ACCESS TO CREDIT AND HOUSEHOLD POVERTY REDUCTION IN RURAL VIETNAM: A CROSS-SECTIONAL STUDY

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Abstract

In this paper we develop an econometric framework to analyse the effect of household credit on the economic welfare of households and use cross-sectional data from the two households surveys undertaken in 1992/1993 and 1997/1998 to derive empirical evidence. Our findings confirm that household credit contributes positively and significantly to the economic welfare of households in terms of per capita expenditure, per capita food expenditure and per capita non-food expenditure. The positive effect of credit on household economic welfare is regardless of whether they are poor or better-off households. We also find that credit has a greater positive effect on the economic welfare of poorer households and find that the age of the household head, the household size, land ownership, and savings and the availability of credit at village level are key factors that affect household borrowing. Some policy implications are drawn.

Keywords: microcredit; household economic welfare; poverty reduction; rural credit market; Vietnam

JEL Classification: Q14, O16, O18

1. Introduction

Many researchers have postulated that the provision of financial services to the poor, or microfinance[1], is a powerful means of providing low income households with the chance to escape from poverty and to transform their lives. It is also evident that there is a strong demand for small-scale commercial financial services – both credit and savings – from low-income households (Robinson, 2001). The strong demand for financial services by low income households, together with the evidence that access to credit reduces household poverty, provides clear incentives for policy markers to develop a framework for providing financial services to low-income households.

As many studies have shown, by providing low-income households with access to financial services, the service providers help them improve their productivity and management skills, create jobs, smooth income and consumption flows, enlarge and diversify their businesses, and increase their income and other benefits, such as health care and education. The various evidence supporting this assertion can be found from the papers by Morduch, 1995; Gulli, 1998; Khandker, 1998; Pitt and Khandker, 1998; Zeller, 2000; ADB, 2000; Parker and Nagarajan, 2001; Robinson, 2001; Khandker, 2001; Khandker and Faruque, 2001; Coleman, 2002; Morduch and Haley, 2002; Pitt and Khandker, 2002; Khandker, 2003; .etc.

Recent empirical findings show that access to credit has a positive impact on household economic welfare (Khandker, 1998; Panjaitan, Drioadisuryo and Kathleen, 1999; Remenyi and Benjamin, 2000; Wright, 2000; Khandker, 2001a; Khandker and Faraque, 2001b; Coleman, 2002; Pitt and Khandker, 2002; Khandker, 2003; .etc). Moreover, the literature also shows that most microfinance programs do not serve the poorest, but when they do so, the poorest can benefit from microfinance through increased income and reduced vulnerability (Morduch and Haley, 2002). There is also some evidence that the degree of poverty may affect the response. Better-off poor households have a larger positive response than the very poor (Remenyi and Benjamin, 2000; Coleman, 2002).

Paramount among the limitations of the existing studies is the absence of a coherent econometric methodology that would make empirical findings easily comparable. Differences in research methodology seem to account for differences in research findings. Moreover, the empirical studies seem to focus on a subset of countries and tend to exclude some of the countries where the supply of microcredit has been actively developed – Vietnam, for example. The objectives of this paper are two-fold. First, we propose and implement an

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[1] Microfinance is defined either narrowly as microcredit or broadly as microcredit plus micro savings, micro insurance, pre and post loan technical trainings and business supports. In this paper, we use the term microcredit for narrow microfinance to distinguish against broad definition of microfinance.

econometric framework which seeks to overcome the shortcomings of the research methodology employed in previous studies. Second, we seek to obtain evidence on the impact of credit on household economic welfare in Vietnam. Specifically, the paper addresses two questions: (i) What determine household borrowings in rural Vietnam?; and (ii) How much does household borrowing contribute to household economic welfare and to poverty reduction? The data used for this paper are from the two Vietnam Household Living Standard Surveys taken in 1992/1993 and 1997/1998.

The remainder of this paper is organized as follows. Section 2 represents an overview of microfinance and rural credit in Vietnam. In section 3, we develop the econometric framework and discuss the characteristics of data we used in section 4. In the following section, we present and discuss our test results. The concluding section summarizes the main findings of our paper and draws policy conclusions.

2. Microfinance and Rural credit in Vietnam

Vietnam has been transforming itself from a centrally planned to a market oriented economy since Doi Moi, or economic reform, was initiated in the late 1980s. Significant improvements in terms of the economic growth rate, which accelerated, from 4.6% on average in 1980s to 7.6% in 1990s, have been achieved. However, there is a significant inequality in the development of rural and urban areas. Recent average national per capita income are estimated at $300, but for rural areas, accounting for 80% of population, the figure is at $100. Therefore, the rural development has been set as one of the prime goals of the Vietnamese Government's strategic development plan (Dao, 2002; SRV, 2002). The first government rural development initiative was launched in 1997 when a national poverty alleviation strategy was introduced to give poor and low-income households opportunities to have a better life.

One of the major components of the government poverty alleviation strategy is to ensure that the rural poor have access to credit and financial services. The government concluded that improving access to microfinance in rural areas was one of the most tangible ways of assisting low-income households. However, the outreach of formal banking sector to rural areas is limited. A recent study (McCarty, 2001) indicates that the formal banking sector is meeting only 30 % of rural credit needs. The majority of rural borrowing is from informal sources and often at interest rates that are many times higher than those charged by formal institutions. Although the informal system (mainly money lenders and rotating savings and credit associations (ROSCAs)[2]) satisfies some of the rural credit needs, the high interest rates

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[2] It is a traditional small credit group organized by local people. Each group comprises from 5 to 20 members. The members often have the same career e.g. groups of farmers, groups of traders, groups of war veterans etc.

charged are regarded as usurious for low-income households and it provides no assistance in the field of savings mobilization (Dao, 2002). Improving the supply of banking services in rural areas therefore appears to be one of the most tangible ways to enhance low-income households' capacity to improve their living conditions and to increase financial intermediation in general.

An Overview of Rural Vietnam

Vietnam

61 Provinces, 527 districts, 9,801 communes and 45,000 villages

Total population: 78 million people.

Total number of households: 15 million households.

The inflation rate was 8.9% in February, 1999 and the deflation rate was 0.6% in 2000.

Average per capita income was 200 USD in 1998 and 300 USD in 2001.

The literacy rate is 93 %. Of the illiterate (7% of the population), 80% live in the remote areas, 60% are female.

Rural Vietnam

80 % of the population lives in rural areas forming a total of 12 million rural households.

Average per capita income was approx. 80 USD in 1998 and 100 USD in 2001.

The Rural Population was divided into 5 groups using National Poverty Criteria:

Hungry Poor   : 10% of population (1.2 million households)

Poor   : 15% of population (1.8 million households)

Average   : 40% of population (4.8 million households)

Better-off   : 25% of population (3.0 million households)

Rich   : 10% of population (1.2 million households)

Source: Vietnam – Canada Rural Finance Project, 2001

2.1 Banking sector reform

As part of the economic reform program, the banking sector has been transformed from a Soviet-style mono banking system toward a "two tier system" in which the big four state-owned banks are commercialised and play the major role in banking market and there is a central bank. The banking sector reform also creates the opportunities for the participation of non state-owned banks and credit institutions in the credit market. In rural areas, there are several banks and credit institutions operating, including the Vietnam Bank for Agriculture and Rural Development (VBARD), the Vietnam Bank for the Poor (VBP)[3], Rural

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Each group operates as an individual organization having no relation to other groups or to formal institutions. A group leader is elected by members to collect deposits and keep records. Members deposit savings to form funds, which will be lent to each group member in rotation. Savings can be in cash, paddy or gold. The amount of monthly cash savings depends on the agreement reached within the group

[3] This bank has been transformed into the Policy Bank in 2003.

Shareholding Banks (RSHBs)[4], Peoples Credit Funds, Credit Cooperatives and some Microfinance Institutions. VBARD has the largest branch network and has become the largest player in this market. VBP was formed in 1995 and operates through the network of VBARD as a result of an initiative by the government to provide subsidised credit to poor households.

One of the most important areas of banking sector reform affecting rural credit is interest rate policy. The Law on Banks and Credit Institutions determines and regulates interest rates at banking institutions. Since 1996, the government has gradually liberalised interest rates (WB, 2002). The ceiling interests were replaced by the base rate plus margins. However, banks and credit institutions operating in the rural market regard the rates to be too low to permit them to be financially sustainable. The banks have little or no flexibility when trying to cover expenses and make a return or profit. The regulation that the spread between lending rates and rates on savings cannot exceed 0.3% and 0.5% per month for short-term loans and medium- and long-term loans, respectively, has further discouraged rural financial institutions from extending small loans to the rural poor and low-income households, given the high transaction costs for small loans (Dao, 2002).

