. However, there have been few research conducted in rural areas of big cities such as Haiphong city which has typical characteristics and where almost all rural districts are highly urbanized. Thus, interesting results of the studies will emerge. The research entitled 'Factors affecting credit accessibility of farming households in rural areas of Vietnam: A case study in Hai phong city' will contribute to the gaps of previous literature in this field.

1.2. Research objectives

The overall goal of the study is to investigate determinants of access to credit of farming households in rural areas of Vietnam with the case in Haiphong city. Consequently, the thesis will provide some policy implications for improving households' credit accessibility. Specific objectives are highlighted as following:

(1) to evaluate the current status of credit accessibility by farming households in Haiphong city. This objective is considered by two sub-objectives:

- ✓ to identify the credit sources available for agricultural activities at farming households

- ✓ to analyze households' credit uses for agricultural production

(2) to point out the determinants of farming households' access to credit, including factors affecting households' credit market participation and approved loan amounts by credit suppliers as well as the level of credit rationing.

(3) to assess the impacts of credit access on households' income

(4) to figure out some policy implications for improving credit accessibility of farming households in Haiphong city.

1.3. Research question

In order to obtain the research objectives, some corresponding research questions are considered as follow:

- What is the current credit situation of farm households?
- Which factors affect farm households' credit accessibility?
- How does credit access affect households' income?

1.4. Research hypothesis

Based on Vietnam credit market context and the current circumstance of household credit access in agricultural production at the study site, the following hypotheses are tested in this research:

- Each household has their own ways to finance their agricultural production and has different credit demand.
- Credit accessibility may vary among households
- Household credit accessibility in agricultural production is affected by socio-economic characteristics of each household and other external factors.

1.5. Scope of the study

Agricultural sector contributes to the economy through agricultural production and value-added processing, i.e. crop and animal production and processing, forestry sector, textile goods as well as agriculture supporting industries. Within the scope of the study, this thesis focuses on agricultural production which is one of the basic subsectors of agriculture sector.

There are many primary actors in agricultural production process, including input suppliers, primary producers as farm households, big manufacturers, wholesalers and processors (agents or traders), and retailers. However, the study takes only farm households into account. In rural areas of a developing nation like Vietnam, although household actors still dominate in agricultural production, they often face with the shortage of capital.

There are three type of credit markets in Vietnam, i.e. formal, semi-formal and

informal markets. However semi-formal ones make up a very small proportion in the total, including microfinance, NGOs or government-supported lending programs that are aimed at particular sections of the population/customers. So in this research, semi-formal markets are excluded.

1.6. Structure of the thesis

The thesis consists of 8 chapters of which introduction chapter and the 7 chapters indicating the detailed content of the research. Chapter 1- introduction provides the research background and rationale of the study. This sub-section clarify the overall context of the agricultural sector in Vietnam and Haiphong city as well as some previous studies on credit market, which supported for the rationale why this research topic is considered. Based on the research objectives, research questions, hypotheses are released. The scope of the study and structure of the thesis are as follows.

Chapter 2 concentrates on reviewing relevant typical findings from previous literature, including four main contents. First one is overview information on agricultural sector of the economy. The next parts focus on agricultural and rural credit, including concepts and some theories of credit markets and followed by the issue of credit accessibility. In the last section of of the chapter, literature on factors affecting rural credit accessibility is also indicated.

Chapter 3 provides an overview of agricultural sector and agricultural credit markets in Vietnam, in which detailed characteristics and related information of Vietnam agricultural sector and rural credit are stated. Policy for agricultural and rural credit in Vietnam is as follows. Summary of the development process of Vietnam agricultural credit markets are presented at the end of the chapter.

In chapter 4, the socio-economic characters of the research site- Haiphong city are specified. On the other hand, the chapter contains research methodology section, which is applied to evaluate determinants of rural credit access.

Chapter 5 describes the features of surveyed farming households and current credit situation and credit accessibility for agricultural production at household level.

In chapter 6, factors affecting household credit accessibility in agricultural production are analyzed by using econometric models, including internal and external factors.

As follows, chapter 7 provides results on the income impacts of credit uptake of farm households. Based on that, the chapter also describes household strategies for credit access facilities for agricultural production.

Finally, conclusion and policy implications are indicated in Chapter 8.

2

Literature Review

This chapter includes four sections, i.e. the agricultural sector of the economy, agricultural and rural credit, the issue of credit accessibly by farm households and determinants of rural credit accessibility. The first one describes the importance and characteristics of agricultural sector in an economy. The second section 'agricultural and rural credit', which includes three sub sections, presents information on the concept of agricultural and rural credit which help to differentiate some related definitions, theories of credit markets as well as some approaches to agricultural credit markets. The next part focuses on the issue of credit accessibility by farming households that is the main concept of the thesis. In this part, the definitions of credit accessibility, credit constraints and credit rationing as well as socio-economic impacts of credit access are stated. The fourth section is determinants of rural credit accessibility in which internal and external factors are reviewed from previous literature. Internal factors are socio-economic characteristics of households while external factors that households may hardly control. Some aspects of the content of this chapter are presented in the paper named "Access to rural credit markets in developing countries, the case of Vietnam: A literature review" that is published in Sustainability, Issue 11(5), 2019, 1468.

2.1. Importance and characteristics of the agricultural sector in the economy

Agriculture broadly comprises animal and plant farming, in which animal farming is animal husbandry while farming plants is agronomy, horticulture and forestry in part. According to World Bank's statistical data, agriculture plays an important role in economic growth, which make up 4% of global gross domestic product and even more than 25% of GDP in some developing countries (WorldBank 2020). Agricultural development can be regarded as the most powerful tools to reduce poverty, boost prosperity and insure food security as well as increase national income. In the research of World Bank (2020), growth in the agriculture sector is twice to four times as effective in raising incomes among the poorest as other sectors, helping them expand production and increase welfare.

Therefore, 'agriculture has features that make it a unique instrument for development' (WorldBank 2007). In other words, though the size of non-agricultural sector rises relative to that of agricultural sector, agriculture continues to be a fundamental instrument for sustainable development and poverty alleviation. Agriculture operates in three different worlds, i.e. agriculture-based nations, transforming/developing nations and urbanized/developed nations with specific characteristics as follows.

Agriculture contributes to economic development in some aspects, i.e. an economic activity, as a livelihood and as provider of environmental service (World Bank, 2007).

In addition to industry and service sector, agricultural sector have significant contributions to GDP growth rate of a national economy, providing investment opportunities and acting as a prime driver of agriculture-related and even non-farm industries, such as providing input/raw materials for industry manufacturing. In developing countries or transforming economies, agricultural sector often averagely accounts for 29% of GDP and employs about 65% of the labor force. The numbers are much higher for least-developed ones. The value generated by the value chains of industries and services linked to agriculture makes up 30% of GDP in transforming and urbanized economies. Agricultural production is the fundamentally important provider of food as a most essential good for human subsistence and food security. This characteristic makes agricultural production an inherent part of each society's culture and policies. Agriculture is a source of livelihood for a vast majority of rural inhabitants by creating jobs and increasing income and social welfare. World Bank (2007) reported that there is 86% of world population living in rural areas, of which 83% of those people were engaged in agriculture.

Agriculture can be regarded as a producer of externalities and public goods (Switzerland 2000), such as natural resource protection, rural landscape, recreation areas or environmental services. It is undeniable that agriculture contributes to the viability of societal goals of rural landscape, rural development, cultural preservation, managing watersheds or preserving biodiversity. However, agricultural development progress has created much bad environmental outcomes. The radical transformation of production methods from extensive to intensive agriculture due to increasing world population number as well as the depletion of agricultural land has led to agrochemical pollution of water and soil.

Diversification of agriculture in economic development

The ways agriculture contributes to the development and poverty reduction of one economy rely on the extent of dependence on agriculture as a source of growth it is exposed to (World Bank, 2007). According to World Bank's report, the types of countries classified based on agriculture's role and workforce include: agriculture-based, transforming and urbanized (WorldBank 2014, WorldBank 2007). Agricultural-based countries are where agriculture employs more than 50% of the workforce and GDP share of agricultural sector accounts for more than 25%. In these nations, the main roles of agriculture are decreasing mass poverty and food insecurity. The success of using agriculture as a tool for economic growth requires a productivity evolution in small-scale farming. Transforming countries including pre-transition and transition ones where agricultural GDP value contributes less than 25% reveal the role of agriculture in terms of both sustainable agricultural production and continuing to reduce rural poverty. The division of commercial agriculture is likely to be more prevalent than subsistence agriculture. Therefore, pursuing sustainable agriculture as well as addressing poverty may require a comprehensive approach, of which shifting toward high-value agricultural production is the most dominant pathway. Urbanized and developed countries where

agricultural value added contributes less than 25% and 10% of GDP, respectively, have been in a state of rapid changes in agriculture. These changes include the adoption of substantial technological advances, reflecting high level of economic development. In addition to reducing poverty and employment creation, the role of agriculture in providing environmental services is emphasized.

2.2. Agricultural and rural credit

2.2.1. The concept and the role of agricultural and rural credit

The concept of agricultural and rural credit

There are overlaps in the three terms 'agricultural credit', 'rural credit' and 'micro-credit' in financial sectors. The overlaps have been indicated in the report of CGAP and World Bank in a broader way, i.e. micro-finance, rural finance and agricultural finance as in figure 2.1. The financial markets refer to all financial services provided by suppliers for all types of demander in both rural and urban areas, including credit, savings, insurance, remittances and money transfers. The suppliers constitute all kinds of formal, informal and semi-formal entities, such as banks, non-banks, NGOs and micro-finance institutions (MFI).

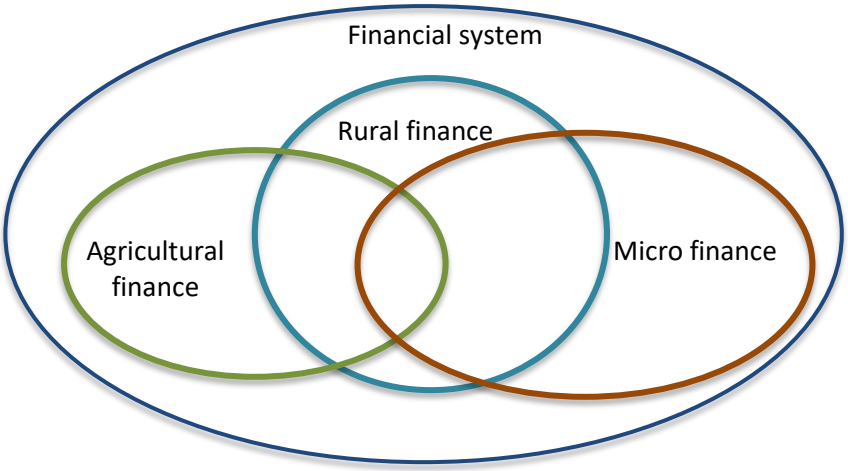


Figure 2.1. The relationship between financial sectors
Source: Adopted from World Bank (Meyer 2011)

MFI refers to financial services for poor and low-income people and small-scale business in both rural and urban areas. MFI engages in both agricultural and non-agricultural sector. Agricultural finance refers to all financial services in agricultural sector, including farming and farm-related activities. Most of agriculture-related activities are conducted in rural areas. Households with high income or low income, small-scale or large-scale firms can use agricultural financial services. Therefore, rural finance is the provision of financial services used by farm and non-farm

households or firms in rural area at all income levels. Accordingly, many non-farm enterprises are directly related to agriculture, such as input supply or processing firms but many others are not related. They all use credit offered by financial institutions in rural areas. In other words, the strong overlaps among three concepts: rural finance, agricultural finance and micro finance reveals the diversification of the financial markets.

Therefore, agricultural credit which is one category of agricultural finance can be defined as credit services in agricultural sector. Similarly, rural credit refers to credit services in rural areas. In this study, the author focuses on credit for agricultural production in rural areas.

The role of agricultural credit

The emergence of financial markets and institutions is attributed to the advantages of the costs of obtaining information and making transactions. Therefore, in one ADB's report by (Meyer and Nagarajan 2000), the fundamental role of the financial system is mentioned as facilitating the resource allocation on the basis of space and time in an uncertain circumstances. Accordingly, the role is performed by five basic functions: 'reducing risks, allocating resources, monitoring managers and exerting corporate control, mobilizing savings and facilitating the exchange of goods and services'. These functions contribute to the economic growth via two channels/approaches: capital accumulation and technological innovation (figure 2.2).

Some economists believe that agricultural finance plays an essential role in poverty reduction and economic development (Meyer 2011, Demirgüç-Kunt, Beck and Honohan 2008a). Capital supply in time is well facilitated through the resource allocation function of agricultural credit markets. Households' production expansion requires capital to meet the increasing demand of input expenditures as well as additional investment. One of popular sources that farmers could use to fund their production is savings. This source could assist them in avoiding debt liability. However, fund accumulation through savings is basically a slow process, even for production expansion. Therefore, credit is indeed a solution in time. Agriculture credit, despite being an indirect instrument of production, could help to place direct production tools and materials in the hand of farmers who could make effective use of them (Memon et al. 2016). In other words, credit is one of important tools for obtaining inputs in time. The transformation of traditional agricultural production ways into modern ones is very likely to challenge farmers in terms of new technology adaption, uses of qualified inputs, quality of outputs and even ways of product distribution and marketing. It is funding for the transformation that drives the growth of production efficiency. Subsequently, agricultural credit may contribute to community growth, especially for agriculture-based nations. Effective production due to credit approaching has given farmers much of opportunities to earn more money and improve their standard of living. In a community, for example a commune/village, agricultural credit is expected to increase the community's wealth

or prosperity through stimulating and diversifying agricultural production. It is the product diversification that could create value chains.

However, some other researchers demonstrate that it is difficult to establish a causal link between credit and agricultural and rural economic development. Agriculture production will not perform its full functions without credit in the modern society. Contemporary farming is increasingly changing compared to the traditional farming, in which the appearance of new machine, new seed or new technology brings more both opportunities and challenges to farmers. As the result of the transformation, either farmers have chance to expand their production scale to increase their income and welfare as well as reduce poverty, or they have to face the risk of being left behind or even risk of default and may fall back to poverty again if they do not adapt new production methods.

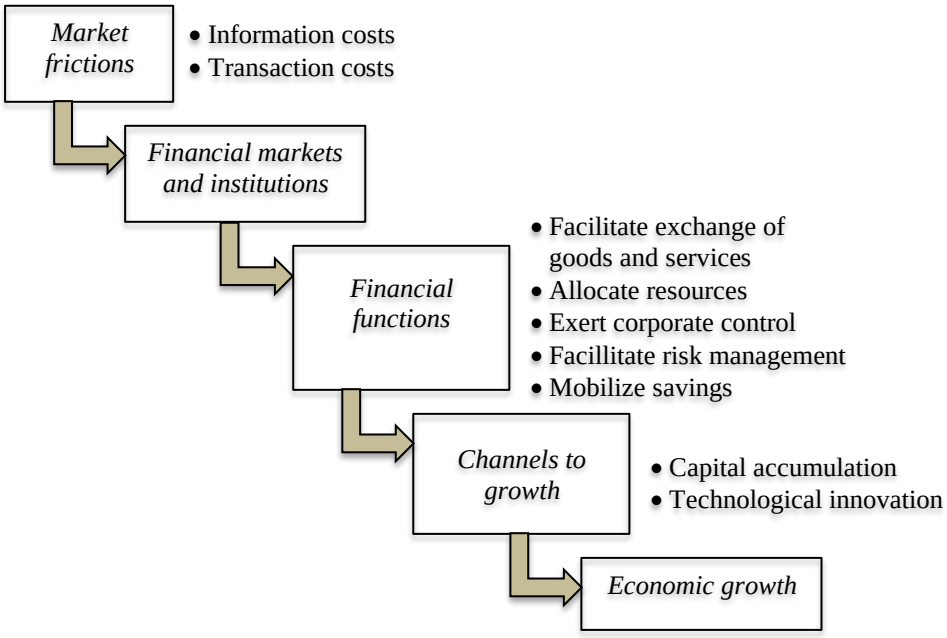


Figure 2.2. A theoretical view of finance and economic growth
Source: Adapted from (Levine 1997)

2.2.2. Theories of credit markets

The three main theories of rural credit markets in developing nations mentioned in the previous research include: monopoly view, perfect market and information asymmetries, in which the first two are traditional ways while the last is more widely accepted by modern researchers.

2.2.2.1. Views of credit market theories

Traditional monopoly view

Village moneylenders are considered as the monopoly power in setting up high interest rates in rural areas. In other words, the lending monopolists could charge the high-interest-rate borrowing as they want to maximize profits (Hoff and Stiglitz 1990).

Perfect market view

Hoff and Stiglitz (Hoff and Stiglitz 1990) also state that to solve the problem of too high interest rate arising from the traditional view, the policy reaction is made. It is the emergence of cheap formal credit provided by governments as substitute for moneylenders – usurious informal credit. Despite of the competitive formal credit sources, informal rates from moneylenders remain high. On the other hand, subsidized loans even can not offset high informal interest rates and consequently fail to drive traditional moneylenders out of the credit markets. However, supporters of this view believe that the existence of observed high interest rate reflected the perfect credit market, in which interest rate is the measure of default risks. In other words, this view considers rural credit markets as perfectly competitive equilibrium. According to this outlook, government should not intervene in the credit markets, at least not in efficient fields.

It is undeniable that the two traditional views above could not adequately explain some features of rural credit markets: (1) the coexistence of both formal and informal credit markets though formal interest rates are absolutely lower than those in informal markets; (2) there is still credit rationing despite the perfectly competitive equilibrium of the markets. Credit rationing means individuals or firms could not gain loans at any interest rate. In other words, credit amount limitations are observed in some case while borrowers are willing to pay high interest rates, even induce a promising investment return; and (3) the number of informal lenders are limited in spite of high interest rate charged.

The two traditional standpoints above are also summarized by Braverment et al. that there are no differences between financial markets and other markets(Braverman and Guasch 1986b), in which interest rate is the same as other commodity prices. The appearance non-price credit rationing is observed but not fully clarified, hence perceived as a temporary phenomenon (Samuelson 1952). The doubts of credit rationing are early issued by Hodgman et al. (Hodgman 1960). He suggests equilibrium theory of credit rationing on the basis of profit-maximizing lenders. These models could be the advances of perfect market view when already mentioned credit-rationing allocation. In this model, default risk is assumed to rely on loan size, in which the greater amounts lenders approve, the higher default risk they incur. He postulates that they should lend borrowers' amount no greater than their wealth. In this case, it is optimal to ration their credit because increased interest rate could not counterbalance surged default risks. Although Hodgman's research manages to analyze credit-rationing mechanism, it has some limitations. The findings do not fully describe the fact that borrowers whose features are likely

identical could received loans or nothing. The other restriction is about interaction between lenders' behaviors and borrower demand that are not mentioned in the model. On the other hand, lender competition is not also taken into account.

Jaffe and Modigliani in the research in 1969 develop Hodgmans' findings by presenting the relationship between lenders' behaviors and customer demand. They exhibit credit rationing obviously based on a theory of rational lender behavior as well as competition in banking. However, their verdict encounters some constraints also. They suppose to define credit rationing, which was an excess demand for commercial loans, at the ruling commercial loan rate. A pure monopoly framework is applied with ceilings on interest rate (Jaffee and Modigliani 1969). It is obvious that imperfect information in the markets is unnoticed in most of early literature.

Information asymmetries

The modern view of information asymmetries, which is ignored in traditional views, is likely to help to adequately explain many of the observed features of rural credit markets. Basically, the events of imperfect information have made a difference between credit markets and other commodity markets (Stiglitz and Weiss 1981). The new views of rural credit markets are postulated mainly based on the three observations in the markets: screening problems, incentives problems and enforcement problems (Hoff and Stiglitz 1990). All three problems are caused by imperfect information or information asymmetries between lenders and borrowers. It is asymmetrical information that causes credit market to not perform well. Screening problem is described as the cost to differentiate the extent of default risks for each borrower while incentives problems are related to adverse selection and moral hazard. On the other words, incentive problems are raised in process of customer selection (adverse selection) and customer repayment (moral hazard). This problem is costly also. The last one – enforcement problem – is repayment compelling. In order to overcome the three problems in the markets, Hoff et al. suggest two mechanisms for lenders, i.e. direct and indirect. So-called adverse selection and moral hazard are early stated in the paper of Braverman et al. (Braverman and Guasch 1986b). The two scenarios are studied under the basic principal-agent problems, in which the agent (borrowers) contract with the principal (lenders) to execute a service for a fee, i.e. income transfer, share of the proceeds or anything form of payment. Income achieving process will be clarified when clearly analyzing the two mechanisms of Hoff and Stiglitz below (Hoff and Stiglitz 1990).

Incentive problems are flourishingly demonstrated in a lot of previous literature as the consequence of information asymmetries. They are supplement of equilibrium theory of credit rationing from the early of the 1950s (described above). In the updated paper in 1976 of Jaffee et al., borrowers are divided into two kinds 'honest' and 'dishonest', in which the honest ones are willing to repay debt regardless of incentives to default while the dishonest ones intend to default due to incentive advantages (Jaffee and Russell 1976). They assume that lenders could not differentiate the two kinds of customers so the optimal solutions are to ration credit.

In reality, the credit constraints also reduce lenders' return from the honest borrowers. They also assert that credit rationing does not happen in the absence of lender competition. Credit rationing is attributed to costly monitoring and screening of incentives problem in the credit markets. High interest leading high return of traditional view is failed with the existence of school of information asymmetries. Lenders' returns are raised only when borrowers' debt obligation is finished. Hence, increasing interest rates will be feasible if they result in increased returns simultaneously. As a result, determinants of lenders' expected marginal profits include interest rate and the riskiness of loans. It is default risks that place a cap on net returns to lenders. It is hard for lenders to recognize the exact extent of default risk incurred by borrowers. It is very likely that high interest rate and large offered amounts increasingly attract riskier customers, which consequently lead to adverse selection effect (Stiglitz and Weiss 1981). Moreover, Stiglitz et al. also argue moral hazard effect that could result in non-repayment problems. Accordingly, borrowers are seemingly exposed to high return rate projects which are associated with higher risks as well as higher possibility of failure, to cover borrowed interest rates. The incentives problem also arises in the research of Keeton et al. They perceive credit rationing as result of incentive problems. While Hodgman early (Hodgman 1960) just concerns about loan-size rationing, Keeton has the same views with Stiglitz et al. (Stiglitz and Weiss 1981), in which both loan-size and loan-quantity rationing equilibrium are taken into account. Both adverse selection and moral hazard co-exist despite careful loan application evaluation of lenders, because lending institutions do not have adequate information on their borrowers. Accordingly, Stiglitz & Weiss conclude that with a fixed loan size, the higher interest rate is, the more moral hazard it causes to. In other words, the expected rate of return to the lenders will rise less rapidly than the interest rate. The verdict is depicted in one modern paper by the authors of World Bank (Demirgüç-Kunt, Honohan and Beck 2008b).

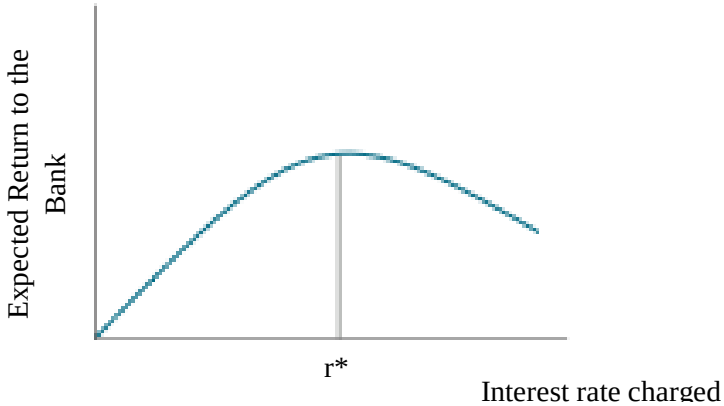


Figure 2.3. Relationship between expected return and interest rate charged
Source: (Stiglitz and Weiss 1981)

In the figure 2.1, r* denote maximized expected return of the lenders or lender optimal interest rate. When interest rate increases, expected return is likely to decrease due to the riskiness of the loans. Therefore, the lenders will not want to increase their rate beyond the optimal point though credit demand may exceed credit supply. The best solution of the lenders is no need to drive interest rate up but to ration credit amount at reasonable size (De Meza and Webb 1987, Stiglitz and Weiss 1981).

2.2.2.2. Problem resolving to information asymmetry problems

In order to resolve the three problems caused by information asymmetries, Hoff and Stiglitz (Hoff and Stiglitz 1990) mention two types of mechanisms: direct and indirect, which are applied to evaluate customers' risk level.

Indirect mechanisms

Firstly, indirect methods are depicted through contracts designed by lenders to borrowers, in which credit suppliers achieve borrowers' information and riskiness. Interest rate could be seen as both the price of loans as well as an indirect screening tool. With the existence of imperfect information, when interest rates have strong impacts on the nature of transactions, i.e. on net expected returns of lenders, credit market equilibrium of supply-demand equality may not happen (Stiglitz and Weiss 1981, Demirgüç-Kunt et al. 2008b). In other words, in this case, market-clearing interest rates are not feasible and non-optimal. Consequently, there should be credit rationing, which is adequately described in the paragraphs above. Hoff & Stiglitz (1990) also confirm that indirect paradigm is important in both competitive and monopoly markets. Although interest rate is not really market-clearing equilibrium, it could be seen as the screening tool to regulate risk structure of lenders' loan portfolio. The higher interest rate is, the more likely to default a loan is. A riskier project that could increases the prospect of loan default is also likely to increase or decrease the expected return. Creditors could not fully and exactly differentiate risk categories of their pool of loans at any given time, which obviously results in many unexpected outcomes. Hence, changes in interest rate might have impacts on the risk mix of lenders' pool of loans. Some authors also confirm that the risks are attributed to adverse selection and moral hazard effects (Dowd 1992, de Mesa and Webb 1992). All the verdicts here are also mentioned in the section above 'information asymmetries'. Lenders cannot infinitely increase interest rate as in the traditional views, they will choose to keep interest rate at optimal levels as well as to ration credit amounts to reach acceptable risk mix and expected net returns. Hoff and Stiglitz (1990) mention that raising interest rate in even less competitive markets is not suitable because the matter of information asymmetries could highly eliminate part or all of lenders' marginal profits.

Besides the tool of interest rate, lenders may apply the other primary indirect mechanism and devices, i.e. reputation effects, and collateral requirement. While credit rationing used by lenders would induce desired borrower behavior (Stiglitz and Weiss 1981, Stiglitz and Weiss 1983), reputation effects could be seen as the interior-

borrower mechanism (Hoff and Stiglitz 1990). In detail, bad credit history would blemish borrowers' reputation and restrict their credit access in the future. To enhance this effect, interest rate should not be set too high so that borrowers' risk averse would increase. In other words, they are less likely to choose high-risk projects. The so-called interaction could be considered as effective long-term relationships to solve incentive problems (Braverman and Guasch 1986b). Long-term credit relationship is developed based on risk sharing. To deal with incentive problems, lenders may decide if to renew or extend the loans and interest rate charged. In other words, this view also applies credit rationing models (Hellwig 1977, Stiglitz and Weiss 1983).

In the research of (Stiglitz and Weiss 1981), collateral requirement is mentioned as an indirect device to relieve incentive problems. The authors also analyzes the relationship among collateral value, default risks as well as lenders' expected return. The question raised here is whether increasing collateral requirements would reduce default risks and increase the profit of banks/lenders. Similar to the issue of interest rate, collateral requirement growth could result in higher probability of incentive problems or default. They explain that small borrowers who are just required small value of collateral are vey likely to be default. Stiglitz and Weiss (1981) take into account the case that those potential borrowers who have different equity have the same credit demand. In reality, affluent risky customers are often willing to meet collateral requirements while safe borrowers are often reluctant to endow high-value collateral. The fact that increasing collateral requirements may cause adverse selection is confirmed by (Wette 1983). In the paper of Bester (1985), he presents collateral requirements could be seen as screening substitute tool for credit rationing. That means banks can offer contracts with different collateral and interest rates, in which customer would be classified based on risk categories. In other words, risk lovers intend to choose deals with higher interest rates and lower collateral (Bestor 1985). However this verdict may not be feasible because small peasants in some developing countries without collateral or with small collateral could incur default risk. Banks or institutional lenders often find difficult to directly scan their customers, so they mainly depend on collateral as land (Hoff and Stiglitz 1990). Consequently, households with larger land areas (thus also have greater income) often have higher formal credit accessibility.

Direct mechanisms

In addition to indirect devices, direct tools are also applied to affect borrowers' behavior. Hoff and Stiglitz (1990) cited that direct tools could help expanding lenders' ability to detect applicants' data and enforce loan repayment, of which expenditures of lenders' information obtaining in this case might be increased and costly. However, the costs of each type of lenders often differ. In reality, informal creditors seemingly take more advantage of direct tools than formal ones. This finding is ascertained in the research of (Braverman and Guasch 1986b, Hoff and Stiglitz 1990). Braverman et al. discovers that incentive problems including the adverse selection and moral hazard are likely to less severe for informal lenders than

the formal. Informal lenders, i.e. local traders, local moneylenders and so on have chance to access local information at the lower cost as well as more easily and more exactly than institutional lenders such as banks. The benefits in terms of information collection come from informal suppliers' location, i.e. living near or even having relative connection with borrowers. The so-call advantages are described as geography and kinship (Hoff and Stiglitz 1990). Therefore, informal lenders' default rates are observed to be lower than formal. Local lenders can be neighbors or relatives of borrowers, which makes asymmetric information become insignificant. Collateral in some areas is unnecessary and even credit contracts are in verbal agreement. Borrowers and lenders transact based on the trust. Loans are only offered inside a small geographic community, so repayment is expressly compelled. As a result, it is the differences between non-resident and resident/local formal lenders make the credit markets segmented, in which informal lenders with high interest rates could hardly be excluded.

Other direct effective tool to help lenders reduce incentive problems and enhance debt repayment is interlinking credit with other markets. Landlords are often mentioned in some early papers in terms of credit transactions with their tenants/employees (Bhaduri 1973) while Hoff and Stiglitz demonstrate that the most well-known form of interlinkage is provided by traders (Hoff and Stiglitz 1990). The credit and labor interlinkage is ascertained to reduce transaction costs and exploitation of weaker agents by more powerful principals, which could help ease principal-agent problems. Braverman et al. (1986) also present credit-labor market interlinking and emphasize some limitations in the research of Bhaduri (1973) in terms of not focusing on asymmetric-information structure. In detail, theory of Bhaduri (1973) fails to explain why landlords are willing to subsidize workers' credit instead of high-interest rate charging like others lenders. The theory seems to be wrong with monopolist landlords, in which there is no lending competition. Some authors develop Bhaduri's theory in order to explain the linear contracts. Braverman and Srinivasan also observe that landlords sometimes provide subsidized loans without requesting sharecropping. However, some law/regulations on the floor of crop shares may enhance the credit-tenancy linkage (Braverman and Srinivasan 1981). Regarding asymmetric information as limitation of Bhaduri (1973)'s theory, many later research have involved the contract interlinkage as a response of moral hazard problems (Bell and Zusman 1980, Braverman and Stiglitz 1982, Mitra 1983). Braverman (1986) considers incentive problems in his research, i.e. moral hazard features of the interlinkage as follows: (1) tenants do not rent land for a fixed amount so sharecropping should be engaged in contracts. Borrowers or tenants will not gain the full profit margin as risk sharing. (2) Landlords cannot absolutely control tenants' actions, i.e. in terms of level of effort and the choice of production technique; therefore monitoring costs would be very high. Landlord lenders could reduce moral hazard by affecting borrowers' behavior such as approved amounts, terms of credit contracts as well as prices of input and output. In other words, through production technique application of borrowers, lenders-cum-landlords could

observe levels of risk-averse as well as default risk. On the other hand, landlords can affect borrowers' behavior via interest rate charges as well as the attractive tenancy contracts offered. In an other research of Braverman and Guasch, they consider credit-labor interlinkage as self-selection screening device to allocate tenants into appropriate contracts based on their certain ability (Braverman and Guasch 1984). Traders instead of landlords are presented in the research of Hoff and Stiglitz (1990). In other words, trade-credit instead labor-credit interlinkage also provides borrowers' detailed information to lenders, in which non-resident traders-cum-lenders request their customers to sell all the crops to or via them. Through the control of output purchase, loan repayment enforcement is increasingly strengthened. Sometimes a cooperation/interaction among traders may be very close in well-ordered markets, which could prevent borrowers from selling goods to other traders who are not their trader-cum-lenders. However, market interlinkage may not absolutely resolve all incentives problem. The interlinkage could be seen as one of tools to intensify lender-borrower relationship, which helps lenders obtain more borrowers' inside information as well.

2.2.3. Approach to agricultural and rural credit

While theory of rural credit markets provide mechanisms to analyze lender-borrower interactive behavior, approaches to credit markets focus on the ways of market operation or the ways capital flows as well as the paradigms of regulating markets by authorities. In other words, financial markets are always intervened by governments in many ways to ensure the soundness. Governments have made an effort to involve in credit allocation through affecting banks' behavior. They want to avoid bank system failure because of its importance. Macro economic tools, such as money supply and interest rate, are implemented by Governments to prevent moral hazard or excessive risk incurred by financial institutions. There have been two approaches to rural finance or rural credit, i.e. directed credit approach as traditional one and financial market approach as new paradigm (Graham 1992, Meyer and Nagarajan 2000).

Directed credit approach (traditional approach)

Governments of many developing countries, especially in Asia, have believed that the issues of economic development, firm growth and even poverty alleviation could be achieved by finance control. In their research, Meyer & Nagarajan (2000) mention five main kinds of governmental interventions used: 'lending requirements and lending quotas imposed on banks, refinance schemes, loans at preferential interest rates, credit guarantees, and lending by development finance institutions'. This finance control verdict has been found in some early research. Formal lenders under traditional views are observed to be excessively risk averse, so they could be influenced to reject rural poor or risky loan applicants. Subsequently, they are possibly induced to follow government subsidized loan programs. On the other hand, most informal lenders often charged high interest rate on loans to maximize their profits (Adams and Graham 1981). It is usurious informal interest rate leading to high-cost short-term loans that are

not advantageous to rural production investment with huge transformation in technology. Therefore, authorities believe that targeted credit allocation will aid in decreasing lenders' costs and risks as well as debt burden for borrowers (Meyer and Nagarajan 2000). However, there have been many doubts about the feasible impacts of credit subsidies on economic growth (Von Pischke 1991). Von Pischke presents some limitations of the traditional credit allocation in his research. Firstly, the role of subsidized credit has been overstated regarding economic development. In detail, it neglects alternative ways to obtain development objectives as well as disregards saving mobilization therefore leads to inefficient capital flows in the economy. On the other hand, supported credit projects hardly deliver good/efficient loans. This obstacle is clearly mentioned in the paper of Meyer & Nagarajan (2000). The problem is that subsidized credit is not free and someone must pay extra fees in addition to/through interest rate to achieve it. In other words, credit allocation is explicitly and intentionally directed in favor of large customers, which could result in incentive problems. Moreover, it is cheap subsidized interest rate and preferred loan application process that will exacerbate the problems, leading to nonperforming loans due to encouraged unprofitable or high default risk investments. The moral hazard problems possibly become explicit. In some cases, borrowers believe that governments would not blame them on their loan default, in which few financial penalties are imposed on them. As a result, financial regulations, such as risk management, savings and capital mobilization, are seriously breached (Gonzalez-Vega 1989). Some research have observed that subsidized credit is not really an effective way to increase small farmers' income and the traditional credit often results in costly and sometimes counterproductive policies.

Overall, main characteristics of the traditional credit approach could be summerized as follows:

(1) Governments seemingly focus on building up specialized financial institutions for the purposes of credit subsidization while the financial nature of the institutions is disregarded. Efficiency of supporting schemes is evaluated on the basis of quantity rather than quality of loans, in which just the amount disbursed and allocated consistent with the rate of change in techonology application and growth in employment and output is focal point (Gonzalez-Vega 1989). The amounts borrowers could obtain are just dependent on their demand instead of both demand and debt repayment ability (Graham 1992).

(2) The role of interest rate as an indirect tool of credit allocation is distorted. Authorities have believed that only low subsidized interest rate is proper to enhance agricultural production and development and even is an indispensable part of input package of production. They hence neglected the other determinants of agricultural development (Adams and Graham 1981).

(3) The financial viability of financial institution is disregarded because of high transaction cost and low loan recovery. In this case, both lenders and borrowers are

likely to incur transaction costs which could be even greater than the interest rate charged on loans(Adams and Vogel 1986).

Microfinance

The emergence of microfinance in the early of 1970s could be considered as appropriate solution to problems of the directed credit approach. Many institutions, such as NGOs, grant small loans as part of their programs to rural development, i.e. employment creation, provide emergency relief after natural disasters, health and education improvement (Meyer and Nagarajan 2000). The origins of microfinance arise from three initiatives: small loan providing, poverty reduction and supplement to conventional financial sector. The success of microfinance comes from the specialized features in operations. The term of micro loans is short-term so the process of loan repeating is quite quick. Microfinance institutions are seen to reduce adverse selection and moral hazard as well as lending costs and risk through frequent loans repayment schedules, in which borrower performance is continually scanned and monitored. On the other hand, MFOs use group-based lending rather than individual, in which collateral could not be required. Monitoring paradigm is decentralized from the institutions to peer lending groups that makes lending procedures are simple.

In addition to the pros, microfinance in the early emergence has some limitations. Firstly, microfinance is not suitable to farmers who have highly long-term credit demand. Secondly, the transaction costs of MFOs are likely to be greater in rural than urban areas due to rural population separation. Thirdly, microfinance markets are segmented with each micro lender serving only a small market niche. It is high transaction costs including information collection that prevents them from rapidly expanding to larger range of customers. Therefore, microfinance which results in better performance than the old direct credit approach can be seen as the link between the old one to the new one – financial market approach.

Financial market approach (new approach)

It is the old mechanism replaced by the new one that imply the significant transformation in developing countries towards financial market efficiency, i.e. from mandates to markets (Robinson 1997, Meyer and Nagarajan 2000). In other words, supply-leading direct credit policies have been gradually converted to the demand-leading or market-oriented approach. Under the new financial market paradigm, financial institutions perform their operation as financial intermediation instead of only specialized subsidized tools of governments in production stimulation or poverty alleviation. In other words, the market view focuses on good loan recovery, low transaction costs and deposit mobilization (Gonzalez-Vega 1989, Graham 1992). Financial market liberalization is reflected under the new mechanism (Von Pischke 1991). The key importance of the new paradigm is the freedom given to both borrowers and lenders, in which lenders could use their tools to decrease transaction costs and set interest rate high enough to cover costs. Accordingly, the relationship between borrowers and lenders is no longer givers and receiver and the borrowers become valuable clients who tend to have long-term relationship with

lenders. Based on that, incentive problems could be eased. The new market view highlights voluntary saving mobilization rather than only governmental donors (Meyer and Nagarajan 2000). The information structure is involved in the management and operation process instead of only subsidization.

Flows of funds and information would be transferred and linked between varied market participations (Spio and Groenewald 1997). The key differences between the old and new approach to rural credit markets are summarized by some authors as in table 2.1. Especially, in the research of Yaron (2004), mechanism of government interventions is included as one element of two approaches.

Table 2.1. Main differences between the traditional and new approach

Description	Traditional approach	New approach
Primary goals	- Overcome market imperfections - Income expansion (by applying technology with subsidized credit) - Poverty alleviation	- Lower risks and transaction costs - Income expansion - Poverty alleviation
Role of Governments	- Directly intervene in the markets and heavily subsidize credit for agricultural production	- Decreased subsidies and create independent institutions - Control the markets and participants' behavior through policies
Mechanism of Government Intervention	- Macro policies focusing on ensure cheap supply of products and control prices, protect domestic production. - Set ceiling interest rate on both lending and savings consistent to subsidized policies.	- Policies promote efficient development of the markets through focusing on unique features of each market. - Market-oriented interest rate mechanism, ensure market competition.
Role of financial markets	- Direct tools of Governments for credit subsidized programs	- Function as efficient financial intermediate
View of users	- Borrowers as beneficiaries selected by targeting and receive credit from Governments through financial institutions	- Borrowers and depositors are lenders' valuable clients towards long-term relationship
Sources of funds	- From Governments and donors	- Mostly from voluntary saving mobilization
Information systems	- Designed for credit targeting and subsidizing	- Designed for management process
Sustainability	Largely neglected	A major concern
Financial evaluations	- Credit impacts on targeting borrowers through quantitative criteria instead of qualitative ones	- Performance of financial institutions

Source: Adapted from Adam (1998) and Yaron (2004).

2.3. The issue of credit accessibility by farm households

2.3.1. The concept of credit accessibility

2.3.1.1. The concept of credit access

Households' access to credit/credit markets can be simply defined as approaching credit services (Zeller et al. 1996). In a broader way, access to credit means households could choose and gain specific credit sources among many available ones. Consequently, households' credit accessibility can be explained as the greatest amounts approved (Diagne and Zeller 2001). According to the theory of credit markets in section above (section 2.2.2), the modern view of information asymmetry theory explains the matter of credit limits or credit rationing. Only supply-demand equilibrium could not explain the limits of credit accessibility under the condition of asymmetric information, in which lenders do not just depend on market price of loan, i.e. interest rate. Incentive problems including adverse selection and moral hazard resulted from information asymmetries could lead to high risk of loan default. The risk default is hardly decreased only by increasing interest rate. Therefore, lenders tend to ration or limit every loan they make. In other words, credit flows do not easily move from suppliers to demanders. It is a screening process where borrowers apply for credit and then lenders decide whether to accept or reject the loan applications and how much credit is approve in case of loan acceptance (Stiglitz and Weiss 1981). This process refers to the term "access to credit" or "credit accessibility" while "credit market participation" may be inclined to the demand side. Due to the segmentation of credit markets, credit access in formal and informal ones are often separately analyzed. The terms "access to credit" or "credit accessibility" or "credit constraints" or "credit market participation" in some paper are interchangeably used. Regarding credit constraints, some people think those are constraints from lenders. However, credit constraints also come from both supply and demand side that are also included in the concept of "credit access" or "credit accessibility". Demand-side constrained households are those who may have credit demand but do not apply loans because of some reasons, such as fear of rejection, fear of high transaction costs and so on. In other words, supply-side constraints could be considered as credit rationing by lenders while demand-side constraints relate to borrowers' decision of market participation as in figure 2.5 below (Boucher et al. 2009). Formal credit constraints are clearly categorized in this figure, including three main types: risk constraints (demand-side constraints), transaction cost constraints (demand-side constraints) and quantity constraints (supply-side constraints). Therefore, credit rationing indicating lenders' behavior on applied amounts is only a particular case of credit constraints.

Therefore, similar to the concept of credit access, credit constraints also mention borrowers' decision to take part in the credit markets and lenders' response to borrowers' application by rejecting or rationing or fully approving the applied

amounts. However, the credit constraint concept clearly reveals the reasons why a household decides to not participate in the markets.

In conclusion, all terms 'access to credit', 'credit accessibility', 'credit constraints' imply the process that farmers have credit demand then can choose to participate in credit markets and have barriers by lenders when entering the markets. This process describes the three dimension of credit access or credit accessibility: borrowers' participation in the credit markets, credit amounts obtained and the level of credit rationing provided by lenders.

Similarly, there are some differences between the terms 'use of credit' and 'credit access'. The differences are also analyzed based on supply-demand framework (Beck, Demirgüç-Kunt and Honohan 2009, Claessens 2006), of which use of credit refers to actual consumption of credit/financial services. In other words, use of credit is the equilibrium where the credit quantity demanded is equal to the quantity supplied. Meanwhile credit access as discussed above refers to the different scenarios of credit supply and demand.

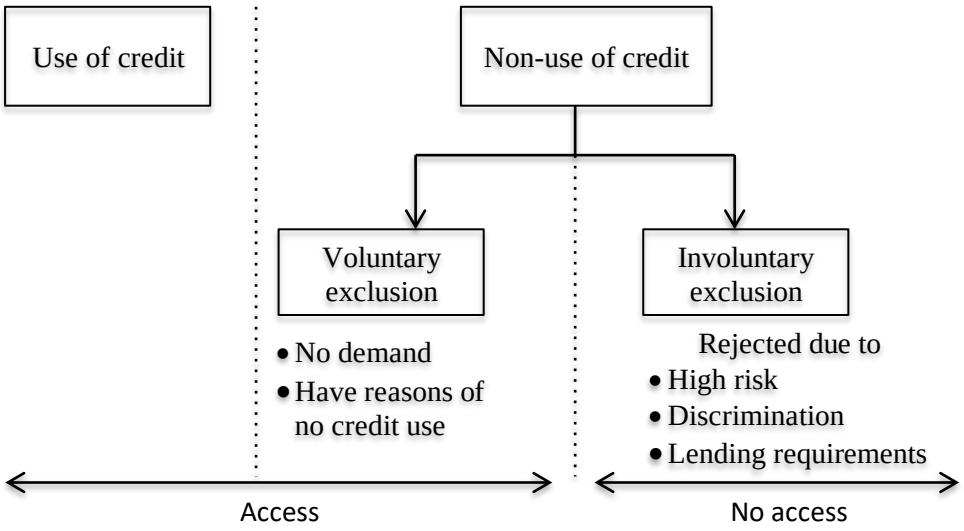


Figure 2.4. Differences between use of credit and credit access.

Source: Adapted from (Claessens 2006)

The differences between use of credit and credit access are presented in figure 2.4 above. Accordingly, non-users of credit due to voluntary exclusion is assigned to the group of having credit accessibility. They often meet all requirements of lenders but they decide not to use credit for two reasons: (1) they have no demand; (2) they have specific reasons for non-use. The group of non-users with involuntary exclusion is equal to 'no access' group. This group consist those who have credit demand but are rejected by lenders for some reasons, such as high risk or bad credit history, discrimination in lending programs or not meeting minimum lending requirements.

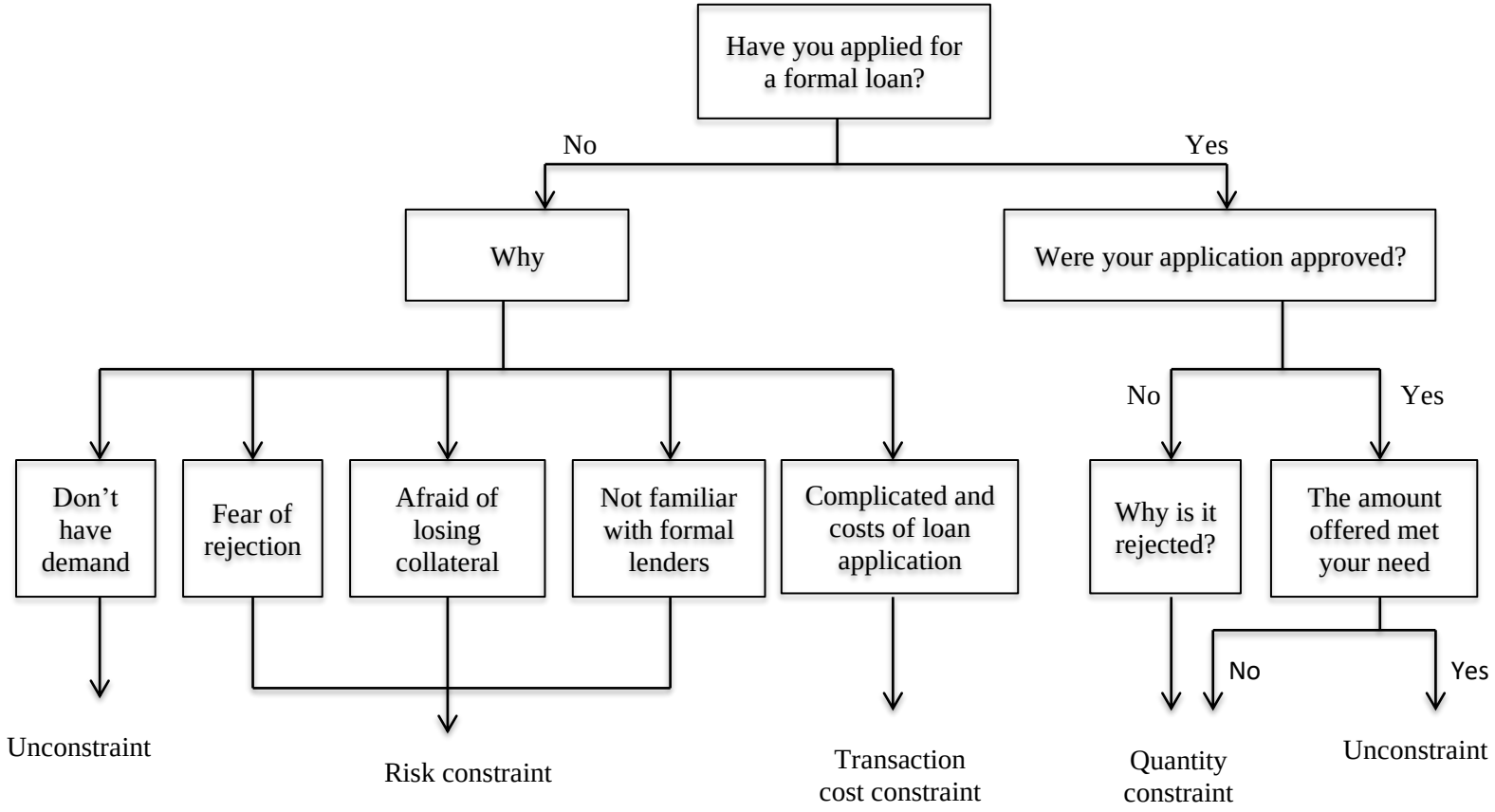


Figure 2.5. Framework of identifying credit-constrained households
Source: Adapted from (Boucher, Guirkinger and Trivelli 2009)

2.3.1.2. Detection of credit constraints

Access to credit and credit constraints have been measured and detected by the two main methodologies, i.e. indirect and direct way. The indirect way detects credit constraints based on violations of the life cycle-permanent income hypothesis while second method directly collects information from household surveys on whether households self-revealed to be credit constrained (Diagne, Zeller and Sharma 2000, Diagne 1999). The implication of permanent income hypothesis is that 'in the absence of liquidity or borrowing constraints, transitory income shocks should not affect consumption'. The hypothesis has been early assumed by Friedman that agents have sensible expectations on their lifetime income and wealth (Friedman 1957). According to the permanent income hypothesis, a transitory income shock has nearly no impacts on consumption. The reason is that positive temporary changes in permanent income is saved nearly totally while negative changes are compensated by credit taking-up. In other words, the presence of credit constraints is tested by using household consumption and income data in figuring out a significant dependence of consumption on transitory income. However, empirical evidence from the indirect approach for measuring and detecting credit constraints has been inconclusive. Consumption has been stated to be excessively smooth in terms of permanent as well as transitory income shocks (Campbell and Deaton 1989, Attanasio and Pavoni 2011). In other words, the response of consumption smoothing to transitory shocks is significantly different from zero, which means current income is even more important for intertemporal consumption allocation than permanent income (Hall and Mishkin 1982, Blundell, Pistaferri and Preston 2008). On the other hand, under context of uncertainty, the dependence can still appear because of precautionary behavior even when household is non credit-constrained (Carroll 1991, Kimball 1989). In the research of Carroll (1991), the author clearly mentioned the fact that current income would have a negative relationship with consumption growth if conditions of uncertainty were negative correlated with wealth even in the absence of credit constraints. The life-cycle permanent income hypothesis has been also extended to include the relationship of credit constraints and precautionary behavior (Deaton Angus 1991, Carroll and Samwick 1998). Some authors also mention the correlation of consumption and income shocks if we have a precautionary motive even without credit constraints (Browning and Lusardi 1996, Carroll 1997, Deaton Angus 1991). Therefore, it is concluded that the indirect way to detect credit constraints is likely to be unconvincing.

The more popular second method to define and measure access to credit is directly asking households. In this approach, information which is directly obtained from households' answers, i.e. their credit demand, loan application, experience in credit markets as well as exposure of loan rejections, is used to determine whether they are credit constrained (Diagne et al. 2000, Boucher et al. 2009, Beck et al. 2009). The questionnaire is designed to classify households as credit constrained and non-credit constrained based on their responses. The data of borrowers' socio-economic characteristics from the questionnaire is then processed in regression model to figure

out determinants of the possibility of a households being constrained and the impacts of this possibility on varied household outcomes. Despite its improvements compared to the indirect approach, the direct one still has some limitations. Firstly, this method is quite bias in considering credit constraints just from the borrowers' view instead of both borrowers and lenders. Secondly, the approach is indeed qualitative. Consequently, it fails to quantify the extent to which households are really constrained and affected by credit access regarding welfare outcomes.

In order to correct the limitations, the extended version of the direct method has been developed, i.e. the credit limit variable (Diagne et al. 2000, Diagne and Zeller 2001). In this approach, credit constraints are considered under both lenders and borrowers' view, which is consistent to the theory of credit markets mentioned in section 2.2.2 above. Consequently, access to credit or credit constraints should be measured and determined by both lenders and borrowers' characteristic and decisions rather only borrowers as in the direct approach above. Diagne et al. (2001) state the maximum amount as the measurement of access to credit that a household could borrow from a given credit source. In other words, the lenders are very likely to be constrained on the amounts that they can possibly lend, which is credit limits or loan rationing due to imperfect information in the markets. That means credit sources are limited and the lenders have to choose their borrowers on the basis of credit default and interest rate charged (Diagne et al. 2000, Stiglitz and Weiss 1981, Thomas 2000). The separation of lenders and borrowers' behavior are explored in the research of Zeller (Zeller 1994). In details, the credit access process start from borrowers' demand for credit and then decisions to participate in the markets. If they choose to borrow, then they will be subject to lenders' decision on credit rationing. In that case, lenders have rights to partially or fully reject or approve the demand. Lenders' decisions also rely on the process of scanning and investigating borrowers' characteristics. In short, the credit limit approach focuses on the method for quantifying the extent of household credit accessibility, including the approved amounts and the extent of credit rationing.

In reality, the second and the third approach are more broadly accepted than the first one. In many other studies from the early of 1990s to 2000s, households are categorized into credit-constrained and non credit-constrained from information collected from their answers. Surveyed borrowers report any of their constraints for a given source, i.e. application rejection or being granted less than they asked for (Jappelli 1990, Godquin and Sharma 2005, Boucher et al. 2009). In the research of Boucher et al. (2009), no-applying (but having demand) and partially constrained households are both classified into the group of credit-constrained. The farmers who have indeed demand for credit do not apply for credit because they are afraid of being rejected. Empirical method for identify and classify credit-constrained households will be clearly described in the chapter 4 – research sited and methodology.

2.3.2. Socio-economic impacts of credit access on household welfare

Undeniably, credit access has a great socio-economic impacts on rural households, such as output/production increase, enhancing household income as well as poverty alleviation (Yadav and Sharma 2015, Malik and Nazli 1999). Consequently, the negative effects of credit constraints on agricultural output and productivity has been confirmed in many research (Feder et al. 1990, Petrick 2004). Feder et al. (1990) in the research in China proved that 1% increase of the liquidity level of credit-constrained households would increase the output of the households up to 0.04%. In other study in Nigeria, improved productivity as well as food security is also achieved through farmers' loan access facility, i.e. the presence of subsidized interest rate and the deduction of loan procedures(Ugwumba and Omojola 2013). De Rosari et al. apply simultaneous equation to observe the impacts of credit access on households production, consumption and investment (de Rosari et al. 2014). The relationship between farm productivity and credit access across credit constrained and unconstrained households in Peru is mentioned in the survey of Guirkinger et al., in which the value of agricultural production in Peru will be estimated to increase by 26% if institutional credit constraints are reduced (Guirkinger and Boucher 2008). Formal credit impacts are also emphasized to have positive correlation with family income, expanding their livelihood activities, improving living standard and welfare condition (Das 2018). In Das's paper, both formal semi-formal and informal credit impact are considered, however just formal credit access have significant effects on household income. The results are confirmed by using second-stage Heckit procedure. In other study in some developing countries such as Pakistan, credit usage could lead to a growth of output and income in rural areas, then improve the welfare of the farmers (Olagunju 2007, Bashir, Mehmood and Hassan 2010). This verdict is also confirmed by some other authors in Bangladesh and Peru (Khandker 2005, Copestake et al. 2005, Ekwere and Edem 2014). While many authors mention the significantly direct and positive relationship between credit facility and household income and output, others state contradict results, i.e. insignificant or indirect relationship. In the research of Ahmad in Pakistan, at first credit amount variable is found to insignificantly affect household agricultural output (Ahmad 2011). The author tests the causality of credit amount and other input that are bought by credit, such as tube wells, tractors, fertilizers and seeds. The results show tube wells, tractors and fertilizers have significantly strong causality with credit while the three inputs also have great impacts on agricultural output. Consequently, the author concludes that credit amounts have strong indirect correlation with agricultural output through direct inputs purchased by credit. The author applies ARDL approach instead of OLS regression of many other studies. ADRL is used to test for the existence of the long run equilibrium relationship among time series variables. This approach is approach and extended by Pesaran (Pesaran, Shin and Smith 2001). The indirect relationship is mentioned in the paper

of Raza and Siddiqui as well (Raza and Siddiqui 2014). Credit amounts are found to indirectly affect agricultural output through technical efficiency in addition to direct inputs (seeds, fertilizers and so on). Technical efficiency is described as the ability of a firm/household to achieve the maximum output from a given set of inputs and available technology (Bravo-Ureta et al. 2007). Some authors have estimated the impacts of credit access and credit amount on technical efficiency (Binam et al. 2004, Xi and Li 2007). Binam et al. (2004) present the positive relationship between credit access and farming efficiency and also suggested that considerable increase in output and/or decrease in cost simultaneously could be obtained by existing technology.

In terms of poverty reduction, Das et al.(2018) has considered the impacts of three credit types: formal, semi-formal and informal according to three poverty line benchmarks: the Planning Commission of India's poverty line, World Bank poverty line, and multidimensional poverty. Regarding World Bank benchmark and multidimensional poverty line, both formal and informal credit have significant impacts related to poverty reduction, in which formal access decrease the probability of staying poverty line and informal is opposite. Therefore, informal borrowers may stay vulnerable. Semiformal access's significant effects are just confirmed with India's poverty line, which focus on microfinance advantage.

Despite a great number of research being in favor of remarkable impacts of credit on agricultural output/income/efficiency as well as poverty alleviation, some other studies have released contradict. In other words, credit access is found to have no impacts on household income and poverty reduction. In some cases, easy credit access from some sources, such as micro-credit or preferential formal credit from government, even leads to indebtedness situation of farmers when they do not have good financial status. This situation will be a financial burden on them and cannot increasingly lift them out of poverty.

They state that credit access have insignificant or negligible effects on household income (Coleman 1999, Adams and Von Pischke 1992). These authors confound the impacts of micro-credit access, in which loans are observed to not being directly employed in production with a positive return. Dale W. Adams et al. (1992) assert that micro-credit access is really not a direct and effective tool for poor farmers to improve their welfare, so would not help to reduce poverty. Micro-credit obviously benefits households in the short-run, not in the long-run indeed (Bateman and Chang 2009). In the study of Hossain et al., they indicate the positve effects of micro-credit on agricultural income in the short ter while long-term effects are not. The issue is due to improper utilizaion of agricultural loans in the longer period. It is the fact that micro-loans without collateral and easy lending process may result in rural housholds' misuse of them in the long term (Hossain, Mohammad and Yu 2021). Simultaneouly, the authors also confirm that banks, mirco-credit or informal credit do not reduce poverty significantly in both short- and long-term. Therefore, some studies demonstrate that in terms of provety reduction, giving poor farmers money

directly is not as effective as supporting them in production. These findings are consistent with those of (Banerjee et al. 2015). The study use the variable 'monthly consumption' as good indicator of overal welfare, which does not increase for those accessing to microfinance and then also does not alleviate poverty. Many cross-country studies emphasize the impact of financial depth rather than financial inclusion on the reduction of poverty and income inequality. In other words, there is some empirical evidence that credit deepening is not indeed help all household segments to the same extent (Beck et al. 2009, Honohan 2004, Morduch and Haley 2002). In reality, indirect effects of credit access via providing more efficient products and labors to poor borrowers are much more important than direct ones. In some cases, poorest or lowest-income population are very likely to be excluded from the institutional lenders because of bigger default risks than others (Hermes and Lensink 2011, Amin, Rai and Topa 2003). Bad impacts of credit access on household welfare are also mentioned in the research in Gambia, African (Manja and Badjie 2022). It is interesting that, both formal and informal credit are found to have deleterious effects on welfare. The study presents that it is the ease of credit access that even lower households' income, especially informal credit. They are very likely to incur high interest rate and then delayed payments or default.

2.4. Determinants of credit accessibility

The section will briefly describe what determines credit accessibility of farming households. There are two categories of determinants, including: external factors and internal factors. External factors at macro level which are those influences or situation that a household can not control affect household's decision as well as credit accessibility, i.e. rural credit market, systematic risks of agricultural production, urbanization, lenders' behavior and government policies. Internal factors represent micro factors within household related demographic characteristics of family as well as family heads, feature of production, income and social networks.

As discussed in section 2.3.1, 'the concept of credit accessibility', when we study credit accessibility, we should consider both lenders' and borrowers' behavior in terms of three aspects: borrowers' decisions to participate in the markets or choose credit sources, the amounts obtained and lenders' decisions to reject or fully/partly approve loan amounts demanded by their potential customers. Therefore, research on determinants of credit accessibility ought to be clarified concerning all three aspects.

Supply-side characters refer to lenders' behavior while demand-side reflects borrowers' behavior. In reality, there is no clear separation between supply and demand side factors because one factor could affect both lenders and borrowers' decisions. More specifically, farmers' decisions to choose credit sources refer to demand side while the obtained amounts are related both credit demand of borrowers as well as lending decisions of lenders, i.e. both demand and supply side. The conditions of credit constraints may belong to supply side.

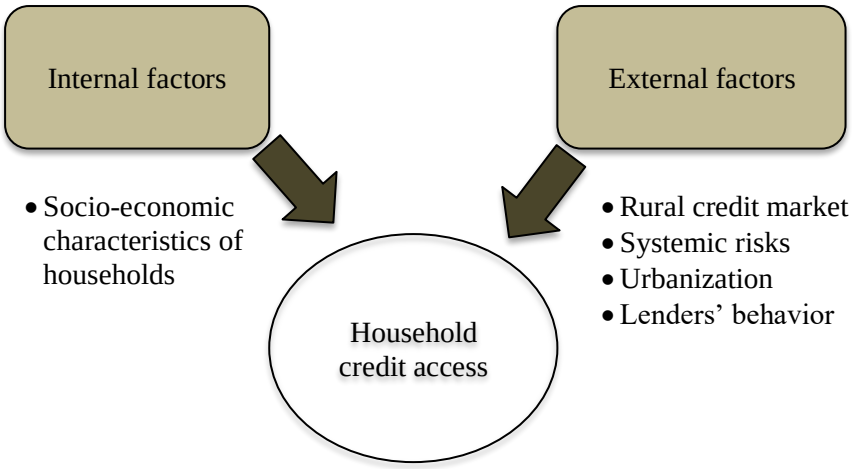


Figure 2.6. Summary of determinants of household credit accessibility

2.4.1. External factors outside farm households

Rural credit market

According to the modern view of credit market theory, market participants' relationship is mainly characterized and regulated by the matter of imperfection, including information asymmetries and transaction costs. It is imperfect information that makes loan-scanning process costly. In the early of 1960s, implicit assumption of zero transaction cost which went unchallenged before, became controversial and revealed (Coase 1960). The transaction cost economics are really developed by Oliver Williamson and then popularized by many other researchers. Transaction costs could be divided into three categories: search and information costs, bargaining costs, policing and enforcement costs (Dahlman 1979, Jaffee 1995, Williamson 2010). In the credit market, total transaction costs are calculated per households and loan contract, including two main categories: transport costs and signaling costs (Petrick 2004). Transport costs could be seen as borrowers' total expenses as well as opportunity cost of time spent for travelling. The expenses rely on the distance between borrower location and lenders. Signaling costs compose expenses required by lenders in addition to interest rate. The great proportion of the signaling costs and transaction cost is incurred for loan scanning procedures and other bank fees before lenders decide to lend. In other words, transaction costs are involved in all segments of a loan processing: scanning of customers' data costs relating to decision of loan approval and then enforcement of repayment. Despite interest rate used as the tool of regulating default risks, credit rationing is widely applied by lenders to reach optimal expected return and reduce the great impacts of informational asymmetries in markets (Stiglitz and Weiss 1981, Hoff and Stiglitz 1990). In the step of customer data scanning, many important information can be missed out, such as private information of borrowers leading to unexpected risk

increase, unobservable output and so on. As a result, borrowers are likely to receive credit amounts less than their demand. On the other hand, information asymmetries also result in contract enforcement problems or incentive problems which are one of the obstacles to formal lending and then increase transaction costs as well (Ghosh, Mookherjee and Ray 2000). One of the key obstacles to formal credit access is difficulty of contract enforcement incurred by asymmetric information (Ghosh et al. 2000, Jappelli and Pagano 2002, Djankov, McLiesh and Shleifer 2007). These research focuses on relationship between the presence of information sharing among lenders, lending activities and default rates. Bank lending to private sectors in general is greater when information sharing is more firmly developed.

Many studies have mentioned the dominance of informal credit compared to formal one due to information asymmetries and transaction costs; so many good borrowers would choose to resort to informal credit markets. Informal lenders who are often local village moneylenders, relatives or friends find easier to access and accurately assess borrowers' information. This extensive monitoring could not be adequately achieved by formal lenders, which may lead to market segmentations (Hoff and Stiglitz 1990, Braverman and Guasch 1986b, Germidis, Kessler and Meghir 1991). In one study in Africa in the 1990s, the authors observe that nearly all loans are informal ones which are transacted within a small village or kinship group (Udry 1990). In this case, information asymmetries between creditors and debtors seem to be negligible therefore collateral is also neglected. A mechanism for loan enforcement totally depends on kinship and village sanctions through authorities' appeal. Many potential borrowers choose to participate in informal markets instead of formal ones (Germidis et al. 1991, Basu 2003). Germidis et al. (1991) compare the features of informal markets outweighing formal ones. It originates from local cultural and customs, which are easily advocated by rural population. Informal lenders' advantages of local information access induce the more simple and straightforward procedures of loan requests, which appear to be in favor of a great proportion of low-educated farmers in rural areas. It is the localized operation manners of informal lenders that create a dense and effective information network at the root level for scanning borrowers' data before lending as well as for monitoring and supervising borrowers' money flow for repayment enforcement. Community culture of rural areas increasingly enhances the updating of information of locals. Therefore resident village lenders are willing to lend a large amount without collateral which is impossible for formal institutions (Ghosh et al. 2000). It is the reason why farmers who have credit demand for large-scale production but have no valuable or small-valued assets prefer to resort to informal borrowings in spite of higher interest rate in informal credit markets. While collateral is considered as compensation in case of default, business plan or income flow must be documented as the proof of repayment ability. However, farmers in developing countries with high informality often find it difficult to provide the documentary evidences to formal lenders such as banks, which make them shy away from formal markets. In case of lack of documentary evidences, the process of rationalizing loan scanning

should be incur high transaction costs. That is the reason why some research mentioned informal loans might be actually cheaper after total transactions costs (including official and non-official costs) of formal loans are included. As a result, many borrowers prefer to fulfill their loan demand in informal markets although they could approach formal sources (Chung 1995, Kochar 1997).

Related to enforcement problems, Ghosh et al. (2000) mention the feature of frequent repeating lending in informal markets, which is not commonly found in institutional markets. Informal lenders could extend real loan maturity by frequently repeating lending based on implicit relationship between them. In other words, informal lenders could offer better refinancing terms in case of poor harvests. Consequently, farmers may decide to obtain informal credit which facilitates greater consumption smoothing against the failure even if informal interest rates may be more expensive than formal ones (Guirkinger 2005).

In above paragraphs, we have mentioned the information flow that lenders obtain from borrowers for scanning and monitoring. However, the reverse flow that borrowers get knowledge about lenders is also vital. Barriers to formal institutions comes from the ability of borrowers to approach their information are presented in some papers. In reality, especially in rural areas, households/customers often lack of awareness regarding formal credit or basically the inadequacy of bank branches in the locality (Mallik 2015, Campero and Kaiser 2013). The farmers' awareness sometimes depends on their illiteracy which makes them reluctant to approach formal lenders even when the information is available. On the other hand, the illiteracy also results in their hesitance in approaching bank loans with procedural complications (Germidis et al. 1991, Guirkinger 2005).

However, with the development of technology in all economic sector in general as well as in agricultural sector, farmers' adoption of internet and mobile banking services increasingly affect their likelihood to access loans through technological platform. Information technology innovation such as internet or smart phone are effective tools for lenders to offer and inform their financial services to rural areas or even low-density population. These high-tech services allow customers to access banking facilities from dispersed areas where bank branches can not reach to (Pénicaud and Katakam 2019). Njogu et al. consider the association between level of technology adoption and credit access in terms of credit market participation and credit amounts (Njogu, Njeru and Olweny 2017). Level of technology adoption comprises of the adoption and frequency of use of mobile banking platform. The results show that only the use of mobile banking has no significant impacts on decision to seek a credit loan. It is the frequency of using mobile banking significantly affects both the likelihood of credit access and credit amounts. In spite of advances in digital products of banks, economies of scale and scope and network effects are confounding in terms of customer acquisition, funding, compliance activities, data and capital (Feyen et al. 2021). This still results in significant search and assembly costs for customers, which encourage re-bundling and grant

advantages to large multi-product suppliers, including technology (big tech) firms expanding into financial services, i.e. fintech companies. Fintech has already driven grater access to convenience of financial services for retail users.

Systemic uncontrolled risk in agricultural production

Agriculture is considered as one of economic sectors fraught with many uncertainties and risk. Many researchers have indicated definitions as well as implications of risk in agriculture. "Events are uncertain when their outcome is not known with certainty. Uncertain events are important when their outcomes alter a decision maker' s material or social well-being" (Robison and Barry 1987). This verdict is also confirmed by (Harwood 1999). He differentiates the concept of uncertainty and risk, in which uncertainty is needed for risk to happen while uncertainty does not necessarily lead to risk (Chavas 2004). In other words, risk is uncertainty that happens and may incur the probability of losing money or affect family' welfare (Heifner et al. 1999) but sometimes the two concepts are interchangeably used. Another term related risk and uncertainty is vulnerability that is often defined as the likelihood that a risk will cause a significant drop in well-being. Vulnerability relies on both feature of risk as well as households' asset endowment and insurance instrument availability (WorldBank 2000). There are different ways to categorize agricultural risks. Risks could be divided in 4 groups: production risks (weather, pests, diseases and change in technology), ecological risks (climate change, management of natural resources), market risks (output and input price variability, competitiveness, new products...) and regulatory or institutional risks (government policies in agriculture, food safety and environmental regulations) (OECD 2000). This classification is the same of (Moschini and Hennessy 2001). Some other authors split agricultural risks into two main group: impersonal (including production, market and institutional) and personal risks. Production risks result from unpredictable weather or crop performance while market risks compose uncertainty related to input-output price. Institutional risks are government policies/regulations affecting agricultural production, such as: credit policy, tax provisions or regulations directly related to the usage of input material and so on. Personal risks relate to individuals only such as: death or illness (Huirne et al. 2000, Hardaker 2004). Another type of risks are mentioned in the papers of (Musser and Patrick 2002) is financial risks which is repayment ability or ability to refinance farming. Financial risks here may involve both impersonal and personal risks. This is due to bad farming performance or farmers' intentional non-repayment.

Risks in agriculture could be divided in the three main types: micro (idiosyncratic) risks affecting an individuals or households, meso risks relating groups of households or communities and macro (systemic) risks affecting communities or regions or nations (OECD 2009) as in table 2.2. However, meso and macro risks are more difficult to be controlled than micro risks because of their extent of spreading. Therefore, we focus on the two systemic risks as external factors of credit access.

Table 2.2. Systemic risks in agriculture

Type of risk	Micro or idiosyncratic	Meso	Macro
Market/prices		- Fluctuation in price of local land, or related in some industries	- Change in input/output prices due to large-scale shocks, trade policy...
Production	- Hail, frost, non-contagious diseases, personal hazards	- Rainfall, landslides, pollutions...	- Flood, droughts pests, contagious diseases, technology
Financial	- Change in income from other sources (non-farm)		- Change in interest rate/value of financial access to credit
Institutional/legal	Liability risks	Change in local policy	Change in national policy

Source: (OECD 2009)

Basically, the risks in lending or lenders' lending decisions would hinge on borrowers' ability to repay a loan which is determined by the feasibility of the farm business. Simultaneously, risk-aversion farmers would not be willing to borrow because they are afraid of financial liability in case of bad farming performance (Abay et al. 2021). The viability of farm business are fundamentally exposed to both micro and macro risks, such as market prices, production, financial and institutional risks as stated in the table (Maurer 2014). In his study, he mentions the three types of risks related to agricultural credit i.e. principal credit risks, specific risks and political risks. Principal risks which incur in the context of asymmetric information in the credit markets, are clearly presented in the previous paragraph named 'rural credit market'. Specific risks include production risks and market and price risks. Production risks could be attributed to any uncertainties from diseases, climate changes or even higher-yield cropping strategies which eliminate all farming return (OECD 2009). The imbalance of supply and demand conditions could result in significant fluctuations in both input and output prices. Prices of agricultural products are typically volatile especially in developing and poor countries. This is attributed to spontaneous increase in production in agricultural sectors while demand is still constant or increase a bit. The significant drops in product price have huge impacts on loan repayment ability. It is lack of supporting-agriculture policies that places agricultural production in developing countries in risks. Agricultural product price in more globally integrated markets may be affected by international production dynamics. For example, with industries' input material imported abroad, an increase in global input prices could lead to growth in local input prices and then local output price and vice versa. Similarly, if there are increases in global demand

of a product, prices of raw material production in exported countries therefore will rise as well.

In reality, every government often intervenes the agricultural sector in different ways that significantly affect agricultural markets. Government policies have directly impacts not only on production but also credit in agriculture, which could have both positive and negative signals. In many countries, especially in developed countries, government policies for balancing local product supply and demand help stabilize prices, which are limited in developing nations. The local intervention in one export product price of one large export country could trigger the significant change in this product price in global markets. On the other hand, the introduction or removal of tariff barriers can also remarkably fluctuate local prices. Government intervention is commonly observed in financial sectors in terms of subsidized loans, lending quotas or interest rate ceilings or floors. This too great involvement could make agricultural loans more risky, then leading to high transaction costs and high rate of default incurred by adverse selection and moral hazard problems. Much empirical evidence has confirmed this verdict that is mentioned according to traditional approach of credit in the section 2.2.3.

Urbanization

Urbanization refers to a complicated socio-economic process that transforms the built environment, shifting the population from rural to urban areas (UnitedNations 2019). Urbanization progress basically changes dominant occupation, social lifestyle, culture as well as demographic and socio-economic characteristics of local population. An increase in land area and population size of urban compared to rural settlements is one of major consequences of urbanization process. Urbanization is fundamentally characterized by urban planning as well as public and private investments in many dimensions of infrastructure. The phenomenon of urbanization have close relationship with modernization, industrialization and the sociological process (Gries and Grundmann 2018). However, the impacts of urbanization are mixed. According to United Nations (2019), the great positive effects of urbanization are ‘a positive force for economic growth, poverty reduction and human development’. The growth of big towns and cities are one of main divers characters of prosperous economy. The high concentration of business with various and well-educated labor force in cities may undoubtedly boost the economy with most updated entrepreneurship and technological innovation. People in cities find easier to access social services relating to education, public health than those in rural villages. Simultaneously, public investment in these services are often more convenient as well as less costly thanks to sufficient infrastructure available in urban areas (Brockerhoff 2000). Urbanization is strictly tied up with three dimensions of sustainable development: economic, social and environmental (UnitedNations 2019). Therefore, well-managed urbanization may maximize advantages as well as minimize adverse impacts of the increasing number of city dwellers. However, the

dramatically rapid urbanization, especially in developing countries has increasingly revealed negative consequences.

It is undeniable that urbanization has huge impacts on both supply and demand side of rural credit markets. Urbanization with the adequate establishment of infrastructure in a variety of forms, such as: physical, financial, technological, social and informational, could in crease both supply and demand of credit (Gabriel and Rosenthal 2013). In the research of (Lyons, Grable and Zeng 2017), the effect of infrastructure is significant on bank loans, especially for urban households while effects on non-bank loans and for rural people is negligible. However, another finding in this study shows that households living in more urbanized areas are less likely to have bank or non-bank loans. That means people living in communities with better infrastructure leading better access to lender are less likely to have a loan. This is attributed to strongly negative urbanization effect which stresses the financial sector' capacity to meet the demand. The finding of urbanized communes in Vietnam is also delivered in the research of (Khoi et al. 2013). Formal credit amounts, informal credit amounts and formal credit accessibility all have significantly negative relationship with urbanization variable. That means households residing in urbanized communes have receive less formal and informal amounts and also have lower probability of accessing formal micro-credit programs than those in other rural communes. This is explained that households have more chance to seek job in cities rather focus only farming production, so they have less credit demand for agricultural activities. Another reason is that people living in urbanized areas may have higher income and more savings to self-finance their business. In the paper, the authors mention micro-credit programs which target specific poor borrowers, therefore urbanized-commune dwellers are not the priority. The proxy of urbanization in some studies is also presented through geographical features of households, such as direct road access to village (Khoi et al. 2013) or distance between borrowers and lenders (Atieno 2001, Chauke et al. 2013).

Lenders' behavior

A credit contract is apparently characterized by both lenders and borrowers. More concretely, features of both lenders and borrowers have great impacts on credit accessibility. In some other studies, lenders' behavior are generally characterized by both micro and macro-economic factors and even there are obvious differences between formal and informal lenders' behavior. Bank lending behavior is believed to being determined by a combination of economic contexts, loan quality problems and capital growth (Shrieves and Dahl 1995). The paper focusing on the 1900s credit crunch presents the significant changes in bank lending policies to response to economic condition changes, portfolio risk levels and the dynamics of relationship between capital and lending. On the other hand, transformation of government regulation combined with changes in bankers' risk assessment contributes to substantial credit contraction.

Assuming that the factor of economic cycle remains unchanged in a given time, lenders' behavior is supposed to be affected by current policies and loan quality, in which loan quality have direct impacts on lenders' decision. More concretely, demand-side variables reflect the credit demand and the choice of borrowers to take part in which type of credit markets while supply-side factors refer to lenders' response to or lenders' behavior with borrowing demands of households. According to theory of credit markets under the view of asymmetric information, credit rationing is one of tools of lenders to react incentive problems incurred to insure the competitive interest rate and optimal expected return. In other words, lenders are very likely to be constrained by factors on the maximum amount that they can lend. This limited amount could be offered based on the likelihood of default as well as repayment ability and independent of the interest rate (Diagne et al. 2000). In the research of (Zeller 1994), he asserted that supply and demand-side (lender and borrower's behavior) should be separately analyzed. The progress starts from if households decide to participate in the credit market or not as well as the amount they demand. If they choose to apply loans, lenders have rights to partially or fully reject or approve their applied borrowings. Therefore, the approved amount is determined by both lenders and borrowers factors.

2.4.2. Internal factors of farm households

Internal factors of farming households or characteristics of households could have effects on household borrowing decisions to participate in the markets, the obtained amounts and the conditions of credit constraints- three dimensions of credit accessibility. However, in previous literature, some authors did not mention enough three dimensions. They often discuss one or two aspects. The three dimensions of credit access in papers will be depicted by dependent variables used. For example, some authors focus on only the probability of credit market participation or credit demand referring whether farmers have credit demand or not while some others consider only the credit amount. On the other hand, some others take account of the three aspects of credit accessibility. In terms of credit sources, many authors separately study formal and informal credit while some others do not. Therefore, literature on internal factors below will be presented for each paper.

Characteristics of households are socio-economic factors which include demographic, income/assets, production, credit and social features of households and household heads. The factors have been identified in numerous studies in many developing countries. Demographic factors may include information of household and household head, such as: age, gender, education, farming experience, number of family member, dependency ratio and so on while income/asset factors comprise: agricultural and non-agricultural income, savings, land ownership. Production features focus on farm size/ farm area or livestock value. Credit history will used to assess customer' creditworthiness. Social capital/social networks can be seen qualitative factors having great impacts on household credit accessibility especially

in developing countries. The proxy of this factor is differently depicted in each paper, such as: credit group membership, having acquaintances in financial institutions, working as governmental officials and so on.

In the research of (Hananu, Abdul-Hanan and Zakaria 2015), the logistic regression model is used to determine the factor affecting agricultural credit demand in Northern Ghana. The dependent variable is 'access to credit by smallholder farmers' that means 'having loans or not'. There are seven statistically significant variables: age, gender, education, household size, annual income, group membership, borrowing form informal sources – dummy variable. Age of household heads is observed to have positive relationship with households' formal credit accessibility. Age of farmers is likely to reflect their farming experiences, especially with older people rather than younger. The less credit demand for agricultural production of the younger people may due to a lot of chance to seek non-farm jobs. Regarding lenders 'view, the increased age combined with possibly increased working experiences is expected to reduce risks as well as raise the ability of repayment or the amount obtained. The positive sign of age variable is also confirmed in the paper of (Gray 2006, Yehuala 2008) Female household heads are more likely to access formal loans than males. It is explained that micro credit programs by governments in developing countries are targeted towards women. In other papers, male farmers are found to have higher opportunity of accessing rural credit than female counterparts (Fletschner 2009). Significant variable 'education' in Hananu's paper implies that better-educated farmers have higher probability to access formal credit. Better knowledge and information on credit markets, especially formal markets, may reveal high viability of farming projects and high possibility of debt repayment in time or just simply indicated their ability to comprehend banks' procedures and precisely complete loan application forms. Positive effects of education level on formal market entry are also confirmed by (Kosgey 2013, Odhiambo and Upadhyaya 2020). In this paper of Hananu (2012), the negative coefficient of the variable 'family size' in the function of credit accessibility results from bigger families having less credit demand than smaller ones. He explains that small households are often labor and input constrained, so they have more credit demand. Annual income is found to be negative to credit accessibility that means lower-income families have more credit demand than the others. This is reasonable because income could be seen as proxy of wealth, hence higher-income family could finance themselves. Group membership here symbolizes families' social network. Social group attendance as a joint guarantee helps households find easier to access formal credit. The last significant variable is not mentioned in many studies, i.e. borrowing from informal sources. The relationship between formal and informal markets is described through using the variable 'borrowing from informal sources' in the model. The positive coefficient means household borrowing from informal lenders simultaneously have more credit demand in the formal market. The authors give the two reasons: (1) informal loans have lower interest rate than formal ones so

they want to borrow from both to reduce the total costs; (2) the transaction costs for obtaining formal loans are higher than informal ones.

A research on financial inclusion in Indonesia's fishery sector also applies logistic model to find out determinants of household credit participation in bank credit market (Pranata 2019). The binary dependent variable 'obtain credit from banks' has two values 1 and 0. Four determinants of household credit participation in the paper are ratio of income over expenses, job type, years of doing business and number of family dependent. Surprisingly, the important characteristic of household 'education' here which is not the same as in other paper, has no significant impacts on credit access because most of households in the research have low education level regardless of their social status or income. Ratio of income over expenses may reflect household repayment capacity level. The higher ratio of income over expenses is, the higher probability of bank accessibility households have. The author also denotes that each job type of household heads has a different probability of achieving bank credit. While education has no impacts on credit access, years of doing business or farming experience of household heads have positive effects. Household heads' farming experience may have close correlation with age, which possibly presents the higher profitability of projects and then reduce risks and enhance the likelihood of debt repayment. In this paper, Pranata (2019) mentions the variable 'number of family dependents' rather than family size only. Household size and number of dependent people or dependency ratio of family are likely to be closely related to each other. Bigger household size could be seen as the reason of the increase in household income expansion but increased household size coupled with increased dependent people leads to the greater financial burden, possibly increasing expenses or consumption and the possibility of being poor. The positive sign of the variable has confirmed this verdict. Families having more dependents have greater probability of attaining bank credit because they require more money for necessities and for production expansion. The positive relationship is confirmed by (Simtowe, Zeller and Phiri 2006), (Shah et al. 2008). Prananta also run another model 'tobit regression' to ensure model and empirical results meeting internal and external validity of the study.

Another study conducted in one African country Kenya which focuses on agricultural credit access by grain growers, resulting in six determinants: gender, age, education, family size, applied loan and repayment period (Kosgey 2013). Age is used as a proxy for maturity, farming experience while education reflects better technical knowledge, farming skills and ability to approach more information on credit markets. The explanation for impacts of age, education is totally consistent with the studies of many authors (Pranata 2019, Hananu et al. 2015, Atieno 2001). Males in the research of Kosgey (2013) are observed to have higher probability to access credit than females. This finding contradicts that of Hananu et al. (2015) stated above. The coefficient of farm size is negative while those of applied loan and repayment period are positive. 'Applied loan' reveals that farmers who apply for credit are more likely to access the loans than those who do not.

In his paper on credit access, (Akudugu 2012) researches both credit demand by farmers as well as supply by rural banks in Ghana's upper east region. The logit model provides results on farmers' decision to access credit from the rural banks while the tobit model is applied to identify the extent of credit supply by Rural banks. The extent of credit supply is measured by the ratio of the amount of credit supplied to the farmer to the amount of credit applied for. Age, literacy, cash crop, savings, farm size, gender, politics, group member and distance have significant impacts on credit demand while only savings affected the extent of credit supply. The positive sign of age have confirmed in many papers (Atieno 2001). Literacy in this study may be equal to education in other papers. The farmers who have at least nine years of formal schooling have more credit demand because they are likely to able to read and comprehend banks' procedures than those illiterate. Female household heads are found to demand more credit than males, which is very common for subsidized programs focusing on women (Hananu et al. 2015). While interest rate variable has no impacts on farmers' credit demand, farm size has significant positive effects. The type of production 'cash crops' is found to be significantly influential. Cash crop production is a profit-making venture while food crop refers to subsistence. Therefore, farmers into cash crop production are keener on expanding their production activities in order to take advantage of economies of scale. The reason why savings have positive relations with formal credit accessibility is saving-before-credit policy by rural banks. In other words, many people have savings in some banks just because they want to obtain credit in the banks in return (Akram, Ajmal and Munir 2008). In this study of Akudugu (2012), there are two variables presenting for social networks, i.e. politics and group membership. The coefficients of those are both positive. The explanation given in the study is that such social groups are established by rural banks for mobilization of savings and credit delivery. Therefore, farmers decide to join due to the expectation to access financial services. On the other hand, social group membership could be seen as a joint guarantee for group-based lending (Morduch and Armendariz 2005, Kah, Olds and Kah 2005). It is reasonable that distance from the residence of farmers to rural banks have negative relation with credit demand. Farmers often tend to know more about the services and prefer to loans offered by lenders that are close to them. Regarding credit supply side, only tangible determinants of the extent of supply is savings. In other words, farmers having more savings are able to obtain more credit from lenders. This is attributed to 'savings before credit policy' stated above.

In other research on formal agricultural credit access of smallholder farmers in Kenya, the authors mention the variable 'flexible loans' (Odhiambo and Upadhyaya 2020). Flexible loans here refer to features of loans offered to farmers, such as grace period, repayment schedule, bullet/balloon payment, rescheduling options, refinancing options or lines of credit. In addition to types of loans, other factors are considered such as age, gender and education of households, type of loan, household size and family wealth presented by owned assets. Credit access in this study is

measured by the value of loan or loan amount. However, surprisingly, none of the flexible loan elements have a significant influence of credit access. Education and household wealth have significantly positive impacts while asset-based loan is negative. Asset-based loan as one type of loans means loans in form of asset financing instead of cash financing.

Formal credit access in Ghana is studied by (Dzadze, Aidoo and Nurah 2012) with three significant determinants: extension contact, saving accounts, education level. The logit model with dependent variable ‘ has access to formal credit’ is used in the paper. ‘Extension contact’ here means farmers receives extension services or not. The paper also focuses on rural banks as in that of (Hananu et al. 2015) and (Akudugu 2012), hence the explanation of the results are similar.

Social capital is concretely analyzed in the study of smallholder farmers’ credit access from financial institutions (Mohammed, Egyir and Amegashie 2013). Social capital may include all factors related to farmers, i.e. tangible social capital and intangible social capital. Tangible social capital could be physical, human, natural and financial resources, such as: machinery and equipment, cultivated land, labor, livestock while intangible social capital is structural and cognitive social capital, which included all socio-economic characteristics of farmers. Structural social capital is such as demographic characteristics, network, and connection/linkages. Cognitive social capital relates to share norms, values, trusts, beliefs among others and so on. The logit model is used with the independent binary variable ‘access to credit’ that means application and receipt of credit. Smallholder farmers in the study are conducted with two groups: non-farmer based organization and farmer based organization. It is very surprising that only factors relating to social capital and social network significantly affect credit access of farmers in Northern Ghana, i.e. know someone in financial institution, collective action index, homogeneity index, network connection index, level of trust index, respect for contract index. The five indices are based on the farm-based organizations’ characteristics and the social capital indicators in the World Bank paper by (Grootaert et al. 2004). Social network factor indicated by family and community networks is also found to be significantly related to individual’s access to formal credit in Indonesia (Okten and Osili 2004). The network plays an important role in providing information, so decreasing the search costs of borrowers as well as monitoring and enforcement costs of lenders.

The paper of (Li, Gan and Hu 2011) examines accessibility to microcredit programs by Chinese rural households, i.e. Rural credit cooperatives (RCCs). Both demand-side and supply-side factors are used to analyze rural household accessibility to microcredit with binary choice models. The dependent variable is 1 if the household has secured microcredit from RCCs and 0 otherwise. 12 variables are found to have significant influence on household credit access: distance between household residence and RCC branch office, household size, education, annual income, household heads’ self-employment, ratio of household members without income to income earners (dependency ratio), total value of asset, savings with

RCC, attitude towards debt (averse or not), access to other credit sources, family members working as village or township officials and household owning shares of RCC. The significant positive signs on income, self-employment, officials and education are observed. People having higher annual income or involving in self-business are more inclined to access microcredit. It is reasonable that they tend to expand their business and their high income could improve repayment ability. Family members working as village or township officials could be seen as a proxy of social network, which may reflect their presumed good relationship with local financial institutions. The positive sigs of social network in some forms are confirmed in many papers (Okten and Osili 2004, Mohammed et al. 2013) Therefore, they found easier to access microcredit programs. Asset, savings and having RCC shares may mirror family wealth. Hence the three negative variables means the wealthier families often had surplus funds to self-finance instead of borrowing. The negative relationship between family size and microcredit access in the paper of Li et al. (2011) is the same as in that of Hananu et al. (2015). While Hananu et al. explain that smaller households are likely to be input and labor constrained so they demand more credit, Li et al. give the reason of larger family's low repayment ability attributed to lower expected income per capita. This outcome contradicts that of (Vaessen 2001, Ho 2004). Vaessen (2001) gives the result of larger families having higher probability of accessing formal rural banks because of labor availability and high earning capacity. The significantly negative coefficient of distance variable is consistent with the finding of (Akudugu 2012). Li et al. clarify that increased transaction costs relating travelling costs may be perceived by greater distance from household to RCC branches. The substitute of informal credit sources for formal sources is also mentioned in the research of (Hananu et al. 2015) above. The availability of informal credit suppliers tends to shy potential borrowers from formal credit markets. Some good potential borrowers choose to borrow from informal markets even though they can succeed in obtaining credit if they apply loans to formal lenders. This is due to many barriers of formal credit markets incurred by imperfections of the markets, which is clearly in previous sections (Mallik 2015, Atieno 2001, Guirkinger 2005). Li et al.'s finding of positive relationship between dependency ratio and credit access is the same as of (Pranata 2019). Families with higher dependency ratio have a higher probability of being involved in microcredit program with low interest rate to fund their household activities, such as consumption.

While many authors above often focused on formal credit markets, (Okurut, Schoombee and Van der Berg 2005) target on credit demand and credit rationing in the informal financial sector in Uganda. The authors use Heckman two-stage (including both heckit and heckman probit) models to examine factors affecting both credit demand (demand side) and credit rationing (supply-side). Two dependent variables of models are obtained amounts and the extent of credit rationing. Therefore, the study has presented all three dimensions of credit accessibility concerning informal sources. The logit model is first applied to determine who

demand informal credit, then heckman probit models show the determinants of informal credit rationing and heckman two-stage selection is utilized to model the amount of credit approved. In terms of logit regression focusing on whether people have applied for informal credit, there are six significantly influential factors: age, gender, years of education, dependency ratio, household expenditure, land/adult equivalent and region. Informal credit demand significantly increases with household heads' age, education level, dependency ratio and the level of household expenditure. These significant results are consistent with that of (Odhiambo and Upadhyaya 2020, Hananu et al. 2015) and (Pranata 2019). Expenditure per capita in some case presenting household's wealth status is also proved to have positive relationship with credit access (Mohamed 2003). Male household heads are likely to demand more credit than female counterparts, which is the same in (Kosgey 2013). However, another proxy of household wealth 'land assets per adult equivalent' has negative signs on informal credit access in this paper of Okurut et al. (2005). The explanation for negative signs is the same as in (Li et al. 2011). Well-being families often have more surplus money to self-finance their activities so they demand less credit. The heckman two-step selection model for both demanded and received credit amount equation, in which the former has four significant factors: age, education household expenditure and dependency ratio while the latter has three ones: household expenditure, asset per adult equivalent and household size. On the other hand, heckman probit model, of which the dependent variable is depicted by being credit rationed, gives the results of six determinants: age, gender, dependency ratio, household expenditure, asset per adult equivalent and region. The variable 'household expenditure' has positive coefficients in the three functions of credit demand, amount demanded and amount received, which is reasonable and consistence with the authors' expectation. However the negative effect of the variable 'asset per adult' on credit rationing is opposite to the expectation.

The binomial logit model in the paper of (Ololade and Olagunju 2013) exposes the significant correlation between gender and marital status and access to credit, in which being a female or not being married decreases the probability of having access to credit. The other significantly influential variables are availability of guarantor with positive signal and change in interest rate with negative signal.

In the paper of (Kuwornu, Ohene-Ntow and Asuming-Brempong 2012), the authors just focuses on credit constraint condition of farmers from formal banks, which refer to supply side or credit suppliers' behavior rather than demand side. The probit model is utilized with the dependent variable 'credit constraint condition' which means whether a farmer received only a part or full of the loan applied. There are four significant determinants in the paper: gender, household size, annual income and farm size. The positive sign of gender variable means male farmers are likely to be more credit constrained than females. This is contrary to the findings in other papers. Male farmers are also found to have higher opportunity of accessing rural credit than female counterparts (Fletschner 2009, Kosgey 2013). Both household size and annual income have a positive sign while farm size had a negative one. The

positive coefficient of household size means families with more members are more likely to be constrained. The sign of annual income and farm size is contrary to the authors' expectation. The findings of family size is the same as that of (Nuryartono 2007). Nuryartono states that larger families are more likely to suffer from risk because family size could be seen as a proxy for risk bearing capacity. However, total income variable in Nuryartono' paper has the opposite effect compared to that of Kuwornu et al.'s study. Nuryartono considers total income as a proxy of household welfare, so the greater the households income have, the less credit constrained the households are subject to. The increasing household income may imply better repayment ability. The negative relation of 'farm size' and 'credit constraint condition' is inconsistent with some other studies (Oyedele et al. 2009).

There are many studies on household credit access in Vietnam which are often carried in many provinces with different climate, geography, and households' socio-economic characteristcs. In reality, there is no consensus in the name of factors used. They could be different in each country or between studies among a nation. We will discover the determinants of houseohlds' credit access in Vietnam to compare other studies in other developing countries discussed above.

In their research, Barslund et al. conduct a survey on both formal and informal rural credit in four provinces of Vietnam (Barslund and Tarp 2008). The authors evaluate credit accessibility with three dependent variables: farmer credit demand, loan amounts obtained and level of credit rationing. Formal and informal credit access is conducted both in the pooled samples and in separate credit markets. Many other Vietnamese researchers also separately investigate formal and informal credit markets (Khoi et al. 2013, Bao Duong and Izumida 2002) For pool samples, with probit model, farmer credit demand is determined by factors such as: age, land holdings, adults, feed, distance, connections, regions (by province) while loan size is determined by the OLS regression model. Land holdings have significantly positive impacts on credit demand but no effects on loan size. Families with more adults have higher credit demand, which implies more potential investment in the future or increasing expenditures. However, the impacts of land holdings in each province are different. The proxy of social network in the paper is connection or connectedness that is denoted by the fact of households having acquaintances in existing credit institutions. The connection variable has a clear and positive effect on credit demand and not on amount obtained. While land holdings have significant impacts on credit demand but little on amount obtained, total assets and the value of livestock (depicted by feed expenditure) were opposite. Obviously, lenders' decisions (amount obtained) are affected by actual expenditure and repayment ability rather than only land holdings. Age is observed to negatively relate to just credit demand.

When Barslund et al. (2008) separate the formal and informal credit access, the results are interesting. Formal demand is driven by age, land, adults, feed, total assets, distance connections and region. Different from the results of pooled samples above, feed (expenditure) and total assets have significantly positive correlation with

both formal demand and formal obtained amount. In addition to feed and total assets, age, education and regions also determine households' amount received from formal lenders. On the other hand, informal demand is negatively associated with age, education, total assets, red book status while the coefficients of feed, dependents, connections, and 'not paid' are positive. The positive sign of dependents and bad credit history reflect household needs to smooth consumption and address external shocks. There is a clear difference that the signs of total assets on formal demand and informal demand are contrary. That means families with higher total asset value are more likely to demand formal borrowings than others. In other words, assets could be seen as collateral so households having low-value assets are afraid of being rejected by formal lenders. Consequently, they tent to approach informal sources. Regarding to amount received from both formal and informal sources, significant an insignificant factors are much different. In terms of some demographic factors, age and education significantly relate to formal amounts but informal amounts are determined by gender and adults. While the coefficient of land holdings variable is significantly negative in only informal equation, coefficients of total assets and feed are significantly positive in the two equations of both formal and informal credit.

Barslund et al. (2008) consider lender's behavior in the form of dependent variable 'loan is approved or rejected'. The authors apply heckman probit to address this sample selection bias because lenders' behavior could be observed for households who applied for credit. Four sub-regressions in addition to the main regression are used to clearly examine determinants of credit rationing. For the based regression, there are six significant factors: age, gender, adults, feed, connections and provincial dummy. The four sub-regressions reveal two more significant factors, i.e. education and credit history to make the results robust.

(Khoi et al. 2013) in the study of credit access in the Mekong River Delta of Vietnam, has deeply analyzed the effect of credit source on access to rural credit, i.e. the effect of informal amounts on formal credit accessibility. The concept is discovered by some authors in other countries (Li et al. 2011, Hananu et al. 2015). The three equations are mentioned in the paper of Khoi et al. (2013) with three dependent variables: informal amounts, formal amounts and formal credit access. Firstly, informal amounts are significantly explained by age, education, land ownership, savings, income levels, purposes of informal loan, informal interest rate, duration of informal loan, direct road access to village and urbanized commune. Informal amount equation is estimated by tobit model. The positive signs of age and education mean that older and less-educated household heads obtain less credit from informal lenders. On the other hand, households with land ownership could borrow more informal credit. This is inconsistent with the finding of (Barslund and Tarp 2008). The coefficients of savings and income levels are found to be negative. In many previous papers, savings and income could be regarded as the proxy of family wealth, so households with big savings or high-income level often demand less informal credit. Three factors affecting informal loans are loan purposes, interest

rate and duration which all have positive signals. It is interesting that informal credit demand for consumption and small trade are higher than for agricultural production. This fact reflects the segmentation of rural credit markets in Vietnam and some other developing countries (Bao Duong and Izumida 2002, Hoff and Stiglitz 1990). Two significant geographic factors, i.e. direct road access to village and urbanized commune, have opposite signals, in which urbanized commune variable with negative coefficient exposed the choice of many household to seek city jobs rather than doing farming. It is interesting that the direct road and urbanization are often identified in many credit paper in Vietnam, which reflect the trend of rural development in rural areas of Vietnam.

In terms of determinants of formal microcredit accessibility, Khoi et al. (2013) mention ten significant factors as follows: age, marital status, ethnicity, government employees, member of credit group, poor certificate, income level, sources of main income, geo-economic factors and informal loan amounts while formal amounts are explained by education, household head occupation, the value of agricultural land, health expenditure, formal subsidized interest rate, purposes of formal loan and urbanized commune. Formal accessibility is estimated by probit model and heckman selection model is used for formal amount function to avoid selection bias. It is very clear that two determinants relating social network, i.e. member of credit group and government employees are delivered in formal microcredit accessibility equation while there are no significant social network variables in formal amount equation. The two social network factors are also stated in the research of (Hananu et al. 2015, Li et al. 2011). Similar to Barslund et al.' s paper (2008), formal amounts which partly reflect lenders' behavior on credit rationing are determined by the factors relating to actual loan purposes, actual expenditure as well as borrowers' ability to repayment debt. The study also clarifies the segmentation of Vietnam rural credit markets in which formal credit is often used for agricultural production while informal credit targets diversified purposes.

In another research on rural areas of Vietnam, (Bao Duong and Izumida 2002) conduct survey in three provinces representing three main regions of Vietnam: Ninh Binh (North), Quang Ngai (Centre) and An Giang (South). Formal and informal credit is separated in the studies. The authors evaluate credit accessibility of rural household through received amounts and lenders' behavior. Both formal and informal amounts are estimated while only formal lenders' behavior is considered. Tobit estimations are used for amount function and probit model is applied for formal lenders' behavior. Formal amounts are significantly explained by total farming area, total production value of livestock and provincial dummy. The results of formal amounts may confirm the rural credit market segmentation of which formal credit is used to invest in livestock production. Only two factors are observed to significantly correlate with informal amounts, i.e. total farming area and dependency ratio. The finding of dependency ratio variable is consistent with that of (Barslund and Tarp 2008) who mention dependency as one determinants of informal credit demand. Household with high dependency ratio often borrow from informal

sources for consumption smoothing while they could not obtain formal loans. The significant coefficient of total farming area in informal amount equation uncovers the fact that informal credit markets could be a substitute or a complement to the formal credit markets in case formal markets could not meet the actual credit demand.

Many Vietnam credit paper have detected the importance of social network/capital in households' formal credit accessibility. In their research on credit access, (Luan and Bauer 2016) identify the significant social network variable: the number of people known who could be asked for help. The dependent variable is binary variable with a value of 1 if a household took out a loan. The number and the type of helpers are supposed to be indicative of a greater level of social interaction, which are observed to have significantly positive relationship with credit access. In the paper, in addition to this social network variable, other influential factors are the number of contacts with agricultural extension in the last 12 months, age of household heads, total value of savings, household experience any types of shock. In other study of (Dinh, Dufhues and Buchenrieder 2012), network-based determinants of credit constraints include four variables: bonding (strong ties to persons of similar social standing), bridging (weak ties to persons of similar social standing), bond-link (strong ties to persons of higher social standing) and bridging-link (weak ties to persons of higher social standing). Only bond-link variable has significant and negative impact on the extent to which a household is credit constrained. The significant variable implies that the greater the number of socially higher ranking personal network members to whom a household is connected, the lower the probability of credit constraints the household is likely to encounter. Some other significant variables are presented in the paper, such as number of past credits, ethnic, income and regional dummies. Ethnicity is also pointed out in some Vietnam study on rural credit access. This variable receives value of 1 if households are the King majority and other minorities receiving 0. Ethnicity has significantly positive correlation with formal credit demand/ amounts and negative with formal credit constraints (Duy et al. 2012, Khoi et al. 2013). As a result, minorities often refer to those populations less wealthy, less educated or less collateral.

2.5. Chapter conclusion

The chapter starts to focus on the importance and the characteristics of agricultural sector in economic and rural development, poverty reduction and as source of livelihood for rural population. The concept of agricultural and rural credit is defined in the relationship with other financial sectors of the financial market system. Many researchers advocate indirectly causal link between agricultural credit and economic growth through two channels: capital accumulation and technology adaption while some others argue with this because of risks in economic transformation.

One of most important sections of the chapter is 'theories of credit markets' which originates the concept of credit accessibility/access. Credit market theories depict

how credit markets as well as participants of the markets function and their relationship. The modern view of credit market theories is widely accepted is information asymmetries of the markets. Increasing interest rates was failed to reduce the riskiness of loans due to asymmetric information problems between lenders and borrowers. Therefore, the best solution to the problems is rationing credit amounts at suitable size rather than only driving interest rate up. In addition to credit rationing method, lenders use both direct and indirect mechanisms of loan monitoring to solve problems of information asymmetries.

The concept of credit access is defined based on the supply-demand framework, of which credit access constitutes three dimensions: borrowers' participation in the markets, their credit amounts obtained and the level of credit rationing by lenders. There are some overlaps between some terms 'credit access/accessibility, credit constraints'. 'Credit constraints' intentionally refer to reasons why households are constrained and types of constraints. However, all of them are explained based on supply-demand actors. Socio-economic impacts of households' credit uptake on their social welfare are analyzed in many studies but the results are different. Household social welfare in each study can be depicted as income, production output or expenditure or even socio-economic impacts can be evaluated through indicators of poverty reduction. Results of some studies favor the positively significant correlation between credit uptake and household income/output or negatively significant correlation between credit constraints and households' welfare while some others show that the correlation is insignificant.

The next section of the chapter reviews previous literature on determinants of credit access, including internal and external factors. External factors which stay outside households often include: information asymmetries of credit markets, systemic risks in agricultural production, urbanization and lenders' behavior. Imperfect information of the market and systemic risks may affect both lenders and borrowers' behavior. Type of customers as well as approaches and cost of analyzing customers' data of each lender will determine this lender' decision in approving or rejecting and rationing loan application. Meanwhile borrowers' awareness of each lender will affect their choice of credit sources. Similarly, systemic risks in agricultural production may have strong impacts on borrowers' income and their repayment capacity, so simultaneously affect lenders' decisions. Supply and demand in credit markets are also partly determined by urbanization. Urbanization may boost or decrease both credit supply and credit demand in agricultural production. More concretely, it can decrease credit demand of small-scale households but increases that of large-scale ones. In other words, the changes in households' income in highly urbanized areas may affect their decision. In some research, credit market supply even does not meet the demand owing to high speed of urbanization. Meanwhile, credit supply is very likely to surge due to the expansion of the financial systems. Last but not least, lenders' behavior is the direct determinants of credit supply in the markets. It is interesting that lenders' behavior is determined by both macro and micro factors. Macro factors may include macro economic situations or government

policies on credit while micro factors are lenders' lending policies and loan quality, of which loan quality is characterized by customers' socio-economic characteristics. Customer's characteristics here are internal factors that decide their credit demand as well as their market participation, amounts they receive and lenders' behavior towards loan application as stated before. The socio-economic factors could be categorized in five groups: demographic factors, income/asset factors, credit factors and production factors and social capital/networks. Each research will use different factors or even the same type of factors but in a different proxy. The four former factors can be not difficultly observed while the last latter one 'social capital/network' factors are often diversified and can be latent. Social networks can be observed through occupation, social relationship or social status. The differences in choosing variables/factors of each research come from the distinctive characters of the research site and research sample.

The measurement of determinants of credit access can be conducted for pooled or separate types of markets. Some authors just focus on formal credit markets or informal ones while some others take into account both of them. However, analyzing data for pooled types of credit markets may make the results bias. Therefore, in this thesis, the author will separately analyze formal and informal credit markets.

3

Agricultural credit and policy for agricultural credit in Vietnam

Vietnam agriculture has remarkably developed over the past 30 years since the economic and political reforms under "Doi Moi" launched in 1986. The radical transformations are observed both in terms of production and trade. From one of the world's poorest nations after war, Vietnam now becomes a lower middle-income country as well as one of the biggest foods exports in the world.