2.2 Market structure and outreach

The rural financial market in Vietnam is segmented into three core sectors: formal, semi-formal and informal. In the formal sector, the key providers of microfinance services are VBARD, VBP, PCFs and RSHBs. The semiformal sector is dominated by National Programs, Microfinance Programs of Mass Organisations, and Savings & Credit Schemes supported by NGOs and donors. Typically, formal semi-formal financial sectors in Vietnam provide credit to rural households for the specific purposes of rural development and/or poverty reduction at cheaper interest rates. Thus, these sectors basically employ their own criteria in selecting and screening borrowers who are eligible to receive loans from them. For this reason, we include the semi-formal sector into the formal sector in our study.

These formal and semi-formal schemes however, were either unable to meet the huge demand for financial services or they could not reach the poor. In such cases, the poor have to rely on the informal credit schemes, which consist mainly of credit extended by rotating credit associations, moneylenders, families, friends and traders. Chart 1 at the end of this section presents an outline of the structure of rural credit market.

Prior to 1990, formal credit institutions (state-owned banks and credit cooperatives) provided credit only to state enterprises and production cooperatives. International NGOs were not allowed to operate in the country; and social organizations did not offer financial

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[4] RSHBs are the result of the reorganization or merger of rural credit cooperatives in which the government has a 10% stake. The main advantage of such banks is that their lending procedures are simple, with staff relying on their knowledge of and close relationships with borrowers who are often family or friends (Dao, 2002).

services. Individual farmers and households therefore could not access credit from formal institutions. The Doi Moi policy, begun in 1990, and followed by reform of banking sector and land use, has changed the face of rural credit service development. The percentage of rural households having access to credit has increased significantly.

However, there is still a large proportion of households with no access to formal or semi-formal credit. 51% of rural households remained unable to access banking services in 1998 and around 30% in 2001. Of the 12 million rural households, 41.7% had access to VBARD loans, 21.4% to VBP loans and 6% to PCFs in 2001. For rural low-income households, these figures are respectively to 35.1, 18.6% and 5.9%. Borrowing from RSHBs remained at 0.08%, while credit programs implemented by Social Organizations (SOs) provided loans to some 3% in 1998, which decreased to 1.8% in 2001 (Table 1). The remainder – around 29.8% of total rural households and 38.6% of total rural low-income households - seek funds from informal lenders, or have no demand for funds.

[Insert Table 1 about here]

2.3 Lending technology

As in many other countries, the common methods of lending in rural Vietnam are individual and group lending. It is observed that 90% of loans are made on the basis of group lending (Table 2), but this method of lending in fact works mainly as a mechanism to reduce transaction cost, rather than as a joint-liability sharing mechanism. Most loans are provided by formal institutions on the basis of collateral, whether for individual or group lending. The assets listed and used as collateral include land use certificates (LUCs), houses and fixed assets; of which LUCs are the most widely used by rural borrowers. Movable assets such as televisions, bicycles, and animals do not qualify as collateral. Moreover, the administrative procedure requires that the local peoples' committee must certify the list of assets and their total value. The average loan size is typically small at around 3.2m VND (around USD200) for formal and semiformal lenders and 1.75m VND (USD110) for informal lenders (Table 3).

[Insert Tables 2 and 3 about here]

2.4 Rural borrowers

A recent study by Dao (2002) suggests that if we only consider the 12 million rural households, 65% can be categorised as poor or low-income households. Moreover, of the rural households, we find that the living standards of borrowing households are slightly lower than those of non-borrowing households (Table 4).
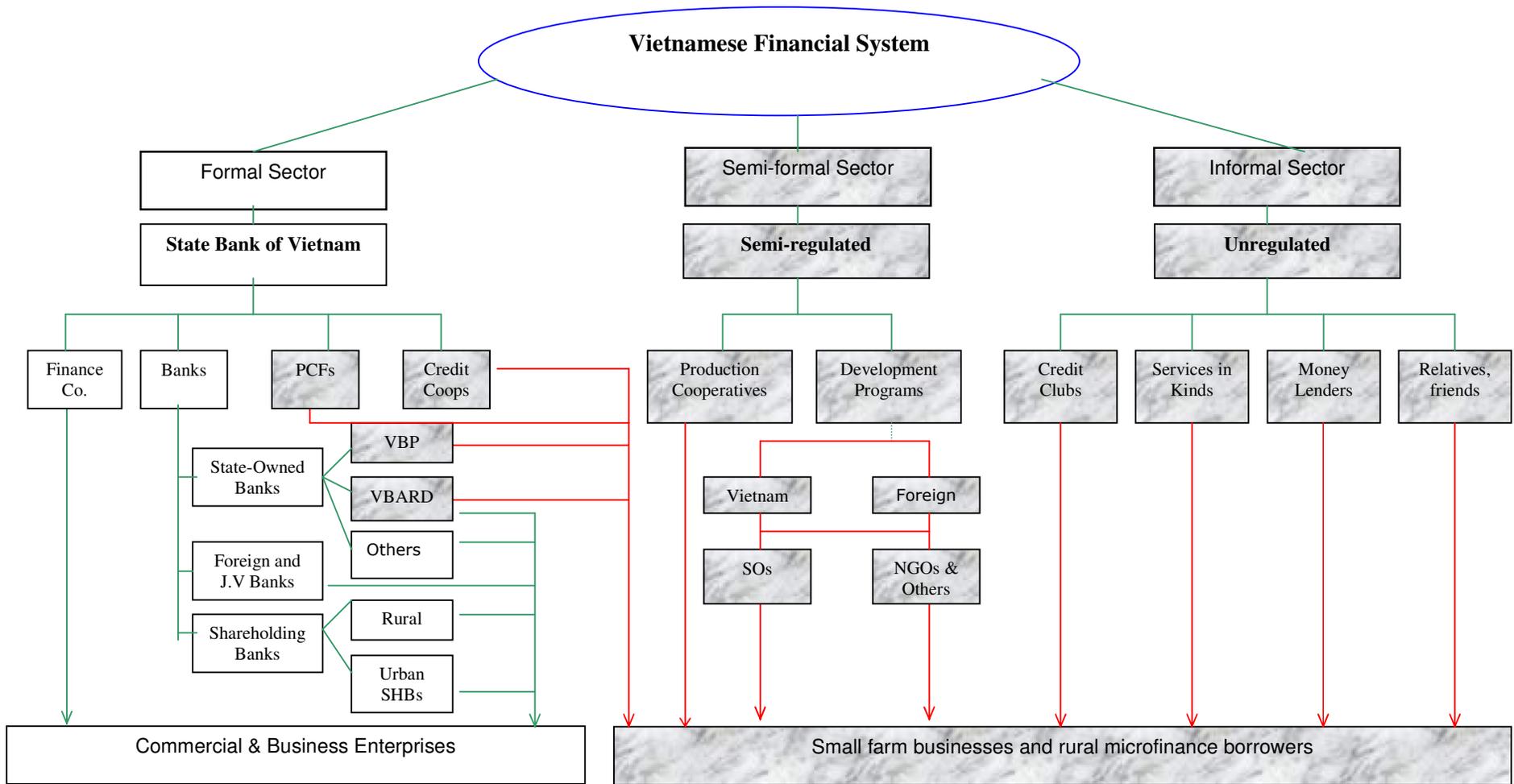
[Insert Table 4 about here]

The most evident characteristic of rural borrowers in Vietnam is the lack of sufficient collateral, partly due to the former state-landownership system. Only a small number of

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households have the collateral required by formal financial institutions. These institutions only accept legally registered assets as collateral – the primary asset being the official Land Use Certificate (LUC). As by June 2001, no province in Vietnam had yet finalized the issuance of LUCs to households. Moreover, each household can have only one LUC, which provides eligibility for only one loan at a time. Assets used as collateral are usually of low value, and are usually under-valued in comparison to the land price stipulated by the government.

The low level of education of rural borrowers causes difficulty in understanding and completing the necessary forms and documents (e.g. business plans and statements on loan utilization). Most rural borrowers reside far from financial service points, resulting in time-consuming travel to the bank branches. Further, the publicity about financial services is both inefficient and late. Rural borrowers are also inexperienced in preparing loan applications and many rely on credit officers to help them. For most applications, credit officers are consulted on the preparation of business plans and loan utilization, or simply in order to get loan application forms. However, credit officers are limited in number and, in the case of VBARD, one officer regularly has to deal with three communes with hundreds of borrowers without a fixed working schedule. Consequently, applicants spend a lot of time and money on preliminary activities, which in some cases do not even result in the submission of an application form. Furthermore, households want to use funds for various purposes, but formal financial institutions only finance a certain number of specified uses (McCarty, 2001). The expenses (certification fees, photograph, application form, travel and work lost etc.) incurred to borrow from the banks are unaffordable for many low-income households who thus effectively face financed exclusion.