The chapter will provide overview of agricultural sector as well as government policies for agricultural credit in Vietnam. Hence, the chapter includes three parts. The first part describes the overview of agricultural sector in Vietnam, including macro information and characteristics of agricultural sector. The second section focuses on agricultural credit in rural of Vietnam, which constitutes overview of agricultural and rural credit markets and their features as well. The next part is key policies for agricultural and rural credit in Vietnam. The fourth section is summary of the process of agricultural and rural credit market development in Vietnam. The last section is conclusion of the chapter.

3.1. Agricultural sector in Vietnam

3.1.1. Overview of Vietnam agricultural sector

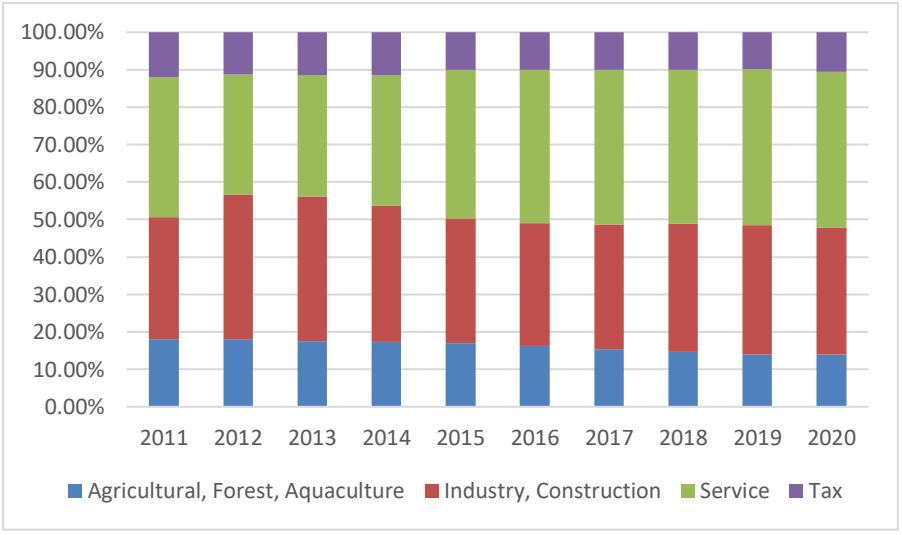


Figure 3.1. Vietnam GDP by economic sector from 2011-2019.
Source: GSO

It is obvious that the share of agricultural sector in Vietnam GDP has increasingly decreased from 2011 to 2020, around 18% in 2011 and just 14% in 2020 while the proportion of industry-construction and service have annually undergone an upward trend. Simultaneously, the growth rate of agricultural sector has experienced a

downward trend as describe in figure 3.2 below. The decreases in GDP share of the agricultural sector are due to Vietnam's shift towards a service economy.

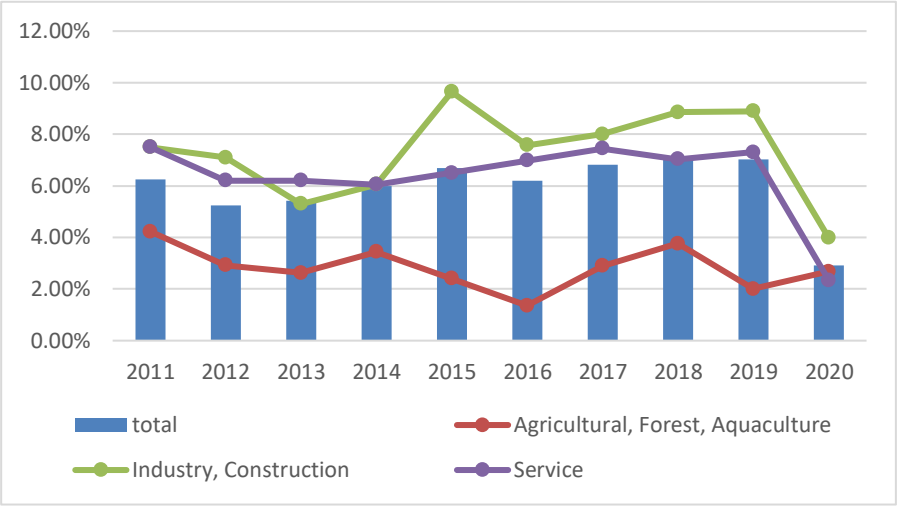


Figure 3.2. Growth rate of GDP by economic sector

Source: Author's calculation from GSO

Figure 3.2 presents information on growth rate of Vietnam GDP and GDP of each economic sector from 2011 to 2020. The rates of agriculture, forest and aquaculture has declined from more than 4% in 2011 to around 2% in 2020. Meanwhile, the service sector and industry-construction sector witnessed the higher growth rate than that of total GDP.

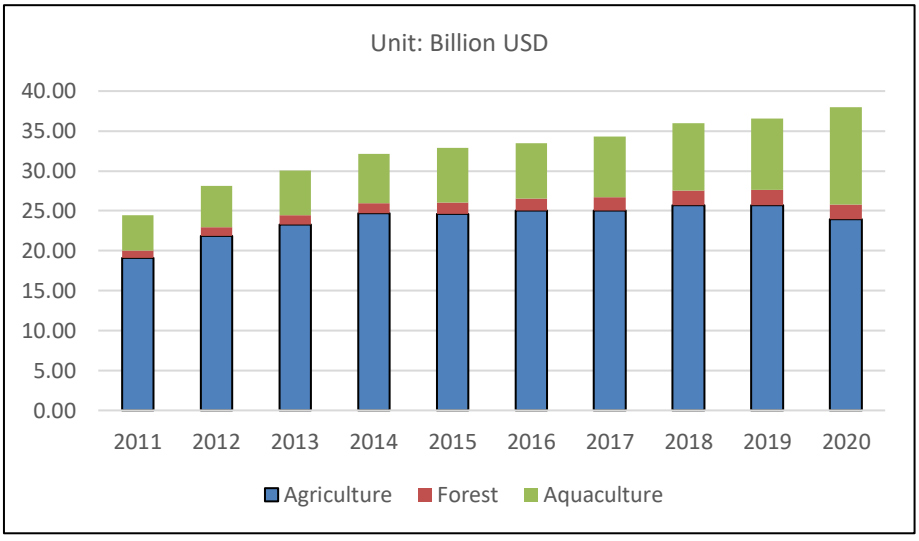


Figure 3.3. Constitution of Agriculture, Forest and Aquaculture GDP value

Source: GSO

Despite of the decreased share in GDP structure as well as declined growth rate, the value of agricultural sector has steadily risen year by year in figure 3.3. GDP of both agriculture and aquaculture sub sector have also witnessed the annual rise. However, the changes in share of each sub-sector are different in figure 3.4.

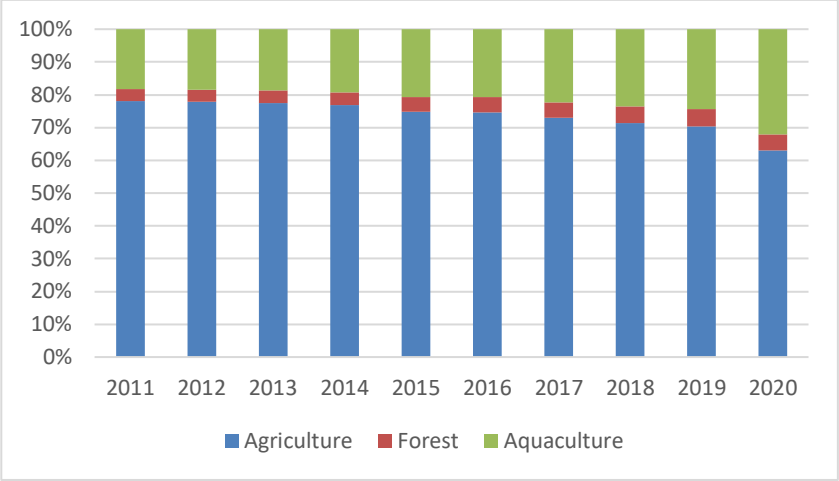


Figure 3.4. The GDP share of sub-sectors in agricultural sector

Source: Author's calculation from GSO

The share of the agriculture sub sector has gone down from approximately 80% in 2011 to around 60% in 2020. This decrease is replaced by the increase in aquaculture share. The increase in GDP share of aquaculture subsector is enhanced by its current fastest growth rate in figure 3.5.

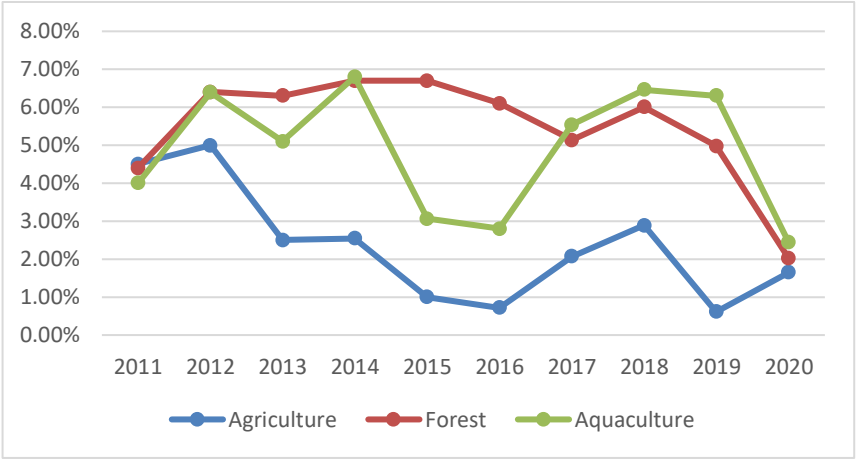


Figure 3.5. GDP growth rate of agriculture's sub-sectors

Source: Author's calculation from GSO

In figure 3.5, the growth rate of agriculture subsector significantly decreased in 2015, 2016 and plunged in 2019 at 0.61% due to climate changes as well as animal diseases seriously affecting livestock production. However, agriculture is one of sectors which always experience trade surplus thanks to annual increasing export turnover, while national trade balance stayed negative in 2011 and 2015 (figure 3.6).

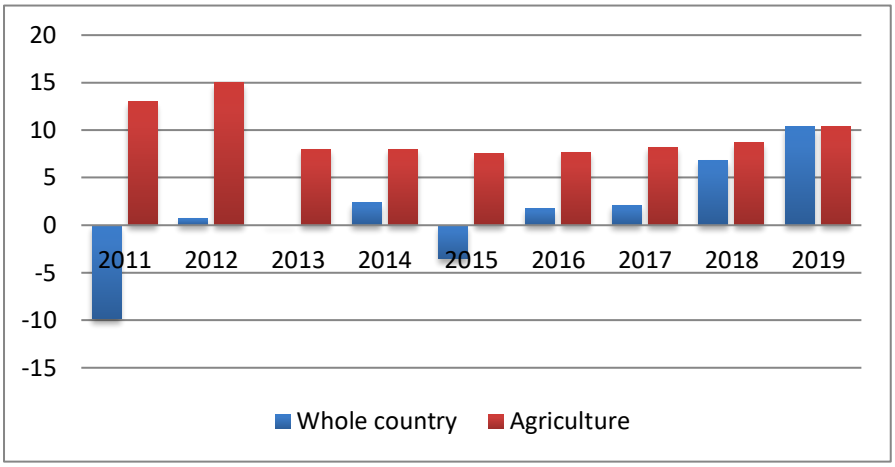


Figure 3.6. Trade balance of whole country and agricultural sector (Billion USD)

Source: GSO and MARD

Vietnam with significant growth in agricultural exports now ranks among the top five global exporters in products as diverse as shrimp, coffee, cashews, rice and pepper (WorldBank 2016) in figure 3.7.

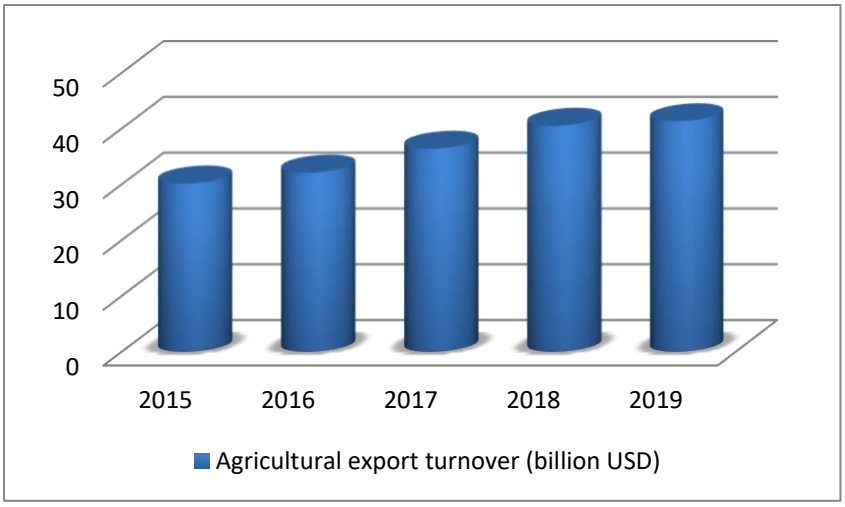


Figure 3.7. Agricultural export turnover of Vietnam

Source: MARD

3.1.2. Some characteristics of agricultural sector

It is undeniable that Vietnam's performance of agricultural output or export or growth rate has been more notable than its gains in efficiency, farmer welfare and product quality (WorldBank 2016). In other words, Vietnam is facing with trade-offs between economic, social and environmental objectives in the process of agricultural development. Analyzing some characteristics of agricultural sector of Vietnam will help to get clear insights of it.

3.1.2.1. Labor force

Although the GDP proportion of agricultural sector remain the lowest and even its growth rate has decreased year by year, agriculture still employs approximately half of population.

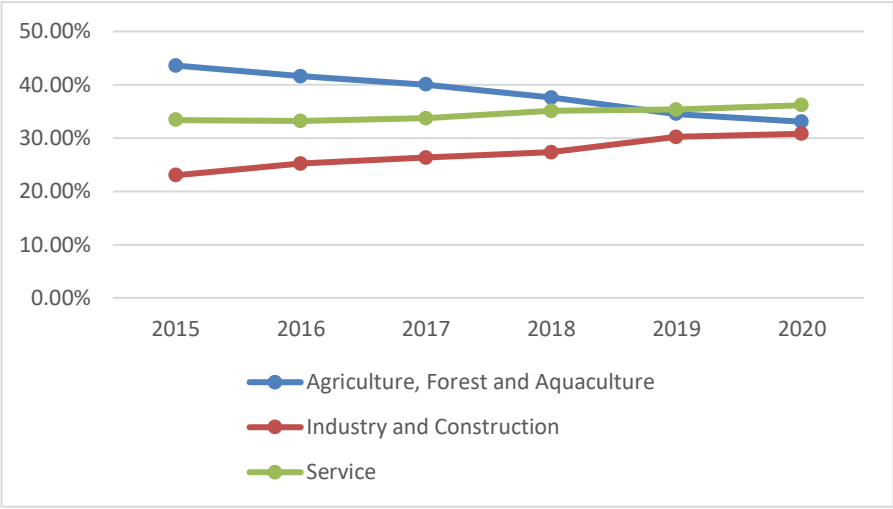


Figure 3.8. The share of labor force by economic sector

Source: GSO

Figure 3.8 presents the downward trend of the proportion of labor force in agricultural sector despite of its highest number among the three economic sectors. The percentage of labor force in agriculture, forest and aquaculture is 43.6% in 2015 and just 34.5% in 2020. The majority of agricultural labor force, approximately 90%, is rural people.

Despite its economic development with rapid urbanization, rural labor force of Vietnam remains the majority compared to urban one. The proportion of rural labor force is around 70% in 2010 and slightly decreases at 67.6% in 2019 (GSO 2019). On the other hand, a larger rural population works in agricultural sector, at more than 50% in both 2011 and 2016 in table 3.1. However, labor structure has moderately transited from agricultural to non-agricultural sectors. Agricultural labor share tend to decrease from 2011 to 2016, from 59.59% in 2011 and 51.39% in 2016. Meanwhile, the percentage of non-agricultural labor has the increase of 6.88%.

Table 3.1. Labor force in rural areas of Vietnam

	Labor (Million person)		Structure (%)	
	2011	**2016**	**2011**	**2016**
Total	**32**	**31.02**	**100**	**100**
Agricultural sector	19.06	15.94	59.59	51.39
Non-agricultural sector	12.45	14.21	38.92	45.80
Inactive	0.48	0.87	1.49	2.81

Source: Rural, Agricultural and Fishery Census 2016 (GSO 2016)

Despite of its largest share of labor force among the three economic sectors, agriculture has witnessed the lowest percentage of trained employed population with certificate, just about 4% in 2019. Meanwhile, the rates of industry and construction sector range from 14.1% tom 76.4% for each sub-sector in 2019, for example the lowest of 14.1% for construction and the highest 76.4% for electricity, gas, steam and air conditioning supply. The rate is even higher in service sector with the highest number of 92.2% for human health and social work activities as in figure 3.9 (GSO 2019).

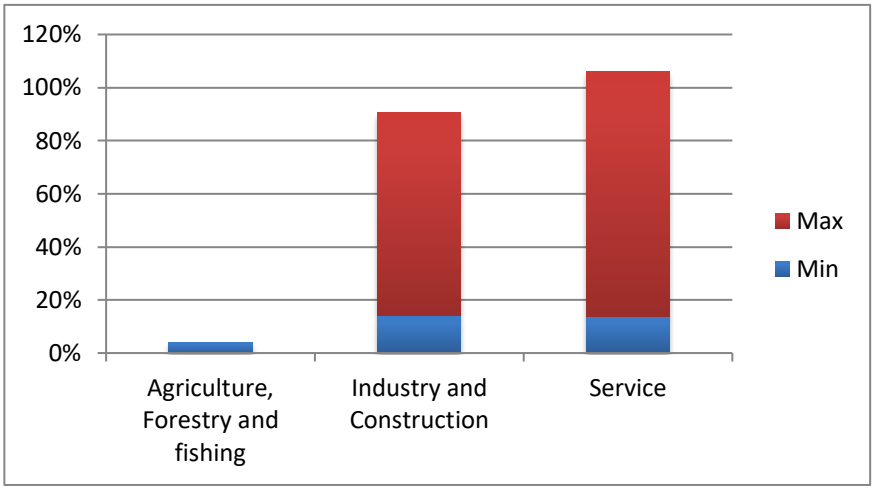


Figure 3.9. Trained employed population with certificates by economic sector

Source: GSO (2019)

The distribution of agricultural labor force by qualification is presented in figure 3.10. There are 92.07% not receiving vocational training and followed by those who had received training without certificates, nearly 4%. Total of people had been trained and provided with certificates of professional qualifications from primary level or higher just accounts for about 4.3. The low labor quality in agricultural sector in Vietnam is likely to be a significant constraint to improving productivity, quality as well as efficiency in production and business.

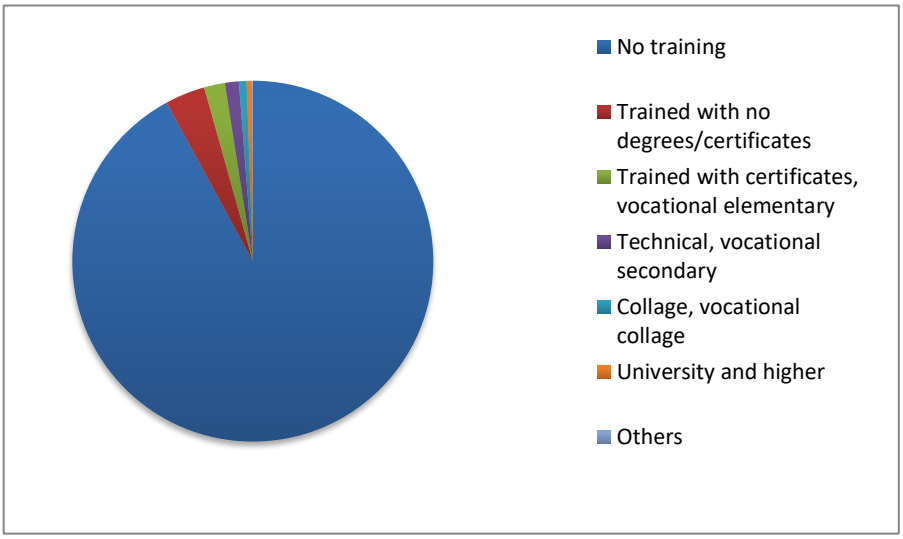


Figure 3.10. Agricultural labor force by vocational training qualification
Source: Rural, Agricultural and Fishery Census 2016 (GSO, 2016)

3.1.2.2. Production scale

There are three kinds of agricultural, forestry and fishery production units: enterprise, cooperative and households. Among three kinds, household remains the fundamental production units, making up for 99.89% in 2016 as in table 3.2.

Table 3.2. Distribution of agricultural, forestry and fishery unit

Kind of unit	Number of units		Structure (%)	
	2011	**2016**	**2011**	**2016**
Total	**10,376,981**	**9,291,825**	**100**	**100**
Enterprise	2,536	3,846	0.02	0.04
Cooperative	6,302	6,946	0.06	0.07
Household	10,368,143	9,281,033	99.92%	99.89

Source: Rural, Agricultural and Fishery Census 2016 (GSO, 2016)

Among households using agricultural land, the proportion of those with land area lower than 0.2 ha is 36.05% while those with are from 5.0 ha and over just accounts for nearly 2.3% as in figure 3.11. Therefore, nearly 90% of households have land size smaller than 2 ha. More concretely, the percentage of households growing annual crop just with the land area of under 0.2 ha is 44.6% household while that of rice plating households is 53.7%. There are 67.5% of pig families raising under six pigs. Chicken raising households with the scale of under 20 heads accounts for 46.6%. The share of aquaculture households with water area under 0.2 ha makes up a large number, at 73.1% (GSO 2016).

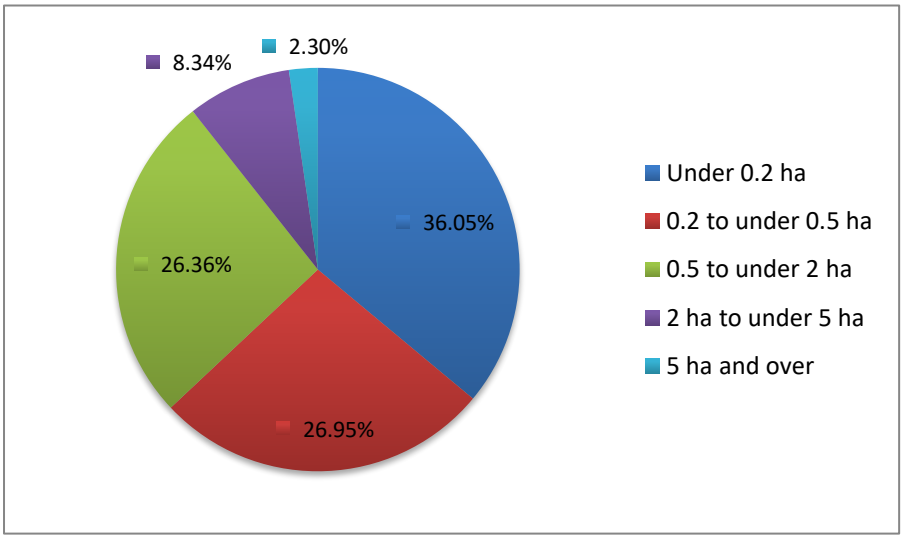


Figure 3.11. Agricultural land size of households

Source: Rural, Agricultural and Fishery Census 2016 (GSO, 2016)

One household who is recognized as a farm must satisfy the minimum area and output value of goods per year. The farm criteria is based on circular no 27/2011/TT-BNNPTNT and now replaced by no 02/2020/TT-BNNPTNT. However, the rural, agricultural and fishery census was conducted in 2016, farms in the census are recognized by circurlar no 27/2011/TT-BNNPTNT.

Table 3.3 Number of farms in 2016

	Number of farms	
	2011	**2016**
Total	20,028	33,477
Cultivation farm	8,665	9,276
Livestock farm	6,348	21,060
Forestry farm	50	113
Fishery farm	4,522	2,402
Mixed farm	443	626

Source: Rural, Agricultural and Fishery Census 2016 (GSO, 2016)

After two census of 2011 and 2016, the number of farms sigficantly increased from 20,028 in 2011 to 33,477 in 2016. The increase in number of livestock farm is greatest, of which the number of 2016 is around three times as great as that 2011. Reversely, the number of fishery farm reduce to half. Despite the growth in farm number, the ratio of farms to households just is 0.36%. almost all farms are small-scale production, mainly based on family scale. Therefore, they are constrained to attracting workers and generating jobs for rural population.

In addition to the characterisics of labor force and production scale, the application of new technology, science and mechanization in production as well as production efficiency should be considered as the noticable features of Vietnam agricultural sector nowadays. The Vietnamese Good Agricultural Practices (VietGAP), the use of net-house or greenhouse in cultivation and the establishment of production linkages in value chains are commonly applied in many provinces. On the other hand, mechanization of production is strengthened by the increase in numbers of 12 types of key specialized machines and equipment in agriculture. The number of item used in 2016 is 6.3 million, increased by 66.4% compared to 2011 (GSO, 2016). However, the production area is supported by machine accounts for the small share comprard to the total, for example the proportion of rice area with machine support is just 12.5%. Similarly, the share of production out with the technology and science such as vietGAP is just equal to a small percentage of the total.

3.2. Agricultural and rural credit in Vietnam

3.2.1. The organization of agricultural credit markets

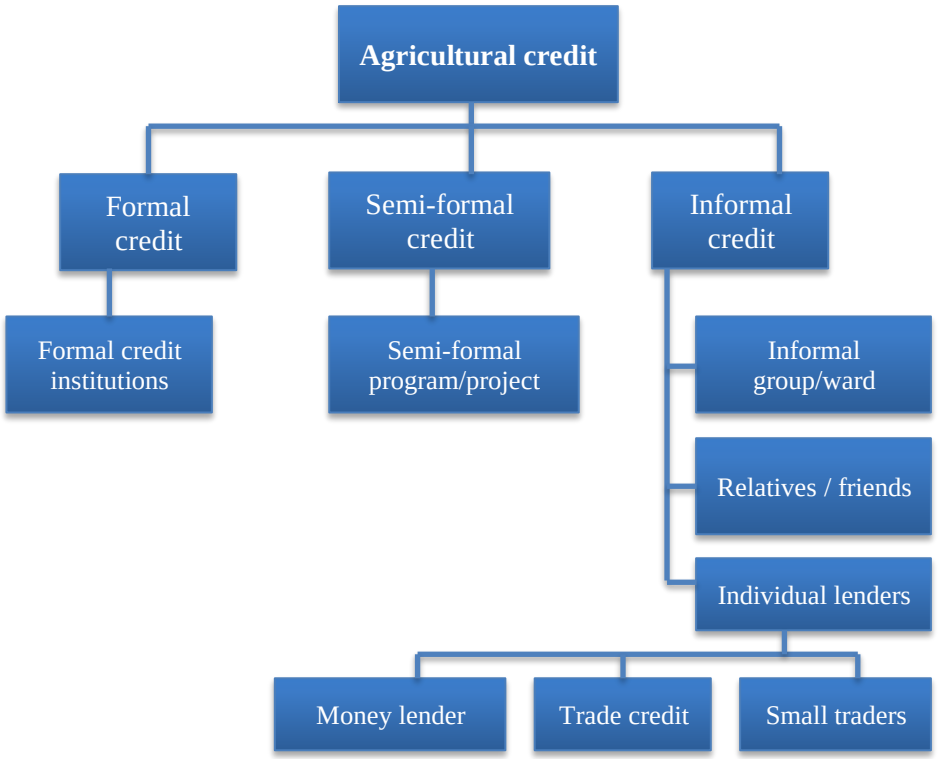


Figure 3.12. Agricultural credit markets in Vietnam
Source: Author's summary and adapted from (ADB 2010)

Vietnam agricultural credit markets could be categorized into three sections: formal, semi-formal and informal credit markets as in figure 3.12.

Formal credit is provided by formal credit institutions. Now there are about more than 100 formal credit institutions in Vietnam which are categorized in five types: banks, non-bank credit institution, micro-finance institutions, foreign bank branches and representatives offices as in figure 3.13 below. Bank institutions include commercial banks, policies banks (VBSP and VDB) and cooperative bank. People credit funds (PCFs) are Cooperative bank's members however PCFs are not considered as actual banks. PCFs just offer some banking service based on government regulations. However, formal credit in agricultural sector is mainly supplied by the four institutions: VBARD, VBSP, PCFs and micro-finance institutions. Formal micro-finance institutions originated as micro-credit program operated by foreign NGOs with the purpose of supporting the poor people, especially in rural areas and in agricultural sector. Nowadays, formal micro-finance institutions provide financial services aiming to meet the needs of individuals and families with low incomes or micro-enterprises in both agricultural and non-agricultural activities. The micro-finance programs and projects which have not been qualified as formal institutions by SBV are classified as semi-formal credit sources. However, the outstanding credit balance of micro-finance institutions as well as the network of branches is often much smaller than VBARD, VBSP and PCFs.

VBARD (Vietnam bank for Agriculture and Rural Development) was established in 1988 and officially came into operation in December 1900. The bank's networks are dense and spread all over the country in both urban and rural areas with more than 2000 branches. VBSP originated the Vietnam Bank for the Poor (VBP) which started to operate in 1996, providing low interest rate credit through micro-credit programs to the rural poor. The Vietnam Bank for the poor operated for non-profit purposes and poverty reduction under VBARD. In order to separate preferential credit from commercial credit, Vietnam Bank for Social Policies (VBSP) was established in 2002 and separated from VBARD. VBSP's main activities are lending to the poor, in which the loan procedure is implemented by the bank, local authorities and local associations. In other words, the bank almost offers indirect lending to borrowers through local social associations (Women's Union, Farmers' Union, Youth Union and Veteran Union). The local social associations act as guarantors of borrowers. Therefore, borrowers are not required for collateral but must be in the borrower list of the local commune.

The People's Credit Fund (PCF) system originates as a pilot program that was monitored by the State Bank in July 1993. It is a saving and credit institution whose operation model is based on the Caisse Populaire model, Canada. PCFs mainly operate in rural areas where they are located. In other words, almost all loans offered by PCFs direct to local people of the commune as PCF's location. The purpose of PCFs is to mobilize on-the-spot deposits for local loans as the ways to support community and local development.

Semi-formal credit sector includes various suppliers of micro finance. They could be characterized by: (1) a component of any program/project development providing microfinance service; (2) in-charge micro-finance programs which are not qualified as an formal micro-finance institution; (3) social funds (micro-finance operation under decree No. 30/2012/ND-CP; and (4) non-governmental organizations who provide micro-finance services, including international NGO regulated by decision No. 340/QĐ-TTg and local NGOs under No. 88/2003/ND-CP.

Among the three categories of agricultural credit, types of informal credit are most diversified. Although the dense network of formal institutions and the development of semi-formal organization, a large gap in the credit markets continues to exist. Hence, the existence of informal credit markets seems to fill this gap, performed as a supplement of formal credit's shortage. Informal credit fund could be achieved from relatives, friends, informal credit and saving groups (CSG), such as 'ho, hui, phuong' or local lenders. Local lenders are often local moneylenders or small traders (input suppliers or local dealers). Small traders provide trade credit in commodity instead money. The type of local lenders now has become an important and so popular in rural areas with more than 51% of households credit being granted via this (Putzeys 2002).

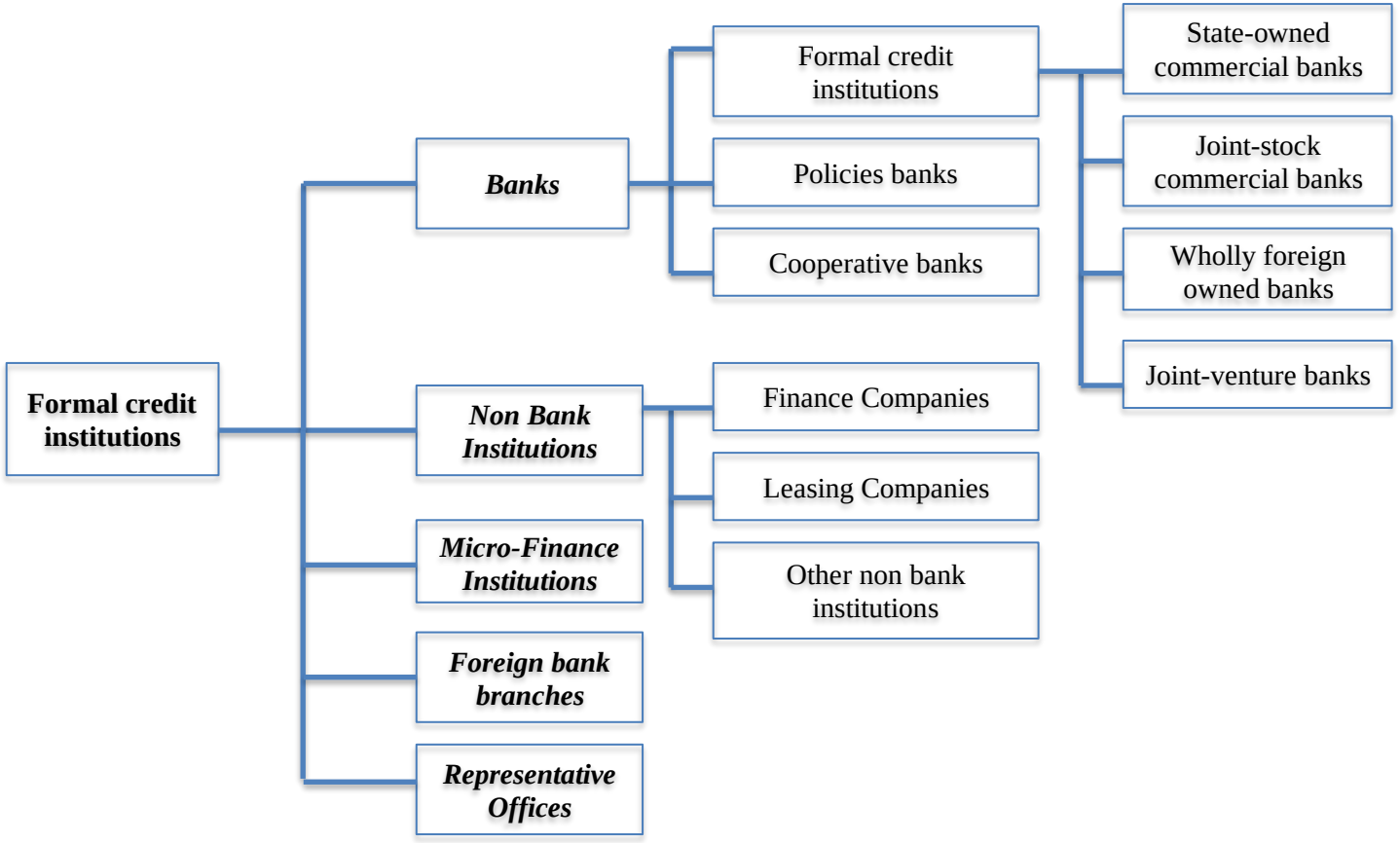


Figure 3.13. System of formal credit institutions
Source State-owned bank of Vietnam

3.2.2. Features of agricultural credit markets

3.2.2.1. Some macro indicators

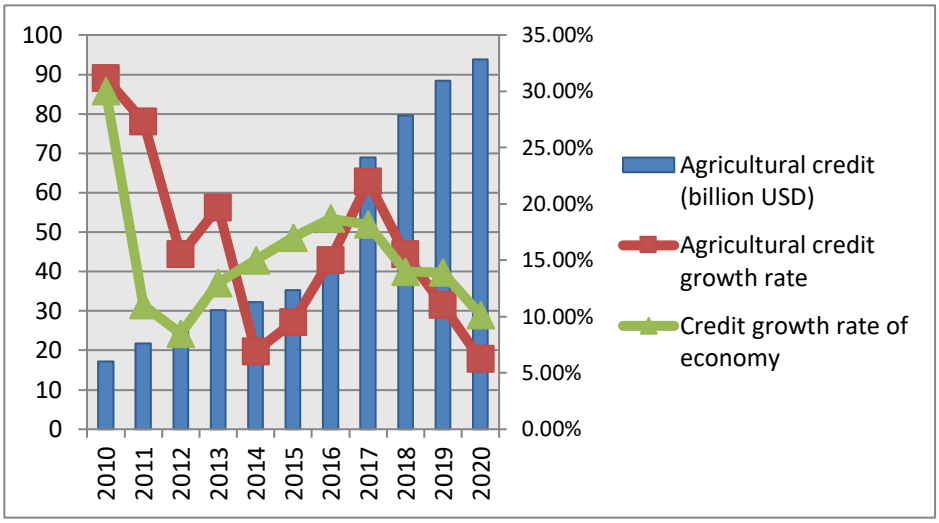


Figure 3.14. Agricultural credit and agricultural credit growth rate of Vietnam

Source: State-owned bank of Vietnam

Despite remarkable surge in agricultural outstanding credit to the economy, agricultural credit growth tend to decrease from 2010 to 2020. The credit growth rate in agricultural sector is higher than that of the whole economy in some years (figure 3.12). The significant decrease of agricultural credit growth rate in the recent three years 2018-2020 may be due to a combination of supply and demand factors. However, the average credit growth rates of agricultural sector are higher than that of the whole economy. In the period of 2010-2015, the former was 17.4% while the latter was 13.39%. The agricultural credit growth rate averages 19.8% for the period of 2016-2020 and that of the whole economy is 15.25% (Vietnam SBV report).

According to SBV' report; now more than 80 credit institutions and around more than 1000 PCFs are offering agricultural loans, including foreign banks. However, some domestic commercial banks, VBSP and PCFs accounts for the main market share of agricultural credit. Among commercial banks, the four largest commercial banks with the biggest charter capital are Agribank, Vietcombank, Vietinbank and BIDV. The four banks' outstanding agricultural credit makes up around 50% of the whole economy' credit in agricultural sector. The biggest share of agricultural credit, i.e. 38%, is offered by Agribank, which is totally state-owned commercial banks. On the other hand, Agribank has the highest ratio of agricultural credit to its total credit compared to others commercial banks, ranging from 65% to 70% (VBARD financial reports, 2019). Vietcombank, Vietinbank and BIDV are three commercial banks where the state holds more than 50% of charter capital (figure 3.15).

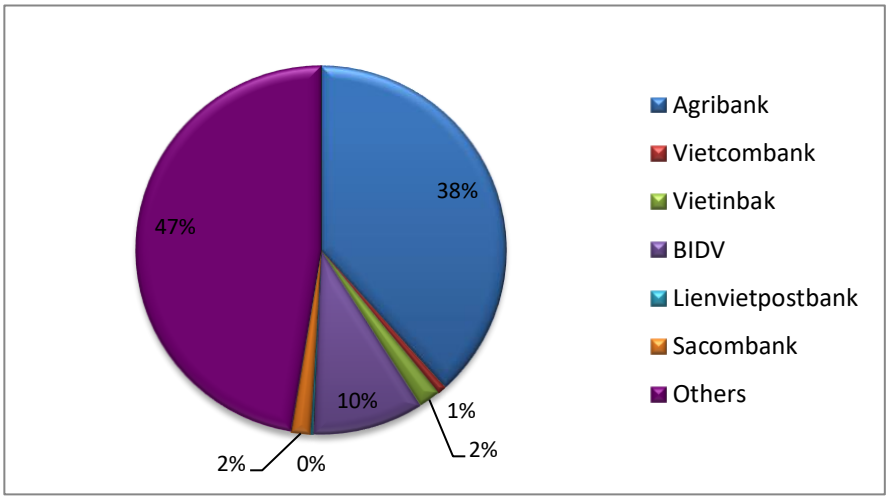


Figure 3.15. Market share of agricultural outstanding credit in Vietnam

Source: the author's summary from financial reports of some credit institutions.

3.2.2.2. Characteristics of agricultural credit markets

Segmentation

The segmentation of agricultural credit markets is owning to segmented clients of each sub-market as well as clients' borrowing purpose differences (Bao Duong and Izumida 2002).

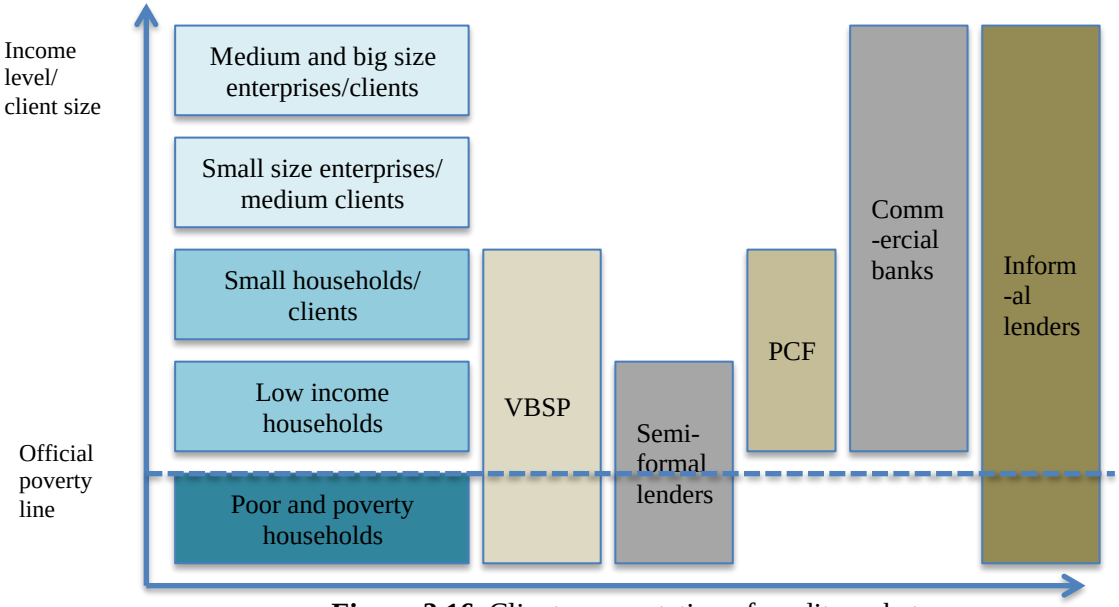


Figure 3.16. Client segmentation of credit markets

Source: Author's summary and adapted from (Le 2013)

Figure 3.16 presents the client segmentation of each sub markets. It is clear that there are many types of lenders who are suitable for all kinds of households or clients. Commercial banks focus on households from low to high-income level with either individuals or multi-size enterprises. However, there are only some commercial banks targeting households in rural areas, of which the typical one is VBARD (Agribank). PCFs at commune level often aim to offer loans for low and medium income local households. In other words, rural households with medium or large production scale often approach PCFs or VBARD rather than VBSP or semi-formal lenders. Semi-formal lenders or VBSP focus more on low-income clients as well as the poor. In addition to differences in client type, each lender has some other differences in the operation.

Table 3.4. Feature of lenders in each credit market sector

	Formal markets			Semi-formal markets	Informal markets
	VBARD	VBSP	PCFs		
Main Lending scheme	Individual based (and pilot group-base)	Group-based	Individual based	Individual /group based	Individual
Loan size	Medium to large	Small	Small to large	Small	Small to large
Interest rate	Medium	Low	High	Low	No interest rate, Low to high
Loan term	Short to long term	Medium to Long term	Short to long term	Depends on lenders	Depends on lenders
Customer	Diversified	Social beneficiaries	Diversified	Depends on each project	Diversified
Collateral	Required/No required	No required	Depending on each PCF	No collateral	Depending on lenders

Source: Author's summary

Regarding lending scheme, VBARD and PCFs mainly offer individual based lending scheme. However, VBARD has piloted group-based lending in some areas with small credit amounts. The typical feature of VBSP is group-based lending scheme through social associations except a much small proportion of individual-based one. Almost all loans of PCFs require no collateral except some specific cases while VBARD requires collateral or no collateral for their loans. However, according to some governmental policies aiming agricultural and rural development, borrowers of VBARD could obtain a limited loan amount without collateral. For example, under the decree 55/2015/ND-CP, the maximum amount that VBARD will

offer in agricultural sector is 3 billion VND. These preferential policies will be discussed in next section of the chapter. Under governmental regulation on its operation, VBSP is the policy banks with limited clients and mainly subsidized interest rate. That means only social beneficiaries who are poor, nearly and have low income can borrow. However, in practice, especially in rural areas of big cities or industrial provinces, people who are in the 'social beneficiaries' list of local communes are not really poor. Therefore, actual purpose of VBSP loans may be the mixture of consumption and production or even other debt rollover due to the preferential interest rate*. The customer types of VBARD and PCFs are diversified while those of semi-formal lenders depend on each project in each specific area. Collateral criterion of PCFs depends on each PCF, which means PCF could require collateral or not. The popularization of informal credit markets is owing to their flexible lending criteria, even in case informal lenders offer high interest rate. Informal loans can be offered by friends or relatives without interest rate to high interest rate relying on the relationship between lenders and borrowers while money lenders often charge usurious interest rate (table 3.4). VBARD, VBSP and PCFs are the three main formal credit suppliers in rural and agricultural sector. In addition, there is other non-bank institution which offer lending in rural agricultural sector, i.e. finance company. However, they often offer consumer lending rather than production ones.

Constraints of formal credit market participation

Constraints to participate in formal credit markets may result from both supply and demand side. Agricultural sector is often considered to be so risky due to complicated weather happenings, unpredicted diseases and pests (Thornton et al. 2009, Nardone et al. 2010). The risk is more likely to be exposed in developing countries such as Vietnam, in which science and technology are still weak so agricultural production strongly relies on natural resources (Tanaka, Camerer and Nguyen 2010, Neil Adger 1999). In addition to fragmented agricultural production, farmers are very likely to subject to risk relating to take the products to the markets. The incompletion of governmental policies relating agricultural product price increasingly makes lending in agricultural sector riskier. Hence, commercial banks except VBARD are reluctant to develop agricultural credit section. Despite being a bank with biggest share of agricultural credit, VBARD is still a commercial bank for profit. VBARD has loan scanning process on the basis of collateral and income for paying debts. In reality, farmers' assets' value, which could be used as collateral, is often low for both dwelling land and agricultural land. On the other hand, their income from agriculture is not stable and not recorded in documents. Therefore, it is hard for farmers to be able to obtain big borrowings from commercial banks for agricultural production. Consequently, many borrowers even choose to resort to informal markets to finance their production. Other commercial bank except VBARD almost limit their expansion to the rural remote areas where population's low level of science and technology increasingly enhance the risks of agricultural production. So, people in remote and poor areas in their turn are increasingly constrained to access formal credit.

Vietnam bank for social policies (VBSP) is willing to lend without collateral but the approved amounts are very limited. The beneficiaries of the bank are the poor population in multi-dimensional poverty line or the customers of specific subsidized lending programs. Owing to strong urbanization, the number of poor people in both rural and urban areas increasingly declines. However, they want to seek cheap funds. Consequently, the demand of VBSP loans will exceed the supply strong due to its low interest rate. This could lead the fact that people with good social relationship/networks tend to easily obtain cheap funds. In the research of (Braverman and Guasch 1986a), they indicated wealthier farmers find it easier to achieve credit than small farmers who are more likely to be constrained to enter formal credit markets.

Government intervention

The central bank of Vietnam's intervention (SBV) includes regulations of setting lending interest celling of agricultural sector as well as other policies relating to encourage formal credit institutions to expand agricultural credit through specific subsidized credit programs as well as complements to legal regulations. In developing countries, Government can be considered as a leader and regulator of effective agricultural credit markets (Bhatt and Mundial 1989) meanwhile inappropriate intervention of Government could even lead to borrowers' costly and risky credit access (Claessens 2006). Vietnam government's intervention seems to simply request credit institutions to broaden their agricultural credit rather than taking actions to share risks with them. Expanding credit will become more and more risky if the imbalance of production supply and demand is serious. This may be true in case markets for the consumption of agricultural products are unstable in Vietnam. A good policy for trade and services co-operatives will be a necessary intermediary between farmers, businesses and banks to organize consumption for farmers. Government credit subsidies may enhance moral hazard problems or enforcement risks incurred by borrowers if there are no serious penalties. Then the probability of banks/institutions facing with capital risks is extremely high. Capital risk is the possibility that a bank will lose money on an investment or business venture.

3.3. Policies for agricultural and rural credit in Vietnam

Key agricultural and rural credit policies in Vietnam could be categorized into three main areas of focus: collateral requirements, interest rate cap and interest rate subsidy as in table 3.5 below.

Collateral requirements

There are three main decrees from 2010 to 2018 relating to increase non-collateral loans for farming or non-farming households/individuals, farming cooperatives or farming enterprises. Decree 55/2015/ND-CP on credit policy for agricultural and

rural development, replacing decree 41 and then decree 116 amending decree 55. Individuals, households, collectives, home business and farm owners can borrow from 50 million VND up to 3 billion VND depending on the purpose in decree 55 rather than 50 million to 200 million VND as in decree 41. And then decree 116 raised the non-collateral loan minumum amount to 200 million. Although being eligible to borrow non-collateral loans as in article 9 of decree 55, in practice the borrowers have land rights at risk or have to sumbit land certificate to lenders if they fail to repay. In other words, credit institutions will require the land certificate but do not document this procedure to circumvent the policy. The submission of borrowers help to make sure that they can borrow non-collater loans from only one insittion. In deree 55 and dercee 116 amending some articles of decree 55, lending in high-tech agricultural production is encouraged. High-tech enterprises or cooperatives can obtain a loans without collateral from 70% up to 80% of the value of such production. SBV also instructs credit institutions to reshedule overdue loans or continue to offer new loans to borrowers when natural disasters or epidemics occur.

Interest rate cap

Interest rate cap or setting maximum lending interest rate reveal Vietnam governmental indirect policy intervention to encourage agricultural and rural development. Customers of five top-priority sectors, i.e. agricultural and rural development, exports, support industries, small-and-medium-size companies, and high-technology enterprises, are eligible to benefit from interest rate cap policy. Five top-priority sectors are mentioned in Circular 39/2016/TT-NHNN dated in 2016 of the State bank of Vietnam (SBV) prescribing lending transactions of credit institutions and/or foreign bank branches with customers Circular 14 and 20 in 2012 set the short-term lending interest rate cap based on deposit interest rate cap while the most recently adopted decision, i.e decision 1425 and 1730 set a fixed maximum lending interest rate for commercial banks and for PCF and micro-finance institutions separately. The fixed interest rate caps were futher tightened compared with that of polices before. However, the low interest rate cap may squeeze the possible profit margin, decreasing incentives of credit institutions to supply their services to the targeted customers (WorldBank 2019). According to Worldbank research, the interest rate cap 5.5% of decision 1703 or even 6.5% of 1425 are below the cost of credit institutions. This makes lending unprofitable to customers of agricultural sector which is risky in Vietnam. Therefore, the negative effect of interest rate cap policy may reveal higher risk and operating costs of these lendings. In many case, to contrain adverse effect of the policy, many credit institutions avoid short-term lending to agricultural sector if they can not gain funding at subsidized rate from the government. However in circular 39/2016/TT-NHNN also instruct credit institution that interest rate cap is applied to five top-priorty sectors and customers are required to have transparent financial situation, otherwise interest rate is negotiated between lenders and borrowers. In reality, households in agricultural and rural sectors in Vietnam often have small production scale without transparent production plans. Moreover, their cashflow in production process as well as income

flow for debt repayment are not transparent also. As a result, it is difficult for households to able to benefit from interest rate cap. They are often charged by negotiated interest rate higher than interest rate cap for agricultural producion.

Interest rate subsidy

While policies on collateral requirements and interest rate cap aim to overall agricultural sector, interest rate subsidy targets towards each sub sector or some aspects of agriculture, such as shrimp, fishery or high-tech agriculture or value chain finance. Decision 1050/QD-NHNN dated 2014 on high-tech and value chain agriculture piloted in some provinces set interest rate cap for both short-term to long-term loans. Loan term is arranged by negotiation between commercial banks and borrowers who are mentioned in the decision 1050 while collateral requirements are decided by commercial banks. Government encourages commercial banks to consider customers without collateral if commercial banks can monitor cash flows of the value chain. However, in practice, commercial banks are hesitant to enter this market due to potential even higher risks than other agricultural lending. The weak connections among participants in the value chain or unstable markets for agricultural product consumption make such this lending much risky.

Table 3.5. Key agricultural and rural credit policies of Vietnam

Area of focus	Year	Policy name/Event	Targeted sector	Key provision
Establishment of credit institution	1988	Development of Vietnam Bank for Agriculture	Rural and agricultural sector	Provide financial services to agricultural and rural sectors
	1995	Re-establishment of PCFs	Rural sector	Mobilize savings from rural households
	1995	Vietnam Bank for the Poor (VBP)	Overall sector	Provide credit to poor households at low interest rate
	2002	VBSP – renamed from VBP	Overall sector	Provide cheap credit to the poor and rural households
	2005	Decree 28/ND-CP/2005 of the Government	Overall sector	Direct the organization and operations of micro-finance institutions
Collateral requirements	2010	Decree 41/ND-CP/2010	Agricultural and rural sector	Increase non-collateral loans for farming households, non-farm households, farming cooperatives and farming enterprises
	2015	Decree 55/2015/ND-CP; Circular 10/2015/TT-NHNN implementing Decree 55/2015/ND-CP	Overall agricultural sector	Individuals, households, collectives, home business, and farm owners can borrow from 50 million up to 3 billion VND without collateral depending on purposes
	2018	Decree 116/2018/ND-CP amending decree 55/2015/ND-CP	Overall agricultural sector	Individuals, households, collectives, home business, and farm owners can borrow from 100 million up to 3 billion VND without collateral depending on purposes

Interest rate cap	2012	Circular 14/2012/TT-NHNN Circular 20/2012/TT-NHNN adding Circular 14	Five priority sectors including agricultural and rural development	Set interest rate cap for short-term loans equal to interest rate cap of one-month and over term deposits set by SBV plus (+) 3%/per year. Circular 20: interest rate cap of short term deposits is 13% per year and that of PCF is 14% per year
	2017	Decision 1425/2017/QD-NHNN		Maximum short-term lending interest rate of 6.5% per year for financial institutions and foreign bank branches and 7.5% for PCF and microfinance institutions
	2020	Decision 1730/QD-NHNN		Maximum short term lending interest rate of 4.5% per year for financial institutions and foreign bank branches and 5.5% for PCF and microfinance institutions
Interest rate subsidy	2009	Decision 497/QD-TTg	Agricultural and rural sector	Supporting interest of loans to buy machinery, equipment, materials for agricultural production and building materials in rural areas
	2013	Decision 68/2013/QD-TTg	Agricultural sector	Support 100% of loan interest rate for the first 2 years, 50% for 3rd year for loans spent on buying machines and equipment to mitigate post-harvest losses.
	2014	Decision 1050/2014/QD-NHNN	Value chain	A value chain based lending scheme was piloted in some province. Maximum interest rate are charged on applicable projects
	2014	Decision 540/2014/QD-TTTTg	Shrimp and catfish farming	Temporary debt rescheduling for maximum 36 months, no charging overdue interest on restructured loans and exemption or reduction of interest

	2015 2018	Decree 89/2015/ND-CP Decree 17/2018/ND-CP	Fishing industry	Interest rate subsidy for fishermen in building a new boat
	2017	Decision 813/QD-NHNN	Interest rate subsidy to promote high-tech agriculture	SBV instructs commercial banks to use at least 100,000 billion VND to lend in high-tech or clean agriculture. Annual interest rate is from 0.5% to 1.5% lower than normal commercial interest rate with the same term.
	2020	Circular 01/2020/TT-NHNN	All sectors including agriculture	Debt rescheduling, exemption or reduction of interest rate and fees, retention of deb category to assist borrowers affected by Covid-19 pandemic

Source: Author' summary and adapted from (WorldBank 2019)

3.4. The developmental progress of agricultural and rural credit markets in Vietnam

The developmental progress of agricultural and rural credit markets in Vietnam is historically marked by the 'Doi Moi' reform in 1986. Therefore, there are typical differences of the markets before and after 'Doi Moi' depicted in figure 3.17.

Before 1986, agricultural credit market was operated under 'take-give' mechanism or central planning regime or 'mono-bank' system, of which the state bank of Vietnam (SBV) had a monopolistic position in formal credit markets. SBV had three bank members as specialist institutions on behalf of SBV in each economic, i.e. the State Agricultural Bank focusing on agricultural and rural sector, the Foreign Trade Bank and Investment and Development Bank focusing infrastructure and capital investment for state owned enterprises. In addition to the State Agricultural Bank, Rural Credit Cooperatives, which are collective-type financial institutions, depend almost absolutely on the State Bank of Vietnam for their fund in lending. Operation of Rural Credit Cooperatives is under the rule 739-TTg in 1956 and updated by decision 52-NHNH/QĐ in 1983. The establishment of credit cooperatives aimed to suppress informal credit in rural areas. Official credit in this period was delivered by the State Bank to communes, cooperatives and state collective farms. Very few farmers were able to obtain loans from these formal institutions (Izumida and Duong 2001).

After 'Doi Moi' reform in 1986, the establishment of the Vietnam Bank for Agriculture VBA in 1988 (then renamed to VBARD) as well as the separation of four specialized banks from the SBV, namely the Industrial and Commercial Bank of Vietnam (now Vietinbank), VBA, the bank for investment and construction of Vietnam (now BIDV) and the bank for foreign trade of Vietnam (now Vietcombank), were the first steps in lending to private investment in agriculture. The Ordinance 38-LCT/HĐNN8 in 1990 classified credit institution three main types: bank institutions, credit cooperatives and finance companies. In Law on Credit institutions 07/1997/QH10 in 1997 of the National Assembly, credit cooperatives are still mentioned as one type of credit institutions and allowed to transmit to another type consistent with the trends of financial markets. The establishment of Central People's Credit Fund as well as local People's Credit Funds gradually replaced Credit Cooperatives in rural areas. Until 2014, in the Law on Credit institutions 20/2004/QH11 on amending some articles of the Law on Credit institutions 07/1997/QH10, collective credit institutions were mentioned as institutions implementing lending and banking services which included cooperative banks, People's credit funds (PCFs) and others. Credit cooperatives were not offically mentioned in the Law.

In addition to commercial banks and PCFs, since the 1990s the semi-formal lenders appeared in Vietnam through many programs and projects funded by international NGOs, or bilateral and multilateral official development assistance (ODA) programs. Beginning on a small scale, many projects/programs have been transformed into some models including both formal micro-finance institutions or just remained as semi-formal projects regulated by specific policies.

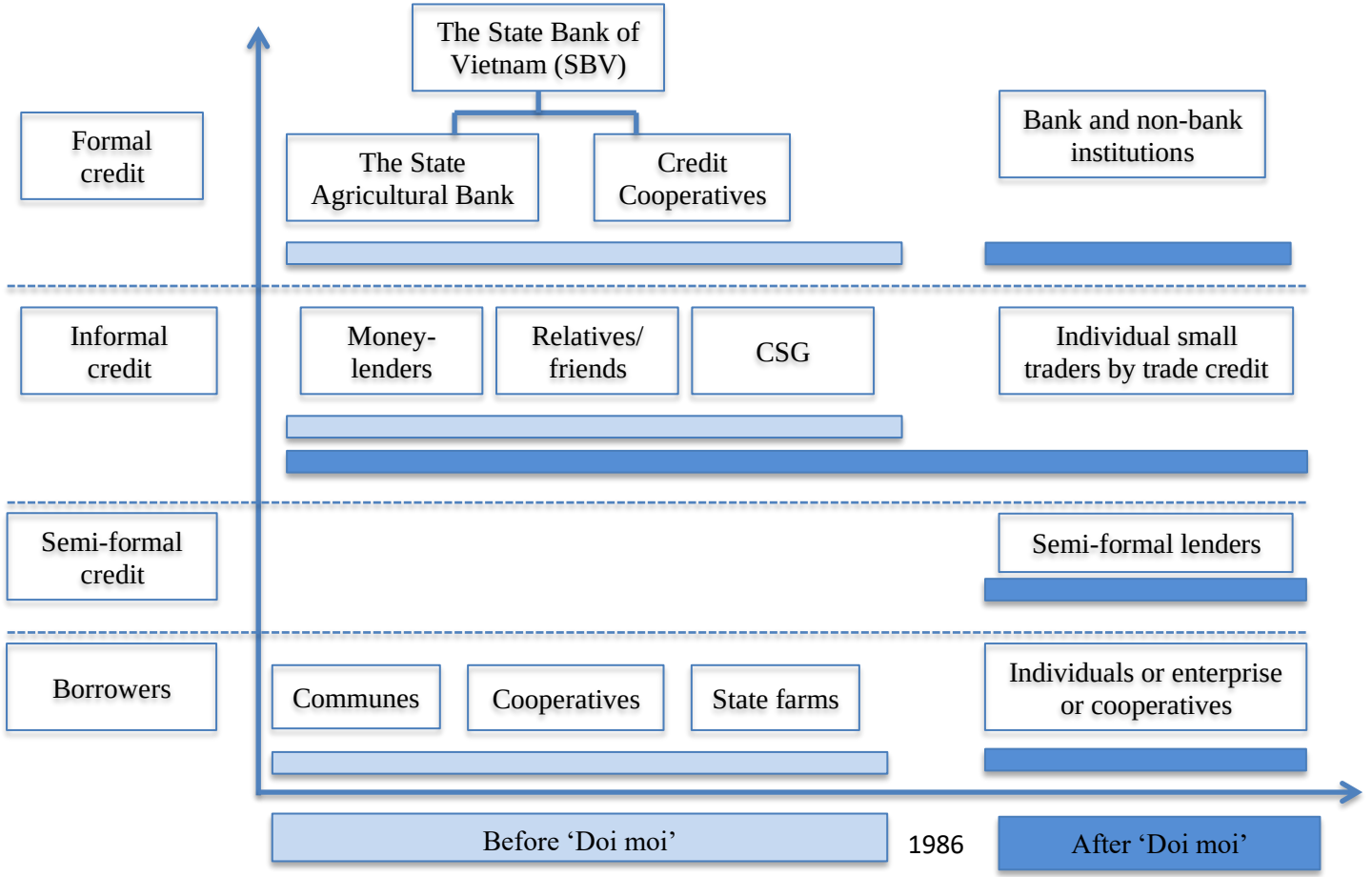


Figure 3.17. The progress of agricultural and rural credit development
Source: Authors' summary

3.5. Chapter conclusion

The first content of the chapter emphasizes on agricultural and rural credit markets in Vietnam. The credit markets are categorized into three sub markets: formal, semi-formal and informal, of which informal credit is so popular in rural areas because of its diversification and convenience. Three formal credit suppliers of Vietnam agricultural and rural credit are VBARD, VBSP and PCFs while it is hard to capture all type of informal credit lenders. Vietnam agricultural and rural credit markets are characterized by three main features: segmentation, constraints of formal credit market participation and government intervention. The dichotomy of Vietnam credit markets is indicated by the differences in segmented types of customer, loan purposes and loan characteristics. Constraints of formal credit market participation originate from both suppliers and demanders. Vietnam government intervention in order to support agricultural sector reveal some limitation due to lacking synchronization among related policies.

Therefore, the next section of the chapter also highlights some key policies for agricultural and rural credit in Vietnam and their advantages and disadvantages. It is policy synchronization that makes a large number of farmers not benefit from the policies. The key credit policies can be divvied in three groups: collateral requirements, interest rate cap and interest rate subsidy. The decrees relating collateral requirements mention the maximum amounts without collateral farmers can borrow. However, the normal households just can obtain maximum 200 million VND while criteria for obtaining larger amounts mainly target on collective production unit and high-tech production rather than normal households. In terms of interest rate cap for five top-priority sectors including agriculture, the prerequisite criterion is that households have to submit transparent financial record of production, which is not feasible with a vast majority of farm households in Vietnam. Similarly, some policies on interest rate subsidy for high-tech or value chain agriculture have not actually encouraged formal lender to enter these fields.

The last content of the chapter is author' s summary of the development process of agricultural and rural credit sector. The big changes of the markets have been marked by the 'Doi moi' renovation. Before the renovation, the only formal supplier for agriculture credit is the central bank – State owned bank of Vietnam and the main borrowers are collective units. Owing to 'Doi moi', the emergence of commercial banks and many other non-bank institutions has brought a lot of chance for households. They can easily approach many type of institutions in case of meeting the institution criteria. In addition to formal markets, the remarkable transformations in terms of quantity and category after 'Doi moi' are noticed. The prevalence of informal markets in some rural areas of Vietnam reflects the shortage and the constraints of formal markets.

4

Research site and methodology

4.1. Research site

In the research on household rural credit in Vietnam, the research site of each study is much different. The author Luan et al. have used secondary data from Vietnam General Statistic Office (the Vietnam access resources household survey) (Luan and Bauer 2016) while the author Khoi et al. have conducted survey of selected 15 villages of 13 communes in the Mekong River Delta (Khoi et al. 2013). In another study of (Dinh et al. 2012), the authors applied surveyed data of Son La province which is highly agriculture-based province of Vietnam. In the PhD thesis of Le Thi Minh Chau (Chau 2014), she has chosen Hai Duong province as her study site. Although in the last recent years, the emergence of industrial zones has boosted the province's GDP share in industrial and service sector, Hai Duong is still one of the industrialized and urbanized provinces that have the highest percentage of GDP in agriculture sector (GSO, 2015-2020). The author Duy et al. conducted their survey in three province of the Mekong River Delta, i.e. Can Tho, Soc Trang and Tra Vinh (Duy et al. 2012). Among the three provinces, although Can Tho is municipality, its proportion of GDP in agriculture sector remains higher than the other municipalities. Similarly, the studies of (Barslund and Tarp 2008) or (Bao Duong and Izumida 2002) were conducted in some regions of Vietnam, i.e. the Red River Delta, the Central Highlands, the South of Central Part, and the Mekong River Delta. In each region, one province was selected as representative. All of them are not municipality and highly agriculture-based. Therefore, there have been few province-level studies conducted in big cities as municipality that are much highly industrialized and urbanized to identify the differences between them and other provinces.

As discuss in the introduction chapter, Hai phong is one of big cities in Vietnam with status of municipality but there are more than 50% of its population living in rural areas and 20% of labor force are employed in agricultural sector. Among rural households, around 50% of them have main income source from agricultural sector (Rural, Agricultural and Fishery Census of GSO, 2016), which reveal the importance of agriculture in raising household income in particular and in economic development of the city in general. One of typical characters of Hai phong rural areas is high-speed urbanization Therefore; research on household credit access in Haiphong with its specific characteristics will result in interesting and distinctive findings in order to contribute to literature of this field.

4.1.1. Overview of Haiphong city

4.1.1.1. Natural contexts

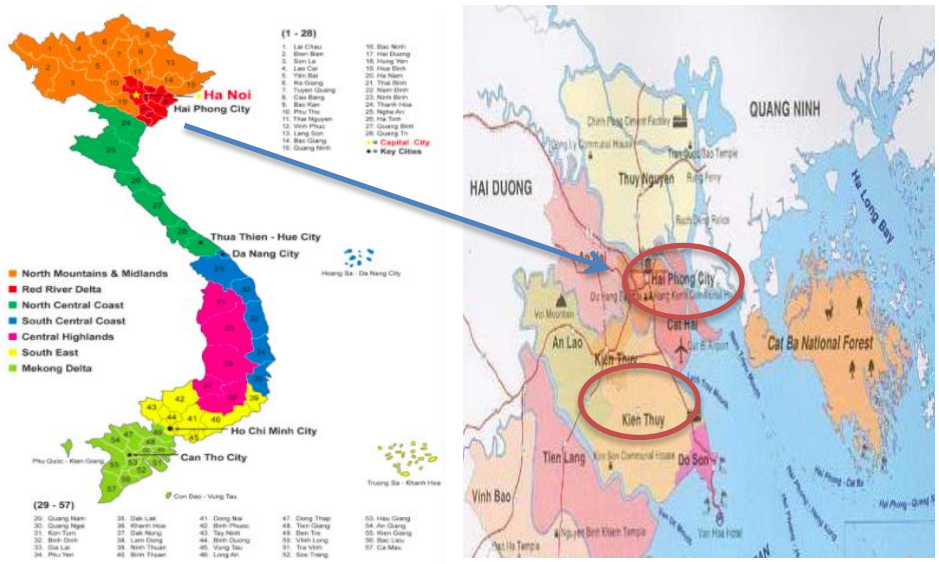


Figure 4.1. Maps of Haiphong city

Geographic location

Haiphong, which is a harbor city, is located at the mouth of the Cam River, 120 km east of Hanoi – the capital of Vietnam as shown in Figure 4.1. Haiphong is one of the five national grade-one cities, a third big city of Vietnam together with Ho Chi Minh City and Hanoi capital. Hanoi and Haiphong are the two municipalities belonging to the Red River Delta (the other provinces of the Red River Delta: Vinh Phuc, Bac Ninh, Quang Ninh, Ha Nam, Hung Yen, Hai Duong, Thai Binh, Nam Dinh and Ninh Binh). It has a total natural area of around 1,561.8 km^2 with the population of about more than two million. Haiphong is subdivided into 15 district-level sub-divisions, including 8 rural and 7 urban districts. Haiphong borders Quang Ninh province to the north, Hai Duong province to the west, Thai Binh province to the south and the Gulf of Tonkin – gulf at the northwestern portion of the South China Sea – to the east. Three islands, i.e. Bach Long Vi, Cat Ba and Long Chau, located in the gulf, are also administered as part of the city.

With favorable geographic location as well as owning one of the biggest ports, Haiphong now is the center of economy and trade in the Northern coast of Vietnam. Haiphong is the main gate to the sea for Northern provinces and key transportation hub of the Northern provinces and the Nation. In other words, the location of Haiphong carries itself economical meanings as the central of Western Economic Belt in the Tonkin Gulf (Haiphong – Quang Ninh), economic central in Northern

coastal areas (Quang Ninh – Hai phong – Thai binh – Nam dinh – Ninh binh) and a centre of urban chains between Vietnam (Hai phong – Hai duong – Hanoi – Viet tri – Yen Bai – Lao cai) and China (Mengzi – Kunming)

Terrain and Hydrology

The Red River Delta is a Delta with mild topography which is protected from the Red River's flash floods but widely subjected to tidal influence. More concretely, the Red River Delta is surrounded by mountains in the East and West and by hills in the North. Alluvium of the delta is deposited by two main rivers: the Red River and its distributaries and the Thai Binh river. The Delta is characterized by a slight slope from the Northwest to the Southeast.

Haiphong is a coastal city in the downstream of Thai Binh River system belonging to Red River Delta geography, located in Vietnam's northeastern coastal area. The topography of the southern part of Haiphong is quite low with the attitude from 0.7 to 1.7 meters above the sea level while the terrain in the north is midlands alternating with plains and hills. The mountainous area of the city accounts for 15% the total areas. The mountains here run in the direction from the northwest to the southeast.

As part of the Red River Delta, Haiphong has a dense system of rivers with average density of 0.6-0.8 km/km^2. The city has 16 main rivers with the total length of 300 km. The slope of the rivers is quite small and mainly flowing in the direction from the southeast to the northwest. This is a place where all downstream of Thai binh river flowing into sea. The river system generate fertile basin and abundant freshwater for the activities of local people. In addition to a diverse system of rivers, Haiphong has the coastline of 125 km in length with many nice beaches.

In general, the topographic and hydrologic condition of the city is appropriate for infrastructure establishment, population arrangement and production expansion as well as economic development.

Climate

Climate of Haiphong in particular and the Red River Delta in general is characterized by a humid subtropical climate with hot, humid summers and dry winters. There are 4 distinguished seasons in a year: spring, summer, autumn and winter. The city is wetter from April to October, approximately 90% of the city' annual rainfall typically in these months. The annual average rainfall is 1,600-1,800 mm and the average humidity of air is 85-86%. The highest level of humidity is in July to September and the lowest in January and December. April is often the month marking the transition from cold and dry winter to a warm rainy summer. The average temperature in summer is around 32.5^{o}C and in winter is 20.3 ^{o}C. The annual average temperature is 23.9 ^{o}C. Due to close to sea, Haiphong' climate is milder than areas without sea like Hanoi. Haiphong is warmer in winter and cooler in summer in comparison to Hanoi.

Natural resources

There is limestone resource in Thuy Nguyen district and the limestone resource spreads from Haiphong to Kinh Mon district of Hai Duong province (all belonging to the Red River Delta). The Red River Delta owns a large coastal area with 400 km coastline stretching from Thuy Nguyen district of Hai Phong to Kim Son district of Ninh Binh. With the marine resources, Haiphong possesses huge potential to develop the economy in terms of seafood, tourism and logistics. The coast with big intertidal zone and thick sediment is an ideal facility of aquaculture and seaweed farming.

Forest resources

Haiphong has a primeval forest in Cat Ba Island, which is a world biosphere reserve. This primeval forest is located on limestone – a unique type of forest.

4.1.1.2. Population and labor resources

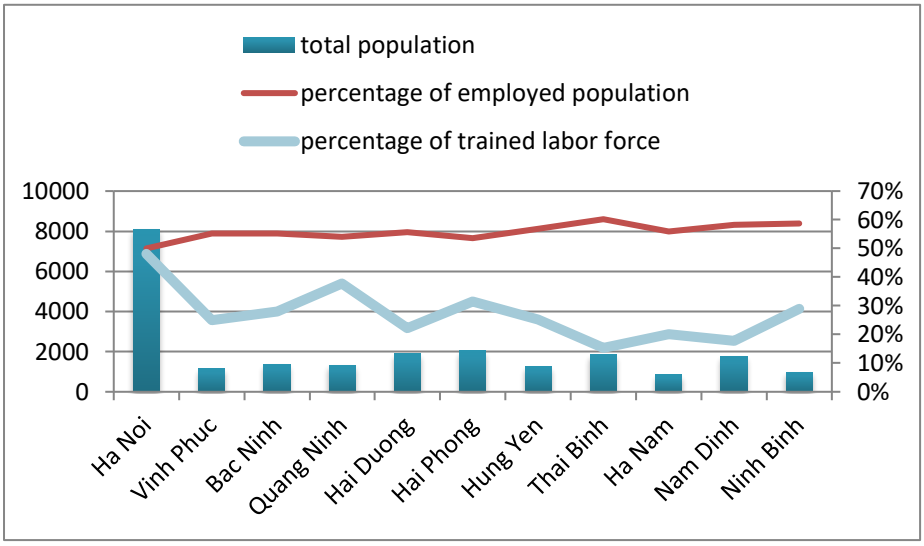


Figure 4.2. Population by provinces of the Red River Delta (population unit: thousand person)

Source: Author's calculation from (GSO 2019)

Haiphong is the fifth most populous city/province in Vietnam (behind Ho Chi Minh city, Hanoi, Thanh Hoa and Nghe An) and the second in the Red River Delta as shown in figure 4.2, with a population of 2,033,3000, 46.7% of population reside in urban districts and 53.3% of rural. The gender distribution is half female with 50.3%. With an average population density of 1,302 person/km^2 (third densest city of the Red River Delta behind Hanoi and Hung Yen), the population distribution is not uniformly and the urbanization speed is relatively fast. Haiphong in particular and the Red River Delta in general are always in the top list of high population density compared to other regions and other provinces (except for Ho Chi Minh).

This is due to the fact that the Red River Delta only makes up 5% of Vietnam total land, about 15,000 km^2 but 30% of the country' population live here.

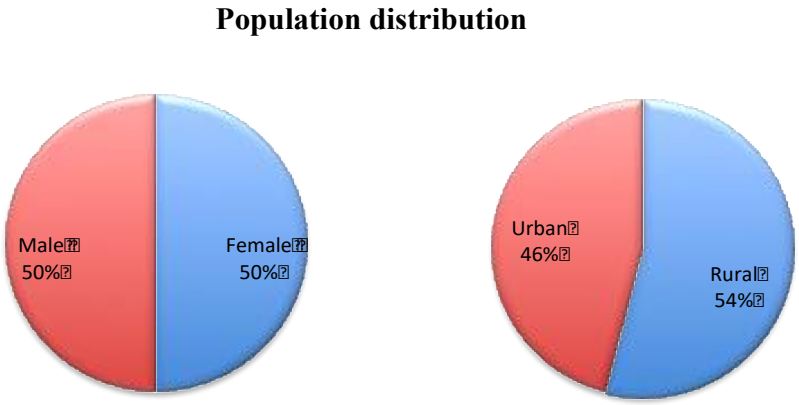


Figure 4.3. Haiphong population distribution by gender and residence
Source: HaiphongSO (2019)

The percentage of female and male population of Haiphong is quite equal, around 50% for each while the number of people living in rural areas is higher than urban despite of Haiphong's status as a municipality (figure 4.3).

As in figure 4.2 above, the percentage of employed population of Haiphong city and other provinces in the Red River Delta is more than 50% while the proportion of trained labor force is different among provinces. Haiphong has the third greatest rate of trained labor force behind Hanoi and Quang Ninh, 31.6%, 48.1% and 37.7% respectively. The rates in provinces of the Red River Delta are commonly higher than other provinces of other regions of Vietnam (except Da Nang city with 44.6% and Ho Chi Minh city with 37.1%). The high proportion of trained population or high-quality labor could be seen as the major enticement for capital flows and economic prosperity.

It is clear that the percentage of labor force in agricultural, forestry and fishery is lowest for most of provinces of the Red River Delta in general and for Hai phong in particular. Hai phong is observed to have the highest rate of population working in service sector compared to other provinces. The labor shift from agriculture to industry and services in recent years is noticeable, which is due to the development trend of the economy as well as government-oriented policies. Although the share of primary agriculture in GDP as well as number of agricultural labor will decline, Vietnam agriculture is expected to generate more economic value as well as farmer and consumer welfare and simultaneously address production-related costs and environmental problems (WorldBank 2016).

Table 4.1. Labor distribution by economic sector and by province of the Red River Delta

	Total population	Agriculture, forestry and fishery	Industry and Construction	Services
Ha Noi	100%	12.8%	-	-
Vinh Phuc	100%	28.49%	44%	27.51%
Bac Ninh	100%	18.28%	50.28%	31.44
Quang Ninh	100%	30%	39%	31%
Hai Duong	100%	30.58%	40.49%	28.93%
Hai Phong	100%	20.42%	39.17%	40.41%
Hung Yen	100%	44.5%	-	-
Thai Binh	100%	40.25%	37.18%	22.57%
Ha Nam	100%	10.59%	59.71%	29.70%
Nam Dinh	100%	35%	-	-
Ninh Binh	100%	42.82%	-	-

Source: Author's calculation based on GSO (2016)

4.1.1.3. Economic situation

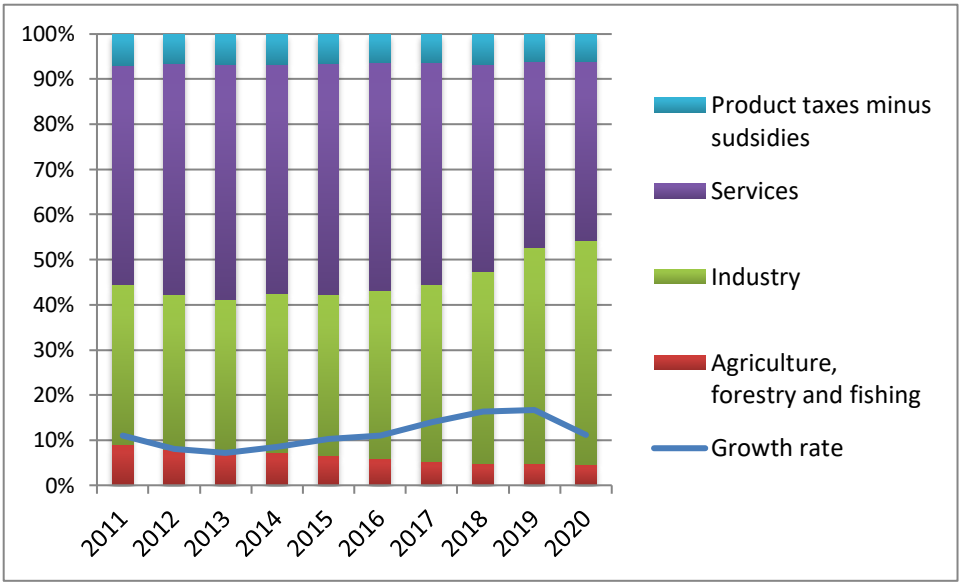


Figure 4.4. Haiphong GDP by economic sector in 10 years
Source: Author's calculation based on HaiphongSO (2011-2020)

Recent years have witnessed the change in Haiphong economic structure, shifting from agriculture to industry and services in figure 4.4. The percentage of Haiphong GDP in agriculture sector was around 10% in 2011 and gradually decreases year by year, now reaches at 4.6% for 2020. Although, percentage of agriculture decline, its annual value increase at the average rate of 2.42% in the period of 2011-2018. Agricultural production now focuses on value-added products, increasing productivity and application of high technology. The significant growth can be easily observed in industry sector owning to industrialization. Haiphong has a network of large industrial zones. The structure of industry sector also shifts towards increasing the proportion of processing and manufacturing segment and decreasing that of mining segment. The inside structure of service sector has not significantly changed through 10 years, of which the divisions of trade, transportation and warehousing still play a leading role.

The growth rate of GDP has stably increased each year and peaked in 2019 at 16.68%- the highest rate until now (figure 4.4). Consequently, an estimated GDP per capital of 2019 is roughly 6,000 USD. The rate of 2020 has slightly decreased due to the covid pandemic. According to HaiphongSO (2020), total GDP of the period 2016-2020 is valued at approximately 46 billion USD, which is 1.97 times as much as of 2011-2015. In 2020, GDP per capital may reach 5,863 USD compared to average GDP per capita of nearly 3,000 USD.

Haiphong is often included in the list of the cities/provinces of Vietnam having highest growth rate of GDP as in figure 4.5

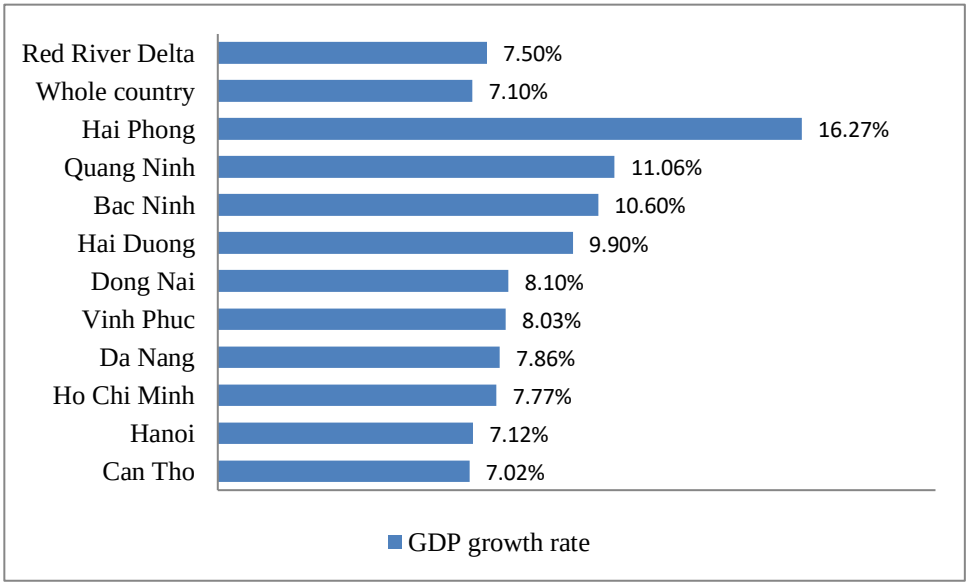


Figure 4.5. GDP growth rate of some provinces in 2018

Source: GSO (2018)

Figure 4.5 presents GDP growth rate of some provinces of the North, the Central and the South of Vietnam compared to the Red River Delta and the whole country in 2018. While the rates of the Red River Delta and the whole country in 2018 are 7.5% and 7.1% respectively, that of Haiphong city is 16.27% leaving Hanoi, Ho Chi Minh and Da Nang behind.

4.1.2. Agricultural production of Haiphong city

4.1.2.1. Distribution of agricultural labor and households

Despite of Haiphong' status as municipality as well as grade-one city, the proportion of people living in rural areas is higher than that of urban areas and the rate of labor force in rural is also higher than urban, 58.85% and 41.15% respectively (HaiphongSO, 2019). The number of agricultural households is estimated in Rural, Agricultural and Fishery Census that is conducted every 5 years starting 1996. The most updated census was of 2016, so author will use the data of the 2016 census to estimate the results of household distribution as in table 4.2 below. It is clear that the rates of labor force in rural areas compared to that in urban areas, 57.26% and 42.74% respectively, is quite the same those of data in 2019. The number of households living in rural areas is simultaneously greater than that in urban areas. There is no much difference between the rate of urban and rural households (48.10%-51.90%) or between urban and rural labor force (42.74%-57.26%). However in terms of rural areas, the percentages of agricultural and non-agricultural households as well as that of labor force are much different (table 4.2). That means many people or households living in rural areas choose to do non-farming jobs. Only 30.06% of rural households have agricultural activities while the rate of non-agricultural ones is 69.94%. Similarly, the proportion of people living in rural areas and doing farming jobs just account for 20.66% compared to 79.34% of non-agricultural jobs. This means many members of agricultural families often seek non-agricultural jobs rather than participating in family's farming activities.

Table 4.2. Distribution of agricultural household and labor force

Description	**Households**		**Labor by person**	
	Quantity	Percentage	Quantity	Percentage
Total	579,690	100%	1,131,579	100%
Urban	278,846	48.10%	483,655	42.74%
Rural	300,844	51.90%	647,924	57.26%
Agricultural	90,432	30.06%	133,864	20.66%
Non-Agricultural	210,412	69.94%	514,060	79.34%

Source: Author's calculation based on HaiphongSO (2016) and Rural, Agricultural and Fishery Census 2016 (GSO, 2016).

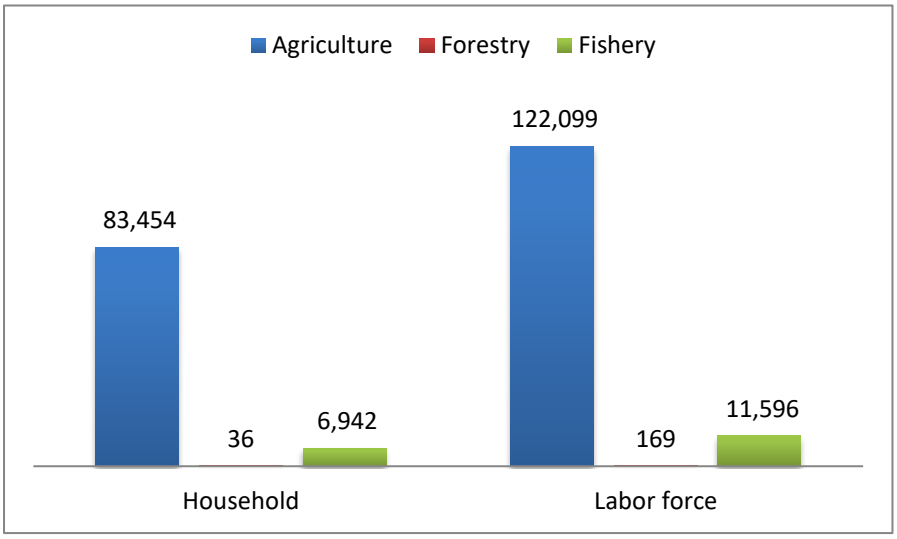


Figure 4.6. Number of agricultural households and labor force in agricultural sector in rural areas of Haiphong

Source: HaiphongSO (2016)

Concerning three types of agriculture-related activities of both households and workforce, i.e. agriculture, forestry and fishery, the biggest number belongs to agricultural sector and is followed by fishery while the percentage of forestry household and labor force is too much small (figure 4.6).

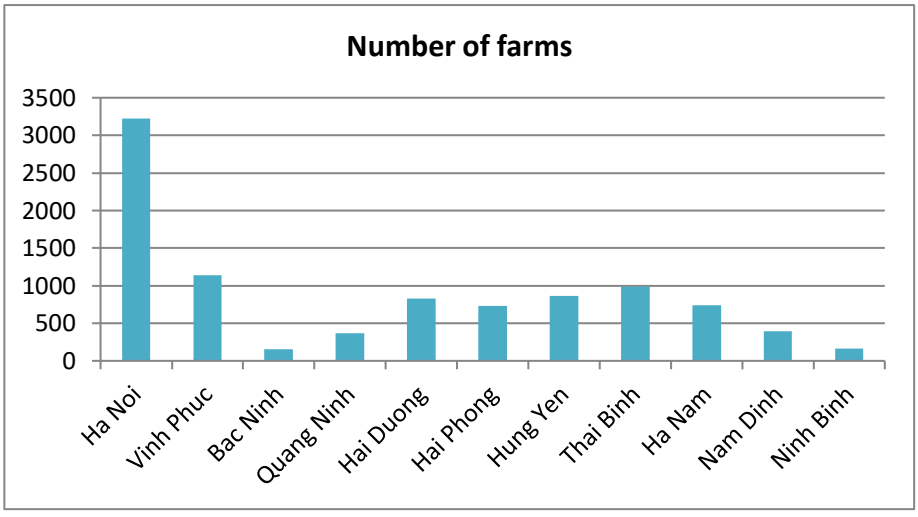


Figure 4.7. Number of farms by provinces in the Red River Delta 2019

Source: GSO (2019)

Farms are households that produce goods on a large scale and must meet certain criteria for production scale and output in agriculture, forestry and fishing now according to Circular No. 27/2011/TT-BNNPTNT dated April 13, 2011.

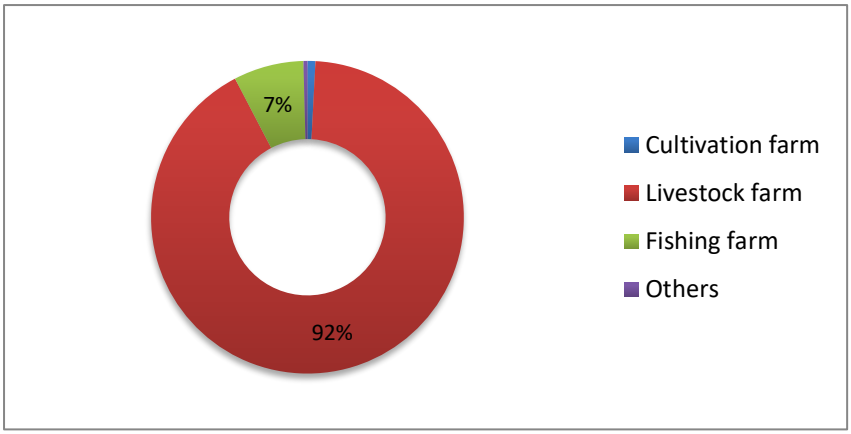


Figure 4.8. Number of farms in Haiphong by agricultural activities

Source: HaiphongSO (2019)

Figure 4.7 above presents the number of farms by provinces of the Red River Delta. Haiphong has 731 farms in 2019. The number of Haiphong is lower than Hanoi may be due to the smaller areas as well as population. However, some provinces such as Vinh Phuc, Thai Binh or Hai Duong also have greater number of farms than Haiphong. This is possibly attributed to the process of strong industrialization and urbanization in Haiphong, expressed by some economic indicators of Haiphong compared to other provinces in section 'economic situation' above. Regarding types of farms, Haiphong has the greatest number of livestock farms of 669 as total 731, making up around 92% as in figure 4.8.

4.1.2.2. Agricultural production in Haiphong city

Due to the much small number of forestry households and labor force, the section will focus on agricultural and fishery activities.

Cultivation production

Cultivation production includes annual and perennial crops, of which annual-crop products comprise 70% of the world's farming market. Annual plants include cereal (cereal for grain and for tuber), annual industrial crops (sugarcane, rush, jute...), medical plants, food crops and legumes. Perennial crops have a several-season lifespan, which grow form the planting time to the first time of harvesting for one year and over, and are harvested for many years such as perennial industrial crops (tea, coffee, rubber...), fruit trees, medical plants and so on. There are four main types of cereal in Haiphong: rice, maize, sweet potato and cassava, of which rice paddies occupy the largest area and then maize remain the second. Some main other

annual crops such as Tobacco-pipe tobacco and vegetables. Two main types of perennial crops are fruit crops and perennial industrial crops (table 4.3).

Table 4.3. Planted crops of Haiphong city in 2019

Description	Areas (Thousand ha)	Production (Thousand ton)
Annual crop (total)	82.17	715.94
Cereals:	65.82	417.86
Rice	64.93	413.23
Maize	0.89	4.63
Other annual crops:	16.35	298.08
Tobacco-pipe tobacco	2.5	4.17
Vegetables	13.85	293.91
Perennial crop (total)	2.38	25.79
Fruit crops	2.06	19.62
Perennial industrial crops	0.32	6.17

Source: Author's calculation based on HaiphongSO (2019)

Table 4.3 present area and production of both main annual crops and main perennial crops. Area and production of annual crops are much greater than that of perennial crops, of which rice accounts for the largest proportion. Rice is the most important plant for food security in many countries. Hence, the area as well as production of rice is always more abundant than other crops.

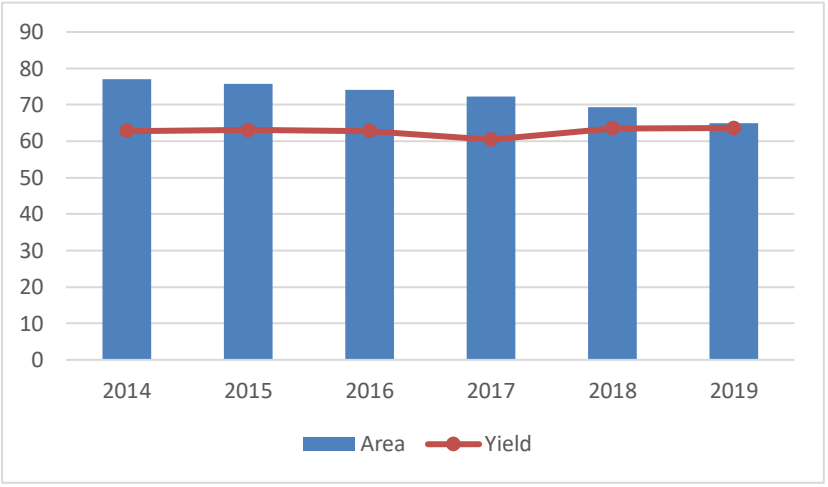


Figure 4.9. Area (in thousand ha) and yield (in quintal/ha) of paddy of Haiphong
Source: HaiphongSO (2019)

As the city with high and rapid industrialization and urbanization, the area and production of rice in Haiphong annually decrease. However, production of rice remains stable, leading stable yield of paddy year by year as in figure 4.9.

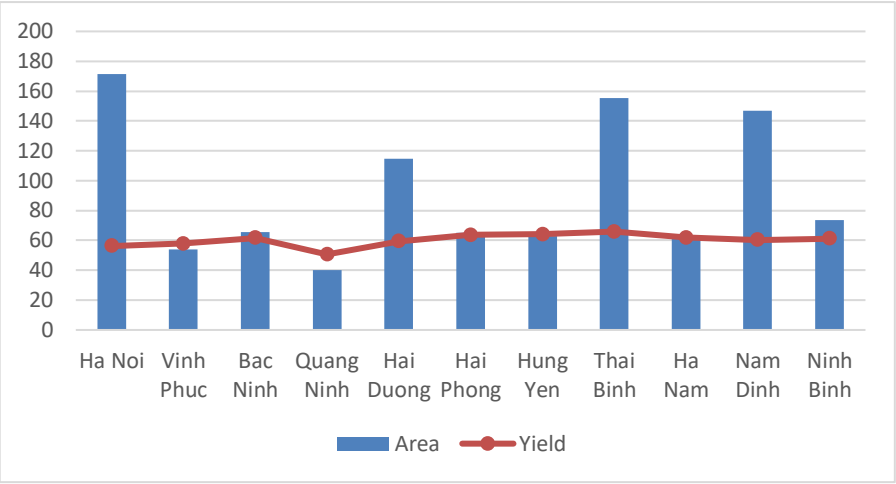


Figure 4.10. Area (in thousand ha) and yield (in quintal/ha) of paddy in the Red River Delta

Source: GSO (2019)

It is clear that rice area and production of Haiphong are lower than many provinces of the Red River Delta as well as of the other regions of Vietnam (figure 4.10). However, the yield of paddy of Haiphong remains in the top of provinces of Vietnam (GSO, 2019).

Livestock production

The livestock sector plays an important role in agriculture of Vietnam, which makes up around 28% of agricultural gross value-added and is one of the fastest growing agricultural sub-sectors. In 2018, 5.4 million tons of pork, beef, buffalo and poultry were slaughtered in Vietnam. Pork dominates Vietnamese main meat production at 71.76% and is followed by poultry 20.33%, beef 6.2% and buffalo 1.71% (GSO, 2018). In the past 10 year from 2005-2014, population of pig, cattle and buffalo has slightly decreased while the poultry population has increased. Although the population of pork, beef and buffalo are on the slight downtrend, production of all type of meat and egg has significantly increased with the highest rate of poultry meat, followed by pork, beef and buffalo meat (Dinh 2017). However, the appearance of African swine fever virus from the mid of 2019 have huge impacts on both pig population and pork production of each province of Vietnam, affecting the uptrend of previous years. From 2020, the production as well as the number of heads has continued to be recovered.

The situation of Haiphong livestock production is shown in figure 4.11 below with the same trend as the whole Vietnam context.

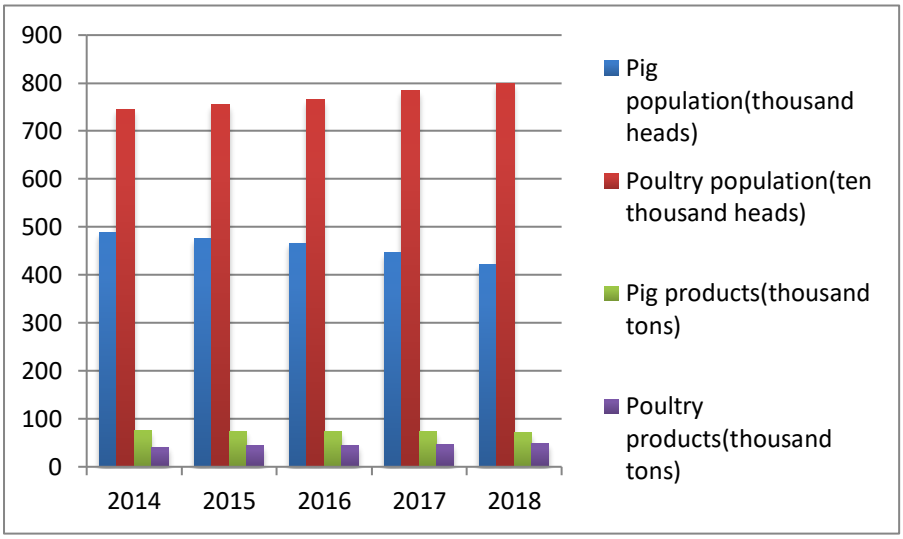


Figure 4.11. Pig and poultry production of Haiphong

Source: HaiphongSO (2018)

In the period of 5 years from 2014 to 2018, both number of pig and pig products moderately declined while both poultry population and poultry products annually increased. The numbers of chickens account for around 80% of poultry population as well as poultry products and the rest are duck, swan and goose. The livestock production of Haiphong in 2019 has suffered from abnormal uncertainty-African swine fever virus. Therefore, the decreases of 2019 do not reflect the actual trend of livestock production.

Aquaculture production

In addition to livestock, aquaculture is an important and growing sub sector of Vietnam's agricultural economy. Fisheries including capture and aquaculture accounted for around 3.5% of Vietnam GDP in 2014. With the advantage of tropical climate, more than 1 million km^2 of inland surface due to dense river network and 3,260 km of coastline, Vietnam has attractive features for aquaculture development (Nguyen 2017). Haiphong has a dense system of rivers, i.e. 16 main rivers with the total length of 300 km and the coastline of 125 km. Therefore, Haiphong also has many benefits for aquaculture development with three types of waters: freshwater, brackish water and salty water as in figure 4.12.

Total annual area of aquaculture of Haiphong slightly changed from 2014 to 2019, of which freshwater area has significantly increased while that of brackish water decreased. The slight increases in area of aquaculture in Haiphong in recent years are attributed to land recovery policies as well as environmental uncertainty. The proportion of salty water accounts for a small percentage as of total.

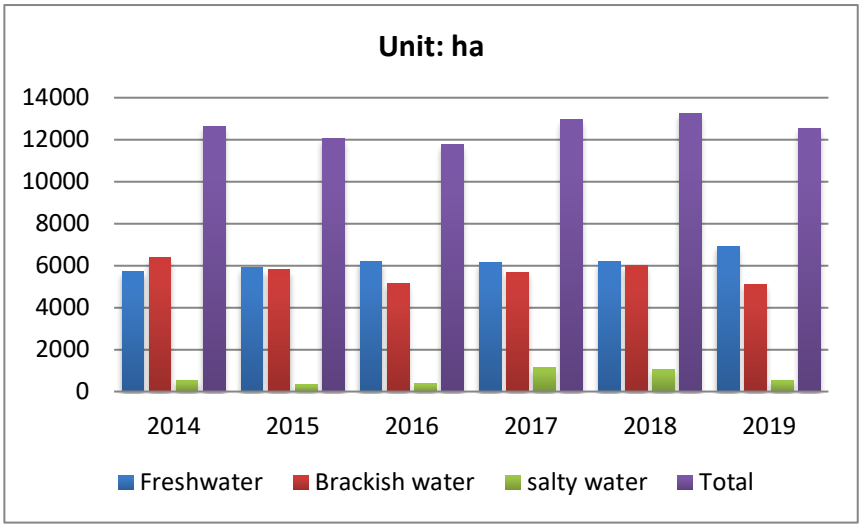


Figure 4.12. Area of aquaculture in Haiphong
Source: HaiphongSO (2019)

4.1.3. Agricultural and rural credit situation in Haiphong city

Figure 4.13 presents information on total outstanding credit of formal credit institutions in Haiphong from 2018 to 2020 in three economic sectors.

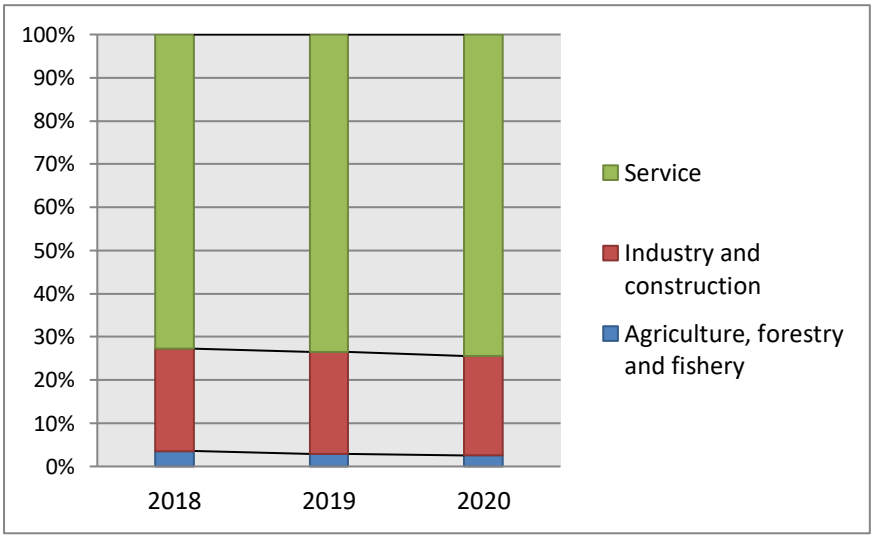


Figure 4.13. Total outstanding formal credit by economic sector in Haiphong
Source: State-owned bank of Vietnam

It is clear that the credit proportion of agriculture, forestry and fishery has gradually decreased year by year while those of industry-construction and service have increasingly gone up. Agricultural production mainly take places in rural areas, of which credit for agricultural production in rural areas contributes the highest percentage at 52% compared to others sectors as in figure 4.14.

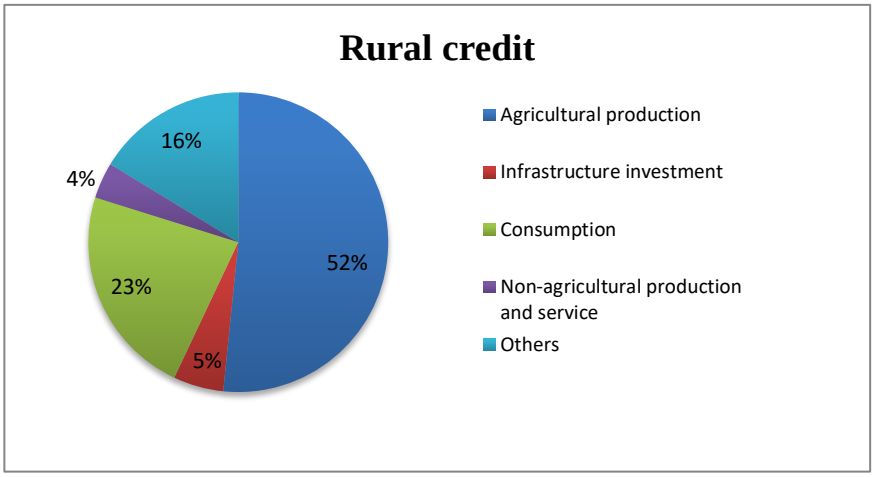


Figure 4.14. Formal credit in rural areas by borrowing purposes of Haiphong

Source: State-owned bank of Vietnam (2020)

Concerning three sub sectors of agricultural sectors, i.e. agriculture (cultivation and livestock), forestry and fishery (aquaculture and capture), Haiphong has no formal credit on forestry sub sectors. The majority of formal credit is used in agricultural sub sector, around 98%.

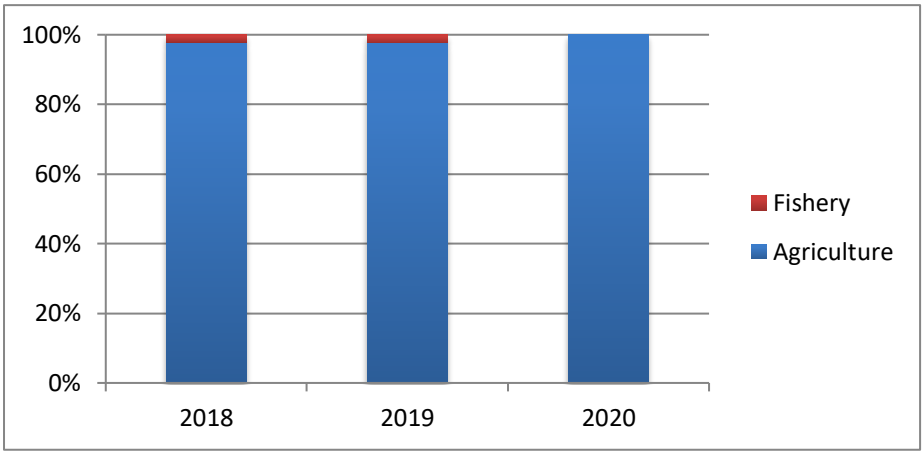


Figure 4.15. Formal credit by agricultural sub-sectors in Haiphong

Source: State-owned bank of Vietnam

4.2. Research methodology

4.2.1. Analytical framework

Based on theory of credit market discussed in chapter 2, an analytical framework was designed to analyze households' credit accessibility in Haiphong city. Figure 4.13 demonstrates the analytical framework including 3 main contents focusing on three dimensions relating to two sides – borrower and lender side of credit accessibility. As stated in chapter 2, credit access is considered from both demand/borrower side and supply/lender side. Lenders and borrowers' behavior/decisions lead to three outcomes: borrowers' market participation, amounts obtained and credit rationing, of which market participation relates to borrowers' decision and credit rationing relates to lenders' decision while amounts obtained result from both borrowers and lenders' decisions (depicted in figure 4.16). The three outcomes are three dimensions of credit access. The three main contents are as follows:

(1) Credit situation: the two main types of credit sources/lenders considered in the research, i.e. formal credit and informal credit. The characteristics as well as the differences of formal and informal credit markets are analyzed. Credit use by purposes and in amounts as well as credit constraints will be analyzed by groups of households and groups of lenders (informal and formal lenders). Groups of households are classified based on socio-economic features of households. This content will be presented in chapter 5.