Chart 1: Microfinance Services Structure

Vietnamese Financial System

Formal Sector	Semi-formal Sector	Informal Sector
State Bank of Vietnam	**Semi-regulated**	**Unregulated**

Formal Sector:
- Finance Co.
- Banks
  - State-Owned Banks
  - Foreign and J.V Banks
  - Shareholding Banks
    - Rural
    - Urban SHBs
  - VBP
  - VBARD
  - Others
- PCFs
- Credit Coops

Semi-regulated:
- Production Cooperatives
- Development Programs
  - Vietnam
    - SOs
  - Foreign
    - NGOs & Others

Unregulated:
- Credit Clubs
- Services in Kinds
- Money Lenders
- Relatives, friends

Commercial & Business Enterprises

Small farm businesses and rural microfinance borrowers

Source: Microfinance Resource Centre (2001)

PCFs: Peoples Credit Funds; VBARD: Vietnam Bank for Agriculture and Rural Development; VBP: Vietnam Bank for the Poor; SOs: Social Organizations

3. The model

We consider a simple two-period economy[5] in which there are two sets of actors, households and the lenders. We assume that households finance their economic activities by borrowing from the lenders. The impact of borrowing during the period is expected to occur at the end of the period and to affect household economic welfare[6]. For simplicity, we look at household i in location j at time t. During the period from t-1 to t, this household would have a demand for credit C^d_{ijt}. However, household demand for credit is constrained by the supply of credit C^s_{ijt}. While the demand depends on household characteristics, the supply of credit depends on the availability of funds and the lender's characteristics[7]. The household borrowing function[8] is jointly determined by demand and supply functions, denoted as C_{ijk}. During the period from t-1 to t, the household generates its economic welfare, which is observed at time t and denoted as Y_{ijt}. The figure below illustrates our approach.

…	t-1	t
Demand function C^d_{ijt-1} Supply function C^s_{ijt-1} Borrowing function C_{ijt-1}	At t-1: Observed economic welfare Y_{ijt-1} Observed borrowing C_{ijt-1} From t-1 to t: Demand function C^d_{ijt} Supply function C^s_{ijt} Borrowing function C_{ijt}	At t: Economic welfare Y_{ijt} Observed borrowing C_{ijt}

For the purpose of assessing the impact of credit on household economic welfare, an output supply function is employed in which we introduce credit as a separate explanatory variable in the welfare function. Household welfare may be reflected in income and expenditure indicators, etc. At the household level, the welfare is most likely to be affected by the household characteristics such as the age of household head, the education of household head, total farming area, etc. At village and commune levels, household welfare is possibly affected by the characteristics of the village and commune in which the households live. For example, the prices of selected goods and services in the village and commune may affect household expenditure or income. We recognise those characteristics as the local market characteristics. Household welfare is also affected by household and local market

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[5] We, however, consider two separate points of time at the end of each period in this paper
[6] The term "household welfare" is used generally here for the purpose of modelling. The selection of testing welfare variables such as income, expenditure and savings etc will be discussed in testing practice section.
[7] We use the term characteristics to imply all the realised attributes of households and the lenders, which for the purpose of modelling we do not specify here in this section but in the testing practice section.
[8] We imply the function of amount of credit that a household receives.

characteristics that we cannot observe or measure. For instance, households exerting more effort may generate higher income. The controlling variables therefore include household characteristics, local market characteristics and unobservable characteristics. The household welfare function takes the structural form, as follows

$$Y_{ijt} = \beta + X_1{}'_{ijt}\,\beta_1 + X_2{}'_{ijt}\,\beta_2 + C_{ijt}\beta_c + W'_{ij}\,\beta_w + \varepsilon_{ijt} \qquad (1)$$

where X_1, X_2 and W are vectors of household characteristics, local market characteristics and unobservable characteristics, respectively. Y and C represent household welfare and total household borrowing. The estimation of parameter β_c would show the effect of credit on the household welfare.

There are, however, some concerns about the equation (1). Firstly, is it appropriate to use the total household borrowing? If C represents borrowing from a specific source (e.g. controlled program[9] or borrowings from one type of lenders), the parameter β_c may not be consistent. Specifically, a household may borrow from a bank and from a moneylender or whatever. Then, if we consider the effect of bank loans on household welfare and find β_c, it is less convincing to conclude that β_c shows solely the effect of bank borrowings since it is possible that household welfare results from the borrowings from the moneylender. Therefore, the use of total household borrowings should be better than the use of borrowings from a specific source.

Second, is the total household borrowing an exogenous variable in equation (1)? To answer this question, we consider a function of household borrowing which results from the interaction between demand and supply function. Note that the econometric literature on the identification problem (see Greene, 2003; Wooldridge, 2003; Manski, 1995; for examples) shows that identifying separate demand and supply functions of household credit from a sample of households is impossible without further information about either demand or supply. However, this is not our purpose in this paper. We consider neither the demand nor the supply of household credit, but the function of household borrowing for a representative household. One may think of our approach as identifying the factors that determine the quantity of credit that a typical household may receive. Consequently, the understanding and interpretation of determinants of household borrowing should take into account both the demand and the supply side.

The household demand for credit depends on a number of observable factors, such as: household characteristics, local market characteristics, etc. Examples of household

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[9] i.e. one credit program or source of interest only; the others are ignored.

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characteristics may include the gender of household head, the education of household head, the ownership of farm land, the initial endowment, etc. Local market characteristics may include the prices of selected goods and services, average education levels, farm landowning levels etc. It is also likely that the unobservable characteristics of household and local market affect household demand for credit. These types of variables may include the human effort and dedication etc. Hence, the demand function takes the general form:

$$C^d_{ijt} = \beta^d + X_1{'}_{ijt}\,\beta^d_1 + X_2{'}_{ijt}\,\beta^d_2 + W_d{'}_{ij}\,\beta^d_w + \varepsilon^d_{ijt} \tag{2}$$

where X_1 is a vector of household characteristics; X_2 is a vector of local market characteristics; and W_d is a vector of unobservable characteristics of households and the local market.

Similarly, the supply of credit depends on the lenders' characteristics, local market characteristics and some unobservable characteristics. The lenders' characteristics may include the type of lender, such as formal or informal, the availability of funds, the allocation pattern of funds and the competition between lenders etc. Local market characteristics may be the same as in the credit demand function. The unobservable characteristics may include valuation of the lender based on, for example, the average effort and dedication to work by households in a specific market. The supply takes the form:

$$C^s_{ijt} = \beta^s + X_3{'}_{ijt}\,\beta^s_3 + X_2{'}_{ijt}\,\beta^s_2 + W_s{'}_{ij}\,\beta^s_w + \varepsilon^s_{ijt} \tag{3}$$

where X_3 is a vector of lenders' characteristics; X_2 is a vector of local market characteristics; and W^s is a vector of unobservable characteristics of households and the local market which correlates with supply of credit.

In theory, the demand and supply of credit would determine the amount and price of credit granted to a representative household. However, the credit market is special. The existence of asymmetric information may lead lenders into the problems of adverse selection and moral hazard (Alkelof, 1970). One solution to these problems is for the lenders to tailor their loan contract covenants, which may act as a screening device to distinguish borrowers (Bester, 1985; Bester, 1987). Another solution is for the lenders to ration credit (Stiglitz, 1981). For these reasons, the function of household borrowing may result not only from pure demand and supply functions but also from variables controlling for asymmetric information problems, such as collateral, interest rates, availability of funds and competition amongst borrowers etc[10]. The reduced form of household borrowing function therefore should be estimated as follows:

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[10] Khandker (2001,2003) discusses this issue but our setup is slightly different.

$$C_{ijk} = \beta_0^c + X_1'_{ijk} \beta_1^c + X_2'_{ijk} \beta_2^c + X_3'_{ijk} \beta_3^c + W_c'_{ij} \beta_w^c + \varepsilon^c_{ijk} \qquad (4)$$

where X_1 is a vector of household characteristics; X_2 is a vector of local market characteristics; X_3 is a vector of lender's characteristics and W^c is a vector of unobservable variables.

Now we look at the equations (1) and (4). We may see that with a cross sectional data i.e. households are observed at only one point of time (i.e. at the end of the observed period), it is likely that the unobservable characteristics of household and local markets, W^c in equation (4) and W in equation (1), are correlated, so that the estimate of Y based on (1) could result in biased coefficients. More specifically, because of unobservable characteristics of households and the local market, such as a household's special effort and dedication, and the natural comparative advantages of the local market etc, it is possible that an increase in a household's welfare is not the result of household borrowings but because of that the household has invested more effort or they live in a better location for farming, for example. Alternatively, the lenders may screen households using their characteristics. As a result, better-off households receive loans but better-off households may also be able to generate higher welfare outcomes. Therefore, the estimation of β_c based simply on the welfare equation (1) may not be consistent.

Econometrically, the solution to the issue of endogeneity of credit is to employ instrumental variables and two-stage regression method (see details of this method: Greene, 2003; Wooldridge, 2003, for examples). We first estimate the determinants of household credit, which include instrumental variables that will not be included in Equation (1), but can be used to predict the amount of household credit that does not depend on household characteristics. Selecting appropriate instrumental variables is therefore a crucial task as the instruments must not be correlated with household welfare but must be closely correlated with the amount of credit borrowed. Given the existence of credit rationing in the market, the high demand and limited supply of credit in rural areas, what actually matters is the supply of credit. The instrumental variables must therefore be those which well describe the characteristics of the lender.

From the Equation (4), there are two sets of observable variables, of which we can see that the lender's characteristics may serve as the instrumental variables. The lender characteristics influence the supply of credit and they do not directly affect household welfare. But which of these characteristics should be chosen? One may think the lending interest rate could be a good instrument as it describes the response of supply i.e. the amount

of credit supplied. However, in rural Vietnam, because of the government restrictions on the lending interest rates, the "interest rate" can not serve as an instrument as it does not vary very much across the sample. The instrumental variables that we select include: the availability of funds; the credit allocation pattern; and the competition between lenders at commune and village levels.

Hence, in the first stage, the household borrowing is estimated based on Equation (4) where lenders' characteristics play the role of instrumental variables. The predicted values of household credit that are obtained from Equation (4) are then used, instead of actual values, in the second stage (i.e. Equation 1) to correct for the problem endogeneity of credit. The alternative option is to include both the actual values and the predicted residuals computed from the first stage (Equation 1) into the second stage regression (Equation 2). The coefficient of the predicted residuals in the second stage regression shows the Durbin- Wu –Hausman test (see more about this test in Greene, 2003), which indicates that whether or not the endogeneity of credit is significant and that the two-stage regression is appropriate.

Having solved the problem of the endogeneity of credit, our next concern is about the selection of the sample. From a household survey, we can observe that there are a number of households who borrow and other households who do not. For a number of reasons, including credit rationing by the lenders, the non-borrowing households cannot get loans even they wish to do so. The allocation of credit therefore is not a random process. If we select only borrowing households and estimate the effect of credit on household welfare, the estimation may be biased. For example, the lenders select households because they are more credit-worthy, but credit-worthy households may achieve higher welfare outcomes. Hence, the effect of credit on household welfare is not consistent.

To control for sample selection bias, the whole sample, which includes both borrowing and non-borrowing households, should be used. The first stage regression using Equations (4) is then reconsidered as follows. For the purpose of convenience, we denote vector X = (X1, X2, X3) i.e. X includes household characteristics, local market characteristics and lender's characteristics. The structural form of household credit function (4) therefore becomes:

$$C_i^* = X_i^{'}\beta + \varepsilon_i \text{ with } \varepsilon_i|X_i \sim N(0,\sigma^2)$$

Econometrically, if we observe (Y_i, X_i) for a random sample, the estimation of the coefficients β using ordinary least squares (OLS) regression produces a consistent estimation of β, i.e.

$$\hat{\beta} = (X'X)^{-1}(X'C^*)$$

However, as we can observe only borrowing households, resulting in a random sample conditional on $C_i^* > 0$, the least squares regression may not be appropriate. The reason is as follows. Consider the following credit equation for every observation:

$$E[c_i | x_i, c_i > 0] = x_i'\beta + E[\varepsilon_i | \varepsilon_i > -x_i'\beta] = x_i'\beta + \sigma E[\frac{\varepsilon}{\sigma} \Big| \frac{\varepsilon}{\sigma} > -\frac{x_i'\beta}{\sigma}]$$

We assumed $\varepsilon_i | X_i \sim N(0, \sigma^2)$, so we can arrange this equation for[11]:

$$E[c_i | x_i, c_i > 0] = x_i'\beta + \sigma\lambda(x_i'\beta/\sigma) \qquad (5)$$

Equation (5) implies that a marginal effect of x'_i on c_i differs from β which results from the OLS regression, which is therefore not appropriate. A number of studies have proposed different methods to solve this problem using log likelihood function maximisation. We follow Tobin's (1959) approach, which is then called the Tobit model[12].

4. Data and measurement

Our data are drawn from two surveys on living standards in Vietnam, namely Vietnam Living Standards Surveys - VLSS 1992/1993 and VLSS 1997/1998. The first survey was conducted in 1992/1993 by the State Planning Committee, known now as the Ministry of Planning and Investment and the General Statistical Office (GSO). The second was conducted by the GSO in 1997/1998. Both surveys were funded by UNDP and Swedish International Development Authority (SIDA). The surveys were parts of the Living Standards Measurement Study (LSMS) household surveys conducted in a number of developing countries with technical assistance from the World Bank.

VLSS 1992/1993 covers a sample of 4,799 households, 150 communes and 300 villages over the country. In which, there are 3,839 rural households, accounting for 80% of the overall sample. Of the rural households, there are 1,985 households (41.4%) being indebted from various sources. VLSS 1997/1998 was designed to provide an up-to-date source of data on households. It covers a sample of 5,999 households, 194 communes and 388 villages, including all households surveyed in 1992/1993. The proportion of rural households is 71.2% (4,269 households). There are 38.9% of rural households borrowing from all sources. The timing of this VLSS approximately five years after the first allows analysis of medium term trends in living standards.

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[11] See Appendix 1
[12] See Appendix 2

The construction of variables plays an important part in our study. The dependent variables, which proxy for household welfares, include per capita expenditure, per capita food expenditure and per capita non-food expenditure. The variable of total household credit is constructed by summing all loans from the formal and informal sources such as bank loans and ROSCA loans. The household characteristics include variables measuring natural attributes such as age, gender of household head; variables measuring household assets, such as savings and farm-land owning. Local market characteristic variables include: the prices of selected goods and services; the averaged household characteristics in a commune, such as averaged education, averaged farm-land owning. The construction of variables measuring local market characteristics is mainly for the purpose of controlling for the location fixed effects, rather than for comparison. The lender characteristics include proxy variables of the availability of funds at province, commune and village levels and the competition between lenders. The discussion of variables is in Section 5.

5. Econometric procedures and results

In this section, we implement the tests and report the empirical evidence on the effect of household credit on household welfare. The first stage regression estimates the determinants of household borrowing. The question that we want to answer in this stage is: what are the determinants of household borrowing? In other words, we are interested in exploring: (i) whether or not the natural attributes of a household affect its amount of borrowing; (ii) how the household's endowment affects its borrowings?; and (iii) does the supply of loans by the lenders play any role on household borrowing?

In the second stage, the predicted residuals resulting from the first stage are included as an explanatory variable to control for the endogeneity of credit in the estimation of household welfare. The questions that we will answer in this stage, are as follows: (i) is the household credit endogenous and is the two-stage regression appropriate?; (ii) what is the effect of household credit on household welfare?; and, (iii) is there any difference in the degree of effects between 1992/1993 and 1997/1998?.

5.1 Determinants of household borrowing

In the first stage, we use the Equation (4) and implement tests using the Tobit model. We select and implement the tests *separately* for two samples of rural households in 1992/1993 and 1997/1998. After adjusting for missing data, the 1997/1998 sample includes 4101 rural household houses, of which 2108 households are borrowing households. The 1992/1993 sample includes 3264 rural households, of which 1733 households borrowed. The test results of are reported in Table 5.

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[Insert Table 5 about here]

The 1997/1998 sample

Considering the test results for the 1997/1998 sample from Table 5, we find that, of the natural attributes of households, the age of household head and the size of household are significantly related to total household borrowing at 1% level of significance. In 1997/1998 survey, the middle-aged households tend to borrow more than the other households. The household size is positively and significantly related to household borrowing, indicating either that larger-size households demand more loans, or that the lenders allocate more credit to households with more labourers. The gender of the household head and the dummy variable of whether a household is a farm household are not significantly related to household borrowing. This result indicates that in rural areas there is no distinction between genders and type of households in demanding loans and the allocation of credit.