(2) Factors affecting credit access: factors that affect households' credit access are divided into two groups: external factors which are outside households and internal factors which come from socio-economic characteristics of households. Each factor group has impacts on both lenders and borrowers' behavior or impacts on three dimensions of credit accessibility. The impacts are evaluated by econometric models. The results of this will be mentioned in chapter 6.

(3) Impact of credit uptake and policy recommendation: impacts of credit uptake on household income which is one of household welfare indicators. Household welfare can be measured by monetary and non-monetary indicators. Most common monetary indicators are household income and consumption expenditure while non-monetary indicators focus on health or education. Monetary indicators are more commonly used than non-monetary. In this research, household income indicator is selected. Based on both determinants of credit access as well as income impact of credit uptake, some policy recommendation will be discussed to enhance farmers' credit access for agricultural production.

In terms of content (2), the two dimensions of credit access, i.e. credit market participation and loan amounts obtained will be considered in both formal and informal markets. With its diversification and less requirements, informal credit is likely to be prevalent in rural areas. Hence, it is hard to observe informal lenders' behavior in rationing credit amounts. As a result, in this research, concerning credit-rationing level, I will only focus on evaluating formal lenders' behavior.

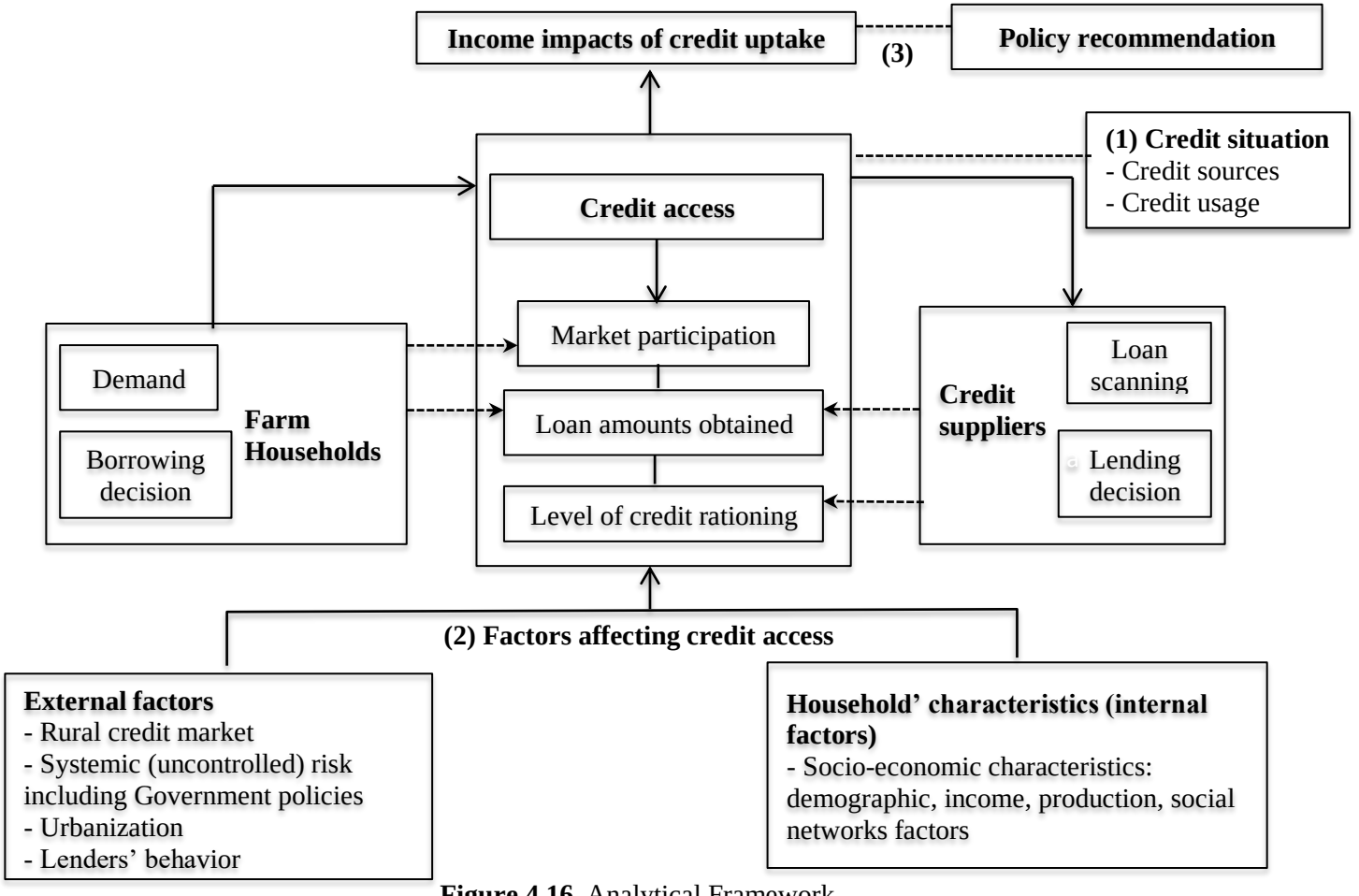


Figure 4.16. Analytical Framework

4.2.2. Research design

Research design is the framework of research methods and techniques in order to address research questions as well as research objectives. Research design is created to find answers to research questions, including data collection, data analysis, and interpretation and discussion of data. Research design can be broadly classified into quantitative and qualitative method. Qualitative method figures out correlation between collected data and observations based on mathematical calculations. Quantitative method finds the answer to inquiries by compiling numerical evidence. Components are classified and processed by statistical models to explain observations. Some researchers use only qualitative method or quantitative method while others apply mixed ones, i.e. both qualitative and quantitative method. The differences between the qualitative, quantitative or mixed research are based on not only the type of data you collect but also how you analyze the data.

Figure 4.17 describes the research design with five steps. Some steps use qualitative method or qualitative one or mixed one. With the mixed method, sometimes results of qualitative and quantitative are independently interpreted while sometime the results of one are used to enhance that of another one. The detailed data collection, data analysis and results are presented in chapter 5, 6, 7, 8 respectively.

4.2.3. Study site and sample size selection

Study site

Selecting appropriate sites is a key of the research. The criteria of the selection of the research site were the following (1) the study site should be the densely populated rural region with the typical socio-economic characteristics; (2) the population access to credit for agriculture as a tool for economic development and income increase. Haiphong has 8 rural districts involving agricultural production, of which Kien Thuy, one typical district with four communes was selected for the study. Among 8 rural districts, two island districts, i.e. Cat Hai and Bach Long Vi are excluded due to specific features. The rest of 6 districts are considered to select the study site.

Table 4.4. Situation of agricultural activities of rural districts in Haiphong

Districts	Proportion of rural population (1)	Proportion of HHs in agricultural sector (2)	Proportion of agricultural HHs (3)	Proportion of fishery HHs (4)
Thuy Nguyen	95%	22.02%	85.94%	14%
An Duong	95%	17.01%	98.70%	1.3%
An Lao	90%	26.20%	97.44%	2.58%
Kien Thuy	97%	26.36%	87.18%	12.82%
Tien Lang	90%	49.30%	94.54%	5.65%
Vinh Bao	95%	38.70%	97.88%	2.11%

Source: HaiphongSO 2016

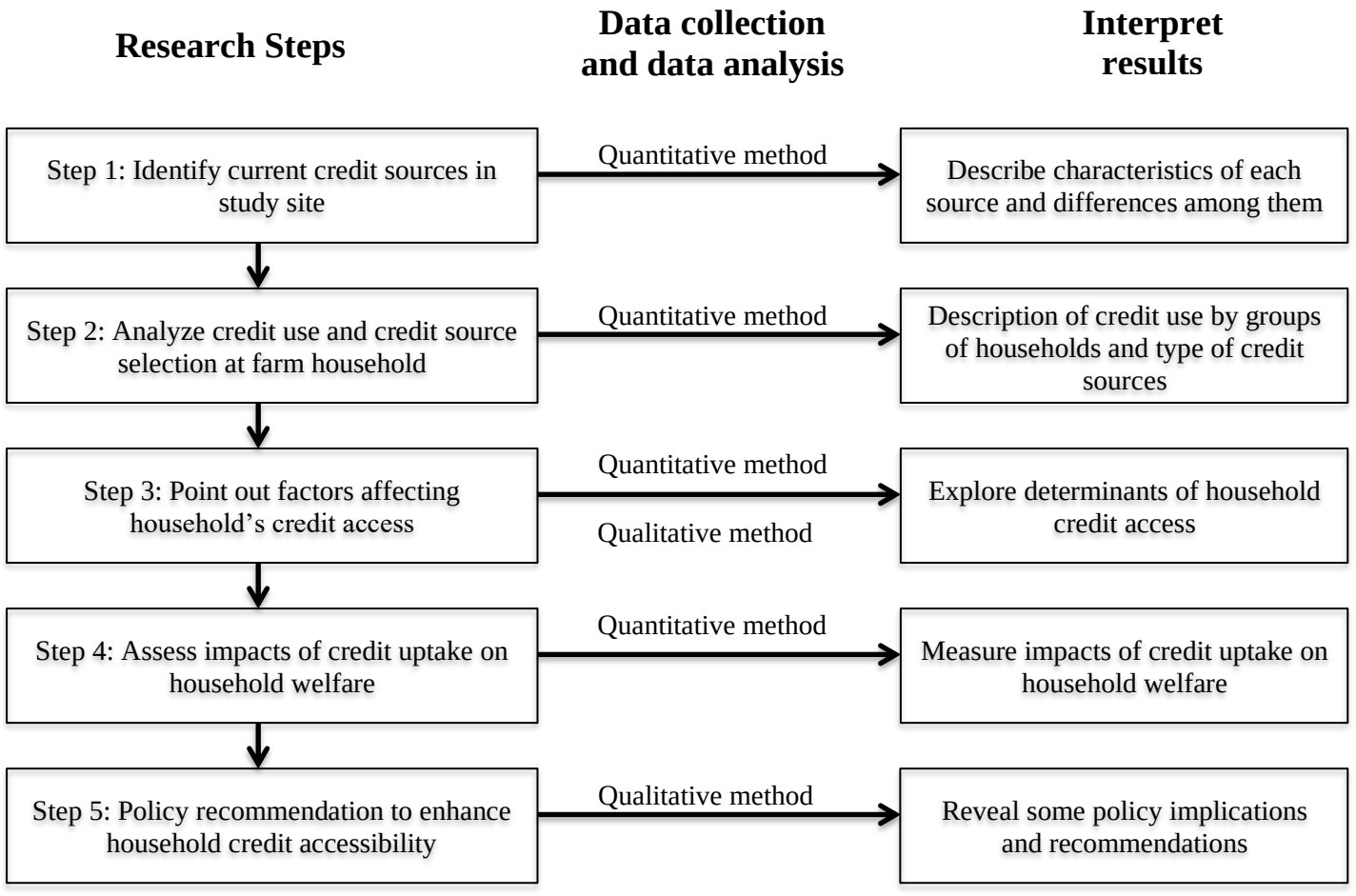


Figure 4.17. Research design

In table 4.4, there are four columns numbered from (1) to (4). Column (1) is the proportion of rural population of a rural district. The rate is high for all rural districts but the highest is of Kien Thuy. The proportion of agriculture-related households (2) is calculated by the ratio of agricultural, forestry and fishery households to total rural households on one commune. In other words, agriculture-related households refer to agricultural, forestry and fishery households. Agricultural households refer to households with all or most of their laborers engaged in agricultural production (crop, livestock or agricultural services) while fishery households are households whose all or most of laborers are involved in aquaculture and fishing. Forestry households are households whose all or most of laborers in forestry production, which account for a much small percentage among rural household in Haiphong. Therefore, the author just focuses on agricultural and fishery households. Proportion of agricultural households or fishery households are calculated by the ratio of agricultural households or fishery households to total agriculture-related households.

The highest rate of agriculture-related households belongs to Tien Lang and is followed by Vinh Bao and Kien Thuy. However, the proportion of fishery households in Kien thuy is much greater than Vinh Bao and Tien Lang, 12.82%, 2.11% and 5.65% respectively. On the other hand, in table 4.4, the agricultural situation of Kien Thuy and Thuy Nguyen are quite similar. However, Thuy Nguyen which is a district strongly focusing on industry and service, stays in the top list of fastest growing districts of Haiphong. On the other hand, in terms of economic structure, the percentage of agricultural sector of Thuy Nguyen is lower than that of Kien Thuy. Therefore, Kien Thuy has been selected as the study site at district level with the diversification of agricultural activities as well the important role of agricultural production in economic development. The four typical communes of Kien Thuy district are selected for the survey: Tu Son, Tan Phong, Ngu Doan and Ngu Phuc.

Sample size

The choice of sample size is often affected by a number of factors, such as purpose of the research, population size, risk of 'bad' sample and the allowable sampling error (Israel 1992). Israel mentioned three criteria needed to determine appropriate sample size in addition to study purpose and population size, i.e. the level of precision, the level of confidence or risk, and the degree of variability in the attributes being measured.

The level of precision is sometimes seen as sampling error. It is the range in which the true value of the population is estimated to be. The range is often depicted in percentage points, (e.g., +/- 5%). For example, if a study figures out that 40% of households in the sample have accessed credit with a precision rate of +/- 5%, we may conclude between 35% and 45% of households in the population have accessed credit.

The confidence level or risk level refers to the extent to which we can be sure the characteristics of the population have been accurately estimated by the surveyed sample. In other words, when a population is repeatedly sampled, the average value

of the features achieved by the samples is equivalent to that of the population (Taherdoost 2017, Israel 1992). For example, if a 95% confidence level is selected, that means 95 out of 100 samples will have the true population value within the range of precision cited above. The risk of probability when the samples chosen does not actually represent the true population value, will be reduced for 99% confidence levels and increased for 90% or lower confidence levels.

The degree of variability in the attributes being measured refers to the distribution of attributes in the population. That means the more heterogeneous a population, the larger the sample size required to gain a given level of precision. The proportion of 50% indicates the maximum variability in a population. The 50% rate reveals a greater level of variability than either 20% or 80%. There are several statistical formulas available for determining sample size. With large population, the equation is developed by (Cochran 1963) as follows:

$$n = \frac{Z^2\, pq}{e^2}$$

Where n is the sample size, Z^2 is the abscissa of the normal curve that cuts off an area α at the tails (1- α equals the desired confidence level, e.g. 95% or 90%), e is the desired level of precision, p is the estimated proportion of an attribute that is present in the population, and q is 1-p. The value for Z is found in statistical tables which contain the area under the normal curve. The study uses p=0.5 (the maximum variability stated above) with 90% confidence level equal to Z=1.64 and +/- 6% precision. The resulting sample size is:

$$n = \frac{Z^2 pq}{e^2} = \frac{1.64^2 * 0.5 * 0.5}{0.06^2} = 187$$

Among 187 households surveyed, the information of 7 households are missing. Therefore, the study will use the data of 180 selected households.

Table 4.5. Household samples

Unit: Person

Description	Total	Tu Son	Tan Phong	Ngu Doan	Ngu Phuc
Population size		10,409	6,151	8,897	6,314
Sample size	180	47	44	45	44

Four selected typical communes with number of households for each are presented in table 4.5. Number of sample households is 47 for Tu Son, 44 for Tan Phong, 45 for Ngu Doan and 44 for Ngu Phuc.

4.2.4. Data collection

Secondary data

Secondary data is collected from various official sources at all levels, reports, books and scientific articles and annual reports of governmental divisions that aim to obtain information/content relevant to the research topic. More concretely, official annual reports/data come from Governmental level (ministry level, such as: General Statistics Office, Ministry of Agriculture, etc.) to provincial level as well as municipal level. Relevant and available data, published or unpublished literatures, policy documents and other relevant sources are gathered from these sources.

Primary data

Primary data collection methods are different ways in which primary data can be collected. The study uses three main tools in collecting primary data: in-depth interviews, focus group discussion and surveys. In addition to collection tools, we have two approaches of collecting data: top-down and bottom-up. The research uses top-down approach. Top-down data collection approach refers to creating an overarching system of data collection before fleshing out subsystems under it (figure 4.18).

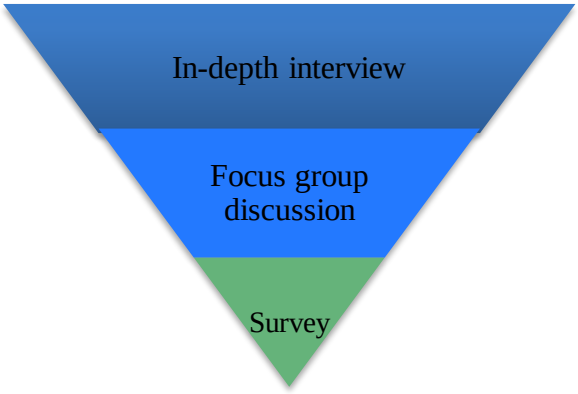


Figure 4.18. Top-down approach of data collection with three main tools

Step 1: Key informant interviews are conducted with three sub-steps concerning local authorities, local formal credit suppliers and local social associations of the communes, respectively.

Local authorities interviewed are one leader of People's committee in charge of agriculture and rural development sector at district level, 4 leaders of People's committee at commune level, 2 leaders of governmental offices of the districts (department of agriculture and rural development, department of natural resources and environment). These interviews aim to obtain data on government policies relating to as well as overview of current status of credit access at the district level.

Local formal credit supplier interviews are conducted with heads of 3 main formal credit institutions at the district, i.e. Vietnam Bank for Agricultural Bank for Agriculture and Rural Development – Kien Thuy branch, People Credit Fund of Ngu Phuc commune and Vietnam bank for social policies – Kien Thuy branch. The data collected from this step focuses on the characteristic, lending procedures as well as risk appetite of each institution.

Local social associations of the communes often cooperate with formal institutions in group-based lending scheme and in this case act as sponsors of farmers' borrowings, i.e. Women's Union, Farmers' Union, Youth Union, and Veteran Union but total loans amounts assigned to Women's Union are greatest. Therefore, 4 leaders of Women's Union of 4 communes are selected. Members of Women 's Union are often heads of each household lending group and they live with the same commune with borrowers. Hence, they have close relationship and actual understanding of each household in the commune. As a result, information/data from interviews of local social association heads provide overview of general characteristic of households.

Step 2: Focus Group Discussion (FGD)

Four FDGs is organized in 4 selected communes with participation of household heads. Each FGD which has 6-8 farmers, was conducted to (1) identify households' main credit demand for agricultural production, (2) reasons of their choice for credit source, and (3) credit constraints they may have if they apply loans. FDG refers to discussions and interactions among group members rather than only personal questions and answers. The information from FDGs help to double-check the reliability of the results obtained from the household survey.

Step 3: Household survey

Household survey utilizes the quasi-structured questionnaire that is used mostly in social science research. The quasi-structured questionnaire is a mixture of both structured and unstructured one. Structured questionnaires often collect quantitative data with pre-coded questions with well defined skipping patterns to follow the sequence of questions while unstructured questionnaires are used to collect qualitative data. The questions designed in unstructured questionnaires are often open-ended questions in which the respondent can answer in a free form without restrictions (Acharya 2010). In addition to surveys, focus group discuss also use such questionnaire.

Household surveys in the research are conducted with 180 households of 4 communes to collect detailed information necessary for the research. The field survey was carried from the middle of 2018 to the middle of 2019. The purpose of this fieldwork is to gather both qualitative and quantitative data on (1) socio-economic characteristics of the households, including demographic, income, production factors; (2) credit situation of the households (credit demand, loan amounts, credit sources, the extent of credit rationing); (3) implications of

households for facilitating credit access. The method of selection is simple random sampling.

A reconnaissance survey or pre-test are conducted before official data collection through the interviews of 10 farm households in Tu Son commune. The purpose of pre-test is to increase the validity and reliability of our testimonial survey evidence. In other words, pre-testing will help the researchers conclude whether respondents understand the questions as well as their answers are on the right track in which the research intended. So, some questions are adjusted to adapt the study site and research units.

Table 4.6. Data collection method

Method	Type of respondents	Number of respondents	Information need to obtain
1. In-depth interview	Local authorities	7	- Government policies relating to credit. - Overview of current status of household credit access at commune and district level - Available credit sources in research site: formal and informal
	Local formal lenders	3	- Characteristics, lending procedures and risk appetite of each institution - The difference between the reality they can apply from policies and policies
	Local social associations	3	- Overview of general characteristics of households - Their knowledge of formal and informal lenders
2. Focus group discussion	Household heads	6-8 persons/ group	- Identify household credit demand for agricultural production - Reasons of their choice for creditsource - Credit constraints they may have if they apply loans
3.Household survey	Household	180	- Socio-economic characteristics of household: demographic, income and production factors - Credit situation of household: credit demand, loan amount, credit constraints as well as the extent of credit rationing - Implication of household for facilitating credit access - The actual credit uses of each source they borrow

4.2.5. Data analysis method

The collected data is inputted into both SPSS and STATA files, then checked and cleaned on each question. Both descriptive statistics and inferential statistics are used to analyze data for the household surveyed.

Descriptive statistics summarize the characteristics of the data set or of sample data. In reality, we only acquire data from samples not from the whole population because it is too difficult or too expensive. Therefore, inferential statistics help to make predictions on the population by using on your sample data. In other words, the purpose of inferential statistics is to make conclusions from a sample and generalize them to a population. A statistic is a measure describing the sample while a parameter is a measure describing the whole population. Sampling error is the difference between a parameter and corresponding statistics. So inferential statistics are used to estimate the parameters in a way that takes sampling error into account. Confidence interval, which is the method for estimating parameters including taking sampling error into account, is one type of interval estimate producing a range of values where parameter is expected to lie. Each confidence interval is associated with a confidence level (which is stated above in section 'sample size selection').

The most common methodology in inferential statistic is hypothesis testing. In other words, hypothesis testing is a formal process of statistical analysis using inferential statistics. The goal of hypothesis testing is to assess relationship among variables using sample data. Predictions/Hypotheses of the populations are tested using statistical tests. Statistic tests, which can be parametric or non-parametric tests, are categorized into three forms: comparison tests, correlation tests and regression tests.

4.2.5.1. Descriptive analysis

Descriptive analysis is applied to draw an overview picture of agricultural production as well as credit situation in Haiphong city based on the sample data set. Through descriptive analysis, some characteristics of the data could be presented as follows: (1) Distribution refers to the frequency of each value; (2) The central tendency implies the average of the value; (3) The variability concerns how the value is spread out. The results could be described in either numbers or graphs. As a result, based on descriptive analysis, distribution of some parameters, such as some socio-economic characteristics of households, credit sources and information relating to agricultural production, are indicated.

4.2.5.2. Comparison and correlation tests

Comparison tests

Comparison tests assess if there are differences in means among two or more groups. They are used to test the effect of a categorical variable on the mean value of some other characteristics. For example: the effect of household head gender on loan amounts obtained. We have two types of comparison tests: parametric test and non-parametric tests. Parametric tests make assumptions that include as follows: (1) the

population that the sample comes from follows a normal distribution, (2) sample size is large enough to represent the population. Non-parametric tests are called 'distribution-free tests' which are applied when data violates assumptions of parametric tests.

The Independent sample t-Test and Mann-Whitney U test are used to compares the means of two independent groups in order to examine whether there is statistical evidence that the the associated population means are significantly different. Independent t Test is parametric while Mann-Whitney U test are non-parametric alternative test of the Independent t Test. Regarding the comparison of more than two independent groups, one-way ANOVA test is used for parametric test and Kruskal-Wallis test is non-parametric.

In this study, Mann-Whitney U test and Kruskal-Wallis are applied to compare the mean credit amounts among household groups, including formal, informal and total amounts. The two tests are used instead of T-test and Anova test because the dependent variables 'credit amounts' are not normally distributed. Groups of households here are categorized based on their characteristics, such as: age, gender, occupation of household heads, type of agricultural production, main income source of families, family location. The results of two tests will provide the differences in amounts among household groups. These tests are mainly presented in chapter 5.

Correlation tests

Correlation tests determine the extent to which two variables have association with each other. Pearson's test (Pearson's r) measures the strength and direction of linear relationships between pairs of continuous variables while The Chi-square Test of Independence is used for categorical variables. The Chi-square Test of Independence is a non-parametric test.

The study will use the Chi-square test to quantify the differences in credit source selection among household groups, which are all categorical variables. That means each group of households will have different decisions in choosing credit sources. The results are also mentioned in chapter 5.

. The tests of comparison and correlation above will give a slight insight of surveyed households' credit access for agricultural production. These results will enhance the results of econometric models quantifying determinnats of credit access in chapter 6.

4.2.5.3. Regression models

Regression tests are used to test cause-and-effect relationships. In other words, regression tests estimate changes in predictor variables (independent variables) causing changes in an outcome variable.

Logistic regression

Logistic regression is the appropriate regression analysis when the dependent variable is dichotomous or binary. The relationship between dependent and independent variables is generally modeled as follows:

$Y_i = \beta X_i + u_i$ (1)

Where Y_i is equal to 1 when a choice is made to adopt and 0 otherwise, X_i are independent variables or characterisitcs of the i[th] individual which determine the probability of adoption. Equation (1) is mathematically represented as:

$$Prob(Y_i = 1) = F(\beta X_i) \text{ (2)}$$
$$Prob(Y_i = 0) = 1 - F(\beta X_i)$$

The function F may take the form of a normal logistic or probability function. The logit model uses a logistic cumulative distributive function P to estimate as follows ():

$$P(Y = 1) = \frac{e^{\beta X}}{1 + e^{\beta X}} \quad (3)$$
$$P(Y = 0) = 1 - \frac{e^{\beta X}}{1 + e^{\beta X}} = \frac{1}{1 + e^{\beta X}}$$

It is difficult to interpreting the coefficients through equation (3), so the model is normally written in terms of log-odd ratio. With a logit transformation, the estimated model becomes a linear function of the explanatory variables which is expressed as:

$logit\ [P(Y = 1)] = \log\left[\frac{P}{P-1}\right] = \alpha + \beta X_i + u_i$ (4)

In this research, logistic regression is used to quantify the impact of socio-economic characteristics of households or internal factors inside households on borrowers' market participation (borrower's behavior). These characteristics are clearly explained in the model of chapter 6. In equation of borrowers' market participation, the dependent variable $Y = Y_j$, the independent variables $X = X_j$, where j is the source of credit (formal and informal), $Y_j = 1$ if the household have loans and $Y_j = 0$ otherwise:

$logit\ \left[P_j(Y_j = 1)\right] = \log\left[\frac{P_j}{P_j - 1}\right] = \alpha + \beta X_j + u_j$ (5)

Multiple regression model and tobit regression model

The model of loan amounts obtained is used to determine the factors that have impacts on amounts obtained of households. The multiple regression models with the dependent variable in the log form of loan amounts obtain is expressed as below:

Log (loan amount)$_j = Y_{1_j} = \alpha_1 + \beta_1 X_{1_j} + u_{1_j}$ if $Y_j = 1$ (6)

Where independent variables X_{1_j} are determinants which have impact on loan. Determinants are also socio-economic characteristics of farm households. The parameters in equation (6) can be estimated by OLS. However, data of loan amount is just revealed with the household participating in the credit markets or with the borrowing households. We cannot observe loan amount if a household does not borrow from any sources. Due to this censoring feature of the dependent variable,

the tobit regression model will be used to compared with the results of OLS. The function is now specified as:

$$Y_{1_j} = Y_{1j}^* = \begin{cases} \alpha_1 + \beta_1 X_{1_j} + u_{1_j} & if\ Y_{1j}^* > 0 \\ 0 & if\ Y_{1j}^* \leq 0 \end{cases} \quad (7)$$

Heckprobit model

To estimate the extend of formal credit rationing, the binary dependent variable of the model should be whether a household is constrained or not, of which constrained households are those just received the amount less than they need and unconstrained is those received the full amount they need. The way of collecting data with questions of constrained households are mentioned in the section 4.2.4 'data collection' above. Based on that, a household is determined to be credit constrained or not only when they participated in the credit markets. In other words, we only observe lenders' decision relating credit rationing only when a household borrows. This fact is the same that of loan amount mentioned above which is only observed with borrowing households.

Therefore, I address this sample selectivity problem by using a bivariate variant of Heckman's selection model (Wooldridge 2002) or heckprobit model with equation (8) including (8.1) and (8.2) as follows:

$Y_1^* = \partial_1 X_1 + \in_1$ (8.1)

$Y_2^* = \partial_2 X_2 + \in_2$ (8.2)

Where Y_1^* is the dependent of variable receiving 1 if a household have formal loans and 0 otherwise. Y_2^* is also the dependent variable receiving 1 if a household is credit rationed and 0 otherwise. Y_2^* is observable when Y_1^* =1. X_1, X_2 are characteristics of households. Equation (8.1) is the selection model and (8.2) is the model of interest or outcome equation. Equation (8.1) (focusing formal loans) is extracted from equation (5) but using probit model.

4.2.5.4. Propensity score matching method (PSM method)

One of study objectives in figure 4.13 'Analytical framework' is to analyze impacts of household credit uptake on household income. As mentioned in chapter 2 'Literature review', determinants of credit access are households' socio economic characteristics including income factors. In return, household income can be impacted by both credit uptake and other household characteristics such as age, education, social network and so on Therefore, usage of only T-test to compare income of borrowing and non-borrowing households or rationed or non-rationed households will badly overestimate the effect of credit uptake or leads to biased estimators because the distribution of the observational variables in the two groups may differ. In other words, the inference of credit impact only makes senses when comparing the two household groups with similar observable characteristics.

PSM is one type of statistical matching technique that uses estimated scores to estimate the effect of a treatment, policy or other intervention by including the covariates that predict receiving treatments. PSM method helps to reduce the bias of normal T-test in probability of receiving treatments or reduce the selection bias. The crucial approach of PSM is to hold all factors constant as much as possible by matched sampling so that the difference in income between credit-accessed and non-credit-accessed households is due to credit. In other words, applying PSM is a good choice to compare the mean outcome, i.e. income, or to evaluate the treatment effect of treatment group and control group (non-treatment group). In this study, treatment group is credit-accessed one and control group is non-credit-accessed.

PSM is estimating the income impact depicted by the Average Treatment Effects on the Treated (ATT)

$$ATT = E(\Delta|T = 1) = E(Y^1|T = 1) - E(Y^0|T = 1)$$

$E(Y^1|T = 1)$ represents outcomes for treatment group

$E(Y^0|T = 1)$ represents hypothetical outcome if treatment group had not received treatment.

However, $E(Y^0|T = 1)$ is an unobservable counterfactual outcome of treatment group. An observation cannot be assigned to both treatment and control group. This is selection bias. We can only observe outcome of control group who do not actually receive treatments, represented by $E(Y^1|T = 0)$. PSM method will solve the problem of multi-dimensionality, which arises from the application of covariate matching procedure due to a great number of covariates. Therefore, we use $E(Y^1|T = 0)$ for $E(Y^0|T = 1)$. PSm is used to minimize individual heterogeneity across observations.

There are three main steps of PSM method to calculate ATT:

(i) The first step of PSM is to estimate the propensity score, which is the conditional probability of being assigned to particular treatment given a vector of observed variables, i.e. the probability of access to credit given the characteristics of households in this study. In other words, propensity score values are dependent on the vector of observed variables that are related to the receipt or treatment. This step is conducted by using the probit model.

$$P(X_i) = Pr\ (Yj=1|\ X_i) = \alpha + \beta X_i + u_i$$

When X_i is vector of observed characteristics of household i, Y_j is the dummy variable and j is the source of credit (formal and informal), Y_j=1 if household i accesses to credit and 0 otherwise. Because the propensity score is a probability, it ranges in value from 0 to 1.

(ii) The second step is matching techniques implemented to sample certain covariates from treated and control groups (accessed and non-accessed groups) to obtain a sample with similar distribution of covariates between two groups. The treatment and the control groups are matched on the estimated propensity score. If the treated observation and control observation have the same/closet propensity

score, the observed covariates/variables are automatically taken into account. Hence, any differences between the treatment and control group will be accounted for and will not be as the result of the observed covariates.

(iii) The third step is estimating treatment effect through the average differences in the outcomes of the treated and control group in each balanced block, i.e. ATT. ATT will be estimated by the mean difference weighted by the number of treated cases in treated group. The formula to calculate ATT is as follows:

$$\text{ATT} = \frac{1}{N^T}\left(\sum_{i\in T} {Y_i}^T - w_{ij} \sum_{j\in C} Y_j^C\right)$$

When N^T is the total number of cases in the treated group, ${Y_i}^T$ and Y_j^C represent the outcomes for case i in the matched treated group and case j in the matched control group (in this study, outcome is income) and w_{ij} are weights depending on each matching method.

The 'teffects psmatch' command in Stata software is used to estimate ATET (the same as ATT) with approach of propensity-score matching.

Impacts of credit uptake on households' income will be separately analyzed for each type of credit source. In other words, there are three functions for estimating ATT between three group categories: formal and non-formal borrowing households, informal and non-formal borrowing households and rationed and non-rationed households.

4.2.6. Limitation of data collection and analysis

The study is conducted in Kien Thuy district of Haiphong city with the sample of only 180 households belonging to 4 selected communes. Therefore, some information in this study may endure bias. Due to limitation of time and manpower, the typical district is selected for research. Information from household is collected based on face-to-face personal interviews. However this information is sometimes bias because of some reasons. Firstly, some of interviewees are household heads while some are not due to the absence of household heads. In a family, the household head may have information more concretely than other members. Secondly, a vast number of household do not record information by text, especially agricultural production information collected depends on their remembrances and estimations. To reduce the bias, cross checking with other source of information and group interviews is applied. On the other hand, some assumptions of regression models are violated, which are fixed by alternative tests in some cases or explained by practical observations.

5

Farm households'credit accessibility for agricultural production

As discussed in chapter 2, there are some differences between the concepts of credit uses and credit access, of which credit users refers to those actually borrowing money. Non-users include both voluntarily and involuntarily market excluded households for specific reasons. This chapter thus targets on describing households' credit uses as well as the reasons why non-users are excluded from credit markets. The chapter has five sections. First section presents descriptive information of surveyed farm households, including some socio-economic characteristics, agricultural production information and the choice of credit sources of farm households. The second part of the chapter demonstrates credit uses of household groups categorized by age, gender and occupation of household heads, type of production, main income source and location of families. The next section will concretely explain households' decisions in choosing formal and informal lenders. Households' credit constraints or reasons of being market excluded are stated in the fourth section. Conclusion of this chapter is presented in the last one.

5.1. Description of surveyed farm households

5.1.1. Some characteristics of farm households

Demographic information

Table 5.1. Demographic information of farm household

Description	Mean	Components (%)
Gender	0.57	Male: 57.8%
	(Min: 0 – Max: 1)	Female: 42.2 %
Age of household head	51.4 years	29-42: 13.3 %
	(Min: 29 – Max: 70)	43-56: 58.9%
		57-70: 27.8%
Household size		
Total number in family	2.99	2-4 person family: 92.78%
	(Min: 1 – Max: 6)	Others: 7.22%
Dependent people	0.63	No-dependent family: 63.3%
	(Min: 0 – Max: 4)	Dependent family: 36.7%

Source: Household survey 2018-2019

Table 5.1 presents some demographic information of farm households, i.e. gender, age of household head and household size. The proportion of male household heads is 57.8% compared to 42.2% of female. Age of household heads range from 29 to 70 with the average value of 51.4. Age is divided into three categories: 29-42, 43-56 and 57-70 as in figure 5.1.

It is clear that the greatest proportion of farmers is in the age of 43 to 56, at 58.9% while the smallest one is in the group of 29 to 42, at 13.5%. Kien thuy is one of highly

urbanized rural districts in Haiphong city. It takes 30 minutes (around 20 km) by motorbike or car from the district to city. Therefore, younger people find easy to seek a job at industrial zones in urban areas or a freelance job in the city with higher income. This is the reason why the rate of household heads from age of 29 to 42 is smallest one. The popular range of age in farming activities is 43-56. They often have experienced farming job almost their whole life.

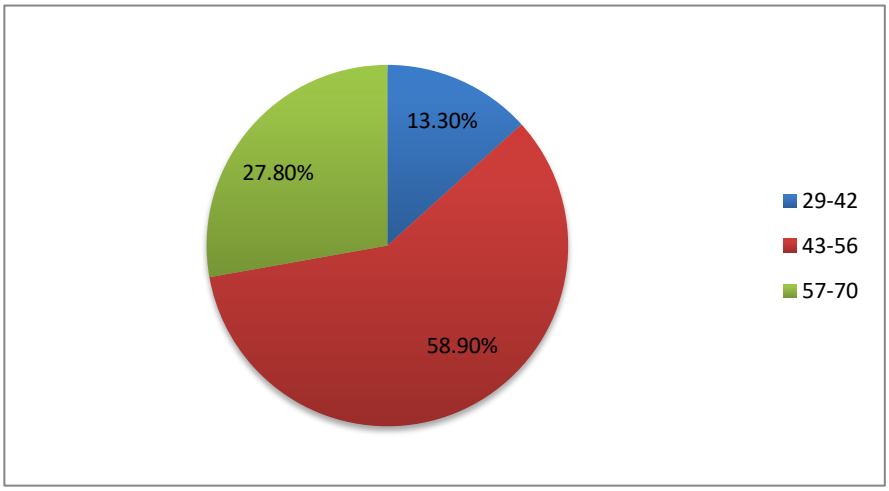


Figure 5.1. Age distribution of household heads

Source: Household survey 2018-2019

The average number of persons in a family is nearly 3 persons, of which families with 2-4 persons accounts for 92.78%. Some of them are nuclear families while some have only parents because their children have grown and live separately. It is surprising that the number of families without dependent persons is greater than those having dependent persons, 63.3% and 36.7% respectively. Most of non-dependent households are older couples who live without their children. Their children may migrate to urban areas for living or working.

Socio-economic characteristics

Some socio-economic characteristics of farm households are depicted in table 5.2, such as: education, occupation and farming experience of household head, type of agricultural production, income and main source of income. Based on data collected, number of household heads having vocational training is much small, therefore just years of schooling (primary school, middle school and high school) is considered in the research. Before 1975, basic education in Vietnam just consisted of 10 years for three levels, so people in this period finished the 7^{th} grade equal to middle school and the 10^{th} grade equal to high school. Vietnam education reforms in 1976, 1981 and 1992, finishing 9^{th} grade just was equal to middle school and 12^{th} equal to high school. The average year of schooling of household heads is 8.7, including 70.6% having middle

school degree and only 28.3% having high school degree. Low education may reveal the limited ability to approach new technology as well document production activities. Therefore, households do not definitely plan their production and they habitually do farming. On the other hand, it is low education that restricts farmers to seek non-farm jobs. 63% of household heads are farmers only while 36.1% have both farm and non-farm jobs ('others' group). However, their non-farm jobs are often manual labor jobs in the city. Some others have non-farm jobs as opening a small local business.

Table 5.2. Some socio-economic characteristics of farm households

Description	Mean	Component %
Education of household head	8.7 years (Min: 5 – Max: 12)	Primary school: 1.1% Middle school: 70.6% High school: 28.3%
Farming experience	29.18 years (Min: 8 – Max: 50)	
Occupation of household head		Farmer: 63.9% Others: 36.1%
Agricultural production (number)		Livestock (Pig and Poultry): 92.8 % Aquaculture: 77.8%
Income (USD) **Agricultural income** **Non-agricultural income**	11,390 (Min: 1,304 – Max: 56,525) 8,401 (Min: 869 – Max: 43,481) 2,948 (Min: 0 – Max: 15,653)	
Main source of income		Farm-based: 80.6% Non farm-based: 19.4%

Source: Household survey 2018-2019

Household heads in the study site averagely experienced farming activities for around 29 years. The relationship between household heads' age and farming experience is depicted in figure 5.2. The distribution pattern of age is the same as that of farming experience. In other words, the older household heads often have more experience than the younger. The fact is so popular in rural areas where farmers often enter farming right after leaving school. Therefore, in the econometric models in chapter 6, I just use the variable age instead both age and farming experience to avoid multicollinearity.

As regards agricultural production activities, the two main activities of surveyed households are livestock and aquaculture. The proportion of households in livestock production is 92.8% and in aquaculture is 77.8%. Many households with livestock production also involve aquaculture farming. The main types of livestock are pig and poultry.

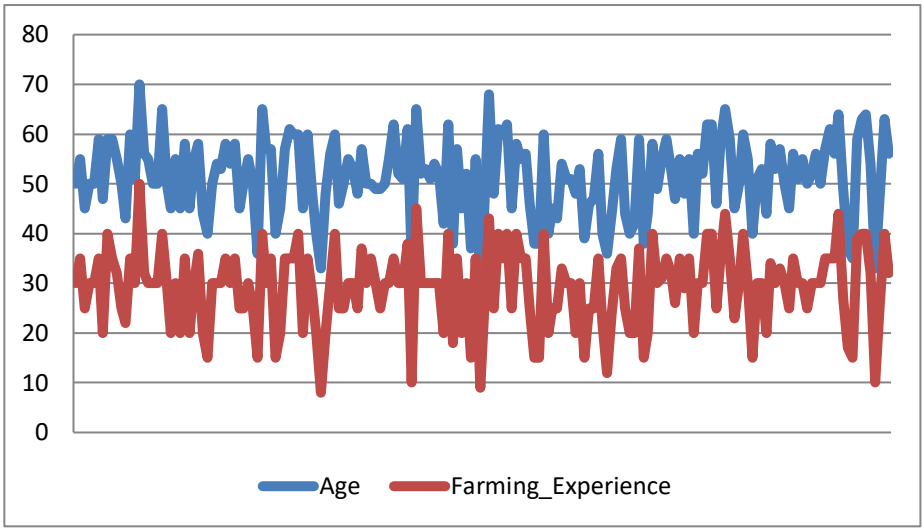


Figure 5.2. Relationship between age and farming experience of household heads

Source: Household survey 2018-2019

Based on the main income sources, survey households are divided into farm-based and non farm-based households. Farm-based households are those whose income from agricultural production account for more than 50% of total family income while non farm-based households have agricultural income making up 50% and below of total family income. In table 5.2, 80.6% of total households are farm-based and 19.4% are non-farm based. This classification will be used to compare some indicators related to credit use in next sections of the chapter.

The average annual income of households is 261.96 million VND (around 11,300 USD), ranging from 30 to 1,300 million VND. Total income includes agricultural income and non-agricultural income. Non-agricultural income may come from family small business, manual jobs or other sources such as salaries or remittances.

5.1.2. Agricultural production at farm households

Type of agricultural production

In table 5.3, the number of households with both livestock and aquaculture is 127, accounting for 70.6% while that of households with only one production type (livestock or aquaculture) makes up 29.4%. The farming model, of which livestock and aquaculture production are combined, is popular in rural areas of Vietnam. The integration of livestock aquaculture is one option for economically and ecologically sustainable development of farming systems for small farmers in developing countries. Livestock production and its process generate by-products which may be essential input feeds for aquaculture. The economic and ecological aspects of linkages between livestock and fish production is revealed by the direct use of

livestock wastes and the recycling of manure-based nutrients as fertilizers to stimulate natural food networks (Little and Edwards 2003).

Table 5.3. Distribution of households by agricultural production type

Description	Total households	Both livestock and aquaculture	Only livestock/aquaculture
Number (Percentage)	180 (100%)	127 (70.6%)	53 (29.4%)
Tuson	47	42	5
Tan Phong	44	43	1
Ngu Doan	45	37	8
Ngu Phuc	44	5	39

Source: Household survey 2018-2019

There is a surprising difference of the number of households divided by agricultural production types among communes. In the three communes, i.e. Tu Son, Tan Phong and Ngu Doan, percentage of households with two production activities is much greater than those with only one production activity. The situation in Ngu Phuc is reverse. This may be due to characteristics of production in each commune. The differences in agricultural production result in the differences in farming areas as well as income, which will be discussed in next paragraphs.

Table 5.4. Livestock and aquaculture production information

Description	Unit	Fatten Pig	Poultry	Fish
Number of HHs	Households	159	24	140
Cycle per year		2-3	3-4	1-2
Output per year/HH	Ton	14.35 Min: 1 Max: 70	4.34 Min: 0.2 Max: 60	5.59 Min: 1 Max: 40
GO per year/HH	USD	Mean: 24,327 Min: 1,700 Max: 118,704	Mean: 11,076 Min: 696 Max: 104,350	Mean: 7,815 Min: 1,304 Max: 69,570

Source: Household survey 2018-2019

Table 5.4 provides some detailed information relating to agricultural production at farm households. Most of households involve in pig and aquaculture production while only 24 households have poultry production activity. Poultry mainly include chicken and duck while fish are mainly tilapia and barramundi. Average output of household raising fatten pig is 14.35 ton per year, compared to 4.34 ton of poultry

and 5.59 ton of fish. The average income of pig-raising households is highest. The ratio of net income to gross output (GO) ranges from 20-30% of each household. The net income from agricultural production is presented in table 5.2. It is clear that standard deviation of some indicators such as output, GO is quite large, which means the values of the indicators are spread out over a wider range.

Farming areas

Table 5.5. Information of farming areas by production types and communes

Farming area (m2)	Total HHs	Mean	Min - Max	P-value
Both livestock and aquaculture	127	4,261.85	120-18,000	0.000***(1)
Only livestock/aquaculture	53	1,031.83	18-9,720	
Tu Son	47	4,999.78	160-18,000	0.000***(2)
Tan Phong	44	3,706.59	150-10,000	
Ngu Doan	45	3,964.22	100-10,800	
Ngu Phuc	44	442,54	18-3,800	

Source: Household survey 2018-2019

(1) Mann-Whitney U Test and (2) Kruskal Wallis Test,

*** Significant at 99%, ** Significant at 95% and * Significant at 90%

Table 5.5 present the information of farming area by production types and communes. Farming area of households with both livestock and aquaculture production is much bigger than those with only livestock or aquaculture. Aquaculture production often requires bigger area than livestock production. Mann-Whitney U test will clarify the difference between the means of households' farm area with two production types. The P-value of less than 1% means that there is a statistically significant difference in areas between the two groups of households. Table 5.3 above presented the difference in distribution of households by production type in the 4 selected communes. Most of households with only livestock production or only aquaculture production live in Ngu Phuc communes. Therefore, the results of average farming area of households by commune in table 5.5 are totally consistent with the results of table 5.3. The average area of households in Ngu Phuc is smallest among the the four selected ones. The Kruskal Wallis Test is applied to test the significant difference in area among communes. The P-value of less than 1% indicates the statistical significance.

5.1.3. Credit sources

The two main credit sources of farm households are formal and informal credit. Formal credit is credit form banks or People credit funds (PCFs) while informal credit is credit from relatives, friends, local sellers, money lenders and so on. Figure 5.3 presents data on credit sources of farm households. Of 180 households surveyed,

there are only 18 households equal to 10% having no loans. The percentage of households borrowing both formal and informal credit is highest, at 50%. The proportion of formal borrowers is lower than informal ones, 11% and 29% respectively. The data shows the fact that only formal credit may not meet household demand so they tend to access both formal and informal credit markets.

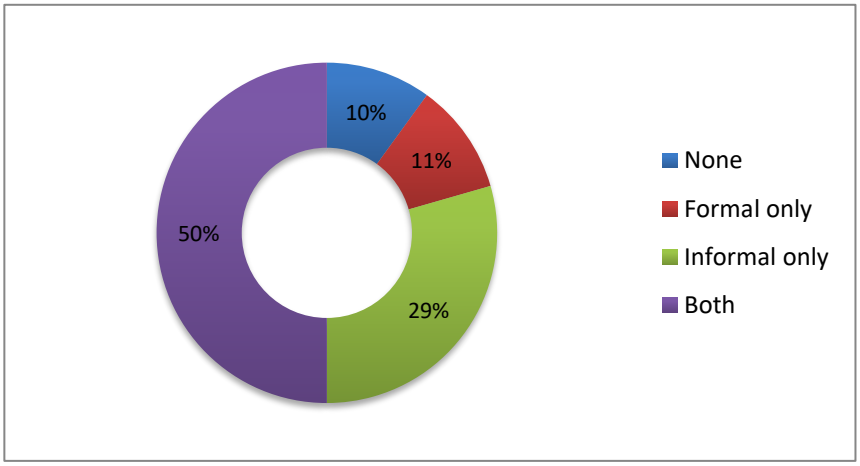


Figure 5.3. Distribution of households by credit sources

Source: Household survey 2018-2019

Table 5.6 below will present detailed information on formal and informal lenders at the study site. There are four formal lenders who offer loans for farm households. The three main formal lenders here are VBARD, VBSP and PCFs. There are also some other commercial banks that offer agricultural loans, such as Dong A Bank, Lien Viet post bank, however their market shares are too much compared to the three main lenders. Among three main lenders, only VBARD request loan collateral while VBSP and PCFs do not require. However, in reality, PCFs ration loan amounts approved based on the value of collateral in process of loan application scanning.

109 households are observed to have formal loans which are offered by VBARD, VBSP, PCF. Of 109 borrowers of formal sources, there are 9 households borrowing from two formal lenders. The biggest number of borrowers is those who borrow from VBSP and followed by VBARD and PCF. Terms of VBARD loans often range from 1 to 5 years, however 1-year loans account for the greatest proportion. Term of loans offered by PCFs in study site is also short-term, i.e. 12 months with interest rate of 1.1%/month or 13.2%/year. PCFs almost offer loans to borrowers living in the commune where PCFs are located.

As mentioned in chapter 3, VBSP is the social bank which mainly provide loans with subsidized interest rate and without collateral for social beneficiaries who are poor, nearly poor and have low income. They often borrow from VBSP for both farm and non-farm production purposes. The list of VBSP borrowers are approved

by local communes, local associations first and then the bank However, in rural areas of Haiphong city – the big city, people who are in the list of borrowers are not really poor. Moreover, the amounts from VBSP are too small to fulfill all process of agricultural production or non-agricultural business. Therefore, in addition to purposes of production or business operation, actual use of these loans can be for non-production activities. On the other hand, some households use VBSP loans with subsidized rate to repay the old debts whose rate is much higher.

Table 5.6. Detailed information of formal and informal lenders

Credit sources	Number of HHs	%	Collateral	Terms of loan	Interest rate (%/month)
Formal sources	109	100%	-	-	-
VBARD	19	17.4%	Yes	1-5 year	0.72-1.1
VBSP	65	59.6%	No	1-5 year	0.55-0.75
PCF	16	14.7%	No	12 months	1.1
VBARD& VBSP	8	7.3%	-	-	-
PCF and VBSP	1	1%	-	-	-
Informal sources	141	100%	-	-	-
Local sellers	92	65.2%	-	1 production cycle	-
CSG*	3	2.1%	-	-	-
Relatives & local sellers	20	14.2%	-	-	-
CSG & Local sellers	22	15.6%	-	-	-
Moneylenders & local sellers	2	1.4%	-	-	-
Relatives &CSG	2	1.4%	-	-	-

Source: Household survey 2018-2019

*CSG: Informal credit and saving group (known ‘ho’, ‘hui’, ‘phuong’)

Farm households could have raise funds through many types of informal lenders. The highest rate of households obtains trade credit through local sellers, at 64.5%. Trade credit is an agreement in which a customer can purchase goods without paying cash up front, and paying the supplier at a later scheduled date. In this case, households purchase input materials from local sellers and then pay them after one production cycle or when households get cash from selling output products.

Therefore, the price of material by trade credit is higher than the price of right paying at the purchase. As the result, the interest rate will be calculated by the ratio of the latter

to the former one. In addition to trade credit, farmers borrow money from their relatives, friends or CSG. CSG is informal credit and saving group (known 'ho', 'hui', 'phuong') of which a group is formed by some people and their neighbors or friends or relatives and so on who have close relationship and trust each other. Each member of groups who will contribute a fixed amount to form periodic savings and lending process, then receive money back in order. The members who take money first has to pay interest to the rest of the group so the last taker will receive interest form the ones before. Interest rate, fixed amounts as well as money distribution order are determined by mutual agreement among members, group leaders or by bidding. The scale of CSG relies on the number of members. The percentage of families borrows from local sellers by trade credit account for the largest number, at 65.2%.

5.2. Credit access of farm households

5.2.1. Credit access by age group

Table 5.7. Credit source selection by age group at farm households

Credit sources	Age group					
	29 - 42	Percentage	**43 - 56**	Percentage	**57 - 70**	Percentage
Total households	24	100%	106	100%	50	100%
None	3	12.5%	10	9.43%	5	10%
Formal credit	2	8.33%	11	10.38%	6	12%
Informal credit	3	12.5%	32	30.19%	18	36%
Both	16	66.67%	53	50%	21	42%

Chi-square test		Value	df	Asymp. Sig. (2-sided)
	Pearson Chi-square	5.462	6	0.486
	Likelihood Ratio	5.969	6	0.427
	Linear-by-linear Association	0.949	1	0.330
	N of Valid Cases	180		

Source: Household survey 2018-2019.

The proportion of households borrowing from both formal and informal credit is highest in the whole sample as in figure 5.3 above as well as in each age group in table 5.7. Chi-square test is applied to test the difference of the source choice among the three age groups. The result of Pearson Chi-square is not statistically significant. Therefore, there is no relationship between age group and the choice of credit sources to finance their production. In other words, farmers in general prefer to borrow from both formal and informal credit markets to meet their different purposes.

Table 5.8. Credit amounts by age group

Amount (million VND)	Age group			P-value
	29 - 42	43 - 56	57 - 80	
Formal amount	96.06	129.81	54.92	0.017**
Informal amount	266.84	255.56	198.78	0.108
Total amount	327.76	309.59	196.4	0.012**

Source: Household survey 2018-2019

P-value of Kruskal-Wallis Test

*** Significant at 99%, ** Significant at 95% and * Significant at 90%

As discuss in chapter 3, the typical characteristic of rural credit markets is the segmentation of each sub-market, such as formal and informal markets. Table 5.8 above shows the difference in average total amounts of each age group. There is no noticeable difference in total amounts between group 29-42 and 43-56 while those of group 57-80 remains lowest. Although the results of Kruskal-Wallis Test are significant at 95%, considering pooled amounts of both formal and informal amounts may make the results biased and unclear.