The proxy variables for household assets are found to be significantly related to household borrowing. At the 5% level of significance, the education of the household head is positively and significantly related to household borrowing, implying that more educated households tend to borrow more than others. At the 1% level of significance, we find that the ownership of farming land positively and significantly affects the amount of household borrowing. This indicates either that the ownership of land is very important for gaining access to loans since the formal lenders normally require land use certificates as collateral for loans, or that households owning more farming land borrow more i.e. bigger farm need more money. Financial savings and non-financial savings are negatively and significantly related to household borrowings, at the 1% level of significance. This shows that the households with smaller endowments tend to demand more and borrow more.

Our next concern is about whether or not the availability of funds (or the supply of credit) plays any role in household borrowings. To proxy for the availability of funds, we calculate the sum of all household borrowings by source at village, commune and province level. We then consider the availability of *formal funds* at village, commune and province level and the availability of *informal funds* at village level. At the 1% level of significance, we find that the availability of *informal* funds at village level, the availability of formal funds at village level and the availability of formal funds at province level are positively and significantly related to household borrowings. However, the availability of formal funds at commune level is negatively and significantly related to household borrowing at the 5% level of significance. The opposite signs of the effect of *formal sources* of credit at different levels may imply that in order to help rural households gain access to formal sources of credit, the

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network of formal lenders must be extended at the village level. The negative effect of the availability of formal credit at commune level possibly implies that where formal credit supply is restricted households may borrow more from informal lenders. The effect of the availability of informal sources of funds at village level on household borrowing indicates that informal sources of credit remain important in rural credit markets.

The 1992/1993 sample

The findings from the 1992/1993 sample, as shown in Table 5, are similar and confirm the main findings from 1997/1998 sample. We find the negative and significant effect of the age of household head on household borrowing at the 1% level of significance. This result also indicates older households tend to borrow less. Household size is again positively and significantly related to household borrowing at the 1% level of significance. The gender of the household head and farm household variable are not found to be significantly related to household borrowings.

Of the proxy variables for household assets, the ownership of farming land, the value of financial savings and non-financial savings are all significantly related to the total household borrowing, but we do not find evidence for the influence of the education of the household head. At the 5% level of significance, the positive effect of the ownership of farming land on the amount of household borrowings confirms the implication that we found in 1997/1998 sample that households owning more land demand more loans for their production or that the lenders use land owning as a priority criteria for offering loans. At the 1% level of significance, the negative effects of financial and non-financial savings are relevant to previous findings that better-off households borrow less.

Regarding the availability of funds and competition between lenders, at the 1% level of significance, we find similar results as in 1997/1998 sample that the availability of informal funds and the availability of formal funds at village level are positively and significantly related to household borrowings. However, the availability of funds at the commune level is not significantly related to household borrowings. The findings again strengthen the view that for rural households to gain access to credit, its supply at the village level must be improved.

5.2 Impact of credit on household welfare

In the second stage of regression, we use the Equation (1) and conduct tests using ordinary least squares method. The predicted residuals that are resulted from the first stage have included in the second stage to correct for sample selection bias and endogeneity of credit. We conduct separate tests for the 1997/1998 sample and the 1992/1993 sample. Table 6

shows the Durbin-Hausman-Wu test which indicates whether or not the credit is endogenous and should the two stage regression is appropriate. Table 7 shows a summary of the tests of effect of credit on household welfares for the 1997/1997 and 1992/1993 sample, respectively. The test results are reported in Table 8 and 9. The dependent variables include the logarithm forms of per capita expenditure, per capita food expenditure and per capita non-food expenditure.

[Insert tables 6 and 7 about here]

From Table 6, at the 1% level of significance, the Durbin-Wu-Hausman tests show that the household credit is indeed endogenous for all dependent variables. Therefore, using instruments and analysing the role of credit on household welfares based on the two stage regression are appropriate. Briefly, at the 1% level of significance, we find that household borrowing is positively and significantly related to household welfares, in terms of per capita expenditure, per capita food expenditures and per capita non-food expenditure for both the 1997/1998 and 1992/1993 samples, as shown in Table 7. We also find that in 1992/1993, household borrowing contributes more to household welfares than in 1997/1997[13]. The effect of borrowing on non-food expenditure is found to be higher than on food expenditure in both 1997/1998 and 1992/1993 samples. The effects on food and non food expenditures are lower in 1997/1998.

Although the findings show very small effects, they do reveal that household borrowing has a positive impact on household welfare[14]. This result supports the view that providing credit to rural households may increase their welfares and reduce poverty. The greater effect of credit on non-food expenditure in both samples possibly implies that households need to borrow to finance other activities, such as production and trading business, rather than daily sustenance. However, further discussion and the correct policy assessment of the impact of credit needs to take into account cost and benefit analysis.

5.3 The main implications

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[13] Specifically, if household borrowing increases by x %, the per capita expenditure increases by $(1+x)^{.058897}-1$ % in 1997/1998 and $(1+x)^{.069796}-1$ % in 1992/1993. The increases in per capita food expenditure and per capita non food expenditure are $(1+x)^{.03155}-1$ % and $(1+x)^{.114328}-1$ % in 1997/1998 and $(1+x)^{.05l011}-1$ % and $(1+x)^{.124194}-1$ % in 1992/1993

[14] We may be concerned standard errors when using two *separate* stage regressions as discussed in Maddala (2001, pp. 360-363). As Maddala analyzes, although the two separate stages of regression may produce consistent coefficients, the standard errors may be incorrect since in the second stage, the predicted values are used instead of the actual values. If so, the interpretation of the test results may lead to different conclusions. Hence, we also conduct extra tests for this purpose using 2SLS estimator directly. The extra tests indeed do not contradict our findings (see Quach, 2005).

In a short, our findings reveal some important implications. First, a schematic picture of a typical household which borrows in the rural Vietnam is presented. A typical household owns an area of farming land and borrows to finance its production because it lacks an endowment (i.e savings). The middle-aged and larger sized households tend to borrow more. The gender of household head and the type of household (i.e. form or non-farm household) however do not affect the amount of household borrowing. This snapshot shows that the households who borrow are those who lack endowments, but have land and labour. They indeed need loans for production. However, the amount of household borrowing is influenced by the availability of funds at the village level. This implies an important policy conclusion: in order for rural households to gain access to credit, the formal/semiformal credit network must be extended to the village level.

Second, the positive impact of household borrowing on household economic welfare indicates that the provision of credit to rural households is an effective tool for improving their living standards. However, the very small values of the estimated coefficients raise the question of whether it is efficient to provide financial services to the rural households. The traditional view (Robinson, 2001)) on rural finance emphases that providing credit to rural households involves high risk and/or high transaction costs. If the costs are too high, one may question: (i) whether providing credit to rural households is good policy, and if it is; (ii) how should we provide financial services to them? This returns us to the debate of whether we should follow a subsidized poverty reduction approach or a market risk related approach aimed at achieving sustainability of financial services provision, which is well discussed in Robinson (2001).

6. Conclusions

Although there has been substantial research on the relation between microfinance and household economic welfare, the research approach and methodology has been flawed. The main problems in the study of credit impact assessment include: the endogeneity of credit; and sample selection bias. In this paper, we have: (i) proposed an econometric framework that aims at minimising the above problems; and (ii) provided the empirical evidence on the role of household credit on household economic welfares with the case of rural Vietnam.

We have found that household borrowing is affected by various factors, of which the following are important: the age of the household head, the household size, the ownership of farming land, the value of financial savings, the value of non financial savings, the availability of informal funds and the availability of formal funds at village level. The positive effect of the ownership of farming land implies either that the households owning more farming land

tend to borrow more or that the lenders lend more to those households. This possibly demonstrates that the formal/semiformal lenders require rural households to provide collateral in the form of land use certificates. The negative coefficient of the value of financial savings and the value of non financial savings on the amount of household borrowing indicates that households with insufficient endowments (i.e. low savings) tend to borrow more to finance their production. We also found that the availability of informal and formal/semiformal funds at village level increases the amount of household borrowing. This finding has a very important implication that in order to help rural households gain access to the formal sources of credit, the banking network must be extended to the villages.

The main purpose of this paper is to assess the role of credit on household economic welfare. We have found that household borrowing is positively and significantly related to the household welfare in both 1992/1993 and 1997/1998 samples. The similarity of finding for each of the two periods informally supports robustness tests. Although the effect is small, the finding implies that providing loans to rural households is a tool to help poor rural households escape from poverty. We also conducted formal tests of robustness (see Appendix 3) to control for the sample bias. These do not contradict our findings. Moreover, we found that household borrowing has a greater positive impact on poorer households, compared with better-off households. This strengthens the view that poorer households can potentially gain from access to formal/semiformal credit in particular, and financial services in general.

However, we may be concerned about the very low impact of credit on household welfare. Given the high transaction costs of providing credit to rural households, the benefit, or the impact, may be lower than the cost, and hence the question is raised: should we provide credit on a risk-related, or a subsidized basis? The main case for subsidizing credit is to reduce poverty by supplying cheap credit, but, as we and many others have found (e.g. Khandker, 2003; Khandker and Faruque, 2001), the marginal of impact is low. Moreover, credit is not the only tool in a poverty reduction strategy, so why do we need to commit a cheap credit? The risk related approach, which aims at assuring sustainability of the providers, results in the supply of much more expensive credit to rural households and we may expect exclusion of the very poor households to result. We thus return to the debate of which is better: the risk oriented or the subsidized poverty alleviation approach? We leave this for future research.

Appendix 1

$$E[c_i|x_i, c_i > 0] = x_i'\beta + E[\varepsilon_i|\varepsilon_i > -x_i'\beta] = x_i'\beta + \sigma E[\frac{\varepsilon}{\sigma}\Big|\frac{\varepsilon}{\sigma} > -\frac{x_i'\beta}{\sigma}]$$

We assumed $\varepsilon_i|X_i \sim N(0, \sigma^2)$, so we can arrange this equation for

$$E[c_i|x_i, c_i > 0] = x_i'\beta + \sigma\frac{\phi(-x_i'\beta/\sigma)}{1 - \Phi(-x_i'\beta/\sigma)} = x_i'\beta + \sigma\frac{\phi(x_i'\beta/\sigma)}{\Phi(x_i'\beta/\sigma)}$$

where $u = \frac{e - 0}{\sigma}$; $\phi(u) = \frac{1}{\sqrt{2\pi}}e^{\left(-\frac{1}{2}u^2\right)}$; and $\Phi(u) = \int_{-\infty}^{u}\phi(z)dz$

Set $\lambda(x_i'\beta/\sigma) = \frac{\phi(x_i'\beta/\sigma)}{\Phi(x_i'\beta/\sigma)}$, we then have

$$E[c_i|x_i, c_i > 0] = x_i'\beta + \sigma\lambda(x_i'\beta/\sigma) \quad (5)$$

Appendix 2

Consider the distribution of C given X conditional on C>0:

$$f_{C|X, C^* > 0}(c|x) = \frac{f_{C^*|X}(c|x)}{1 - F_{C^*|X}(0|x)}$$

We then arrange for the distribution of the observed dependent variable:

$$f_{C|X}(c|x) = \frac{(1/\sigma)\phi((c - x'\beta)/\sigma)}{1 - \Phi(-x'\beta/\sigma)}$$

The log likelihood function is then constituted as a function of logarithm of sum of distribution function of all observed dependent variables with respect to β and σ.

$$L(\beta, \sigma^2) = \sum_{i=1}^{n}\left[-\frac{1}{2}\ln(2\pi\sigma^2) - \frac{1}{2\sigma^2}(c_i - x_i'\beta)^2 - \ln\left(1 - \Phi(-x_i'\beta/\sigma)\right)\right]$$

The Tobit model is used to estimate the consistent parameters β and σ by maximizing this log likelihood function by differentiating the above equation with respect to β and σ and setting the derivatives equal to zero.

Appendix 3 - Robustness tests

In the proceeding section, using the whole sample of households in 1992/1993 and 1997/1998, we have shown that credit has a positive and significant impact on household welfare. How robust is this conclusion? Is there any difference in the results between points in time? Are the results consistent for the sub-samples of both poorer households and better-off households?

The conduction of tests for two separate samples has shown the test of robustness in terms of variance in results between points in time. The test results have confirmed the positive impact of credit on household welfare. In this section, we look in detail at the role of the better-off households. It is likely that household borrowing may have positive and significant impact on the better-off households, rather than the poorer households, for the reason that better-off households basically know better how to use credit to generate household welfare. If this is found to be so, the above findings are also robust. Therefore, we implement two further sets of tests. For each sample, we divide it into two sub-samples of households: better off households and poorer households. To construct the sub-samples, rural households are classified into five groups from 1 to 5, in which the household group of 1 indicates the poorest households and the household group of 5 indicates the richest households. The better-off households include households of group 3 to 5 and the poorer households belong to groups 1 and 2.

The sub-sample of better-off households in 1997/1998 includes 2377 households, of which 1163 households are borrowing households. These figures for the sub-sample of better-off households in 1992/1993 are 1901 and 949, respectively. The sub-sample of poorer households in 1997/1998 includes 1724 households, of which 945 are borrowing households. The figures for sub-sample of poorer households in 1992/1993 are 1363 and 784 households. We then repeat the tests in the above section for all sub-samples. Tables A3.1 shows the first stage regression results for the sub-sample of better-off households and Table A3.2 shows the results for the sub-sample of poorer households in 1997/1998 and 1992/1993, respectively.

From Tables A3.1 and A3.2 we see that the results of the first stage-regression for the sub-samples are not much different from the first stage regression for the whole sample as in previous section in terms of the significant factors and the direction of effect. However, there are some changes in the degree of significance. For example, in 1992/1993 whole sample, the availability of formal funds at village level is found positively and significantly related to household borrowing at 1% level of significance, but in the sub-sample of poorer households, the effect is found at 5% level of significance (see Table A3.2).

By comparing the results from the regressions on 6 samples: whole samples (2) and sub-samples (4), we find that the following variables have a significant effect on the household credit: age of household head, household size, financial savings, non-financial savings, the availability of informal funds and formal funds at village level. The owning of land is also found to be significant to household access to credit in most of the samples, except for the sub-sample of better-off households in 1992/1993. The significance of these variables in all samples implies that these variables are indeed the key determinants of household borrowing.

Our main interest however is to test whether the results from the second stage regression alter our findings on the impact of credit from the previous section. Table 7 shows the Durbin-Wu-Hausman tests which indicate whether or not the instruments and the second stage are appropriate. The results reveal that the two-stage regression and the instruments are more appropriate for most of the dependent variables and the sub-samples, except for the per capita food expenditure in the sub-sample of better-off households in 1992/1993. Therefore, we do an extra test using least squares regression for this case and the two-stage regressions for the rest.

As before, the predicted residuals, which are calculated from the first-stage regression, are added as an explanatory variable in the regression. The extracts of the second stage test results are also reported in Table 7 for the sub-samples of better-off households and for the sub-samples of poorer households. The test results are reported in Tables A3.2 and A3.4 for the samples of better-off households and in Tables A3.5 and A3.6 for the samples of poorer households. The extra test of per capita food expenditure using least squares regression for the sample of better-off households in 1997/1998 is reported in Table A3.7.

For all sub-samples, the results indeed confirm the findings of the previous section. The household borrowing is positively and significantly related to household welfares at 1% level of significance, except to the per capita food expenditure in the sub-sample of better-off households in 1997/1998 at 10% level of significance. The coefficients however are slightly different. For example, the effect of the same increase of x% in the total household credit in 1997/1998 results in an increase of $(1+x)^{.058897} - 1\%$ in per capita expenditure for the whole sample, higher than an increase of $(1+x)^{.0261606}-1\%$ for the sub sample of better-off households and $(1+x)^{.051041}$ for the sub-sample of poorer households.

This result is important for two reasons. First, it confirms that our findings in the section 5 pass the robustness tests and the conclusion that household borrowing is positively and significantly related to household welfare is consistent. Second, it indicates that

household borrowing can contribute to household welfare regardless of whether the households are poorer or better off households. Moreover, we find that if the household borrowing increases by the same percentage, it contributes more to the welfares of poorer households, compared with better-off households. Specifically, an increase of x% in household borrowing increases $(1+x)^{.051041} - 1$ % in per capita expenditure for poorer households but $(1+x)^{.026106} - 1$ % for better-off households.