The results of formal and informal loan amounts are separately shown also in table 5.8. The results of Kruskal-Wallis Test mean that there is a statistically significant difference in formal amounts among three age groups while the difference in informal amount is not significant. Among three age groups, the group of households ageing 43 to 56 borrows the greatest formal amounts, at 129.81 million VND and followed by group of 29-42 and 57-80. The result may imply that credit demand of households from formal sources increases when the household heads are older (number of 29-42 is smaller than that of 43-56). However the amounts remarkably decrease in the group of 57-80. Therefore, it can conclude that credit demand of households does not infinitely increase when household head' age continue to increase. The relationship between age and formal amount may be depicted by reverse parabolic curve, of which formal amount may decrease when the farmers is much older. The group of 57-60 receives less formal amounts than the other group may be attributed to some reasons: (1) they are too old so they do not want to borrow more to expand production; (2) formal lenders could ration them. When they are at the higher age, they may do not want to expand production or endure debt burden. They may self finance their production by savings or remittances from their children. On the other hand, older people without flexible income flows for debt repayment are very likely to be rationed by formal institutions.

The insignificant difference of average informal amount among three age groups could be explained by some reasons. Firstly, while the purpose of formal credit is mostly for production, households access to informal markets with multi purposes. Secondly, informal credit accessibility is less constrained than the formal ones so informal markets are likely to meet household credit demand better. In other words, the two nearly identical households could obtain much different amounts owning to different purposes.

5.2.2. Credit access by gender of household head

Table 5.9 present some credit information categorized by gender of household heads. The results of` both Chi-square test and Mann-Whitney U test are not statistically significant. Therefore, gender of household heads has no correlation with their choice of credit sources as well as formal and informal amount they received. In other words, women and men have the same role in borrowing decision.

Table 5.9. Credit access by gender of household head

Credit source	Gender		P-value
	Women	Men	
None	9.21%	10.57%	
Formal	7.89%	12.5%	0.759(1)
Informal	30.26%	28.85%	
Both	52.64%	48.08%	
Credit amounts (million VND)			
Formal amount	106.08	105.39	0.973(2)
Informal amount	246.84	238.63	0.850(2)
Total amount	288.94	273.73	0.827(2

Source: Household survey 2018-2019

(1) Chi-square Test and (2) Mann-Whitney U Test.

5.2.3. Credit access by type of production

As discussed in section 5.1.1, two main types of production activities of farm households are livestock and aquaculture, of which some households are involved both two types while some just choose one type of production, either aquaculture only or livestock only.

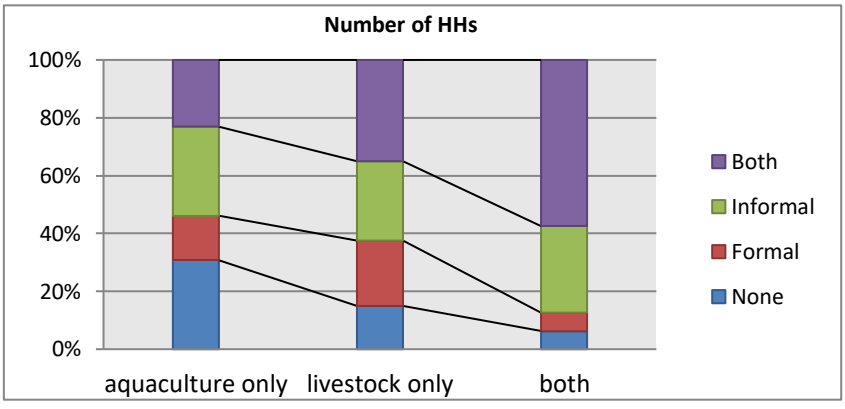
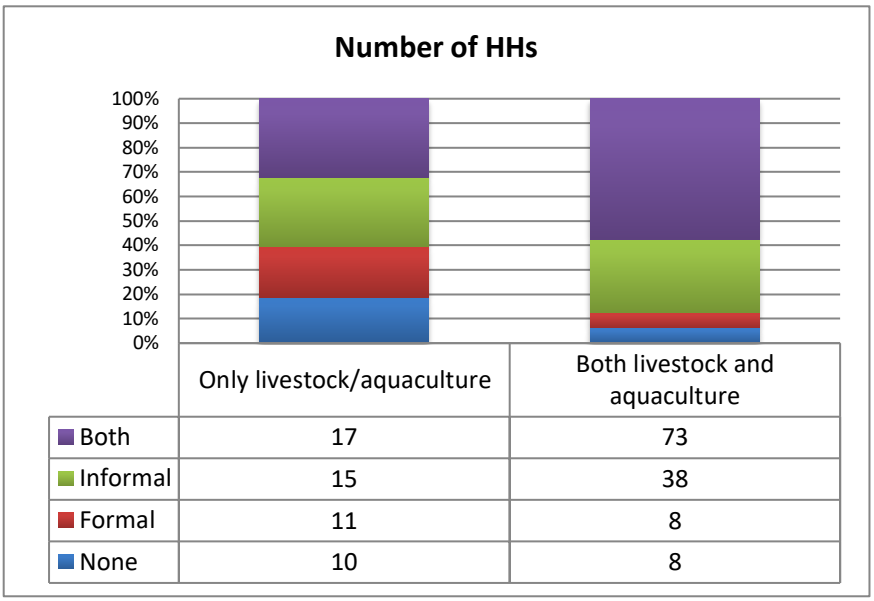


Figure 5.4a. Households' credit source selection by type of production

Source: Household survey 2018-2019

Figure 5.4a shows the differences in households' decisions on credit sources. The proportion of households approaching both formal and informal loans are highest in the group of both two production types while the those of aquaculture only group is lowest. The highest percentage of families having no loans is found in the group of aquaculture only. Chi-square test is applied to check the validity of the relationship. The result of the test is significant at 99% (Appendix 1a). However, the number of farm households with only aquaculture production only is much smaller than those of livestock only and two production types, 13, 40 and 127 respectively. Hence, this result is possibly biased. Therefore, the author just categorizes surveyed households into two groups: only livestock/aquaculture and both livestock and aquaculture as in figure 5.4b.



	Only livestock/aquaculture	Both livestock and aquaculture
Both	17	73
Informal	15	38
Formal	11	8
None	10	8

Figure 5.4b. Households' credit source selection by type of production

Source: Household survey 2018-2019

It is clear that in the group of household with two production types named, the proportion of households having both formal and informal loans is much bigger than those of other credit sources (figure 5.4b). The number of households of 'both' group borrowing from informal lenders only is 38, accounting for around 29.9%. The percentages of non-borrowing and only-formal-borrowing households of this group make up for a small percentage, about 6.3% for each. In terms of one type production group named 'only livestock/aquaculture', there are not big differences between the shares of households among credit sources. However, the rate of families accessing both formal and informal loans is highest and followed by informal only, formal only and none borrowing. The fact is very likely to confirm the role of informal loans in agricultural production of farm households.

To validate the relationship between type of agricultural production and the choice of credit sources of households, Chi-square test is used. The result of the test is shown in Appendix 1b. The result expose that there is statistically significant difference between type of agricultural production and households' choice of credit sources. The Phi and Cramer's V test is also applied to check the strength correlation. The value of the test is 0.318 or 31.8%. Hence, the correlation is quite strong. In other words, the larger production scale is, the greater probability households have to raise capital from both formal and informal sources or even only informal sources only.

The difference between the two groups of production type is observed through both average formal and informal amounts in table 5.10. The author also takes total amount in account. Average loan amounts of 'only livestock/aquaculture' group are much smaller than that of the two-type group. To clarify this difference, Mann-Whitney U test is employed. Therefore, households with both livestock and aquaculture production often demand more credit than those with only livestock or aquaculture. The two-type production may require more capital for both input material as well as expenditure for repairing or renovating their farms.

Table 5.10. Credit amounts by type of production

Amount (million VND)	Type of production		P-value
	Only Livestock/Aquaculture	Both Livestock & aquaculture	
Formal amount	57.39	122.38	0.002***
Informal amount	88.9	283.6	0.000***
Total amount	99.39	344.94	0.000***

Source: Household survey 2018-2019

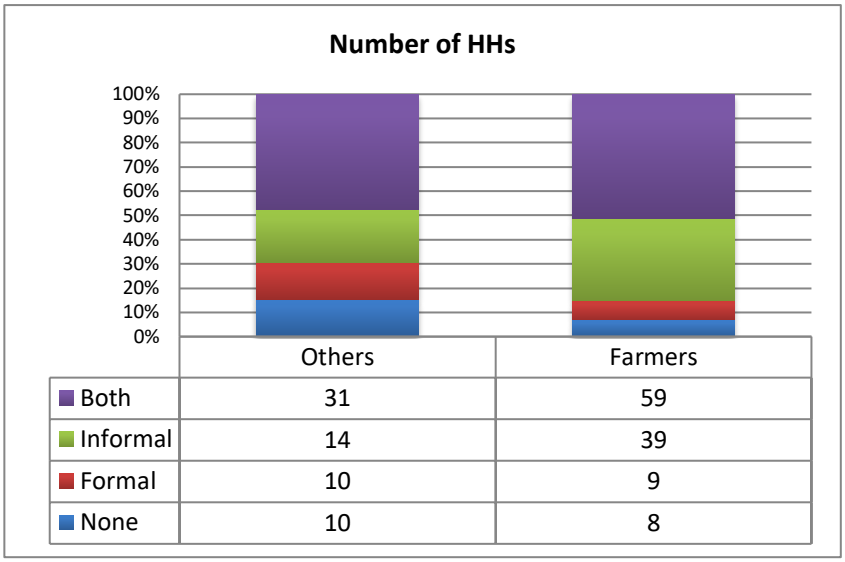
P-value of Mann-Whitney U Test,

*** Significant at 99%, ** Significant at 95% and * Significant at 90%.

5.2.4. Credit access by household head occupation

Figure 5.5 shows the information on the proportion of households by credit sources and household heads' occupation. In two occupation groups, the proportion of households who borrow from both informal and formal credit sources is highest. It is noticeable that the percentages of households accessing informal loans only and both sources in farmer group are higher than those of remaining group while the results of households regarding formal loan only and none are reverse. The comparison may confirm the role of informal markets compared to formal ones, of which informal markets is a supplement to or even a substitute for formal markets when formal markets cannot meet the borrowing demand of households.

The Chi-square test is used to test the relationship between occupation groups of household heads and the choice of credit sources. The results show a statistical significance of 90% (Appendix 2). Therefore, the occupation of household heads has correlation with his/her choice of credit sources. The author conducts one more test, Phi and Cramer's V test to measure the strength of the association between the two variables in (appendix 3). The level of association is 20.4%, which is quite moderate and acceptable.



	Others	Farmers
Both	31	59
Informal	14	39
Formal	10	9
None	10	8

Figure 5.5. Credit source selection by household heads' occupation

Source: Household survey 2018-2019.

Box 5.1: Only formal loans cannot meet our credit demand for production

> We here almost borrow from both formal and informal lenders. Only formal credit, even large amounts from VBARD, is never enough for us. We can easily access formal credit from trade credit or local sellers who are our neighbor or live with the same village with us. Therefore, some households even do not want to borrow formal loans, they fund their production from their own capital and trade credit.
>
> Source: Group discussion in Tu Son commune, 2018-2019

The author still considers the differences in total amounts between the two occupation groups as in section of age groups, gender groups and production groups. The result of Mann-Whitney U Test is significant at 95%. However, when the author considers the relationship between formal and informal amount received of two occupation groups, the results are different. Therefore, it is obvious that taking account of the pooled sample without separating formal and informal amounts actually makes the result biased.

Table 5.11. Credit amounts by occupation of household heads

Amount (million VND)	Occupation		P-value
	Others	Farmer	
Formal amount	95.92	111.57	0.567
Informal amount	192.55	265.44	0.010***
Total amount	224.96	309.06	0.016**

Source: Household survey 2018-2019

P-value of Mann-Whitney U Test,

*** Significant at 99%, ** Significant at 95% and * Significant at 90%.

The result of Mann-Whitney U test is statistically significant at 99% concerning only informal amount obtained while that of formal amount is not significant (table 5.11). Hence, household heads who have job is farmer only tend to borrow more money for informal lenders than those who have both farmer and non-farmer jobs while there is no statistical significant difference of formal amounts between these two group. These results may verify the segmentation of rural credit market or segmentation between formal and informal markets. The indifference of average formal amount between others and farmer group seems reasonable. In reality, formal lenders often consider loan application based on many characteristics of the households rather than only household heads' occupation. Similarly, household credit demand depends on production scale as well as their decision rather on only household heads' occupation. Meanwhile the significant difference in average informal amounts of the 'farmer' group compared to 'others' group may be due to larger production scale or/and more credit demand for other non agriculture-related purposes.

To clarify the relationship between household head occupation and credit amounts in formal and informal markets, the author explores the production type distribution of the two occupation groups.

Table 5.12. Distribution of households by occupation and type of production

Type of production	Occupation			
	Others		Farmer	
	Number	%	Number	%
Total HHs	65	100%	115	100%
Only livestock/aquaculture	29	44.62%	24	20.87%
Both	36	55.38%	91	79.13%
Chi square test	Value	df	Asymp. Sig. (2-sided)	
Pearson Chi-square	11.271	1	0.001***	

Source: Household survey 2018-2019

*** Significant at 99%, ** Significant at 95% and * Significant at 90%.

Table 5.12 provide information on the production type of others and farmer group. Among households whose heads' job is farmer only, the percentage of those involving both livestock and aquaculture production accounts for 79.13%, and 20.87% for those with only one production activity. Concerning 'others' group, the proportion of families having two production types and only one type are 55.38% and 44.62%, respectively. The significant result of Chi-square test helps to confirm this correlation. The detail result of Chi-square test is shown in (appendix 4). Therefore, the significant difference in informal average amounts in table 5.11 and the significant correlation between type of production and occupation in table 5.12 may emphasize the role of informal credit markets in financing agricultural production. The households with two production activities prefer to borrow from either formal and informal credit sources or even only informal rather than only formal ones, which is depicted and discussed in figure 5.4b.

5.2.5. Credit access by main income source

Based on main income source, farm households are categorized by two groups: farm-based and non farm-based households discussed in section 5.1.1. Farm-based households are those whose agricultural income makes up more than 50% of total income and the rest is non farm-based ones.

Table 5.13. Credit source of farm household categorized by main income source

Credit source	Main income source		Chi-square test
	Non farm-based (N = 35)	Farm-based (N = 145)	
None	17.14%	8.27%	0.025**
Formal	20%	8.27%	
Informal	31.43%	28.97%	
Both	31.43%	54.48%	

Source: Household survey 2018-2019

P-value of Fisher's Exact Test,

*** Significant at 99%, ** Significant at 95% and * Significant at 90%

Among 145 farm-based households, the percentage of those prefer to borrow from both formal and informal credit sources is 54.48% while that of non farm-based households is 31.43%. There are not very big differences in the percentage of non farm-based households among both, informal only, formal only or none borrowing sub-groups. The rates are 31.43%, 20% and 17.14% respectively. The fact is opposite for farm-based households. The largest number is of both formal and informal sub-group, 54.48% while that of other group is 28.97% for informal borrowing, 8.27% for the two remaining ones (table 5.13).

The Chi-square test is used to clarify this correlation. However in the result table, there are 2 cells (25%) have expected count less than 5, so Fisher' Exact test is added to make the results more exact. The detailed chi-square test is shown in Appendix 5. The result of Fisher's exact test has statistical significance at 95%. Therefore, the author concludes that the proportion of households of both non farm based or farm-based group prefer to access loans from two credit sources or from informal sources only more than from formal sources only. Especially, with farm-based households, the rate of two-source families is much bigger than the rest. This fact may be due to the higher credit demand for agricultural production of farm-based households. They want to invest more money for production to increase their main income source, i.e. agricultural income. Therefore, they tend to seek informal credit in addition to formal credit when formal credit supply cannot meet their demand.

To clearly explain the relationship between credit source choice and type of households categorized by main income source, type of agriculture production of farm based and non-farm based group are depicted in figure 5.6.

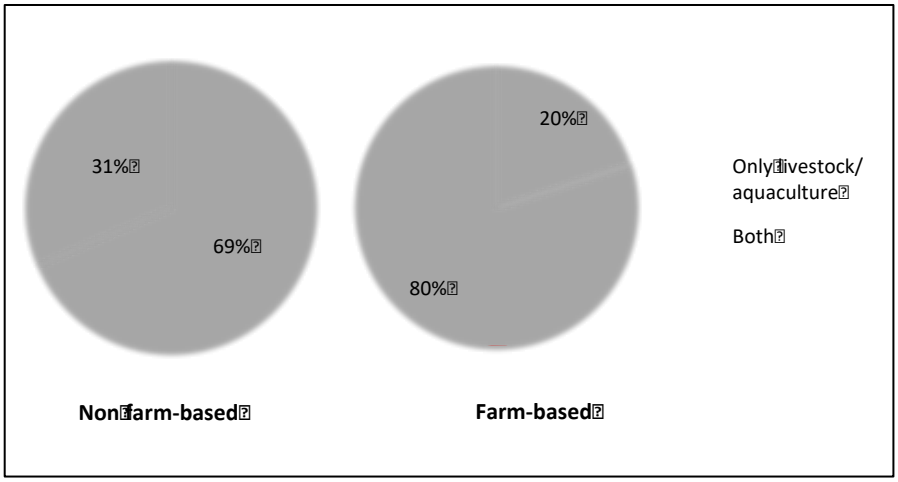


Figure 5.6. Production type of farm-based and non-farmed based households

Source: Household survey 2018-2019

It is clear that percentage of farm-based households with two types of production is 80%, four times as great as that of one production type, just 20%. The ratio of non-farm based group is reverse. The number of household with only livestock or aquaculture production is greater than those involving two production types, 69% and 31% respectively. The results of figure 5.6 are consistent with the results of figure 5.4.

The validity of correlation in figure 5.6 is confirmed by chi-square test in Appendix 6. The Pearson chi-square is statistically significant at the 1% level. The Phi-Cramer's V value of the Phi-Cramer's V test is 42.2 %, which means the correlation between type of production and households' main income source is very

strong. In other words, the households who have main income from agriculture involve in both livestock and aquaculture production.

In addition of the difference in credit source choice, the differences in credit amount of non farm-based and farm-based households are considered in table 5.14 below. It is clear that credit demand of farm-based families is much more than non farm-based. Farm-based ones need both formal and informal credit for their agricultural production while non-farm based may not want to expand their production. That is the reason why non-farm based ones does not borrow a large amount.

The Mann-Whitney test is employed to validate the differences between average amounts of households classified by main income source. For both formal and informal amounts, the P-value of the test is statistically significant at 99%. The results of table 5.14 reveal the high credit demand of households for agricultural production.

Table 5.14. Credit amounts of households by main income source

Credit amount (mil VND)	Main income source		P-value
	Non farm-based	Farm-based	
Formal amount	49.5	116.80	0.005***
Informal amount	87.35	267.77	0.000***
Total amount	90.96	321.11	0.000***

Source: Household survey 2018-2019

P-value of Mann-Whitney U Test,

*** Significant at 99%, ** Significant at 95% and * Significant at 90%.

5.2.6. Credit access by location

Table 5.15. Credit source choice of households by location

Credit source	Region				Chi-square test
	Tu Son (N=47)	Tan Phong (N=44)	Ngu Doan (N=45)	Ngu Phuc (N=44)	
None	4.26%	2.27%	11.11%	22.73%	0.001***
Formal	6.38%	0%	22.22%	13.64%	
Informal	29.79%	36.36%	26.67%	25%	
Both	59.57%	61.36%	40%	38.64%	

Source: Household survey 2018-2019

*** Significant at 99%, ** Significant at 95% and * Significant at 90%.

Table 5.15 presents information on credit choice by communes. In the four selected communes, capital funding through both formal and informal credit is most common. The highest proportion of households borrowing from two credit sources is observed in Tu Son and Tan Phong and followed by Ngu Doan and Ngu Phuc. Ngu Phuc has the smallest percentage of households with both two sources.

The Chi-square test is also employed to clarify the correlation between location and credit source choice. The Pearson chi-square of the test is significant at the 0.01 level. The detail result table of Chi-square test is shown in Appendix 7. In other words, there is a dependent relationship between the two indicators. Among the four communes, Ngu phuc commune has the greatest number of non-borrowing households. Informal credit use is common in both four regions. While the household proportions choosing both formal and informal credit in Tu Son and Tan Phong are larger than that of Ngu Doan and Ngu Phuc, the rate of formal and non-borrowing households is opposite. Before concluding the credit source difference among the four communes, one more indicator should be considered, i.e. differences in credit amounts of households.

Table 5.16. Credit amounts of households by location

Credit amount (mil VND)	Region				P-value
	Tu Son	Tan Phong	Ngu Doan	Ngu Phuc	
Formal amount	153.55	78.18	102.93	76.83	0.199
Informal amount	287.97	264.87	267.87	101.03	0.000***
Total amount	374.56	313.96	266.29	129.23	0.000***

Source: Household survey 2018-2019

P-value of Kruskal-Wallis test

*** Significant at 99%, ** Significant at 95% and * Significant at 90%.

Kruskal-Wallis test is used to validate the difference in average amounts of households in each commune in table 5.16. The result of the test for formal amount is not statistically significant. That means average formal amounts obtained among communes are similar and not statistically different. The result is reasonable because credit amounts approved by formal lenders depend on household demand as well as lenders' decisions based on many socio-economic characteristics of borrower, not based on borrowers' location. The result of Kruskal-Wallis test is significant at 99% for average informal amounts, of which average informal amounts of households in Tu Son, Tan Phong and Ngu Doan is about twice as great as those in Ngu Phuc. Therefore, in chapter 6, the dummy variable 'region' will be excluded in the equation of formal amount and included in informal amount equation. The

differences in total amounts among four communes are also significant at 99% and similar with those of informal amounts.

The difference in credit sources and credit amounts of households among communes in table 5.15 and 5.16 should be explained through the distribution of production types as well as main income source among communes. The distribution of household by production types among communes is presented in figure 5.7 below. The pattern of the three communes, i.e. Tu Son, Tan Phong, Ngu Doan is much different from that of Ngu Phuc. The percentage of households with only one type of production just ranges from more than 2% to below 20% for the three former ones while the rate of the latter is 88.63%.

The correlation between the proportions of households by production types and location is also clarified by the Chi-square test (appendix 8). The Pearson chi-square is significant at 99%. The result of figure 5.7 enhances the result of table 5.15 in explaining why the number of non-borrowing households in Ngu Phuc is highest and the average informal amounts of Ngu Phuc are smaller among four communes. The fact also highlights the important role of informal credit in large-scale production.

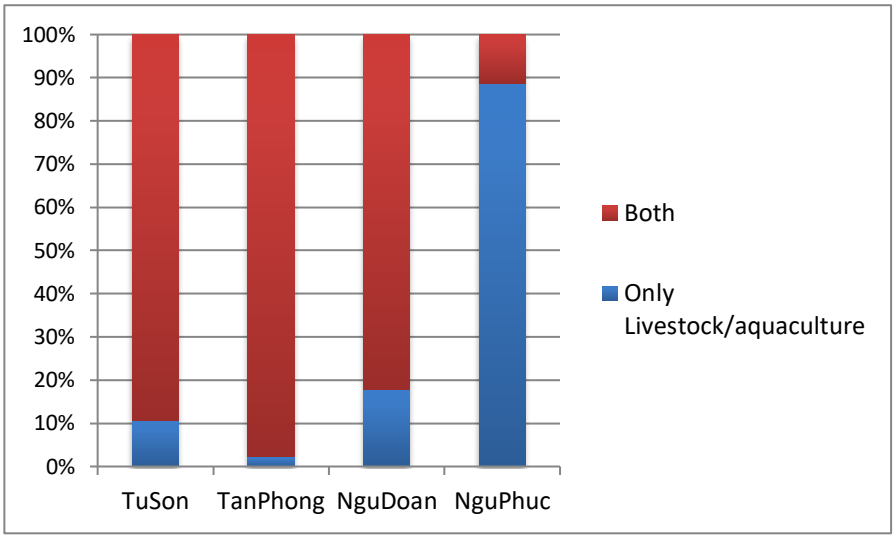


Figure 5.7. Distribution of households by production types among communes

Source: Household survey 2018-2019

The difference in credit source choices and informal amounts among communes are also clarified by the main income source of households as in figure 5.8. It is clear that the number of non-farm based and farm based households in Ngu Phuc is seemingly equal, around 50% for each in figure 5.8. Meanwhile, the ratio of the two groups is distinguishing in the three remaining communes, in which the percentage of farm-based households accounts for 86% to 91%. The Chi-square test is used to

check the validity of this correlation (appendix 9). The result of the test is statistically significant at 99%. Farm-based households prefer to involve in two production types, so they have more credit demand from both formal and informal sources. That is the reason why the average informal amount of Ngu Phuc is smaller than the remaining communes as in table 5.14.

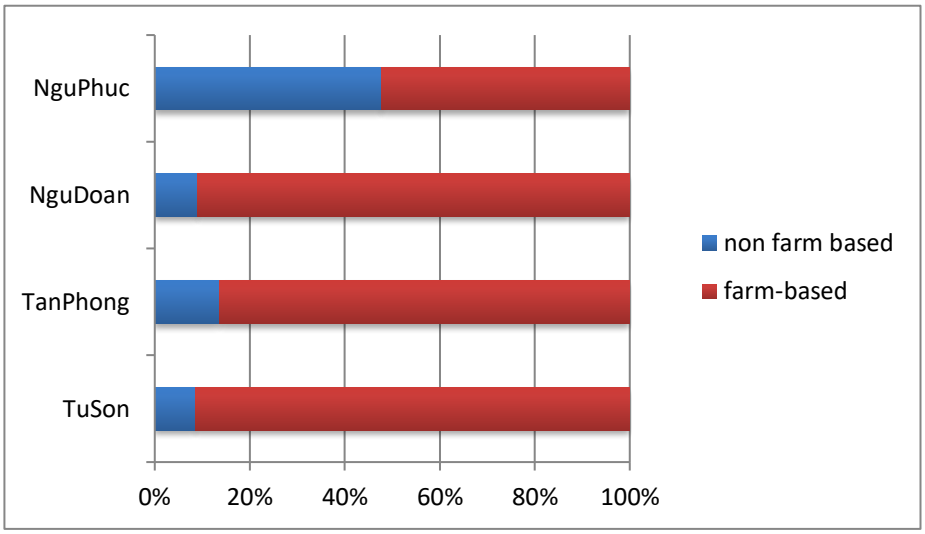


Figure 5.8. Distribution of households by main income source among communes

Source: Household survey 2018-2019

5.3. Household choice of credit lenders

5.3.1. Formal lenders

5.3.1.1. Household's characteristics affecting their choice of formal lenders

In this section, in terms of households having loans from two formal lenders, the author will choose one main lenders to analyze. For example, with households borrowing from both VBARD and VBSP, VBARD will be chosen while with those borrowing from PCF and VBSP, PCF will be selected.

Age groups and gender division

The chi-square test results of age group and gender are not statistically significant. Therefore, there is no dependent correlation between age groups/gender and the choice of formal lenders. In other words, the proportion of households accessing VBSP loans remains highest in spite of different age groups or gender of household heads (table 5.17).

Table 5.17. Household choice of formal lenders by age groups and gender

Description	Formal lenders			Chi-square test
	VBARD	VBSP	PCF	
Age group				
29-42	22.22%	61.11%	16.67%	0.212
43-56	31.25%	51.56%	17.19%	
57-80	11.11%	77.78%	11.11%	
Gender				
Women	17.39%	69.57%	13.04%	0.183
Men	30.16%	52.38%	17.46%	

Source: Household survey 2018-2019

Location

Households' choices of formal lender are very likely to be affected by their living location. For example, the choice of PCFs may be different because the typical characteristic of PCFs is often aiming the customers who live in the area where the PCFs are located. Or even, the households are willing to choose one lender because of the closer distance from the commune to lenders. The different choice of formal lenders, i.e. VBARD, VBSP and PCF among households of each communes are mentioned in the table 5.18.

Table 5.18. Household choice of formal lenders by location

Location	Formal lenders			
	Number of HHs	VBARD	VBSP	PCF
Tu Son	31	51.6%	48.4%	0%
Tan Phong	27	22.2%	77.8%	0%
Ngu Doan	28	3.6%	57.1%	39.3%
Ngu Phuc	23	17.4%	56.5%	26.1%
Chi-square test		Value	df	Asymp. Sig. (2-sided)
	Pearson Chi-square	37.632	6	0.000***
	N of Valid Cases	109		
Phi and Cramer's V test			Value	Apprp. Sig.
Nominal by Nominal		Phi	0.588	0.000***
		Cramer's V	0.415	0.000***
N of Valid Cases			109	

Source: Household survey 2018-2019

*** Significant at 99%, ** Significant at 95% and * Significant at 90%

The lender, which is commonly selected by households in both four communes, is VBSP while PCF borrowings are observed only in Ngu Doan and Ngu Phuc (table 5.18). It is because only Ngu Doan and Ngu Phuc have PCF branches while the two remaining communes do not have. Households of Ngu Doan and Ngu Phuc prefer PCF to VBARD. The percentage of households borrowing from VBARD stays highest in Tu Son. Kien Thuy district have two branches of VBARD, one in the center of the district and one in Tu Son communes. Therefore, it may be the reason why people in Tuson prefer VBARD.

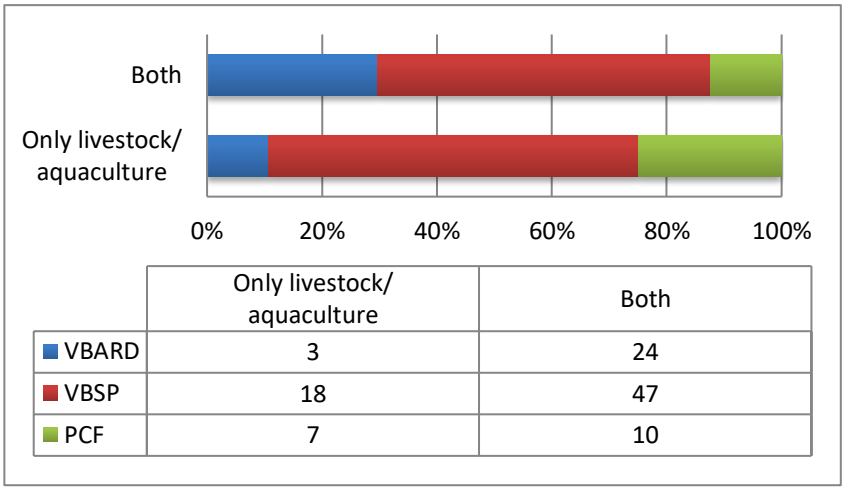
Box 5.2: We prefer borrowing from PCF because of its convenience

We prefer borrowing from PCF to VBARD when we need large amounts. The board of management of PCF includes those living in our village, so they comprehend our family's financial and production circumstance. Lending procedures are very quickly and convenient. Even when we want to expand loan term, PCF are ready to address more quickly than VBARD. On the other hand, we do not have to travel far from our houses to PCF location. Although PCF interest rate is higher than that of VBARD, we are still simply familiar with borrowing from the local PCF.

Source: Group discussion of Ngu Doan commune, 2018-2019.

The chi-square test is applied to clarify the relationship of formal lender choice among four communes. The result is statistically significant at 99%. On the other hand Phi and Cramer's V test is also employed for the strength of the correlation. The result is 41.5% implying the strong relationship. Hence, choosing which formal lender to borrow from partly relies on the location of borrowers.

Type of agricultural production



	Only livestock/ aquaculture	Both
VBARD	3	24
VBSP	18	47
PCF	7	10

Figure 5.9. The formal lender choice of households by production type

Source: Household survey 2018-2019

The most common formal lender of households by type of production is VBSP, of which the rate of 'only livestock/aquaculture' group is higher than 'both' group. This may result from larger credit demand of the latter group; meanwhile the amount they can borrow from VBSP is limited. Concerning the choice of VBARD, the percentage of households with two production types is higher than those with only one-production types. The comparison is opposite in terms of PCF. The difference may be explained in the combination with the information of figure 5.7. The highest number of households involving one-production types is exposed in Ngu Phuc commune whose households prefer PCF than VBARD.

The correlation between the choice of formal lenders and two groups of households categorized by type of production is confirmed by the chi-square test (appendix 10). The result of the test is significant at 90%.

Main income source

The difference in choosing formal lenders between farm-based and non-farm based is presented in table 5.19 below.

Table 5.19. The formal lender choice of households by main income source

Formal lenders	Main income source			
	Non farm based (N=18)		Farm-based (N=91)	
	Quantity	%	Quantity	%
VBARD	1	5.6%	26	28.6%
VBSP	16	88.9%	49	53.8%
PCF	1	5.6%	16	17.6%
Pearson Chi-square	*Value: 7.702*	*df: 2*	*Asymp. Sig. (2-sided): 0.021***	

Source: Household survey 2018-2019

*** Significant at 99%, ** Significant at 95% and * Significant at 90%

There are 28.6% and 17.6% of farm-based households accessing VBARD and PCF while the numbers of non farm-based ones are just 5.6% for each. On the other hand, most of non-farm based families choose to take loans from VBSP, at 88.9%. The rate of VBSP borrowers in the farm-based group is 53.8%.

The Chi-square test is employed to clarify this relationship. The result of the test is statistically significant at 95%. In other words, non farm-based households tend to approach VBSP loans first which is cheaper and requires no collateral while farm-based ones want to access both VBARD and PCF in addition to cheap VBSP credit.

5.3.1.2. Reasons for the choices

Table 5.20. Reason for choosing formal lenders

Reason	Formal lenders		
	VBARD (N=27)	VBSP (N=65)	PCF (N=17)
Lending procedures	66.67%	70.77%	100%
Acceptable interest rate	50%	100%	0%
Quick disbursement	59.26%	75.38%	100%
Appropriate loan term	0%	100%	50%
Convenience	90%	100%	100%
Suitable amount	100%	0%	100%
No collateral	-	100%	-

Source: Household survey 2018-2019

The households were asked the reasons why they choose one lender for their formal credit. There are seven assessment criteria for the choice presented in table 5.20: lending procedures, Acceptable interest rate, quick disbursement, appropriate loan term, credit amount, convenience and collateral. One household could choose more or more criteria for their answers. With respect to VBARD and PCF, the question related to collateral is excluded because the two lenders consider loan application partly based on collateral.

Regarding VBARD, 100% of household complained about the loan term. So no one choose VBARD for 'appropriate loan term'. The proportion of household agreeing with the simplicity of VBARD lending procedure and VBARD disbursement is 66.67% and 59.26%, respectively. When asked about the main reason to choose VBARD, 100% household said that they choose it because of big amounts it could offer.

Box 5.3: Our bank often offers short-term rather than mid-term or long-term loans

We often offer short-term loans, 1-year loans, for households to finance their agricultural production. Sometimes, we also make mid-term or long-term loans for customers. If borrowers have small-scale production plan or high risk of default or unstable income for repayment, we just approve short-term loans for them. In some other cases, we are willing to lend them mid-term loans but they do not want. They just want to borrow short-term loans because of short-term loan processing is quicker. Or even, it is credit officers of the banks that advise households to apply short-term loans for quick disbursement even though the households meet enough criteria for mid-term loans.

Source: In-depth interview of head of VBARD, Kienthuy branch.

In terms of VBSP, there are 70.77% and 75.38% of households satisfying with its loan procedures and disbursement processing. The main reasons of households when choosing VBSP are low interest rates and long-term loans offered. All surveyed households said that the amounts from VBSP couldn't afford their agricultural production. These amounts are just enough for a small part of production expenditures. Sometimes, they borrow low interest loans form VBSP for the purpose of other high-interest-rate debt rollover.

It is obvious that 100% of household satisfying with PCF lending procedures, quick disbursement. All of them also choose PCF for greater credit demand because of its bigger loan size compared to VBSP. Although the loan term of PCFs is short-term, the process of extending loan maturity date is quick and convenient. Therefore, 50% of household mentioned 'appropriate loan term' as one of reasons to choose PCF.

Box 5.4: We almost offer short-term loans

> To reduce risk in agricultural production, we just provide short-term loans without collateral but we still require borrowers to submit their land certificate. The approved amounts are mainly dependent on the value of the asset. For households having mid-term credit demand, we will extend the maturity date then. Our process is very quickly and convenient.
>
> Source: In-depth interview of head of PCF in Ngu Doan commune.

5.3.2. Informal lenders

Similar to formal lenders, the author also considers the impacts of some characters of households on their choice for informal lenders.

Age and gender

Table 5.21. The choice for informal lenders of households by age and gender

Description	Informal lenders					
	Local sellers	CSG	Relatives & local sellers	CSG & local sellers	Money lenders & local sellers	Relative & CSG
Age group						
29-42	63.2%	0%	15.8%	15.8%	0%	5.3%
43-56	61.2%	2.4%	16.5%	16.5%	2.4%	1.2%
57-80	75.7%	2.7%	8.1%	13.5%	0%	0%
Gender						
Women	62.3%	0%	16.4%	18%	1.6%	1.6%
Men	67.5%	3.8%	12.5%	13.8%	1.4%	1.4%

Source: Household survey 2018-2019.

Age groups and gender are also considered as the factors affecting household informal lender choice. Similar to the results of formal lenders, the chi-square tests are all statistically insignificant (appendix 11).

The insignificant results of Chi-square test imply that there is no dependent correlation between age group/ gender and the choice for informal lenders of households. Therefore, the most common informal source is from local sellers by trade credit.

Location

There is a clear difference in choosing informal lenders among communes. The most common informal lender in Tu Son, Tan Phong and Ngu Doan is local sellers while most common informal source of Ngu Phuc is CGS. Among borrowers of CSG & local sellers sub-group in Ngu Phuc, they access CSG credit more frequently than the remaining one (Figure 5.10).

The chi-square test is employed to check the validity of this relationship. The level of significance is 99% (appendix 12). In other words, the proportion of households in favor of trade credit through local sellers in Tu Son, Tan Phong and Ngu Doan is much higher than that of Ngu Phuc. Meanwhile, the favorite informal source in Ngu Phuc is CSG.

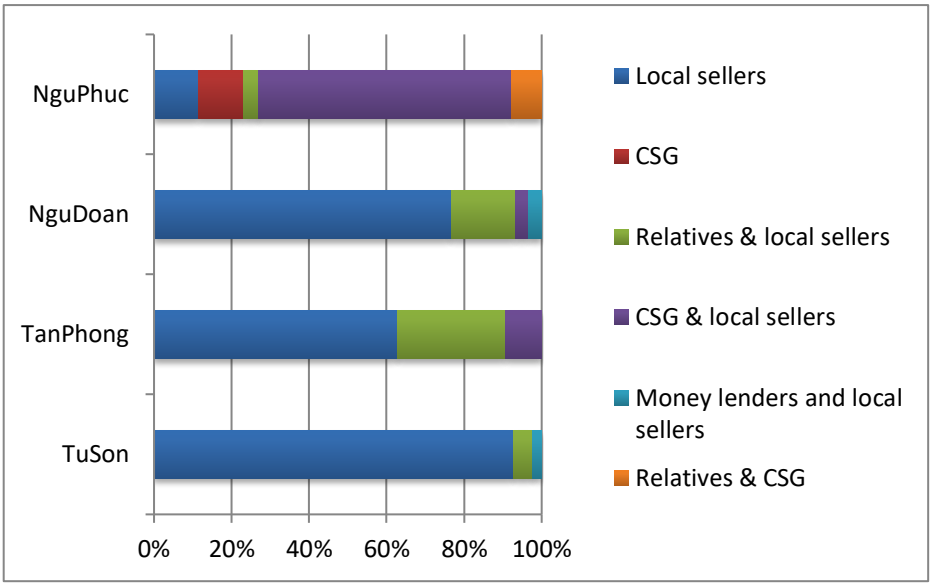


Figure 5.10. Choice for informal lenders of households by communes
Source: Household survey 2018-2019

Box 5.5: When we need short-term loan, we often approach CSG

> CSGs are very common in our communes. We like to join CSG because we can take loans in case of credit need and take interest in case of saving. In each CSG, we know each other quite clearly. We find credit from CSG very convenient and familiar. We have not any official written contracts or regulations. We trust each other.
>
> Source: Group discussion in Ngu Phuc commune, 2018-2019.

Occupation, type of production and main income source

Table 5.22 below presents the description of the choice for informal lenders of households by occupation, type of production and main income source.

In terms of occupation, the most common informal lenders of two sub-groups are local sellers and followed by relatives & local sellers group and CSG & local sellers group. In the group of CSG & local sellers, households' main source is CSG. Therefore, group of CSG and CSG & local sellers will be assigned in one group named 'CSG'. The proportion households of 'CSG' group is equal to the sum of original 'CSG' and 'CSG & local sellers'.

Table 5.22. Choice for informal lenders of households by occupation, type of production, and main income source

Description	Informal lenders					
	Local sellers	CSG	Relatives & local sellers	CSG & local sellers	Money lenders & local sellers	Relative & CSG
Occupation						
Others	42.2%	4.4%	17.8%	31.1%	2.2%	2.2%
Farmer	76%	1%	12.5%	8.3%	1%	1%
Type of production						
Only livestock/ aquaculture	36.7%	10%	3.3%	46.7%	0%	3.3%
Both	73%	0%	17.1%	7.2%	1.8%	0.9%
Main income source						
Non farm based	60%	5%	0%	30%	0%	5%
Farm based	66.1%	1.7%	16.5%	13.2%	1.7%	0.8%

Source: Household survey 2018-2019

The proportion of households in farmer group choosing local sellers for their trade credit accounts for 76% while that of 'others' group is jus 42.2%. However, there are 35.5% of households in 'others' group accessing loans from CSG compared with only 9.3% of farmer group. Similarly, the percentage of households in 'only livestock/aquaculture' group choosing CSG is 56.7% while the rate of two production type groups is just 7.2%. The lower credit demand of 'others' or 'only livestock/aquaculture' sub-group could be one of reasons for the CSG choice. These findings are consistent with the results of figure 5.7 and figure 5.10, of which the highest number of households with only one production type and the most common choice of informal lender as CSG are simultaneously observed in Ngu Phuc commune. On the other hand, the highest shares of households using trade credit are observed in 'farmer' and 'both' group.

Concerning main income source category, there are no big differences between the percentage of non farm based and farm based households in choosing local sellers, 60% and 66.1%, respectively. In addition to the favor of local sellers, households of 'farm based' group and 'both' group fund capital through their relatives or friends. They said the relative/friend sources are quite cheap and long-term loans. However, sometimes it is not easy to approach these sources if the relatives/friends' savings are not big enough to lend.

The chi-square tests are employed to validate the correlation between the choice of informal credit lenders and each category of households. However, the number of cells have expected count less than 5 in each result table, so the author added fisher's exact tests to make results more exact (appendix 13, 14, 15). The results of fisher's exact tests are statistically significant at 99% and 95%. In other words, the most common informal lender is local sellers by trade credit and followed by credit from relatives/friends and CSG. The preference of CSG credit is strongly impacted by household location.

Reasons for the choice of informal lenders

The reasons for choosing informal lenders are presented in table 5.23. The most important reason for the choice of local sellers is offered large amounts by trade credit. The stores selling input materials often locate in the commune so travelling cost is very low. Some households state that the interest rates from trade credit are quite high but acceptable due to its convenience.

In terms of borrowing money from relatives or friends, interest rates can be charge or not. Both flexible loan maturity date and interest rate of these loans depend on the relationship between lenders and borrowers. CGS borrowings are just common in some communes as describe in previous sections. Borrowers who choose CSG as source of both savings and borrowings find it much convenient. Members of CSG are neighbors, friends or relatives. Some households state that they are familiar with CSG so joining CSG is simply their habit. If they have money surpluses, they will deposit to CSG to take interest and take credit at need.

Table 5.23. Reason for choosing informal lenders

Reason	Informal lenders			
	Local sellers	Relatives/ Friends	CSG	Money-lenders
Large amounts				
Acceptable interest rate				
Flexible loan maturity date				
Convenience				
Habit				
In case of emergency				
No collateral				

Source: Household survey 2018-2019

Besides local sellers, moneylenders are also sources of large loan amounts. However, households often approach these loans in case of emergency because of their much high interest rates and inflexible loan terms. All informal credit lenders require no collaterals, which is advantageous to formal lenders.

5.4. Credit constraints of farm households

As discussed in chapter 2 (section 2.3.1), credit constraint or credit access concept includes both borrowers and lenders' decisions, of which borrowers decide to choose any credit sources or not and lenders decide to approve or reject loans. If lenders approve loans, then they will consider rationing the amounts applied or not. However, credit constraints give the more details of borrowers and lenders' decisions.

Due to community culture as well as the popularity and convenience of informal credit in rural areas in Vietnam, most of surveyed household gave the answer 'no' when asked about the constraints they could incur with informal credit access. Hence, credit constraints in the research refer to formal credit constraints. According to (Boucher et al. 2009), credit constraints include both demand-side and supply-side constraints. Supply-side constraints are observed when a household applies for a loan. Demand-side constraints are households' self-constraint or household' reluctance to take part in the formal credit markets.

Figure 5.11 presents the proportion households by constraints. Among borrowed households, there are 74% of those being credit-rationed while the rate of non-rationed is 26%. Credit-rationed surveyed households are those receiving the amount less than they demand. There are no applied families being rejected by formal lenders. The reason is that a household may explore minimum requirements in loan

procedures before applying. Or when a household comes to a lender, bank officer may advise them before they apply.

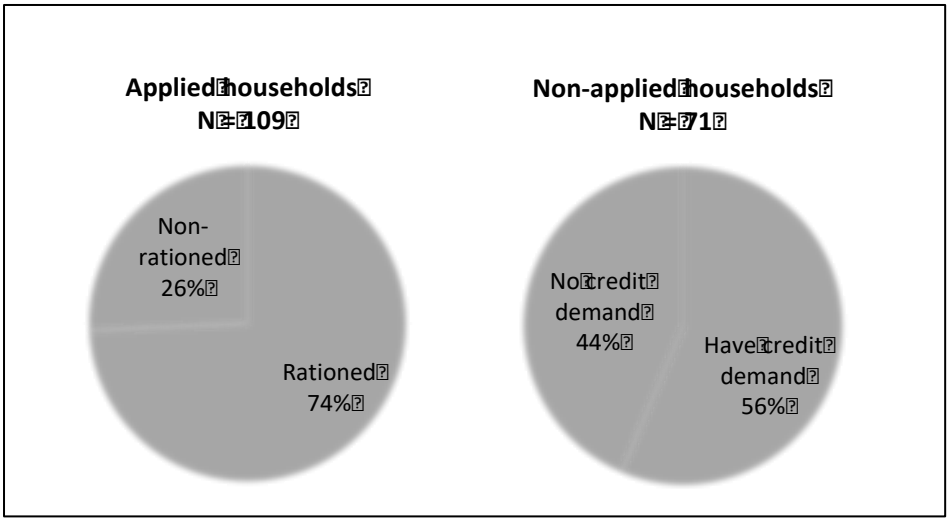


Figure 5.11. Proportion of households by formal credit constraints

Source: Household survey 2019

The proportion of households who have formal credit demand but do not apply for loans accounts for 56% and the rest is no-credit-demand households, at 44%. Households who have credit demand but do not apply loans may incur self-constraints, such as: risk constraints and transaction cost constraints (Boucher et al., 2009).

5.4.1. Some characteristics of non-rationed and rationed households

The being of credit rationed is determined by formal lenders. After a household applies a loan, they will scan and analyze the customer data and make the final decision. In this section, the author just considers the correlation between some households' characteristics and their status of being credit rationed. The characteristics will be included in econometric models in chapter 6 to discover the determinants of credit rationing.

It is clear that 62.96% of rationed household are in the age of 43-56 while the rate of non-rationed households aging 43-56 is 46.43%. The percentage of rationed is also higher than that non-rationed ones for the group of 29-42, 19.75% and 7.14% respectively. However, the fact is opposite for 57-70 group, of which 46.43% of non-rationed compared to 17.29% of rationed. The Chi-square test result is statistically significant at 99%, which validate the correlation between the age of household heads and their status of credit rationing (table 5.24). In other words, the

highest proportion of rationed households is in the group of 43-56. This age group also obtains the greatest formal amounts on average as in table 5.8 in section 5.2.1. It can be explained by that those households in this group demand more credit for their production than the younger group (29-42) and the older group (67-70).

Table 5.24. Correlation between households' characteristics and credit rationing

Description	Credit rationing		Chi-square test[1]
	Non-rationed (N = 28)	Rationed (N = 81)	
Age group			
29-42	7.14%	19.75%	0.006***
43-56	46.43%	62.96%	
57-70	46.43%	17.29%	
Gender			
Women	42.86%	41.98%	0.935
Men	57.14%	58.02%	
Occupation			
Others	28.57%	40.74%	0.252
Farmer	71.43%	59.26%	
Type of production			
Only livestock/aquaculture	50%	17.28%	0.001***
Both	50%	82.72%	
Main income source			
Non farm-based	39.29%	8.64%	0.000***
Farm-based	60.71%	91.36%	

Source: Household survey 2018-2019

[1]Pearson chi-square of chi-square test

*** Significant at 99%, ** Significant at 95% and * Significant at 90%.

The chi-square test results of gender and occupation category are not significant. Therefore, gender and occupation of household heads have no correlation with the being of credit rationing. It is quite suitable because lenders are interested in purpose of borrowing and repayment ability rather than gender or occupation.

In terms of production type, there are 82.72% of rationed households involving in both livestock and aquaculture production while the number of non-rationed is 50%. The percentage of non-rationed households with only one production type is higher than that of rationed. The significant result at level of 99% clarifies this relationship. In other words, the households with two production types are more likely to be credit-constrained than those with one production type.

The big final row in table 5.24 presents that most of rationed households have main income from agricultural production, at 91.36% compared to 60.71% of non-rationed. Reversely, considering households whose main income source from non-agricultural activities, the proportion is 39.29% of non-rationed and just 8.64% of rationed. The Chi-square test has the level of significance at 99%. The result confirms the fact that the probability of farm-based households subject to credit rationing is higher than non-farm based ones.

The higher percentage of credit rationed households involving two production types or having main income from agriculture can be explained by the higher credit demand of them. As mentioned in table 5.10 and 5.14 above, average received formal amounts of these two groups are bigger than their counterparts.

5.4.2. Demand-side constraints of farm households

The supply-side constraints are described in figure 5.11 by the proportion of rationed households. Factors affecting lenders' behavior on credit rationing will be analyzed in chapter 6 by using econometric models. In this section, author just describes demand-side constraints. As described in figure 5.11, 44% of non-applied households have no formal credit demand while 56% of those have formal credit demand. The table 5.25 below presents some demand-side or self credit-constraints of households.

Table 5.25. Demand-side constraints of farm households

Description	Reasons	Quantity	Percentage
Non-applied households		71	
No formal credit demand		31	
	Have no demand at all		
	Choose informal lender first		
Have formal credit demand		40	100%
	Fear of rejection	2	5%
	Not familiar with formal lenders	15	37.5%
	Fear of procedures and cost of loan application	23	57.5%

Source: Household survey 2018-2019

The three main reasons mentioned in table 5.25 are risk constraints (fear of rejection and not familiar with formal lenders), and transaction cost constraints. There are 31 non-applied households say 'no' when asked about whether they have credit demand or not. Some of them actually have not credit at all. They could have self-finance their production. On the other hand, some others said that they just want to borrow from informal credit sources. They find it easy to approach. They also

said the amounts from their savings and informal credit is enough for their production. Therefore, they do not have credit demand from formal lenders.

Of 40 households who have formal credit demand but do not apply loans, only two households have fear of rejection because they do not have land certificate that is considered as collateral in case of borrowing from VBARD or PCF. There are 15 families not applying loans because of not being familiar with formal lenders. They little know about formal lenders or just know VBSP which just offer small amounts. Therefore, the people prefer choosing informal lenders which is more convenient and offer larger amounts. The largest number of household is observed with the reason of procedures and costs of loan application.

5.5. Credit use of farm households

Table 5.26 below presents the data of credit use of farm households, including for agricultural and non-agricultural activities.

Table 5.26. Credit use of farm households

Credit use	Formal lenders			Informal lenders			
	VBA-RD	VBSP	PCF	Local sellers	Relatives/ friends	CSG	Money-lenders
Total (1+2)	100%	100%	100%	100%	100%	100%	100%
Agricultural activities[1]	100%	60%	80%	100%	65%	30%	100%
Purchase of breeding animals	33%	0%	29%	0%	30%	0%	0%
Purchase of animal feeds	15%	10%	15%	99%	35%	25%	100%
Veterinary expenditures	0%	50%	0%	1%	0%	0%	0%
Shed/fish pond reformation	52%	0%	46%	0%	0%	5%	0%
Non-agricultural activities[2]	0%	40%	20%	0%	35%	70%	0%
Expenditures of their small business	0%	14%	8%	0%	25%	15%	0%
Other purposes	0%	0%	12%	0%	5%	43%	0%
Debt rollover	0%	26%	0%	0%	5%	12%	0%

Source: Household survey 2018-2019

Related to agricultural activities, farmers often need money to buy breeding animals, animal feeds, veterinary medicine or reform/repair animal shed or fish pond

while some others often use credit money for non-agricultural activities such as funding their own small business or other purposes or even debt rollover. There is 100% of VBARD borrowers take up loans for expenditures in agricultural production while those of PCF borrowers are 80% and those of VBSP are only 60%. This can be explained that VBARD and PCF loans can meet farmers' demand for agricultural production while amounts from VBSP is quite small with lower interest rate so farmers possibly use them for more consumption purposes or debt rollover. On the other hand, lending processes of VBARD and PCF seem to be stricter than VBSP. The differences in lending process come from their nature of operation that is clearly indicated in section 6.1.1 of chapter 6. In other words, at first households borrow money from VBSP for production purposes but in reality, they often use it for both production and other non-agricultural purposes. Local sellers of animal feeds are most popular informal lenders at the research sites. Purposes of loans from relatives/friends, CSG or moneylenders are varied. Because of their high interest rate, loans from moneylenders now only are used in case of production emergency rather than for consumption.

5.6. Chapter conclusion

In the first content of the chapter, some key socio-economic characteristics of surveyed farm households are revealed. The average age of household heads is quite high. The age group accounts for the highest percentage is 43-56. The younger people seem to seek city jobs or non-farm jobs instead of focusing on farming activities. There are around 36.1% household heads have part-time jobs in addition to farm jobs. The proportion of households who involve in mixed production models of livestock and fish integration is 70.6%. These mixed-type households often have larger farming areas than those with one type of production. To finance agricultural production, surveyed households approach both formal and informal credit sources, of which number of borrowers having loans from both formal and informal markets remains the highest at 50%, and followed by from only informal and only formal ones. The rate of non-borrowing households just makes up around 10%. The three main formal lenders at the study site are VBARD, VBSP and PCF while informal lenders are diversified.

Concerning the content of credit uses by farm households, the author will compare the differences between groups of households in choice of credit sources and average loan amounts received. Households are grouped by some categories, such as age, gender, occupation, type of production, main income source and location. Age and gender almost have no correlation with family's choice of credit sources and credit amount received. There are big differences in choosing credit sources and loan amounts between two-production-type and one-production-type households. Mixed type households actually prefer borrowing from both formal and informal sources or informal sources only. On the other hand, formal and informal loan amounts they receive are all higher than the others. The fact is similar to occupation and main

income categories. Households whose heads have only farm jobs and main income source from agriculture favor borrowing from both two kinds of credit source rather than only one. All the results indicate the role of informal credit in research site. The differences among regions are attributed to their distinctive socio-economic characteristics of households.

In this chapter, author also clarifies the reasons of households' choice for lenders in each credit source type. Farmers in favor of VBARD and PCF often seek large amounts for production expansion while those choosing VBSP want to take advantages of low interest rate and long-term loans. Households' evaluation on PCF and VBSP also mentions their convenience and low transaction costs. The reasons of choices for informal lenders are varied. The chapter presents the constraints of households' participation in formal markets in the last section.

6

Factors affecting household credit accessibility of farm households in agricultural production

Based on the current situation of credit uses of households for agricultural production which was discussed in chapter 5, this chapter will determine the factors that affect credit accessibility of farming households in the study site, including the three dimensions of credit accessibility: households' credit market participation, credit amounts obtained as well as lender's behavior on credit rationing. This chapter includes 3 parts. The first section will determine the external factors on the three dimensions of household credit access. The external factors are rural credit markets. The second section focuses on internal factors which are determinants inside farm households, i.e. households' socio-economic characteristics. These internal factors will have impacts also on the three dimensions of credit access. The conclusion of the chapter will be stated in the third section. Some aspects of the content of this chapter are presented in the paper named "Determinants of farming households' credit accessibility in rural areas of Vietnam: A case study in Haiphong city, Vietnam" that is published in Sustainability, Issue 12(11), 2020, 4357.

6.1. Impacts of external factors

6.1.1. Rural credit markets

Market imperfection can be regarded as one of fundamental impacts on the degree of credit constraints, which is mentioned in chapter 2. Among imperfect features of credit markets, imperfect information are considered as the main determinants of credit constraints or credit rationing, especially in rural areas of developing countries like Vietnam. It is information imperfection that leads to high transaction costs relating to loan screening and monitoring process. Credit market imperfect information in some research is highlighted as the low quality of information about borrowers so it is difficult for the lenders to identify good borrowers (Kunieda and Shibata 2014). The difference of operation among formal institutions has affected their evaluation of customers' information. Information costs are main part of transaction costs (Braverman and Guasch 1986a).

According to the Decree No.55/2015/ND-CP and Decree No.116/2018/ND-CP amending some articles of No.55 stated in chapter 3, maximum loan amount approved by formal credit institution without collateral for common individuals or households living in rural areas is 200 million VND (the maximum amounts could be greater for other different types of farm household including some additional business conditions, for example value chain or high-tech agriculture). The two decrees also mention that households taking no-collateral loans have to submit their land certificate or commune authority's confirmation of using land (households have not been received official land certificate) to formal lenders. Financial institutions have rights to decide loan amounts based on households' production planning as well as transparent financial situation. However, the application of the two decrees is much different between types of formal lenders because each institution has its own lending policies.

In the research site, VBARD and PCF are the two formal credit institutions whose outstanding credit amounts are much higher than VBSP. VBARD has lending policies with both collateral and no collateral. According to the two decrees above, VBARD also approves the maximum non-collateral loan amount of 200 million VND (around 9000 USD) to each rural household. If normal households apply amounts exceeding 200 million VND, VBARD will ration amounts based on their collateral value to deal with asymmetric information of the borrowers in the markets.

Box 6.1. Our customer types are so diverse hence data collection is important

In addition to land use right certificate, we first consider borrowing purposes of each loan application in general and even loan without collateral. In reality, there is few borrowers who have detailed production plans as well as transparent financial status. Production plans relating to expenditures or revenues and the description of income flows of households are almost not recorded in documents. They just estimate these expenditures in their mind instead of recording it in documents. On the other hand, our customers' characteristics are diverse. They can come from different communes in the district. Therefore, the process of loan appraisal by scanning borrowers' data is important. We have to deal with customers on individual basis.

Source: In-depth interview of the head of Agribank, Kienthuy branch, 2018-2019.

The biggest difference between VBARD and PCFs is customer location. As stated in chapter 5, PCFs almost offer loans to locals in the commune where it is located. It is the characterisic that makes PCFs take advantages of access local information at the lower cost as informal lenders. The advantages of informal lenders in obtaining locals' information are concretely mentioned in chapter 2. PCFs and informal lenders could detect borrowers' data more easily and more exactly than other institutional lenders such as banks. Staff or mangers of PCFs and borrowers may have relative or friend or neighbor connection. Although PCFs in the study site require no collateral for almost all agricultural loans, they still ration credit amounts based on the value of borrowers' asset used as collateral to limit informational asymmetries and default risks.

Box 6.2: We have quite adequately known borrowers' characteristics in the commune.

We almost lend the locals in our commune. Due to village and community culture in rural areas, we here living in one commune know each other quite adequately. Local households' characteristics as well as information related to their income, occupation, and production scale are recognized somewhat clearly. When a local come to us to apply a loan, his/her data could come into our mind. It is so convenient and quick for our loan appraisal process.

Source: In-depth interview of head of PCF in Ngudoan commune, 2019.

In the three types of formal institutions, VBSP is the specific formal institution compared to the others in term of the group-based lending without collateral. Commune authorities and local social associations both join the process of sorting potential customer. Hence, VBSP receives borrowers' information that has been trustingly filtered out before. It is the way of lending that help VBSP reduce the adverse selection effect.

The ways of approaching customer information all have huge impacts on lenders' behaviors. In addition to information about borrowers affecting lenders' behavior, borrowers' knowledge about lenders should be also considered here. All surveyed households are asked about their knowledge of available credit sources in the research site. There is three option for answers "well known", "neutral" and "unknown" for both formal and informal credit sources. The results are shown in figure 6.1.

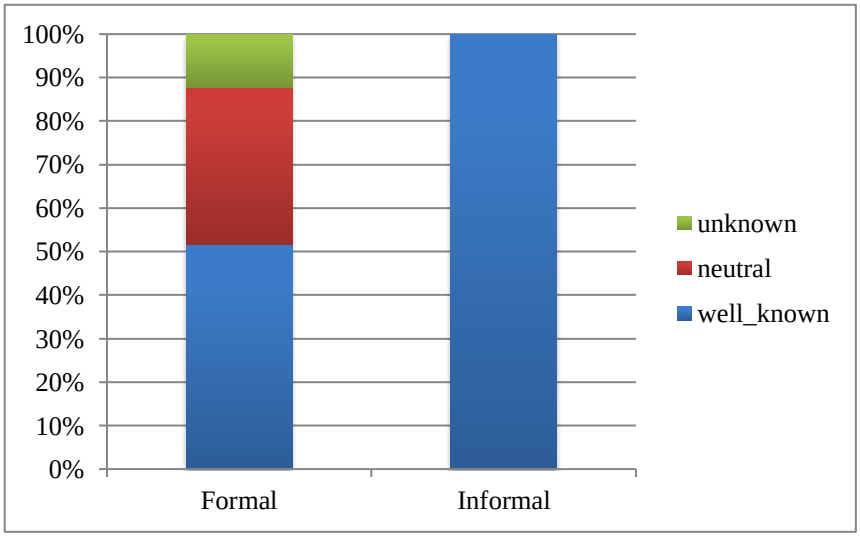


Figure 6.1. Level of households' knowledge about available credit sources

Source: Household survey 2018-2019

It is interesting that there is a big difference between households' knowledge of credit information at surveyed site. While 100% of farm households are aware of informal credit information, this number of formal sources is only 51%. Among responders, the proportion of households 'neutrally' knowing formal ones accounts for around 36%. Only a small percentage of households have no information about local formal lenders. As described in chapter 5, a greatest number of farm families use trade credit from local traders rather than any other informal sources. The informal sources are so popular in rural Vietnam in general as well as in research site in particular.

Box 6.3. I am not familiar with bank loans

> I am not familiar with bank loans. I think bank loan application may be difficult and complicated. I often buy animal feed by trade credit from local stores in my commune. My family and many households here often pay after selling animals for wholesalers. These storekeepers are often our neighbors so buying inputs on credit is very popular and convenient.
>
> Source: In-depth interview of one household in Tanphong commune, 2018-2019

6.1.2. Systemic risks of agricultural production

According to (OECD 2009), types of systemic risks in agricultural sector are mentioned in table 2.2 of chapter 2, i.e. market/price risk, production risk, financial risks and institutional/legal risk. All risk types have strong impacts on both borrowers' and lenders' behaviors.

Production risks

The risks basically come from agriculture's dependence on weather and the environment. Vietnam is one of the developing countries which will suffer the worst from the impacts of climate change (Yu et al. 2010). It is industrialization, urbanization, and even agricultural intensification that harmful affect on air, land as well as water and the expanded uses of energy and transport sectors result in increased greenhouse gas emissions- one of causes of climate change (ADB 2013). Environment directly interacts with climate change, then both of them are threat to livestock production because of the influence on feed crop and forage quality, water resources, animal diseases and reproduction as well as biodiversity.

Box 6.4: Impacts of environmental pollution on livestock production

> Both land animals as pig or chicken and aquatic ones as fish are likely to be subject to diseases. This is attributed to water pollution as results of urbanization and industrialization or even agricultural intensification. The pollution even becomes a more and more serious matter to the rural areas near big cities such as Haiphong. In reality, though many households have carried out vaccine injection for animals as scheduled adequately, their livestock possibly suffers new diseases.
>
> Source: In-depth interview of vice head of agriculture department, 2018-2019

More than 60% of surveyed households said that risks related weather and climate are important when they make formal borrowing decisions, i.e. from VBARD and PCFs. The percentage of non-borrowing households is 80.2% compared to that of borrowing ones with 61.6% (figure 6.2). The risk is likely to increase loan repayment pressure because of short-term loans offered. As stated in chapter 5, loan term of both VBARD and PCFs is mainly short-term. In case of loss seasons, borrowed households have to repay loans by other income or financial sources, such as saving or non-agricultural income or informal credit.

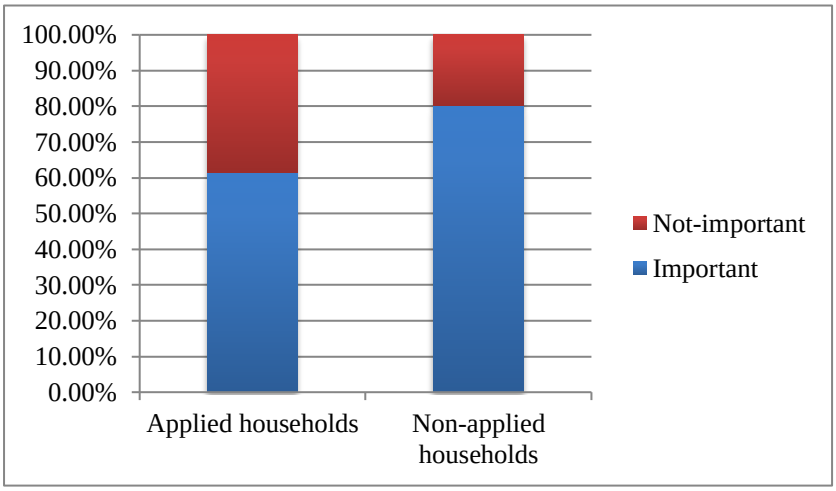


Figure 6.2. Households' evaluation of impacts of production risks on their formal borrowing decisions

Source: Household survey 2018-2019.

Market/price risks

Market/price risks include meso-level and/or macro-level risks (OECD 2009). Meso-level risks are fluctuations in domestic market price due to supply-demand imbalance or small-scale uncertainties while macro-level risks are changes in input/output prices due to large-scale shocks or in trade policies and so on. Price risks owing to the gap between supply and demand markets are so popular for agricultural products of Vietnam.

Despite the significant transition in agricultural sector in terms of production scale restructuring, developing large-scale fields and the application of science, technology and mechanization, small scale production is still common, of which the most popular type of production units is household. The numbers of the two remaining units, i.e. enterprises and cooperatives, constitute a much small proportion (GSO, 2016). Moreover, most of agricultural products are produced in the traditional method. That means farmers do not either pay attention to market demand or apply updated agricultural practices, then their product consumption totally depends on small wholesalers/traders who directly provide products to consumers. In case product supply is excess, farmers/households are forced to sell wholesalers at lower prices meanwhile the actual retail prices almost remain unchanged. Consequently, farm producers are affected by the problem of having bumper production output but gaining small benefits/margins due to plummet price. In addition to the cause of increasing production output, excess supply may be exacerbated by both predicted and unpredicted/abnormal uncertainties of socio-economic events, such as decreases of international market demand or disease pandemic and so on. The main reason leading to the steep drop in agricultural product prices was the shortage of appropriate planning and linkages between producers/farmers/households or small-

scale production and market demand. Besides uncertainties of domestic market demand, the problems of Vietnam agricultural products in international markets are the product quality that decreases the competitiveness, leading to the price drop.

The adoption of supply chain as well as high technology in agricultural production will bring about economic efficiency because it reduces some input expenditures such as animal feed and veterinary medicine. Supply chain often requires careful examination from input material, production process and product packaging to ensure the quality of products. It is the requirements that make farmers responsible for their products' quality. In recent years, although the government has policies on planning, taking account of supply-demand factors as well as market consumption for agricultural products, the expansion of supply chain adoption may be confronted with several challenges, such as farmers' constraints to approach great credit amounts and limited systems of convenient stores in which products of supply chain will be consumed. In reality, convenient stores seem to be common in several big cities while in rural or less developed areas, people prefer traditional markets. Therefore, traditional and spontaneous production as well as product distribution of household units is still common.

Box 6.5. Borrowing formal credit is risky

> I do not want to borrow money from formal institutions because of repayment burden. I find it so risky so I just want to self finance my production or borrow from relatives or friends at low or no interest rate. The 3-year profit of animal production I receive could be eliminated in only one year of loss due to diseases or sharp drops in price. In these cases, we still have to pay all input expenditure including at least: purchase of breeding animals, feed and farming equipment as well as interest if I have a loan. The term of formal loans is too short for us.
>
> Source: In-depth interview of one non-borrowing household head, 2019

Financial risks and legal risks

It is obvious that micro-level financial risks relating to change in farm income from other non-farm income actually affect farmers' agricultural production expansion in rural areas. They are willing to migrate to big cities to seek better job opportunities. Their income from non-farm paid jobs is even much higher than their family' total farm income. This migration is so popular in highly urbanized areas that are not far from big cities. Impacts of urbanization are clarified in the next section. Therefore, many rural households do not want to borrow more formal credit to expand or develop their farm production. They just approach informal credit for convenience. Although the government have a lot of polices on encouraging agricultural production, linkages of these policies have not been tightened. For example, limitations of policies on credit subsidy or supply-demand markets are discussed in chapter 3.

6.1.3. Urbanization

Some Vietnamese researchers mention urbanization as one of significant determinants of credit accessibility. Urbanized commune is confirmed to have negative impact on households' formal market participation as well as obtain loan amounts from both informal and formal sources (Khoi et al. 2013). Other authors have mentioned distance to commune center as the proxy of urbanized commune (Duy et al. 2012, Barslund and Tarp 2008).

Urbanization has brought a lot of chances for young people to seek jobs in the city. Some of them have main occupation are workers and farming activities can be considered as seasonal jobs. One of clear phenomena of urbanization is the increasing average age of household heads. The age average is quite high with the highest percentage belonging to the group of 43-56 and followed by group 57-70. The proportion of group 29-42 is smallest as analyzed in chapter 5. This is likely to be due to non-farm job opportunity in urban sites.

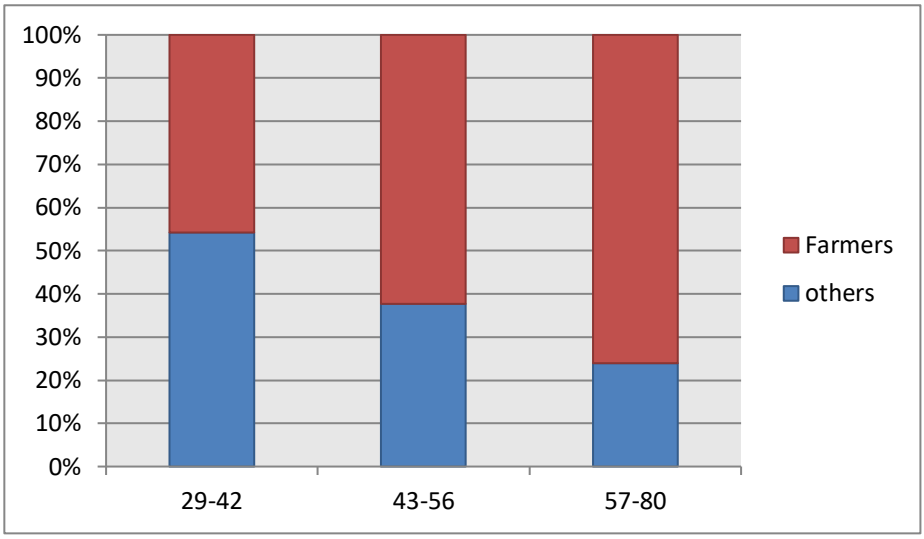


Figure 6.3. Distribution of household heads' occupation by age group

Source: Household survey 2018-2019

In figure 6.3, the proportion of household heads having non-farm jobs remains the highest in the group of 29-42, accounting for more than 50%. These people of the young group have many chances to seek jobs in urban areas. Nearly 40% of households with age of 43-56 have non-farm jobs while that of group 57-80 is just 22%. Urbanization has actually created employment opportunities. Many farmers do not want to expand agricultural production because of its risks. They state that paid jobs, such as workers in companies, bring them more stable income flows than farm jobs. Males of the 43-56 group can find jobs more easily than females.

Box 6.6: We find difficult to seek city jobs and our children don't want to do farming

We are often familiar with farming jobs for more than 20 years and just finish high school so we do not have any professional skills. Some males can find a seasonal job in the city as builder while it is difficult for females to seek suitable non-farm jobs. At the age of more than 40, some companies do not want to recruit females and we cannot work far from home since we have to take care our family. Our children often seek an office job after graduating university or college. If they do not go to university, they will become workers in companies. They reject to continue to do family farming activities.

Source: Group discussions, 2018-2019.

Households were asked about the level of impacts of urbanization on their borrowing decision in the survey. Effects of urbanization here are explained by the chance that each member of households could get a job in the city. 100% of non farm-based families say 'yes' as opposed to only 47.3% of farm-based ones (figure 6.4). Members of non-farm-based family often try to seek non-farm jobs.

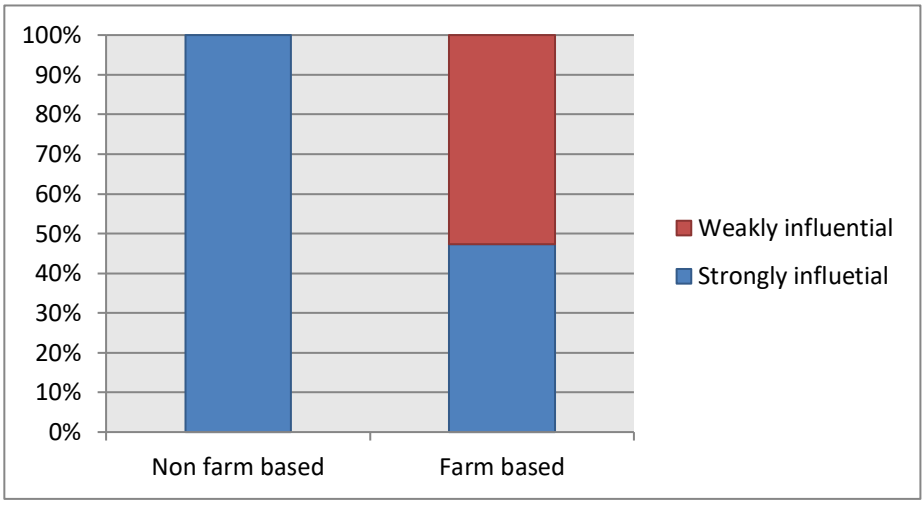


Figure 6.4. Households' evaluation of effects of urbanization on borrowing decision

Source: Household survey, 2018-2019

Box 6.7. Finding city job helps us avoid agricultural production risks

My family has three members. I both carry out farming tasks and am a street seller of vegetables in city while my husband is builder and my son is worker. Our non-agriculture income is greater than agriculture one. Therefore, we do not want to expand agricultural production. Agricultural production is risky in case of bad weather or diseases. City job seems to create more stable income for our family.

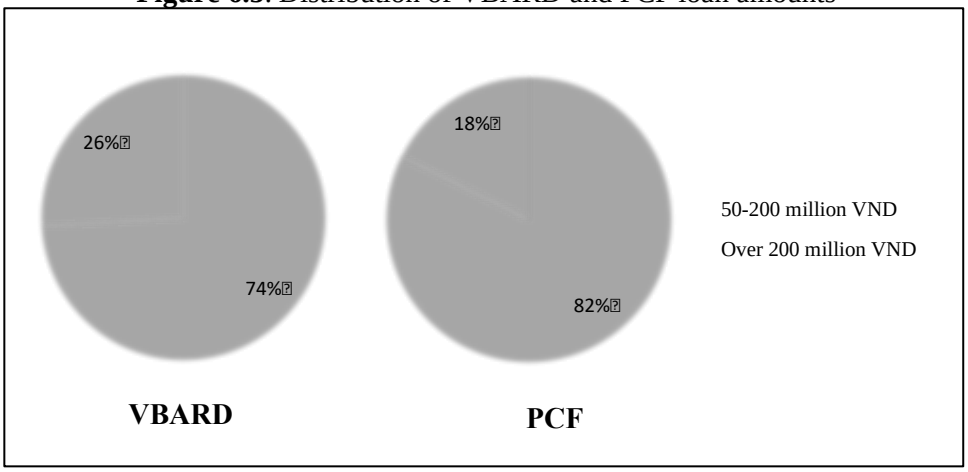
Source: In depth interview of a non farm-based household, 2018-2019.

6.1.4. Lenders' behaviors

As stated before, it is asymmetric information and adverse selection that have effects on lenders' behaviors. Among the three types of formal lenders in the research site, VBARD is possibly subject to these risks most because of its varied range of customers.

Among 28 households borrowing from VBARD, only 7 households are approved with amounts of more than 200 million VND, composing 26% (figure 6.5). There are 74% borrowers obtaining amounts of 50 to 200 million VND. The restraint comes from rural households' asset value that is quite small. Therefore, bank will offer them non-collateral loan products (according the decree no.55 and 116). If borrowers who want to borrow exceeding 200 million VND, they have to submit an asset as collateral whose value is big enough for the loans.

Figure 6.5. Distribution of VBARD and PCF loan amounts



Source: Household survey 2018-2019

In terms PCFs, almost all loans offered by PCFs in the study site are non-collateral. Credit officials of PCF makes lending decisions based on production plan as well as repayment ability of households. PCFs also request borrowers to submit their land-use certificate. While approved amounts exceeding 200 million of VBARD depend on the value of collateral, those of PCFs do not totally rely on collateral's value. However, the greater and greater collateral value basically enhances borrowers' creditworthiness. The advantage of PCFs is lending to local borrowers, which seems to ease asymmetric information as well as adverse selection. However, the proportion of loans exceeding 200 million VND of PCFs is as low as of VBARD, just accounting for 17.6% as in figure 6.13. VBSP is one government bank having special lending procedures. Customer data scanning is conducted through both the bank and local authorities. Therefore, the risk of default of VBSP is basically lowest.

Box 6.8. VBARD requires collateral for large loan amounts

Although, non-collateral loan amounts can be offered up to 200 million VND according to Government polices, we still have to consider customers' risks, production and repayment plans as well as collateral. We want to offer more loans to agricultural production sectors but it is too risky. VBARD is a profit-based commercial bank; hence collateral is still one of important criteria in the process of loan appraisal. In terms of loans of more than 200 million VND, if there are not other prior conditions in the decree no.55 and 116, we basically require collateral for full loan amounts. In details, an aggregate amounts equal up to 75% of the aggregate appraised collateral values. The collateral coverage ratio can be varied based one each type of collateral.

Source: In-depth interview of head of credit department of VBARD, Daihop branch, Kienthuy district, 2018-2019.

The difference of lenders' behaviors is also presented through the percentage of rationed households as in table 6.1. The greatest proportion of credit-rationed households is observed in the group of VBARD. The group of households borrowing from VBSP are least constrained among the three ones.

Table 6.1: Number of households by formal lenders' credit rationing

	No Rationed		Rationed	Total
VBARD	2		25	27
	7.41%		92.59%	100%
VBSP	22		43	65
	33.85%		66.15%	100%
PCFs	4		13	17
	23.53%		76.47%	100%
Total	28		81	109
Pearson Chi-Square	*Value: 7.034*	*df: 2*	*Asymp. Sig. (2-sided): 0.030***	

Source: Household survey, 2018-2019

*** Significant at 99%, ** Significant at 95% and * Significant at 90%.

In order to confirm the difference between the rates of rationed households among lenders, Chi-square test is used. The results show a statistical significance of 95% of the test. In other words, lenders' behavior on credit rationing is distinctive. There is another reason that people often approach VBARD or PCF for larger demanded amounts but do not meet the requirements so they may be rationed more than those borrowing from VBSP.

On the other hand, as discussed in the section of theory of credit accessibility, lenders have to scan customers' data to evaluate their creditworthiness before lending decisions, which is called as a credit rationing process (Aleem 1990). In practice, the process often has two stages. First, credit providers will determine to lend or reject borrowers' application. If lending decision is accepted, then lenders will decide how much credit is granted to each customer. Hence, not all borrowers

will obtain the full amounts which they applied for before. In other words, lenders' behavior, which is one of external factors affecting household credit access, is partly determined by socio-economic characteristics of borrowers (internal factors). Therefore, the sub section focusing on estimation of factors affecting lenders' behavior' will be presented in the section 6.2 below. This sub-section is the intersection of two sections 'external factors' and 'internal factors'.

6.2. Impacts of internal factors

6.2.1. Characteristics of farm households

Socio-economic characteristics affecting households credit accessibility includes observable and unobservable factors. Observable factors can be inputted as independent variables in the econometric models to estimate their impacts while unobserved factors cannot be captured in the models.

Table 6.2. Description of variables

Variables	Denoted by	Description (unit)
Age	Age	Age of household head (years old)
Gender	Gender	Gender of household head, Male: 1, female: 0
Education	Education	Years of schooling of household head
Occupation	Occupation	Household head is farmers only: 1 Otherwise: 0
Total number of people in family	Total people	Total number of people in a family
Dependency ratio	Dependency ratio	The ratio of number of dependent people to total number of people
Credit group membership	Group member	Member of a formal credit group
Area of land with certificate	Certificated land	Area of dwelling land with certificate (m^2)
Area of farming land	Farming land	Area of farming land (m^2)
Agricultural income	Agricultural income	Income from agricultural production (Million VND)
Total income	Total income	Total income = agricultural income + non-agricultural income (million VND)
Social network/connection	Connection	Having government jobs or have acquaintances in formal credit institution, or staff of social associations: 1, otherwise: 0

Common independent variables inputted in the econometric models are: age, gender, education, occupation, total people in family, dependency ratio, credit group membership, area of land with certificate (dwelling land), area of farming land, agricultural income, total income, region, social network/connection. Household often use dwelling land use right certificate as collateral when borrowing. Households do not often use farming land as collateral because two reasons: (1) the value of farming land is much lower than dwelling land although farming land area is much larger than dwelling land; (2) most of households do not have farming land use right certificate (this is due to history of land allocation and government policies). Some continuous variables' value will be inputted in the models in form of natural logarithm. However, each model may add or exclude some variables.

In addition to observable factors inputted in the models, household risk aversion to production and borrowings is an unobservable factor that is not inputted in the models. As in section 5.2.6 'credit use of households by location' shows the differences in credit source choices and credit amounts of households in the four selected communes. The proportion of households have no borrowings is highest in Ngu Phuc commune as in table 5.15 of section 5.2.6. Moreover, average informal loans of households in Tu Son, Tan Phong and Ngu Doan is even twice as great as in Ngu Phuc in table 5.16. This may imply that credit demand for agricultural production in Ngu Phuc is lower than the other communes. They are more reluctant to take production risks as well as financial risks than others.

Box 6.9. We do not want to borrow large amounts to expand production scale

We almost satisfy with current agricultural production scale. We do not want to improve income from agricultural production so production expansion is no need. In our family, the non-farmer members have found jobs as worker in urban while we- farmer members - will expand income from non-agricultural activities by joining informal revolving credit and saving groups or seek non-farm part time jobs at communes. The monthly saving interests range from 2,000 – 5,000 thousand VND or more. We find it better than investing in agricultural production that is much risky. Therefore, we prefer to borrow small amounts from low-interest-rate formal or informal credit sources to finance current agricultural expenditures. We do not want to suffer greater debt burden to expand large-scale production.

Source: Group discussion in Nguphuc commune, 2019

While households in Ngu Phuc do not want to invest large sum of money for large-scale agricultural production, those of Tuson, Tanphong and Ngudoan are basically opposite. They demand more credit for agricultural production expansion in the future. They are willing to take risks in agricultural production process. In other words, they want to increase family income by developing agricultural production. Therefore, households' risk aversion to production and borowings has impacts on households' credit demand and credit accessibility.

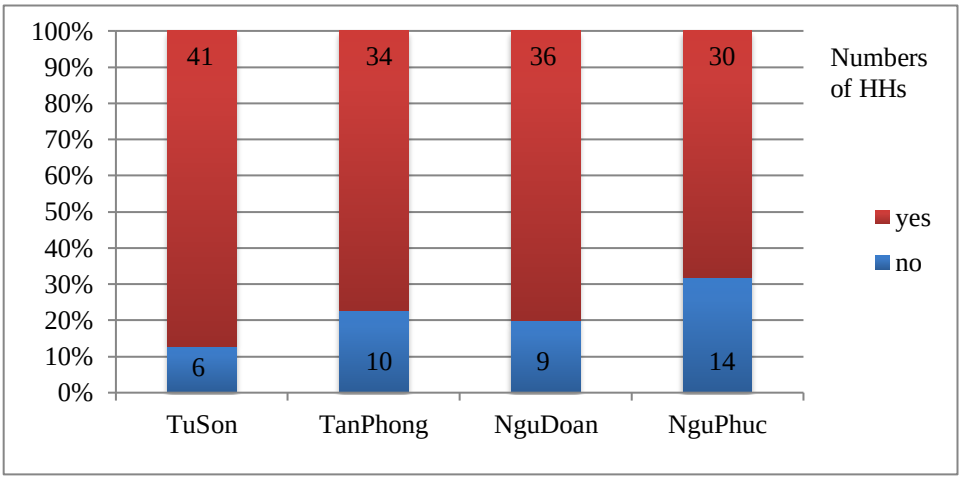


Figure 6.6. Future credit demand of households by commune

Source: Household survey, 2018-2019

Figure 6.6 presents some information of households' future credit demand. The highest proportion of no-future-credit-demand households is found in Nguphuc commune while the lowest one is in Tuson commune. However, purposes of approaching future credit are very different in each commune in table 6.3.

Table 6.3: Households having future credit demand by commune and by purpose

Description	Unit	TuSon	TanPhong	NguDoan	NguPhuc
Production expansion	Households	41 (100%)	34 (100%)	36 (100%)	10 (33.33%)
Expenditures	Households	-	-	-	20 (66.67%)

Source: Household survey 2018-2019

In the survey, households who have credit demand in the future are asked about their purposes. There are two purposes for approaching future credit: production expansion and paying off expenditures of input materials such as animal feed as in table 6.3. Farmers often purchase input materials by trade credit, so they have to incur higher prices rather than paying in cash at the time of purchase.

6.2.2. Measuring the impacts of households' characteristic on credit market participation

6.2.2.1. Impacts of household characteristics on credit market participation

Farming households in the research site borrow from both formal and informal credit sources, so the results will be biased if we only analyze the data as the pooled sample. Binary logistic regression model is used to evaluate the impacts of internal factors on household credit market participation, in which formal and informal credit access is considered separately. Farmers borrowing from formal institutions are

often for agricultural production while informal sources is for multiple purposes, including agricultural and non-agricultural activities. Therefore, the author will conduct 3 functions with 3 binary dependent variables as mentioned in chapter 4: Borrowing for pooled sample, formal borrowing and informal borrowing, respectively.

For borrowing and formal borrowing function as well as formal amount function, 'formal credit group membership' variable is excluded because all non borrowing and non formal borrowing households do not join any credit groups. On the other hand, joining formal credit groups is required when a household wants to borrow from PCF or VBSP. Therefore, including group membership variable will make the estimation results be biased. The other variables are used in the three models are: age, gender, education, occupation, total people in family, dependency ratio, area of land with certificate (dwelling land), area of farming land, agricultural income, total income, region, social network/connection. Both agricultural income and total income should be inputted in models because either borrowers or lenders often consider all income inflows for debt repayment rather than only agricultural income. However, there is the inter-correlation between agricultural income and total income, so the author will conduct sub-functions, of which the based ones include variable 'agricultural income' and extended ones included 'total income' to make the model results robust.

Table 6.4. Expected signals for independent variables

Variables	Expected signals		
	Borrowing	Formal borrowing	Informal borrowing
Age	+/-	+	+/-
Gender	+/-	+/-	+/-
Education	+	+	+/-
Occupation	+	+	+
Total people number	+/-	+/-	+/-
Dependency ratio	+/-	+	+/-
Credit group membership			+
Area of land with certificate	+/-	+/-	+/-
Area of farming land	+	+	+
Agricultural income	+	+	+
Total income	+/-	+/-	+/-
Social network/connection	+	+	+

Due to the segmentation of credit markets, our hypothesis is that the coefficient signs of formal and informal credit access are likely to be different as in table 6.4. Most of variables are expected to have positive sign for formal borrowing except gender. The expected sign of gender is varied, positive or negative, depending on the type of each lender in each credit source as well as the feature of each research site. Female can access preferential credit more easily than Male (Hananu et al.,2015; Fletschner 2009; Akudugu 2012) while male in some other studies are observed to have higher probability to access credit than female (Kosgey, 2013) and especially in informal credit markets (Okurut et al.,2005). In terms of informal borrowing, age and total income are expected to be negative or positive. The relationship between age and informal borrowing is observed to be negative in the study of Khoi et al. (2013) and Barslund M et al. (2013) in Vietnam but positive in the research of Okurut et al. (2005) in Uganda. This is can be explained that older farmers may prefer formal borrowings with lower interest rate rather than informal credit while in some areas, older people have more demand on informal credit due to the poor. However, age is confirmed to have positive correlation with formal credit access in many studies (Hananu et al., 2015; Pranta, 2019; Atieno 2001; Gray 2006; Yehuala, 2008). Education variable often have positive correlation with formal borrowings because higher education can reflect better knowledge of compared information about formal and informal credit (Hananu et al, 2015; Kosgey 2013; Odhiambo et al, 2020) while there are not many studies indicating the significant result of education in terms of informal credit. In studies in Vietnam, Khoi et al. (2013) and Barslund et al. (2008) mentioned the negative correlation between level of education and the probability of informal credit access, which contradict the findings of Okurut et al. (2005) in Uganda. Similar to expected sign of total income variable in informal and formal function, it can be positive or negative. Families who have increasing total income tend to have lower informal credit demand or even lower formal demand because increasing total income could be a financial source replacing informal credit meanwhile increasing income would help farmers have more chances to approach formal credit (Khoi, 2013; Hananu, 2015, Li et al.,2011). On the other hand, there is a hypothesis that the decrease in total income in short term will lead higher demand for informal credit to overcome the difficulties. The hypothesis will be examined in the next section. Agricultural income is related to the value of output holdings as well as or input expenditures. Some authors use variable ‘output holdings and input expenditure’ rather agricultural income to reflect production scale. Khoi et al. (2013) and Bao Duong et al. (2002) indicated that total livestock value and Feed expenditures have positive impacts on either formal or informal borrowings or both. In this study site of the thesis, expected sign of agricultural income is supposed to positive for both because of great informal and formal credit demand for agricultural production. Another proxy of production scale is farm size. So, the expected sign of this variable is supposed to be the same as agricultural income or livestock value, i.e positive (Akudugu, 2012; Kuwornu et al., 2012; Barslund et al, 2008). Land with certificate is one type of family owned asset. In some other studies, authors use

variable 'total asset' rather than only land with certification. This variable reflects family wealth and also can be considered as good collateral when borrowing. Therefore, in case of reflecting family wealth, the expected sign is negative (Li et al., 2011; Barslund et al., 2008, Khoi et al., 2013). Dependency ratio is expected to be positive (+) for formal access but positive (+) or negative (-) for informal one. Dependency ratio is often a proxy of the poor, hence households with high dependency ratio prefer borrowing from institutional credit sources due to lower interest rate than informal ones (Li et al, 2011; Pranata, 2019). On the contrary, families with high dependency ratio may demand informal credit demand for production to increase income in case of formal credit shortage (Bao Duong et al., 2002; Okurut et al, 2005). Similarly, family size could be also either negative or positive for both formal borrowing and informal borrowing. In reality, family size in some cases could be regarded as proxy for both the poor and the earning capacity. A big family size with high dependency ratio refers to financial difficulties, which may result in lower possibility to access credit because of low repayment ability (Kuwornu et al. 2012). In some other study, the explanation for negative sign of this variable is different. Big family size with high proportion of working members implies higher earning capacity or enough finance sources compared to small families that leads to lower demand on credit (Hananu et al, 2015; Kosgey, 2013). However, it is supposed that bigger families with financial difficulties but having good business production plan can access formal credit, such as subsidized program. On the other hand, members of these families can seek non-farm jobs to increase their income so they even have chance to borrow from informal sources. This study of the thesis will examine this hypothesis to find out whether there are differences between this and other studies of other sites. The other variables: occupation, credit group membership, area of land with certificates, area of farming land, agricultural income are expected to have positive relationship with informal credit market participation. The variable 'main occupation of household head' can found in few studies. Putting this variable in the models will help to examine whether main occupation of household heads have influences on their behavior in the credit markets. With descriptive data in previous chapters, this variable is expected to positive for both formal and informal borrowings. Credit group membership is one proxy of social connection. Connection variable is observed to have positive relationship with both formal and informal borrowings (Luan and Bauer 2016).

Table 6.5. Parameter estimates of binary logistic model

180	Based						Extended					
Variables	Borrowing		Formal borrowing		Informal borrowing		Borrowing		Formal borrowing		Informal borrowing	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
Age	0.046	0.489	0.082	0.09*	-0.053	0.265	0.07	0.314	0.082	0.091*	-0.045	0.348
Gender	0.364	0.578	0.705	0.15	-0.191	0.679	0.246	0.704	0.702	0.152	-0.115	0.801
Education	0.195	0.321	0.118	0.377	0.154	0.269	0.22	0.263	0.118	0.375	0.145	0.295
Occupation	1.083	0.096	0.81	0.145	0.604	0.206	1.277	0.071*	0.805	0.151	0.938	0.068*
Certificated land	-0.687	0.291	-0.928	0.073*	-0.695	0.156	-0.943	0.152	-0.933	0.074*	-0.668	0.17
Agricultural income	-0.217	0.652	-0.028	0.943	0.776	0.037**						
Dependency ratio	1.3	0.585	4.741	0.01**	-3.093	0.081*	1.173	0.625	4.736	0.01**	-2.951	0.094*
Farming land	-0.4	0.153	-0.453	0.117	0.116	0.571	-0.504	0.075*	-0.461	0.095	0.138	0.498
Connection	2.374	0.001***	4.426	0.00***	0.106	0.862	2.092	0.003***	4.418	0.00***	0.188	0.756
Total people	-0.348	0.355	-0.308	0.28	-0.121	0.675	-0.306	0.403	-0.307	0.281	-0.158	0.578
Tu son	3.249	0.01**	2.329	0.034**	0.615	0.484	2.978	0.016**	2.334	0.034**	0.674	0.441
Tan phong	3.649	0.012**	1.3	0.224	2.114	0.092*	3.388	0.02**	1.306	0.222	2.172	0.082*
Ngu doan	2.128	0.041**	1.915	0.075*	-0.949	0.243	1.788	0.078*	1.92	0.075**	-0.861	0.287
Group_member					0.429	0.458					0.368	0.518
Total income							0.515	0.391	-0.01	0.983	0.85	0.062*
Constant	3.273	0.567	-0.624	0.883	2.58	0.54	0.526	0.931	-0.642	0.884	0.978	0.826
No. of obs	180		180		180							

Source: SPSS results

* Significant at level 10%, ** Significant at level 5%, *** Significant at level 1%

The goodness-of-fit of a statistical model describes how well the model fits the data or fit a set of observations. In binary logistic models, Hosmer and Lemeshow test with Pearson chi-square statistic is used for the goodness-of-fit. If the result is statistically significant, i.e. $p < 0.05$, the model does not fit the data well. However, the results of 3 functions show that the p-value is greater than 0.05 (appendix 16). Based on this measure, it can be concluded that the models fits the data well.

The results of table 6.5 have basically confirmed the hypotheses above. When we study credit accessibility as the pooled samples, the factors significantly affecting households' participation in the credit markets are region and connection. However, this result seems to be bias due to the segmentation of credit markets that discussed at the beginning of the chapter. Therefore, we will separate formal and informal credit market participation functions. On the other hand, there are no big differences between based and extended functions.

In terms of the determinants of household formal borrowing in based function, the statistically significant factors are: age, certificated land, dependency ratio, region, and connection. It is interesting that the signs of almost all significant variables here are positive except area of certificated land. The sign of age of household head is significantly positive at 10%, which means the older household head is, the more credit demand he/she has or the easier he/she can access formal lenders. This result is consistent with the findings of (Hananu et al. 2015, Odhiambo and Upadhyaya 2020) and opposite to that of (Barslund and Tarp 2008). In rural areas of an Asia country like Vietnam, the older people group can be seen as proxy of farming experience and prestige in commune, which help them less constrainedly approach formal institutions. On the other hand, younger people have less credit demand than the older because of high chances to seek non-farm jobs. Land area with use right certificate is regarded as an important factor to determine farmers' credit access for both formal and informal channels, especially for formal channels. In other words, area of land with certificate may reflect households' wealth. In the research, coefficient of this variable is negatively significant at the level of 10% for formal credit. This is absolutely reasonable because wealthier households are likely to have less credit demand. In the research of (Chandio and Jiang 2018, Hussain and Thapa 2012, Saqib, Ahmad and Panezai 2016), larger land area with certificate will decrease the probability of farmers being constrained. The asset of certificated land could be used as collateral to secure borrowers' loans.

The result of coefficient of variable 'dependency ratio' is contradictory for formal access and informal access. This result is similar to the studies of (Okurut et al. 2005, Bao Duong and Izumida 2002). In table 6.5, dependency ratio positively correlates with formal access and negatively with informal access. Households with high dependency ratio prefer to borrow from formal credit sources because of the lower interest rate. Moreover the families have more motivations to earn more income to remain their livelihood than those with smaller number of dependents (Pranata 2019). As expected, network connection as proxy of social capital is positively correlated with formal credit access at the significant level of 1%. The

higher level of social interaction family members has, the more easily the family can access formal credit sources. These results are found in much research in Vietnam and other developing countries (Duy et al. 2012, Akudugu 2012, Mohamed 2003). In reality, these highly interactive members are often recognized by the leaders of communes or financial institutions, which raise their family's reputation. This correlation, in turn, will ease lenders' loan processing (Zeller et al. 1996, Diagne and Zeller 2001). Regarding region variable, households in Tu Son and Ngu Doan are observed to demand more formal credit than Ngu Phuc (base commune) at the significant level of 5% and 10% respectively.

While agricultural income and total income variables have positive relationship with informal credit access, the results of formal credit are statistically insignificant. These interesting findings can be explained by the fact that formal credit supply does not adequately meet the household demand for agricultural production. Meanwhile in the research of (Hananu et al. 2015) and (Khoi et al. 2013), total income and agricultural income are observed to positively correlate with formal credit access. Regarding region variable, only households in Tan Phong is estimated to have informal credit demand than the base (the base is Ngu Phuc commune).

The differences between extended and based functions are significantly positive coefficient at 10% of occupation variable for both borrowing and informal borrowing equations. In other words, households whose households heads have only farming jobs are more likely to approach informal credit lenders than others. This result also highlights the important role of informal credit in agricultural production in case of formal credit shortage.

6.2.2.2. Relationship between formal and informal credit market participation

In order to investigate relationship between formal and informal market participation or the segmentation of the two markets, the independent binary variable 'informal borrowing' and continuous variable 'informal amount' have been included in the function of formal credit access, in which the dependent variable is still 'formal borrowing'.

The independent 'informal borrowing' and 'informal amount' have no impact on household formal credit access as in table 6.6 because of significant level higher than 10%. In other words, farmers' choice of borrowing from informal sources or their informal amounts have no relationships with their decisions in borrowing from formal sources. The result has confirmed the segmentation of the two markets, which is found in some previous literature (Khoi et al. 2013, Bao Duong and Izumida 2002). In reality, many farmers have chosen to borrow from informal lenders instead of formal ones due to easier access and procedures. Moreover, the borrowing purposes of the two types of credit markets are different. Farmers' formal borrowings are often for agricultural production while the purposes of informal ones are varied, such as for both agricultural and non-agricultural activities.

Table 6.6. Parameter estimates of binary logistic model

Variables	Informal amount		Informal borrowing	
	Coef.	Sig.	Coef.	Sig.
Age	0.082	0.091*	0.081	0.094*
Gender	0.698	0.155	0.690	0.16
Education	0.120	0.371	0.123	0.36
Occupation	0.821	0.142	0.828	0.137
Certificated land	-0.938	0.072*	-0.958	0.067*
Agricultural income	-0.004	0.993	0.005	0.991
Dependency ratio	4.727	0.011**	4.705	0.011**
Farming land	-0.448	0.122	-0.442	0.126
Connection	4.432	0.000***	4.445	0.000***
Total people	-0.311	0.277	-0.319	0.268
Tu son	2.335	0.034**	2.341	0.034**
Tan phong	1.307	0.222	1.314	0.219
Ngu doan	1.888	0.082*	1.842	0.088*
Informal amount	-0.022	0.858		
Informal borrowing			-0.306	0.62
_cons	-0.629	0.882	-0.437	0.918

Source: SPSS results

* Significant at level 10%, ** Significant at level 5%, *** Significant at level 1%

6.2.3. Impact of households' characteristics on credit amounts

Based on some previous literature, our hypothesis for the sign of variables is the same as in section 6.2.2. Table 6.7 and 6.8 reveals the difference between households' borrowing amounts from formal and informal credit sources of OLS models and tobit models.

In OLS model, variables of area of certificated land, agricultural income and total people number in family have significant impacts on formal amounts for based function while the results of extended function include certificated land, total income, total people, area of farming land and age of household heads (in table 6.7). Area of certificated land has significantly positive effects on formal amounts at the level of 5%. This result is consistent with the hypothesis. As discuss in chapter 5, larger amounts from VBARD and PCFs are often secured by collateral value. Therefore, household with larger land area with certificate may receive bigger amounts than others. As expected, the variables of agricultural income and farming land area (extended function) have found to be highly significantly positive both at the level of 1% and 10% respectively. The two variables are proxy for households' larger-scale production. The results are consistent with the findings of (Khoi et al. 2013, Barslund and Tarp 2008, Akudugu 2012, Bao Duong and Izumida 2002).

While income from agricultural production have no impact on formal credit accessibility in binary models, this variable has positive effects on formal obtained amounts. This finding increasingly implies the fact that credit from formal institutions does not meet enough farmer demand for agricultural production. The significantly positive coefficient of total people number variable of formal amount equation reflects higher credit demand of bigger families. In addition to agricultural income, total income is statistically clarified to have positive impacts on formal borrowing amounts. This is reasonable. Formal amounts that borrowers can obtain depend on not only production scale but also debt repayment ability. Total income is considered as good proxy for debt repayment ability. On the other hand, higher number of people in family may refer to higher capacity for income earning. This verdict is also confirmed by (Duy et al. 2012). The result of age variable is coherent with the description results in chapter 5. Older household heads prefer borrowing formal credit to younger ones. Similar to determinants of formal amounts, agricultural income, farming land area total income also determined informal amounts received. These equivalent variables are also mentioned in the study of (Okurut et al. 2005). It is surprising that total people number in family have negative correlation with informal amounts in extended function. The result is opposite with that of formal amount equation. The fact may imply that bigger family size is often accompanied by higher number of dependent family members. Therefore, they prefer formal loans to informal ones.

It is clear that the results of tobit models for formal amount equation are quite different from those of OLS models while there is no big differences in the results of informal amount equation between two models (table 6.8). Regarding formal amount equation with tobit model, just age, dependency ratio and connection are significantly correlated with formal amounts obtained. The results of tobit models reflect one of the most important constraints on formal credit access of households, i.e. collateral requirements. Most of formal lenders often approve the loan amounts based on the value of collateral even when a household involves in large-scale production or good income flows from agricultural production. Education, occupation and agricultural income, total income, farming land area are determinants in based and extended function.

Positive coefficient of dependency ratio of formal amount equation in tobit model actually make the result of the variable ‘total people number’ in OLS model above much robust. Connection variable is commonly observed in Vietnam studies (Barslund and Tarp 2008, Duy et al. 2012). Households whose heads have better social network can obtain more formal amounts. While education and occupation have no impacts on formal amounts, they positively relate with informal amounts at significant level of 5%. In other words, household heads who have higher education level and/or have farming activities as full time jobs demand more credit than others. These results refer to the important role of informal credit in agricultural production. Farmers with higher education levels often have better knowledge as well as apply new technology in agricultural production. Thus, they need more credit to fund their investments. The similar results of agricultural income, total income and farming land area of informal amount equation in tobit model and ols models are also make these results robust.

Table 6.7. Results of OLS models

Variables	Based				Extended			
	Formal		Informal		Formal		Informal	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
(Constant)	-2.272	0.079	0.055	0.936	-2.702	0.047	-0.718	0.404
Age	0.021	0.107	0.001	0.851	0.024	0.068*	0.004	0.673
Gender	-0.051	0.723	0.014	0.835	-0.011	0.942	0.07	0.404
Education	0.021	0.609	0.007	0.727	0.012	0.764	-0.006	0.783
Occupation	-0.225	0.153	0.174	0.036**	-0.102	0.533	0.373	0.000***
Certificated land	0.348	0.015**	0.021	0.763	0.311	0.034**	0.058	0.494
Agricultural income	0.362	0.002***	0.805	0.000***				
Dependency ratio	-0.028	0.953	0.149	0.566	-0.012	0.979	0.356	0.255
Farming land	0.063	0.264	0.104	0.001***	0.096	0.067*	0.177	0.000***
Connection	0.332	0.177	0.031	0.746	0.366	0.139	0.181	0.115
Total people	0.245	0.007***	-0.037	0.427	0.234	0.01**	-0.104	0.064*
Group member			-0.026	0.763			-0.02	0.848
Total income					0.376	0.004***	0.735	0.000***
Number of observations	109		141		109		141	

Source: SPSS results

* Significant at level 10%, ** Significant at level 5%, *** Significant at level 1%

Table 6.8. Results of tobit model

Variables	Based				Extended			
	Formal		Informal		Formal		Informal	
	Coef.	P>t	Coef.	P>t	Coef.	P>t	Coef.	P>t
Age	0.070	0.054*	-0.038	0.310	0.073	0.048**	-0.031	0.423
Gender	0.445	0.240	-0.192	0.609	0.481	0.208	-0.092	0.810
Education	0.100	0.356	0.211	0.049**	0.096	0.374	0.189	0.081*
Occupation	0.504	0.231	0.854	0.044**	0.607	0.163	1.248	0.006***
Certificated land	-0.534	0.148	-0.292	0.434	-0.548	0.144	-0.263	0.491
Agricultural income	0.293	0.341	1.233	0.000***				
Dependency ratio	3.241	0.014**	-2.215	0.106	3.273	0.013**	-1.930	0.164
Farming land	-0.030	0.839	0.244	0.105	-0.011	0.936	0.346	0.019**
Connection	4.932	0.000***	0.236	0.638	4.966	0.000***	0.443	0.378
Total people	-0.086	0.714	-0.105	0.673	-0.099	0.672	-0.189	0.453
Total income					0.316	0.374	1.169	0.002***
Group member			0.158	0.726			0.135	0.770
_cons	-4.829	0.156	-2.226	0.533	-5.299	0.137	-3.678	0.334
Number of observations	180		180		180		180	

Source: Stata results

* Significant at level 10%, ** Significant at level 5%, *** Significant at level 1%

At the beginning of the chapter 4, the author indicate the difference between the research site – Haiphong city and the site of previous studies in Vietnam on agricultural and rural credit, i.e. agricultural credit in rural areas of a big city with high urbanization. The findings above of determinants of households' credit market participation and credit amounts help to confirm the characteristics of the research site .