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Table 1: Comparative Indicators of Rural Financial Institutions

	Population: 78 million people in Vietnam; Total rural households: 12 million Estimated low-income households: 6.7 million											
	Total rural customers (households)						Total rural Low-income household customers					
Financial Institutions (FIs)	Total customers (1,000 households)		% of total rural households		Average loan in 1,000 VND		LIH customers (1,000 household)		% of total customers of FI		% of LIHs	
	1998	2001	1998	2001	1998	2001	1998	2001	1998	2001	1998	2001
VBARD	4,000	5,000	33%	41.7%	4,100	6,450	1,800	2,350	45%	47.0%	27%	35.1%
VBP	1,300	2,571	11%	21.4%	1,500	2,000	600	1,250	46%	48.6%	9%	18.6%
PCFs	600	720	5%	6%	4,200	3,400	300	400	50%	55.5%	4%	5.9%
RSHBs	10	12	0.08%	0.1%	NA	NA	0	0	0%	0%	0%	0%
Semi-formal	NA	120	NA	1.0%	NA	1,547	NA	120	NA	100%	NA	1.8%
Total	5,910	8,423	49%	70.2%	-	-	2,700	4,120	-	-	40%	61.4%

Source: Vietnam – Canada Outreach Project (2001)

Table 2: Comparison of group and direct lending to farm households of VBARD

Lending method	1995	1998	30/06/2001
Direct lending	1.9%	7.9%	12.4%
Group lending	98.1%	92.1%	87.6%
Total	**100.0%**	**100.0%**	**100.0%**

Source: McCarty (2001)

Table 3: Rural household loans and average loan sizes by sources

Lenders	Average loan size (1,000 VND)
Informal financial sector	**1,752**
1.Money lenders	2,141
2.Relatives	1,861
3.ROSCA and other individuals	1,366
Formal & semi-formal financial sector	**3,209**
4.Private banks and cooperatives	2,230
5.Government banks	3,512
6.Government programs and others	1,547

Source: McCarty (2001)

Table 4: Selected indicators of household welfare (in thousand VND)

	1997/1998			1992/1993		
Selected household living standard	Rural households	Rural borrowing households	Urban households	Rural households	Rural borrowing households	Urban households
Per capita expenditure	2361.29	2248.61	5230.33	1161.85	1119.1	2286.14
Per capita food expenditure	1306.81	1251.24	2117.3	702.76	679.36	967.67
Per capita non-food expenditure	1054.48	997.38	3113.04	459.09	439.74	1318.47
Average of poverty status [1..5]	2.85	2.75	4.34	2.84	2.75	4.13
Average amount of borrowing	4626.07	4626.07	13098.42	1328	1328	6215.85

Source: VLSS92/93 and VLSS 97/98

Table 5: First stage Tobit Regression: Determinants of household credit
1997/1998 and 1992/1993
The whole samples

Dependent variable : Total household credit (VND1000, Logarithm)		1997/1998				1992/1993
Explanatory variables	Coefficients	z-statistic	Prob.	Coefficients.	z-statistic	Prob.
The age of household head	1.349238	2.743424	0.0061	-0.534680	-6.649445	0.0000
The age of household head squared	-0.222313	-4.091714	0.0000			
Education of household head (years)	0.074426	2.079463	0.0376	-0.004059	-0.111232	0.9114
Dummy variable: farm household =1; otherwise =0	-0.218607	-0.737600	0.4608	-0.222741	-0.736479	0.4614
Dummy variable: gender of household head: male =1; female=0	0.308263	1.041345	0.2977	0.215318	0.764030	0.4448
Household size (persons)	0.523353	8.092091	0.0000	0.434557	7.904087	0.0000
Farm land owned (Hectare, Logarithm)	0.231562	5.406392	0.0000	0.092318	2.212809	0.0269
Financial savings (VND1000, Logarithm)	-0.216638	-4.325020	0.0000	-0.237987	-5.413677	0.0000
Non-financial savings (VND1000, Logarithm)	-0.313294	-9.322477	0.0000	-0.221818	-6.282292	0.0000
Price of detergent in the village (VND1000/kg, Logarithm)	-0.110967	-0.319148	0.7496	-0.017907	-0.054083	0.9569
Price of fish source (VND1000/bottle, Logarithm)	-1.196459	-4.213158	0.0000	-0.382876	-1.445793	0.1482
Price of noodle (VND1000/pack, Logarithm)	2.887991	3.191280	0.0014	0.470643	0.639311	0.5226
Price of pork (VND1000/kg, Logarithm)	0.798256	0.815365	0.4149	0.081513	0.108388	0.9137
Price of normal rice (VND1000/kg, Logarithm)	-1.209699	-1.243912	0.2135	-0.226098	-0.264794	0.7912
Price of sewing service (VND1000/trouser, Logarithm)	2.166007	4.950512	0.0000	0.310168	0.966095	0.3340
Averaged education in commune (years)	0.017579	0.209168	0.8343	-0.032988	-0.350469	0.7260
Averaged land owned in commune (Hectare, Logarithm)	-0.248341	-1.000495	0.3171	0.151792	1.643362	0.1003
Price index in the region	5.121724	1.625574	0.1040	-9.186247	-2.677549	0.0074
Availability of informal funds in village (VND1000, Logarithm)	0.391335	8.247937	0.0000	0.881074	10.56694	0.0000
Number of households in commune	0.000433	1.435173	0.1512	-0.000145	-1.090582	0.2755
Availability of formal funds in province (VND1000, Logarithm)	0.292953	3.189332	0.0014			
Availability of formal funds in commune (VND1000, Logarithm)	-0.231167	-2.201784	0.0277	0.106379	1.369011	0.1710
Availability of formal funds in village (VND1000, Logarithm)	0.667861	7.758944	0.0000	0.272537	5.315236	0.0000
C	-22.05987	-5.381328	0.0000	-0.658902	-0.172808	0.8628
R-squared			0.145800			0.122646
Adjusted R-squared			0.140771			0.116691
Log likelihood			-8284.762			-6489.587
Uncensored observations			2108			1733
Total observations			4101			3264

Table 6 – Results of Durbin-Wu-Hausman Tests

	The whole sample				Better-off households				Poorer households			
	1997/1998		1992/1993		1997/1998		1992/1993		1997/1998		1992/1993	
Dependent variable (Logarithm)	t -sta.	Prob.	t-sta.	Prob.	t -sta.	Prob.	t-sta.	Prob.	t -sta.	Prob.	t-sta.	Prob.
Per capita expenditure	-9.149071	0.0000	-7.650737	0.0000	-3.596091	0.0003	-2.176149	0.0297	-8.444651	0.0000	-5.173894	0.0000
Per capita food expenditure	-6.002171	0.0000	-5.910136	0.0000	-2.780305	0.0055	-1.319384	0.1872	-3.107590	0.0019	-2.612428	0.0091
Per capita non food expenditure	-11.14564	0.0000	-9.021461	0.0000	-2.979476	0.0029	-3.031199	0.0025	-10.94111	0.0000	-6.905298	0.0000

Table 7 – Effect of credit on household welfares

	The whole sample				Better-off households				Poorer households			
	1997/1998		1992/1993		1997/1998		1992/1993		1997/1998		1992/1993	
Dependent variable (Logarithm)	Coeff.	t-sta.	Coeff.	t-sta.	Coeff.	t-sta.	Coeff.	t-sta.	0.051041	9.501470	Coeff.	t-sta.
Per capita expenditure	0.058897	10.76278	0.069796	8.594428	0.026106	4.016450	0.022210	2.993245	0.018306	3.268044	0.049039	5.273333
Per capita food expenditure	0.031550	6.596244	0.051011	6.560122	0.015926	2.590315	0.014053	1.768436*	0.124351	12.49764	0.027171	2.615912
Per capita non food expenditure	0.114328	13.29480	0.124194	9.877993	0.039319	3.753593	0.045279	3.783517	0.051041	9.501470	0.132783	7.017389

- Significant at 1% for all
- * Significant at 10%

Table 8: Second stage Least Squares Regression: Effect of credit on household welfares
1997/1998 – The whole sample