The positive sign of age which are found in both function of formal market participation and formal amounts, indicates the age range of farm household heads. The sign of this variable in some other studies in Vietnam is negative for credit market participation and positive for credit amounts in the research of Barslund et al. (2008) and Luan et al. (2016) or not significant in the study of Bao Duong et al. (2002) or (Chau 2014). Their jobs can be farming or both farming and non-farming. It really reflect that young families or young member of families tend to seek non-farm jobs. They find easy to find a job in city because the research site is an highly urbanized big city. In terms of variable 'agricultural income', the variable has significantly positive relationship with both informal credit demand/credit market participation and informal amounts while this has no correlation with formal ones. This result are different from other studies on rural credit in Vietnam. Total livestock value or farming expenditures or agricultural income can be alternative to reflect production scale as mentioned above. In this thesis, when I try to replace 'agricultural income' with 'total production value', the results are the same. In the studies of Bao Duong et al. (2002), the authors indicated the significant relationship between formal amounts and total livestock value. In some other studies, some authors use farm size to reflect the scale (Tran 2014, Chau 2014), which also stated the positive relationship between farm size and households' formal credit demand or formal amounts. In the research of Barslund et al. (2008), these correlations are significant for both informal and formal credit demand as well as for informal and formal credit amounts. Therefore, the significant results of households' credit market participation and amounts only in informal markets increasing enhance the divergence of the development in agricultural production at the research site. That means the greater households' agricultural income and production scale are, the more credit they demand, especially informal credit because of formal credit shortage. Simultaneously, small-scale households seem to not want to expand production, who often seek non-farm jobs to increase their income. These findings and descriptive results of chapter 5 are really complementary.

6.2.4. Impact of households' characteristics on lenders' decisions

As discussed before, lenders' behaviors can be regarded as the external factors that affect the level of households' credit access. However, lenders' decisions are partly determined by borrowers' characteristics. In this section, heckprobit model is used to evaluate credit rationing of farmers. The depended variable is credit rationing that is measured by the comparison of demanded amounts and approved amounts. The dependent variable will receive value 1 if borrowers are rationed, means they do not obtain full amounts as they demand and 0 if borrowers are not rationed. The results of heckprobit are compared with results of normal logit/probit model to clarify whether there is bias in normal probit/logit model.

Table 6.9 reveals no big differences between normal probit/logit and heckprobit models. Table 5.24 of chapter 5 presents some information on correlation between households' characteristics and credit rationing, of which households with two production types or main income source from agricultural production are more likely to be credit rationed than otherwise. These households may often need more credit to finance their production. Thus, in addition to characteristics of households mentioned in the section 6.2.1, the variable of demanding amount is included in this function. Demanding amount is the loan amount that a household actually demands.

Table 6.9. Results of binary models

Variables	Logit		Heckprobit	
	Coef.	P>z	Coef.	P>z
Age	-0.189	0.053*	-0.104	0.017**
Gender	0.796	0.468	0.196	0.688
Education	0.374	0.220	0.162	0.172
Occupation	-0.065	0.960	0.028	0.963
Certificated land	-2.546	0.104	-0.731	0.234
Total income	-0.786	0.388	-0.343	0.393
Dependency ratio	1.127	0.731	-0.413	0.737
Farming land	0.268	0.418	0.131	0.334
Connection	0.850	0.591	-0.660	0.239
Total people	-1.461	0.025**	-0.562	0.050*
Demanding amount	4.968	0.002***	2.459	0.000***
_cons	6.965	0.533	1.769	0.732
Number of observations	109		180	

Source: Stata results

* Significant at level 10%, ** Significant at level 5%, *** Significant at level 1%

In two models, age, total people number in family and demanding amount have significantly impacts on households' credit rationing. The significant negative coefficient at 5% (heckprobit) of age means older household heads are less credit-rationed than younger ones. In rural areas, age could be proxy of farming experience as well as social reputation/prestige. The sign of total people number in family is negatively significant at the level of 10%. Number of people in a family could be regarded as the earning capacity. Lenders are interested in this earning capacity to evaluate a family' debt repayment ability. This finding confirms that families with more members are less rationed than others. The results of age and total people number are consistent with the findings of (Barslund and Tarp 2008). These results of the two variables simultaneously make their results of table 6.8 robust. Demanding amount is found to have highly positive impacts on credit rationing at the significant level of 1%. That means the more credit a household demands, the more credit-rationed it is subject to be. Households with big demanding amounts do not often meet lenders' requirements of collateral or production scale or transparent financial situations. This verdict is observed in the study of (Bao Duong and Izumida 2002, Sharma and Zeller 1997). This result of demanding amount may reveal another reason for positive correlation between household head age and credit rationing. The older people are likely to demand less credit than younger ones, so they are less credit rationed.

6.3. Chapter conclusion

External and internal factors are estimated in chapter using both quantitative and qualitative methods. External factors include rural credit markets with information asymmetries, systemic uncontrolled risks, urbanization and lenders' behavior. Information asymmetries in agricultural loans as well as systemic uncontrolled risks in agricultural production make agricultural lending risky. Formal lenders have many reasons to ration loan amounts for agricultural production.

As discuss in chapter 2, internal factors will be inputted in econometric models to estimate their impacts on credit access with three dimensions: households credit market participation, credit amounts received and the level of credit rationing. Internal factors will be analyzed for separate informal and formal credit markets. In terms of credit market participation function, the significant variables determine households' formal market participation are age, dwelling land area with certificate, dependency ratio and connection while those of informal market participation are occupation, agricultural income, total income, dependency ratio. Concerning determinants of formal and informal amounts received, the results of tobit and ols models are different for formal amount equation. Tobit model delivers just two significant variables in formal equation, i.e. dependency ratio and connection. The highly statistical significant variable in function of credit rationing level is demanding amount.

7

Impacts of credit uptake on households' income

In addition to the description and regression results of chapter 5 and chapter 6, this chapter 7 will present the the results of impacts of households' credit uptake on their income in order to reveal a better overview of households' credit accessibility and suitable policy recommendations. The chapter have three main section: impacts of credit uptake on household in come and household strategies to ease credit access constraints and chapter conclusion. The first section estimates impacts of credit access with two separate credit source types on three categories of income, i.e. total income, agricultural income and non-agricultural income. In the second section of the chapter, the author will describe the strategies that households have applied to reduce formal credit market constraints. The strategies help them to approach formal credit more easily and decrease their dependence on informal credit. The chapter conclusion will be presented in the last section.

7.1. Impacts of credit uptake on household income

Table 7.1. below present the descriptive data on the differences in average income between credit accessed households and non credit accessed ones. Due to segmentation of credit markets as well as the determinants of households' formal and informal borrowings are different. Therefore, the mixture of both credit sources is not likely to reflect the actual situations. The author will separate them as in table 7.1. T-test is applied to confirm the differences.

Table 7.1. Differences in income of accessed and non-accessed households

Categories	Total income		Agricultural income		Non-agricultural income	
	Mean	T-test(1)	Mean	T-test(1)	Mean	T-test(1)
Pool sample						
Accessed	267.80	0.148	200.16	0.08	67.64	0.917
Non-accessed	200.27		130.83		69.44	
Formal borrowings						
Accessed	296.41	0.000***	226.87	0.000***	69.54	0.680
Non-accessed	206.76		141.57		65.18	
Informal borrowings						
Accessed	273.56	0.089	207.56	0.021**	66	0.502
Non-accessed	215.82		141.41		74.41	

Source: Household survey 2018-2019

***Significant at 99%, **Significant at 95%

(1)P-value of T-test

When the data is considered as pool samples, the differences in total income, agricultural income and non-agricultural income between accessed and non-accessed group are statistically insignificant. This can be due to the market segmentation as mentioned above. In terms of formal markets, the results of T-test are significant at 99% with total income and agricultural income. In other words, formal credit

accessed households have higher average income than non formal accessed ones. the result for non-agricultural income is insignificant. Regarding informal borrowings, accessed families are also found to have higher total income and agricultural income than non-accessed ones. However, only the result of agricultural income is significant at 95%.

As indicated in chapter 4, the use of only T-test to compare the simple mean income between household groups will badly deliver the impact of credit uptake. This is due to the fact that the determinants of households' credit access are their characteristics including income factor meanwhile in return, the income factor may be also influenced by their characteristics and the issue of receiving credit or not. In other words, the simple comparison of income between groups of accessed and non-accessed households will be biased by any other factors that predict credit accessibility. That is the reason why PSM method is applied to evaluate the income impact. PSM attempts to take into account these biases by making groups receiving credit and not credit comparable with respect to the control variables. The coefficient of ATET from PSM will present the differences in mean income of credit accessed and non- credit accessed group with significant level.

Table 7.2. Income impacts of borrowing and non-borrowing households

Income categories	ATET of borrowing and non borrowing households			
	Coef.	Std. Err.	z	P > |z|
Total income	-44.94	102.39	-0.44	0.661
Agricultural income	-1.97	33.16	-0.06	0.953
Non-agricultural income	-42.97	72.29	-0.59	0.552

Source: Results from Stata

*significance level of 10%, ** significance level of 5%, * significance level of 1%

The table 7.1 will present income impacts of borrowing and non-borrowing households. However the results of ATET for three type of income are not statistically significant. This is quite reasonable because of the segmentation of credit markets. The data on separated markets are presented below.

7.1.1. Income impacts of formal borrowing and non-borrowing households

Table 7.3. Income impacts of formal borrowing and non-borrowing households

Income categories	ATET of formal borrowing and non borrowing households			
	Coef.	Std. Err.	z	P > |z|
Total income	103.75	32.03	3.24	0.001***
Agricultural income	106.59	44.61	2.39	0.017**
Non-agricultural income	-2.84	18.49	-0.15	0.878

Source: Results from Stata

*significance level of 10%, ** significance level of 5%, * significance level of 1%

It is clear that there is impact differences between formal borrowing and non formal borrowing households, which are validated by significant P value of 1% and 5% level as in table 7.3. Meanwhile, there are no differences in non-farm income between the two groups. Positive impacts of formal credit on total income and agricultural income are exposed by positive coefficient of ATET. In other words, formal credit recipients have their both total income level and agricultural income level higher than non-formal-credit ones. The difference in agricultural income has emphasized the role of formal credit in agricultural production as well as reflect the segmentation of formal and informal markets. The purposes of formal markets often aim at production wile the informal markets are characterized by multiple purposes. In other words, formal credit can also lead a change in household behavior in terms of their resources to increase their income. Moreover, the pressure on formal debt repayments can deliver farmers' good performance leading to better outcomes. With on-time repayments, households can re-borrow the loans. This matter is discussed in chapter 5 that a greatest proportion of VBARD loans and PCF loans are short-term with 1-year term. Therefore, if a household wants to obtain more-than-1-year loans, they have to repay the current 1-year loan first and then re-borrow this loan again.

On the other hand, higher total income and agricultural income level of formal credit-accessed households also refer to higher ability of debt repayment. Formal loans have much more transparent as well as much firmer repayment schedules than informal ones. Therefore, households' decision to access formal loans are often consistent with their relative ability to earn higher income. In case of lost production seasons, non-farm income are considered as a perfect substitute for farm income in repaying debts.

7.1.2. Income impacts of informal borrowing and non-borrowing households

Table 7.4. Income impacts of informal borrowing and non-borrowing household

Income categories	ATET of informal borrowing and non borrowing households			
	Coef.	Std. Err.	z	P > |z|
Total income	-45.19	71.61	-0.63	0.528
Agricultural income	-9.78	10.83	-0.90	0.367
Non-agricultural income	-35.41	51.18	-0.69	0.489

Source: Results from Stata

*significance level of 10%, ** significance level of 5%, * significance level of 1%

Surprisingly, there are no statistical differences in total income, agricultural income and non-agricultural income between informal borrowing households and non-informal borrowing ones. In other words, households' decision to borrow informal credit are not influential to their income. As discussed in chapter 5, household members often seek temporary paid jobs in the city rather investing in a business. No impacts of households' informal borrowing decisions on agricultural

income may also reveal the rural credit market segmentation as mentioned above. Households can borrow from informal credit sources for many purposes rather than only for agricultural production. On the other hand, agricultural income may depend on some others factors instead of only informal borrowings.

It is interesting that the results of ATET for formal borrowings are significant for total income and agricultural income while those of informal borrowings are insignificant. In reality, formal lenders often have good criteria to grant the credit. Formal lenders in agricultural sector often decide to lend based on some criteria such as: customers' production planning, detailed purposes of borrowings, repayment ability and good credit history. In other words, it is possible that a household has some better quality than others when applying for formal loans. Meanwhile informal lenders' criteria to grant credit are not often as strict as formal ones. The issue is addressed by PSM as discussed in chapter 4.

The crucial approach of PSM is to hold all factors constant by matched sampling as much as possible so that the difference in income between credit accessed and non-credit accessed households is due to credit. Therefore, similar observed characteristics of some matched accessed and non-accessed households who have the same propensity score from PSM consist of good or bad characteristic/criteria that formal lenders consider to grand credit. Therefore, the difference in income of the two groups is due to credit uptake and will not be as the result of these good criteria.

7.1.3. Income impacts of rationed and non-rationed households

Table 7.5. Income impacts of rationed and non-rationed households

Income categories	ATET of rationed and non-rationed households			
	Coef.	Std. Err.	z	P > |z|
Total income	-40.02	76.82	-0.52	0.602
Agricultural income	-8.24	21.88	-0.38	0.706
Non-agricultural income	-31.77	72.31	-0.44	0.660

Source: Results from Stata

*significance level of 10%, ** significance level of 5%, * significance level of 1%

That all coefficients of ATET in table 7.4 are not statistically significant, means credit rationing status of households have no effects on their agricultural or non-agricultural income. In reality as analyzed in chapter 5, the fact that households often approach both formal and informal lenders to finance their agricultural production, explains why credit rationing have no impacts on their income. Both rationed and non-rationed households borrow from informal credit sources or finance themselves.

Table 7.5 below presents the proportion of rationed and non-rationed households seeking for informal credit sources besides formal ones. There are 87.65% rationed households approaching informal credit as the supplement to formal credit for their agricultural production while that of non-rationed households is 67.86%. The

percentage of rationed households using only formal credit is much lower than non-rationed ones., 12.35% and 32.14% respectively. The correlation is validated by Chi-square test. The result of the test is statistically significant at 95%.

Table 7.6. Proportion of rationed and non-rationed households by credit sources

Credit sources	Rationed		Non-rationed	
	Quantity	Percentage	Quantity	Percentage
Formal only	10	12.35%	9	32.14%
Both formal and informal	71	87.65%	19	67.86%
Chi-square test	Value: 5.666	df : 1	Asymp. Sig (2-sided): 0.017**	

Source: Household survey 2018-2019.

*** Significant at 99%, ** Significant at 95% and * Significant at 90%.

7.2. Household strategies to ease credit access constraints

7.2.1. Strategies of household demanding large amounts from VBARD/PCF

Collateral requirements could be considered as the prerequisite for obtaining loans from VBARD or PCF, even for non-collateral loans according to governmental preferential policies on credit as discussed in chapter 3. The two formal institutions will consider borrowers' compliance with their lending regulations before deciding to lend. In addition to collateral, they are interested in customer credit history as well as creditworthiness and customer's conformity to deb repayment schedules. Therefore, in order to overcome supply-side constraints, households have to at least meeting these three main requirements. Meanwhile they also have some other strategies to facilitate the three requirements. Households' detail strategies will be analyzed below.

7.2.1.1. Meeting collateral requirements

Increase household asset value

In terms of three main formal lenders in rural credit markets, i.e. VBARD, VBSP and PCF, VBARD and PCF offer loans with large amounts based on the value of borrower's collateral except loans mentioned in the governmental policies on subsidized programs. One of strategies to increase loan amounts approve is increasing value of household assets which can be used as collateral. However, just a few households can do. In the situation of climate change, polluted environment as well as diseases, production failure has strong impacts on household income and savings.

Box 7.1: I use 3 land certificates as collateral for the borrowing in VBARD

My family first just had one house and inherited another one from my parents. Then we purchased one more house from our savings. We have used these 3 land certificates of the 3 houses as collateral to borrow 1.5 billion VND in VBARD. VBSP loan amounts are much different so I do not want to borrow so I choose VBARD with higher interest rate but larger amounts.

Souce: In depth interview of one household in Tu Son commune, 2018-2019.

Borrowers have their parents borrow for them

In reality, some borrowers have their parents borrow money for them because they want to obtain more or do not meet lenders' requirements. VBARD is a commercial bank with transparent and firm lending procedures. Therefore, it is difficult for someone who does not directly use the loans, to be able to obtain loans. Lending procedures of VBARD or any other commercial banks is quite secure, including from collecting customer data to analyze the data before lending decisions. In rural areas of Vietnam, the type of extended family is very common. Extended families often include at least three generations: grandparent, married offspring and grandchildren. In other words, there are often two nuclear families in one extended family. All family members are mentioned in one family record book. The family record book is one of governmental polices on the management of total people number in a family. Meanwhile the land certificate of the house is owned by grandparent. In this case, if the married offspring use the family land certificate as collateral to borrow from VBARD, official borrowers of VBARD now are grandparents while actual borrowers are married offspring. This matter is quite popular in rural Vietnam where grandparents and their married offspring often live together in a large house. However, if parents and married offspring live apart and are separated nuclear families, parents can not borrow money from VBARD for their offspring.

The strategy of borrowing is also applied for PCF's borrowing, even more popularly. The typical characteristic of PCF is offering loans to the locals where the PCF is located. Therefore, the relationship between PCF and borrowers are so close, even PCF board of managements and borrowers are neighbors or relatives or friends. Parents could borrow money for their children although they live separately.

Box 7.2: Our parents could borrow money from PCF for us.

We, me and my husband already use our land certificate to borrow a loan from PCF. However now we want to expand our agricultural production, hence our parents also use their land certificate to borrow another loan for us. We prefer PCF than VBARD because of the convenience as well as quick and flexible lending requirements of PCF.

Source: In depth interview of one household in Ngu Doan commune, 2018-2019.

7.2.1.2. Customer creditworthiness and solvency

Information of customer creditworthiness and solvency has decisive impact on lenders' decisions while collateral requirements is just the prerequisite. In other words, formal institutions consider loan use efficiency as well as the ability to repayment debts. Lenders will assess the entire operation of borrowers' production or business as well as income flows for repayment including farm income and non-farm income. Therefore credibility of one customer plays an important role in obtaining credit. It helps to build borrowers' trust, which creates a sense of security for them. Moreover, creditworthiness of one customer in one institution include his/her credit history of his/her previous loans in this institution or even in other institutions. In this study site, community culture in rural areas may have strong impacts on customer solvency. In case of lost production seasons of which farm income flow may be lost, households often use their non-farm income or seek another credit source for paying formal debts first, i.e. informal credit. They even use informal credit for debt rollover to extend loan term. This strategy may be the most common in enhancing formal credit access. As discussed in chapter 5, a vast number of loans in PCFs and VBARD are short-term meanwhile almost all farm households have medium to long term credit. Therefore, they often use short-term credit to repay debts at the maturity date and then re-apply a new loan.

Box 7.3: Approaching short-term informal credit for formal debt rollover

> We find difficult to borrow medium or long term loans from VBARD or PCF. We often approach informal lenders for daily input expenditures and from VBARD or PCF for building farming shields or extending production scale. Therfore one-year loans are much short. We often use short-term informal credit, such as from relatives/friends, CSG, money lenders to pay the formal debts at due date and then immediately re-apply a new loans. Consequently, we just incur high interest of informal loans for a short period before the new loan disbursement.
>
> Source: Group discussions, 2018-2019.

As discussed in chapter 3, the government has instructed formal institutions to apply interest rate cap to support agricultural production. However, one criterion of the interest rate cap policies is borrowers have transparent financial situation as well as explicit production or business plan otherwise the interest rates are negotiated between lenders and borrowers. In reality, agricultural interest rates of formal institutions, i.e. VBARD and PCF, are higher than the regulated interest rate caps. It is very common that in rural areas farmers/households often have no explicit production or business reports, such as predicted expenditures or income flow reports. Therefore, households' benefits from governmental preferential policies on interest rate are limited.

Figure 7.1 below presents the proportion of households meeting the conditions required by VBARD and PCF, collected from 44 surveyed households have loans in VBARD and PCF.

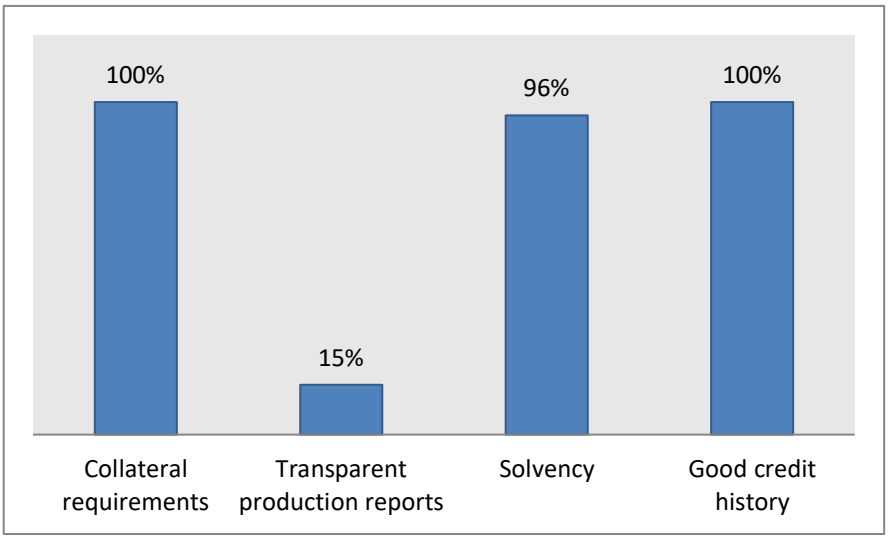


Figure 7.1. Households' satisfaction of formal institution requirements
Source: Household survey, 2018-2019

7.2.1.3. Customer loyalty

There are many point of view on customer loyalty on a product or a service. In the early of 1978, Jacoby and Chestnut demonstrated that customer loyalty should be measured through behavioral approach, attitudinal approach and composite approach, of which the behavioral approach is based on clients' actual or reported purchasing behavior and often characterized as sequence of purchase, proportion of purchase and probability of purchase while the attitudinal approach refers to customer brand preferences over time or purchase intention (Jacoby and Chestnut 1978). This definition is also confirm by (Pritchard and Howard 1997). In addition, some other researchers emphasized the differences between the two approaches in which the attitudinal approach explains the unexplained variance that the behavioral one does not address. In other words, the composite approach of the two approaches should be used to exactly capture the customer loyalty (Baloglu 2002, Yoon and Uysal 2005). In summary, more recently, customer loyalty is often considered as multidimensional concept including behavior factor and attitudinal factor. Behavioral factor relates to repeating purchases and attitudinal factor relates to commitment, such as the likelihood to purchase one product or service again (Prihartono, Sumarwan and Noer Azam Achsani 2015).

Therefore, customer loyalty to formal credit institutions hereby is evaluated by the two dimensions: borrowing repeat and the likelihood to borrow again in the future. Customers' loyalty may give them a certain credibility or increase their creditworthiness to the institutions. In exchange, the formal institutions could offer

them a lower interest rate to old customers than new ones or even approve them the maximum amounts based on the highest ratio of loan amount to the value of collateral.

Box 7.4: The agricultural interest rate may be different among customers with the same production type/scale

> The agricultural interest rates offered to our customers with the same production type or production scale may be different. This is due to customers' credit history or creditworthiness. Our old customers who had good credit history in the past may be often charged the lower interest rate. The interest rate charging each customer is decided by the head of the bank branch.
>
> Source: In-depth interview of the head of VBARD bank, Kien Thuy branch.

Among 27 households now having loans in VBARD, there are 14 households who are old customers, accounting for 51.85%. The proportion of being old customers of 17 PCF households is 58.82%. The loans offered by VBSP are often medium to long term as well as VBSP specific loan procedure, so borrowers' re-application for loans is difficult and not common as VBARD or PCF. The reason why they choose VBARD and PCF are mentioned in chapter 5. On the other hand, table 7.6 below present the answer when households are asked about which credit source you want to approach if you have credit demand in the future. Among 109 formal borrowing households, 97 households plan to borrow more money in the future for production expansion. The percentage of VBARD borrowers want to re-apply for VABRD loans is highest, at 88.46% while that of PCF is 56.25%. There are much differences in future credit source demand among customers of VBARD and PCF and VBARD as shown in table 7.6 below.

Table 7.7. Credit source in the future of formal borrowing households

	Current	Credit source in the future				
Formal institutions		Total	PCF	VBARD	Raltives/ friends	VPSP
VBARD	27	26	0%	88.46%	0%	11.54%
PCF	17	16	56.25%	31.25%	0%	12.5%
VBSP	65	55	0%	34.55%	12.73%	52.72%
Total	109	97				
Chi-square test	*Pearson chi-square: 73.995 df: 6* *Asymp. Sig (2-sided): 0.000****					

Source: Household survey, 2018-2019

*** Significant at 99%, ** Significant at 95% and * Significant at 90%.

The Chi-square test is employed to validate the correlation. The result of the test is statistically significant at 99%. In other words, the proportions of customers re-applying loans to their current institutions remain highest compared to other institutions. VBARD and PCF clients do not want to borrow from their relatives or friends. The majority of customers of the two institutions want to approach VBARD or PCF in the future rather than VBSP or relatives/friends. This is because VBARD or PCF borrowers are those who want to borrow formal large amounts at acceptable

interest rates. Meanwhile some of VBSP clients want to re-apply this institution and some others is also going to approach VBARD or relatives/friends. Re-applying people are likely to seek small amounts with low interest rate.

7.2.1.4. Social network

In addition to compliance to institutions' requirements, households' social network may be influential to facilitate their credit access as mentioned in previous literature in chapter 2. In this section, the author just summarize actual effects of social network on household credit access to VBARD and PCF as in table 7.7.

Table 7.8. Impacts of social networks on formal credit access

Type of social networks	Advantages	Impacts on formal credit access
Relatives/friends/ neighbors	- Gather information on credit institutions and lending procedure - Borrow money as informal credit at lower interest rate or no interest rate	- Informal credit used for formal debt rollover - Informal credit for initial investment to establish production scale model which is large enough to obtain large formal amount
Money lenders	- Borrow money as informal credit at lower interest rate - Borrow a new loan if needed even not repaying old debts	
Village heads	More clearly know information on credit institutions and lending procedure	- Borrow loans at lower interest rate compared to households with the same characteristics - No 'lobby' fee for loan processing
Staff of social associations		
Good relationship with Bank officials		

Source: Group discussions, 2018-2019

7.2.2 Strategies of household demanding low interest rate loans from VBSP

VBSP is the formal institution which has specific loan procedures compared to VBARD and PCF. VBSP require no collateral and lists of VBSP borrowers are created and approved by the authority of communes. Borrowers are divided in borrowing groups whose heads are staff of social associations. The maximum amount of VBSP is fixed at 50 million VND before 2019 and increases to 100 million from 2019. An official meeting are held to decide the loan amount for each members of the borrowing group. The participants of the meeting include the commune authority, head of borrowing groups and the group members. Loan amounts of each member are approved when the authority commune, head of borrowing group and at least 2/3 group members agree with that.

Therefore, households who have good social networks with village heads, staff of social associations as well as borrowing group members have higher chance to obtain the maximum level of VBSP amounts.

All strategies above which just help farmers access formal credit more easily with small amounts, can not solve the fundamental problems of agricultural production, i.e. risks in agricultural production relating to product consumption. Only when the issue of product consumption is address, farmers will have chance to borrow large amounts to expand their production as they want. The farming cooperatives can help individual farmers to access larger amounts, which is discussed in section 7.3 below.

7.3. The role and current situation of cooperatives in agricultural production at research site

As discussed in chapter 6, both external factors and internal factors have strong impacts on households' credit accessibility. In term of external factors, risks in agricultural production seem to be the leading cause of other factors. In details, risks in agricultural production basically include production risks and market/price risks. The two types of risks can directly make farmers incur huge losses, which are the main reason why formal lenders are reluctant to lend in agricultural sector, especially lending without collateral. The proportion of farmers who have enough collateral value corresponding to their full credit demand is very low. The results of internal factors also indicated the shortage of formal credit, so larger-scale households are willing fund their production by informal credit. As mentioned in section 7.2, the strategies just help farmers to access credit more easily with small amounts rather than larger amounts.

On the other hand, as analyzed in chapter 3, although government has issued many policies targeted to credit priority program for agricultural sector, the advantages of these policies are strongly meaningful to cooperatives, enterprises or large-scale farm households who have contracts for product consumption or are in value chain. Having contracts for product consumption as well as transparent financial reports, they can benefit from both policies of bigger amounts without collateral as well as policies of interest rate cap.

Therefore, the core interest of formal lenders is borrowers' sources of product consumption. In other words, recommendation to enhance farmers' formal credit accessibility for production expansion and reduce their reliance on informal credit is to solve the problem of output consumption.

In the research site, with small-scale production, farmers mainly sell their products to small wholesalers or small traders. Their production method is traditional, which finds difficult to meet big wholesalers' requirements of production scale or product quality, such as enterprises (as mentioned in chapter 6- market risks). Or even, in reality, a lot of farmers simply want to sell their products to small wholesalers

because of simply and convenient transaction or because of their long habit. The author can conclude two issues existing in the research site as follows:

(1) Farmers hardly approach larger credit amounts with preferred interest rate as in government policies if they continue to apply traditional production method and sell products to small traders or wholesalers without any official consumption contracts.

(2) If farmers want to expand their production and get large credit amounts, they should involve in the value chain by collaborating enterprises or cooperative units. There are two types of collaborating/integration. i.e. vertical and horizontal. The common integration in the research site is horizontal, at which the collaboration among farmers, cooperatives and enterprises are performed. In other words, cooperatives can bridge the demand of farmers and enterprises. Cooperative will be responsible for providing input material in good quality and reasonable prices as well as selling outputs for enterprises.

There are many new or transformed cooperative unit in the research site since the emergence of Vietnam cooperatives law in 2012 in the research site. Under some preferential credit policies, cooperative units in value chain can borrow large amounts without collateral, such as decree 55/2015/ND-CP and decree 116/2018 amending decree 55. However, not all cooperative can succeed. Many livestock cooperatives have terminated because of two main drawbacks:

Firstly, as being members of cooperatives, households can buy input materials from their cooperative by trade credit, which can reduce their dependence on informal credit by local sellers. However, in reality, a lot of cooperatives have not enough capital for operations. Hence, trading credit for members in cooperatives is limited. That means farmer members still have to finance their input material by themself from informal lenders. Although, cooperatives can borrow greater credit amounts without collateral than individuals under preferential credit policies, the maximum amounts in the policies are not enough for cooperatives' activities. Agricultural cooperatives who always have high credit demand are often credit-constrained because of lack of collateral. In case of fund shortage, cooperatives can hardly invest in technology, machine or improvement of farming skills and modern production techniques. It is the limitation of technology or updated techniques that make quality controls of products as enterprises' request difficult.

Secondly, the most important role of cooperatives and cooperatives' broad of directors is organizing production process as well as connecting the farmer members and enterprises in order to exploring new markets for consumption. If cooperatives cannot connect with enterprises to consume products, they will fail to develop. In addition to management capability, quality controls above can be the barrier of cooperatives to approaching big wholesalers.

The most common types of livestock in Haiphong in general and Kien thuy district in particular are pig and chicken while the most type of aquaculture is fish and prawn. The popularization of agricultural products leads to weak competitive advantage in expanding new consumption markets. Moreover, limited management

capability of director broads and capital shortage are the main reasons which may result in the dissolution of cooperatives in the study site.

Box 7.5: We find it difficult to explore stable consumption markets for livestock products

> I used to be one member of cooperative board of managers in my commune. Members of cooperative can buy input materials at lower prices. However finding a big wholesaler or enterprise stably buying our products is quite difficult. Each member almost takes care to sell outputs by himself. On the other hand, each member still borrows money from informal lenders to buy production inputs. The clear advantages they can obtain when joining in cooperatives might be the good prices for inputs. Many of them choose to leave cooperatives and then the cooperatives close down.
>
> Source: In-depth interview of one large-scale household in Tan Phong commune.

7.4. Chapter conclusion

The chapter targets on evaluating impacts of households' credit uptake on their income. The results of PSM method present that there are differences in total income and agricultural income between formal and non-formal borrowers while the differences are insignificant for informal and non-informal borrowing households as well as rationed and non-rationed households. This estimation of credit uptake on income are likely to reveal the prevalence of informal credit in agricultural production in the study site. In order to benefit formal loans in terms of large amount, suitable interest rate, farm households have some strategies to reduce credit constraints, such as meeting collateral requirements, improving creditworthiness as well as ensuring solvency, remaining loyalty with formal lenders and expand social networks. Howerver, the amounts individual farmers can access are much smaller than those of cooperatives. The section has mentioned the role as well as the drawbacks in management of cooperatives' operation which resulted in their termination.

8

Conclusion and policy implication

8.1. Conclusions

The rationale and background of the research originate the important role of agricultural sector as well as agricultural credit in economic development and poverty reduction in general and in rural development in particular. The thesis contributes to the literature of farm households' credit access by selecting Haiphong- a municipality and a big city whose rural areas are highly urbanized- as research site. The typical characteristics of a big city will reveal some interesting results. These results are different from those of other research sites which are agiculture-based or have higher share of GDP in agriculturals sector. The study has four objectives corresponding with three research questions to point out the current credit situation, determinants of farm households' credit access as well as impacts of credit uptake on households' income and then some policy recommendations. By using methods mentioned in chapter 4 for analyzing collected data, the three research questions are responded by the findings as follows:

Firstly, the research reveal the current situation of credit use of farm households. Characteristic of farm households have impacts on their credit use. Farmers often approach both formal and informal credit sources to fund their production, of which the percentages of household using two sources and only informal sources are much higher than those using only formal ones. This fact reveal the prevalence of informal credit in agricultural production in case of the shortage of formal credit. VBARD, VBSP and PCF are the three main formal lenders in the study site while informal lenders diversify into both type of lenders and interest rate range.

Age and gender of households have no correlation with their choice of formal or informal credit sources. Farmers of older age group 43-56 is observed to borrow more money from formal lenders than the younger 29-42. Age range of farmers has increasingly risen. The young people do not want to do farming jobs and try to seek non-farm jobs in the urban areas of the city. The vast number of paid non-farm jobs in industry and service sector due to urbanization attract a lot of rural residents. They state that their paid non-farm jobs create more stable income and are less risky than agricultural activities. Meanwhile many farmers have part-time non farm jobs in addition to full-time farm jobs. A small percentage of farmers have vocational education. They just finish high school degree so their non-farm jobs are manual work. However the formal borrowing amounts decrease when the age of farmers continue to increase. More concretely, the average amounts of group 57-70 is lower than that of group 43-56. In addition demographic features of households, income, production and occupation characters have impacts on their credit source choice and average amounts obtained. Households who involve in both livestock and aquaculture production prefer accessing credit from both informal and formal sources rather than only one source. There are more than 70% of surveyed households engage in mixed production of both livestock and aquaculture. Their average formal and informal borrowing amounts are also higher than the families with only one production type, i.e

livestock or aquaculture. Similarly, households whose heads have only jobs as farmers and main income flows from agricultural production have both formal and informal loans. Households heads having farm jobs only averagely borrow more money from informal lenders than others while families with main income source from agriculture even borrow more from both formal and informal suppliers. These results may confirm the role of informal credit in rural areas. It is surprising that households' decisions on whether borrowing or not as well as their received amounts are different among communes. These differences can be attributed to distinguishing characters of production types and households' main income sources of each location. On the other hand, it may simply originate households' appetite for borrowing to invest in agricultural production.

There are some reasons for choosing informal or formal credit sources or both. Borrowers often choose only informal credit in favor of its convenience and their habit or their lack of knowledge of formal lenders. Meanwhile, other large-scale households approach both formal and informal suppliers in order to access large amounts. The amounts offered by formal lenders do not meet their demand. Besides choosing credit sources, the choices of lenders of each source are varied among households. The reasons of the choices may include the convenience of lenders' location, advantages of lending requirements, interest rates, large amounts offered or even simply households' habit.

Secondly, the main result of the thesis is determinants of farm households' credit access, including external and internal factors. The four main external factors strongly affecting households' credit accessibility in both three dimensions: household credit market participation, loan amounts received and level of credit rationing, are analyzed in the thesis as follows: rural credit markets with asymmetric information problems, systemic uncontrolled risks, urbanization and lenders' behavior. Internal factors or socio-economic characteristics of households are inputted in econometric models to find out significant determinants of households' credit access. Age, area of land with certificate, dependency ratio, social networks have effects on households' participation on formal credit markets while agricultural income, total income, dependency ratio and occupation are significant determinants of households' informal market participation. Regarding determinants of formal and informal amounts, the results are different between OLS and tobit models. The results of tobit models imply the collateral constraints on formal credit access. Regarding the level of credit rationing, there are three significant factors revealed, i.e. age of household heads, total people number in family and demanding amount.

The differences in variables 'age' and 'agricultural income' reflect the typical characteristics of the research site as the big city with high urbanization compared to others. The positive relationship between age of farm household heads and their formal credit market participation and their formal amounts actually confirm the high speed of urbanization in rural areas of this big city. The younger families or younger familiy members have more chance to seek non-farm jobs. That is the reason why they do not continue to do farming jobs of their familiy. The variable

'agricultural income' reflecting production scale which is replaced by 'total production value' or farm size, has only positive relationship with informal credit market participation and informal amounts but has no relationship with those of formal markets. The result of this variable exposes the divergence of agricultural production at the study site. That means larger-scale households are likely to have more credit demand for production expansion in order to increase their income, especially informal credit due to the lack formal credit while other households with small scale do not want to expand their production and prefer to find non-farm jobs for income improvement.

Thirdly, the last finding is income impacts of credit uptake on households' income, PSM method is used with three income categories, i.e. total income, agricultural income and non-agricultural income. Households' decisions on whether borrowing from informal credit source or not have strongly impacts on their agricultural income and total income. However, households' decisions on borrowing informal credit or their situation of formal credit rationing have no impacts on their income. Due to the advantages of formal loans compared to informal loans, surveyed households have many strategies to ease formal market constraints, such as meeting formal lenders' requirements and/or improving social networks.

The three main findings above are also consistent with the research hypothesis mentioned in chapter 1.

Based on what have been found above, the author propose two groups of recommendations to policy makers which target on enhance farmers' formal credit accessibility for agricultural production as well as reduce their reliance on informal loans. Details are shown in the last section of the thesis.

8.2. Policy recommendations

Based on the limitations of government policies on rural and agricultural credit as mentioned in chapter 3 and the role of cooperatives or collaboration with enterprises in production as in chapter 7, some policy recommendations for both central and local government at the research site are presented as below.

8.2.1. Policy recommendations for local government

Supporting the development of cooperatives in agricultural sector

The role of local government in Haiphong city in supporting the development of cooperatives is much vital in terms of both capital, technology and training. In case cooperatives with good production organization and stable consumption markets incur credit constraints, local government can flexibly consider provide preferential loans without collateral from other funds. Local authority's supporting in technology investment in order to boost production capacity and human resource training and development for cooperative will be helpful solutions. Human resource training and development often focus on skilled staff who are responsible for instructing farmers in updated farming techniques and pest prevention and on skilled managers in

operation management. Besides skilled manager training, agriculture-related bodies of local authority, such as department of agriculture, department of trade and cooperative alliance, should help cooperatives to position their products and identify potential consumption markets.

8.2.2. Policy recommendations for central government

Central government should closely cooperate with local government in encouraging production collaboration by ensuring appropriateness of and high synchronization between credit policies and other agricultural policies

Constraints on capital and consumption markets of cooperatives can not be fundamental reduced without local government's support and proper central government polices.

In term of credit for cooperatives in general and farmers as participants in value chain or in collaborative production processes, improved policies from the central bank and credit institutions are needed. The maximum credit amounts without collateral for cooperatives should be increased if they have good operations and can maintain stable consumption markets. Constant credit demand of cooperatives or farmers are often to purchase input materials. Therefore, credit should be granted for each participants of value chain with pre-determined purposes, for example for farmers of cooperatives to buy input. They will pay to lenders after they sell their products to wholesalers through cooperatives, in which lenders can control actual credit demand of each borrowers. Risk in lending value chain can arise from the weak integration among participants. Farmer are provided input material and their products are bought by the cooperatives/enterprises. Some farmers intentionally sell products for local traders to take benefits from price differences. The fact may cause financial risks for the enterprises/cooperatives which are beneficiaries of credit subsidized programs and even affect the whole supply chain. In other words, enforce problems may happen with subsidized loans. However, regulations on penalties are not strong enough to deter farmers. Therefore, penalty policies for breaking contracts in the supply chain should be toughened.

Regarding looking for consumption markets to balance supply-demand of agricultural products, responsibility of both central and local government are needed. Local government' strength is often focusing on domestic markets while central government can integrate domestic and foreign ones. In reality, the policies relating to evaluate supply-demand of agricultural products as well as trade policies in seeking and/or expanding new markets actually encourage formal lenders to enter agricultural sectors. In other words, only credit policies can not attract formal lenders to the sectors. Therefore, synchronically implementing policies relating to agriculture are required indeed.

In addition to above solution, One solution for farmers to reduce production risks and then improve their financial capacity is agricultural insurance. Insurance companies pay claims directly to the beneficiaries in the event of shocks, such as lost production. Government has implemented some agriculture insurance programs,

of which poor households can receive support up to 90% and 20% for others for insurance premium. However, farmers are reluctant to apply for insurance due to lacking knowledge about insurance criteria and complicated procedures.

Enhancing households' awareness of the adoption of production collaboration is responsibility of both central and local government.

Market-oriented polices on agricultural products may be failed if households continue spontaneous production method. Operating production in small scale and household units will pose challenges to the governmental schemes. Therefore, the role of local government and social associations are very important in provide information and knowledge on the demand markets as well as the new production methods compared to traditional ones. Complete value chain will help them avoid mass production and actually increase products' value as well as expand demand markets by connecting with big commercial distributors.

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Appendices

Appendix 1a. Chi-square test for the relationship between production type and credit source of households

Chi-square test		Value	df	Asymp. Sig. (2-sided)
	Pearson Chi-square	21.395	6	0.002
	Likelihood Ratio	19.132	6	0.004
	Linear-by-linear Association	17.349	1	0.000
	N of Valid Cases	180		

Appendix 1b. Chi-square test and Phi and Cramer's V test for the relationship between production type and credit source of households

Chi-square test			Value	df	Asymp. Sig. (2-sided)
	Pearson Chi-square		18.170	3	0.000
	Likelihood Ratio		17.213	3	0.001
	Linear-by-linear Association		16.234	1	0.000
	N of Valid Cases		180		
Phi and Cramer's V test				Value	Approximate Significance
	Nominal by Nominal	Phi		0.318	0.058
		Cramer's V		0.318	0.058
	N of Valid Cases			180	

Appendix 2. Chi-square test for the relationship between occupation and credit source of households

Chi-square test		Value	df	Asymp. Sig. (2-sided)
	Pearson Chi-square	7.466	3	0.058
	Likelihood Ratio	7.334	3	0.427
	Linear-by-linear Association	3.352	1	0.330
	N of Valid Cases	180		

Appendix 3. Phi and Cramer's V test for the relationship between occupation and credit source of households

		Value	Approximate Significance
Nominal by Nominal	Phi	0.204	0.058
	Cramer's V	0.204	0.058
N of Valid Cases		180	

Appendix 4. Chi-square test for the relationship between occupation and credit production types of households

Chi-square test		Value	df	Asymp. Sig. (2-sided)
	Pearson Chi-square	11.271	1	0.001
	Likelihood Ratio	10.157	1	0.001
	Linear-by-linear Association	11.025	1	0.001
	N of Valid Cases	180		

Appendix 5. Chi-square test for the relationship between credit source and type of households categorized by main income source

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	8.943	3	0.03	0.028		
Likelihood Ratio	8.442	3	0.038	0.056		
Fisher's Exact Test	8.946			0.025		
Linear-by-Linear Association	7.989	1	0.005	0.005	0.004	0.002
N of Valid Cases	180					

Appendix 6. Chi-square test and Phi and Cramer's V test for the relationship between production type and main income source of households

Chi-square test			Value	df	Asymp. Sig. (2-sided)
	Pearson Chi-square		32.018	1	0.000
	Likelihood Ratio		29.499	1	0.000
	Linear-by-linear Association		31.840	1	0.000
	N of Valid Cases		180		
Phi and Cramer's V test				Value	Approximate Significance
	Nominal by Nominal	Phi		0.422	0.000
		Cramer's V		0.422	0.000
	N of Valid Cases			180	

Appendix 7. Chi-square test for the relationship between credit sources and location of households

Chi-square test		Value	df	Asymp. Sig. (2-sided)
	Pearson Chi-square	28.144	9	0.001
	Likelihood Ratio	31.207	9	0.000
	Linear-by-linear Association	15.089	1	0.000
	N of Valid Cases	180		

Appendix 8. Chi-square test for the relationship between production types and location of households

Chi-square test		Value	df	Asymp. Sig. (2-sided)
	Pearson Chi-square	100.793	3	0.000
	Likelihood Ratio	103.512	3	0.000
	Linear-by-linear Association	65.396	1	0.000
	N of Valid Cases	180		

Appendix 9. Chi-square test for the relationship between main income source and location of households

Chi-square test	Value		df	Asymp. Sig. (2-sided)
	Pearson Chi-square	30.206	3	0.000
	Likelihood Ratio	27.024	3	0.000
	Linear-by-linear Association	17.878	1	0.000
	N of Valid Cases	180		

Appendix 10. Chi-square test for the relationship between households' choice of formal lenders and type of production

Chi-square test		Value	df	Asymp. Sig. (2-sided)
	Pearson Chi-square	5.279	2	0.071
	Likelihood Ratio	5.635	2	0.06
	Linear-by-linear Association	5.199	1	0.023
	N of Valid Cases	109		

Appendix 11. Chi-square test for the relationship between households' choice of informal lenders and age group/gender

Chi-square test	Value		df	Asymp. Sig. (2-sided)
Age group	Pearson Chi-square	6.641	10	0.759
	Likelihood Ratio	7.594	10	0.668
	Linear-by-linear Association	2.118	1	0.146
	N of Valid Cases	141		
Gender	Pearson Chi-square	3.282	5	0.657
	Likelihood Ratio	4.388	5	0.495
	Linear-by-linear Association	0.810	1	0.368
	N of Valid Cases	141		

Appendix 12. Chi-square test for the relationship between households' choice of informal lenders and location

Chi-square test		Value	df	Asymp. Sig. (2-sided)
	Pearson Chi-square	103.450	15	0.000
	Likelihood Ratio	94.495	15	0.000
	Linear-by-linear Association	37.686	1	0.000
	N of Valid Cases	141		

Appendix 13. Chi-square test for the relationship between households' choice of informal lenders and occupation

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	18.430	5	0.02	0.001		
Likelihood Ratio	17.757	5	0.03	0.003		
Fisher's Exact Test	18.669			0.001		
Linear-by-Linear Association	14.896	1	0.000	0.000	0.000	0.000
N of Valid Cases	141					

Appendix 14. Chi-square test for the relationship between households' choice of informal lenders and production types

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	44.128	5	0.000	0.000		
Likelihood Ratio	39.054	5	0.000	0.000		
Fisher's Exact Test	36.598			0.000		
Linear-by-Linear Association	14.877	1	0.000	0.000	0.000	0.000
N of Valid Cases	141					

Appendix 15. Chi-square test for the relationship between households' choice of informal lenders and main income source

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	9.842	5	0.080	0.087		
Likelihood Ratio	11.519	5	0.042	0.039		
Fisher's Exact Test	10.573			0.039		
Linear-by-Linear Association	1.176	1	0.278	0.322	0.161	0.038
N of Valid Cases	141					

Appendix 16. Hosmer-Lemeshow goodness-of-fit

	Chi-square	df	Sig.
Borrow	6.035	8	0.643
Formal borrowing	6.598	8	0.581
Informal borrowing	2.350	8	0.968

Appendix 17. Questionnaire for farm households

I. GENERAL INFORMATION

1. Name of household head:.....Household code:.....

2. Name of village:.....

3. Gender: ☐Male ☐Female

4. Age:.....

5. Year of Education:

6. Farming experience in year:

7. Main occupation of household head

☐ Local government employment

☐Farmers

☐Others

8. Income earning activities of households' members

☐Agricultural production ☐Business ☐Paid employment

☐Local government employment/ staff of social associations ☐Others

9. Number of family members:.....

Dependent members:.....

10. Total capital for production:

	Amount in million VND
Total initial investment capital	
Owned amounts	
Borrowed amount	

11. Land holdings

	Area in m^2
Total Land	
Housing land with land use certificate	
Farming land	

12. Family income (million VND)

Income from agricultural production.....

Income from non-farm jobs.....

II. Farming activities

1. Production type of family

☐Mixed type ☐Only livestock ☐Only aquaculture

☐Cultivation

Main production	Number of head	Cycles/ year	Production area (m^2)	Production output/ year (VND)	Average selling price (VND/kg)
Pig					
Poultry	-				
Fish	-				

2. Production information of the household

Production type	Unit	Breed	Feed	Veterinary medicine
Pig	Per head			
Poultry	Per group of heads			
Fish	Estimated heads in one area unit			

Production cost of production

III. CREDIT INFORMATION

1. Do you have loans for agricultural production?

☐Yes ☐No

2. Which credit sources do you borrow from? (If yes for question 2)

Sources	Loan number	Demanding amount	Received amount	Term of loan	Interest rate	Physical collateral (What?)
VBARD	1					
	2					
VBSP	1					
	2					
PCFs	1					
	2					
Local sellers	1					
	2					
Relatives/ Friends	1					
	2					
Local moneylenders	1					
	2					
CSG	1					
	2					

Formal sources: VBARD, VBSP, PCFs
Informal sources: local sellers by trade credit, friends, relatives, local moneylenders, and rotating saving associations (ho/hui/phuong)

3. Which source do you prefer to borrow?

☐Formal sources ☐Informal sources

4. Reasons for formal credit lender selection?

☐Simple lending procedures ☐Appropriate loan term

☐Acceptable interest rate ☐Suitable amount

☐Quick disbursement ☐No collateral

5. Reasons for informal credit lender selection?

☐Large amounts ☐Convenience

☐Acceptable interest rate ☐Habit

☐Flexible loan maturity date ☐In case of emergency

☐No collateral

6. Why don't you apply formal credit?

☐No credit demand ☐Have credit demand but don't apply

7. Reasons for not applying formal credit?

If in question 6, household choose 'no credit demand'

☐Have no credit demand at all ☐Choose informal credit first

If in question 6, household choose 'have credit demand but don't apply'

☐Fear of rejection ☐Not familiar with formal lenders

☐Fear of procedures and cost of loan application

8. Distance to nearest formal financial institutions?

Financial institutions: VBARD, VBSP, PCFs

☐below 1 km ☐10-15km

☐1-5km ☐more than 15km

☐5-10km

9. Knowledge of information on formal credit sources

☐well known ☐Neutral ☐Unknown

10. Knowledge of information on informal credit sources

☐well known ☐Neutral ☐Unknown

11. Household' evaluation of impacts of production risks on borrowing decisions

☐Important ☐Not important

12. Household' evaluation of impacts of urbanization on borrowing decisions

☐Weakly influential ☐Strongly influential

13. Do you have credit demand in the future?

☐Yes ☐No

14. In case of obtaining more credit in the future, you will use the money for which purpose.

☐Production expansion ☐ Pay off expenditures

15. Do you have any acquaintances in any formal credit institutions?

☐Yes ☐No

16. Have you borrowed from one formal credit institutions before? Which one?

☐Yes ☐No

17. Which formal/informal lenders do you approach if you have credit demand in the future?

Formal lenders: ☐VBARD ☐VBSP ☐PCF

Informal lenders: ☐CSG ☐Relatives/ Friends ☐Moneylenders

18. Do your have business plan before borrowing or documentary record of production process?

☐Yes ☐No

19. Did you have overdue debts in the past?

☐Yes ☐No

20. Do you always comply with current debt schedule in terms of timing repayment, interest and deb maturity? (For household is borrowing formal loans)

☐Yes ☐No

III. ADDED INFORMATION

1. Income change after borrowing…… (in million VND)

2. Your evaluation on local bank officials' enthusiasm?

☐absolutely enthusiastic ☐unenthusiastic

☐enthusiastic ☐absolutely unenthusiastic

☐normal

6. Your evaluation on interest rates of formal institution that you are borrowing from.

☐absolutely high ☐low

☐high ☐absolutely low

☐normal

7. Your evaluation on term of loan and repayment period of formal institution that you are borrowing from and give your detailed answer.

☐absolutely appropriate ☐inappropriate

☐appropriate ☐absolutely inappropriate

☐neutral

8. Are you credit group membership?

☐Yes ☐No

9. Which formal credit group are you attending in? (if answer of question 8 is yes)

☐Farmer Union ☐Veteran Union

☐Youth Union ☐Members of PCF

☐Women Union

IV. Production risks

1. Production risk that you have incurred.

☐Price decreasing ☐Input expenditure increasing

☐Price depending on wholesale buyers ☐Animal diseases

2. Do you want to expand animal production and reasons?

If yes	Reasons	If no	Reasons
Food for family consumption and increasing income		Lack of capital	
Can't find another job		Find another job with higher income	
Main income of family		Income from other member family	
Others (specified)		Production loss in past and have no enough money to recover	

		Others (specified)	

Appendix 18. Questions for key informant interviews of local authorities

1. What are formal financial institutions in the districts offer loans for agriculture?

2. What are the main features of agricultural loans from different formal institutions in the district and communes?

3. What are the difficulties of farmers to approach loans from formal markets? Which difficulties are related to administrative procedures?

Appendix 19. Questions for key informant interviews of formal institutions

1. What is the main credit services do you offer for farmers in the district? And how many percent for agriculture?

2. What are the features of loans you are offering?

3. What are the requirements for obtaining loans you offer farmers?

4. What are factors affecting your institution's decisions on approving and rationing loan amounts?

5. What are the ranges of interest rate you charge?

6. What is the term of loans you often offer to farmers?

7. Do you always have available credit funds for agriculture?

8. How do the bank approach the famers in meeting their demand?

9. Do you think what are the main constraints of farmers when borrowing from your formal banks/ institutions?

10. Which lending schemes are you applying? (Individual or group-based lending)

Appendix 19. Questions for focus group discussion

1. Which credit sources do farmers prefers to borrow? Formal sources or Informal sources? And Why?

2. Which factors affect your borrowing decisions?

3. Which main formal institutions in the communes offer loans for agriculture in the commune?

4. What are the main credit constraints of farmers when approaching formal credit institutions?

5. Your assessment of formal institutions' lending requirements

6. What are your strategies to reduce formal credit constraints?