Dependent variable	Per capita expenditure (VND1000, Logarithm)			Per capita food expenditure (VND1000, Logarithm)			Per capita non food expenditure (VND1000, Logarithm)		
Explanatory variables	Coeff.	t-statistic	Prob.	Coeff.	t-statistic	Prob.	Coeff.	t-statistic	Prob.
The age of household head	0.177633	7.306821	0.0000	0.141211	6.645651	0.0000	0.236982	6.203212	0.0000
The age of household head squared	-0.011968	-4.495937	0.0000	-0.010793	-4.638587	0.0000	-0.013962	-3.337507	0.0009
Education of household head (years)	0.021521	11.73443	0.0000	0.011561	7.211788	0.0000	0.035329	12.25802	0.0000
Dummy variable: farm household =1; otherwise =0	-0.023968	-1.597689	0.1102	-0.024622	-1.877764	0.0605	-0.021334	-0.904948	0.3655
Dummy variable: gender of household head: male =1; female=0	0.001698	0.114598	0.9088	0.042384	3.272195	0.0011	-0.057059	-2.450155	0.0143
Household size (persons)	-0.102083	-27.05984	0.0000	-0.095099	-28.84122	0.0000	-0.115973	-19.56257	0.0000
Farm land owned (Hectare, Logarithm)	-0.011821	-5.475450	0.0000	-0.005308	-2.813256	0.0049	-0.019447	-5.732373	0.0000
Financial savings (VND1000, Logarithm)	0.058729	22.25537	0.0000	0.041436	17.96455	0.0000	0.086300	20.81076	0.0000
Non-financial savings (VND1000, Logarithm)	0.045339	23.76919	0.0000	0.025533	15.31461	0.0000	0.077134	25.73254	0.0000
Price of detergent in the village (VND1000/kg, Logarithm)	0.005053	0.288457	0.7730	0.025555	1.668933	0.0952	-0.032365	-1.175645	0.2398
Price of fish source (VND1000/bottle, Logarithm)	0.063933	4.294735	0.0000	0.048672	3.740697	0.0002	0.093392	3.992248	0.0001
Price of noodle (VND1000/pack, Logarithm)	0.081608	1.738382	0.0822	0.101111	2.464200	0.0138	-0.042754	-0.579544	0.5623
Price of pork (VND1000/kg, Logarithm)	0.406621	8.407764	0.0000	0.296651	7.017768	0.0000	0.520518	6.848926	0.0000
Price of normal rice (VND1000/kg, Logarithm)	0.210225	4.321962	0.0000	0.247643	5.824863	0.0000	0.204924	2.680927	0.0074
Price of sewing service (VND1000/trouser, Logarithm)	0.070426	2.987775	0.0028	0.007520	0.365022	0.7151	0.162953	4.399208	0.0000
Averaged education in commune (years)	0.011397	2.747349	0.0060	0.010979	3.027804	0.0025	0.020441	3.135507	0.0017
Averaged land owned in commune (Hectare, Logarithm)	0.058936	4.704746	0.0000	0.065031	5.939285	0.0000	0.063567	3.229086	0.0013
Price index in the region	-1.925638	-12.36355	0.0000	-1.486674	-10.92062	0.0000	-2.830734	-11.56548	0.0000
Total household credit (VND1000, Logarithm)	0.058897	10.76278	0.0000	0.031550	6.596244	0.0000	0.114328	13.29480	0.0000
Predicted residuals	-0.051599	-9.149071	0.0000	-0.029587	-6.002171	0.0000	-0.098780	-11.14564	0.0000
C	6.471063	31.34931	0.0000	6.224408	34.49953	0.0000	5.165934	15.92564	0.0000
R-squared			0.474517			0.385771			0.443598
Adjusted R-squared			0.471941			0.382760			0.440870
F-statistic			184.2145			128.1238			162.6414
Probability (F-statistic)			0.000000			0.000000			0.000000
Observations			4101			4101			4101

Table 9: Second stage Least Squares Regression: Effect of credit on household welfares
1992/1993 – The whole sample

Dependent variable	Per capita expenditure (VND1000, Logarithm)			Per capita food expenditure (VND1000, Logarithm)			Per capita non food expenditure (VND1000, Logarithm)		
Explanatory variables	Coeff.	t-statistic	Prob.	Coeff.	t-statistic	Prob.	Coeff.	t-statistic	Prob.
The age of household head	0.090527	15.87109	0.0000	0.068599	12.56038	0.0000	0.137327	15.55116	0.0000
Education of household head (years)	0.025197	10.58782	0.0000	0.016105	7.067884	0.0000	0.041430	11.24481	0.0000
Dummy variable: farm household =1; otherwise =0	-0.150273	-7.622210	0.0000	-0.098088	-5.196055	0.0000	-0.234073	-7.668874	0.0000
Dummy variable: gender of household head: male =1; female=0	-0.021696	-1.186900	0.2354	0.018206	1.040173	0.2983	-0.095532	-3.375689	0.0007
Household size (persons)	-0.078290	-18.48049	0.0000	-0.074983	-18.48536	0.0000	-0.088868	-13.54973	0.0000
Farm land owned (Hectare, Logarithm)	-0.001443	-0.533001	0.5941	1.65E-05	0.006351	0.9949	2.70E-05	0.006436	0.9949
Financial savings (VND1000, Logarithm)	0.040729	13.67241	0.0000	0.032491	11.39107	0.0000	0.058051	12.58704	0.0000
Non-financial savings (VND1000, Logarithm)	0.036854	14.84336	0.0000	0.021212	8.922329	0.0000	0.063629	16.55315	0.0000
Price of detergent in the village (VND1000/kg, Logarithm)	-0.111503	-5.218410	0.0000	-0.096806	-4.731683	0.0000	-0.126994	-3.838965	0.0001
Price of fish source (VND1000/bottle, Logarithm)	-0.051007	-2.966216	0.0030	-0.059988	-3.643340	0.0003	-0.043821	-1.646044	0.0999
Price of noodle (VND1000/pack, Logarithm)	-0.238041	-4.992694	0.0000	-0.166472	-3.646553	0.0003	-0.426246	-5.774601	0.0000
Price of pork (VND1000/kg, Logarithm)	0.297911	6.016148	0.0000	0.270648	5.708156	0.0000	0.357521	4.663510	0.0000
Price of normal rice (VND1000/kg, Logarithm)	0.082461	1.551289	0.1209	0.222024	4.362158	0.0000	-0.119833	-1.456118	0.1455
Price of sewing service (VND1000/trouser, Logarithm)	0.134822	6.573578	0.0000	0.032058	1.632429	0.1027	0.309711	9.753856	0.0000
Averaged education in commune (years)	0.017738	2.853165	0.0044	0.016384	2.752460	0.0059	0.023928	2.486101	0.0130
Averaged land owned in commune (Hectare, Logarithm)	-0.005925	-1.014662	0.3103	-0.006104	-1.091577	0.2751	-0.011215	-1.240420	0.2149
Price index in the region	1.102585	4.867014	0.0000	0.700230	3.228127	0.0013	1.549224	4.417173	0.0000
Total household credit (VND1000, Logarithm)	0.069796	8.594428	0.0000	0.051011	6.560122	0.0000	0.124194	9.877993	0.0000
Predicted residuals	-0.064254	-7.650737	0.0000	-0.047526	-5.910136	0.0000	-0.117299	-9.021461	0.0000
C	4.658843	18.72168	0.0000	4.903242	20.57829	0.0000	2.398795	6.226434	0.0000
R-squared			0.375452			0.245630			0.387949
Adjusted R-squared			0.371794			0.241211			0.384364
F-statistic			102.6397			55.59346			108.2218
Probability (F-statistic)			0.000000			0.000000			0.000000
Observations			3264			3264			3264

Appendix 3
Table A3.1: First stage Tobit Regression: Determinants of household credit
1997/1998 and 1992/1993
Samples of better off households

	1997/1998					1992/1993
	Coefficients	z-statistic	Probability	Coefficients	z-statistic	Probability
The age of household head	1.482429	2.087290	0.0369	-0.579146	-4.996796	0.0000
The age of household head squared	-0.249041	-3.222121	0.0013			
Education of household head (years)	0.007877	0.158410	0.8741	-0.051062	-1.005726	0.3145
Dummy variable: farm household =1; otherwise =0	-0.414386	-1.074531	0.2826	-0.051352	-0.131594	0.8953
Dummy variable: gender of household head: male =1; female=0	0.432647	1.042593	0.2971	0.408491	1.019818	0.3078
Household size (persons)	0.716737	7.233349	0.0000	0.505222	6.342865	0.0000
Farm land owned (Hectare, Logarithm)	0.204441	3.725166	0.0002	-0.010655	-0.196161	0.8445
Financial savings (VND1000, Logarithm)	-0.262307	-3.519889	0.0004	-0.276602	-4.807256	0.0000
Non-financial savings (VND1000, Logarithm)	-0.375904	-8.139905	0.0000	-0.217089	-4.613575	0.0000
Price of detergent in the village (VND1000/kg, Logarithm)	-0.051318	-0.103650	0.9174	-0.218519	-0.442688	0.6580
Price of fish source (VND1000/bottle, Logarithm)	-1.324972	-3.297068	0.0010	-0.613812	-1.567573	0.1170
Price of noodle (VND1000/pack, Logarithm)	2.329617	1.881117	0.0600	1.121625	1.041135	0.2978
Price of pork (VND1000/kg, Logarithm)	-0.957336	-0.658424	0.5103	0.454189	0.435486	0.6632
Price of normal rice (VND1000/kg, Logarithm)	-0.248053	-0.175695	0.8605	-0.332729	-0.260674	0.7943
Price of sewing service (VND1000/trouser, Logarithm)	1.584815	2.204726	0.0275	0.430463	0.936327	0.3491
Averaged education in commune (years)	-0.196099	-1.494119	0.1351	-0.022342	-0.170444	0.8647
Averaged land owned in commune (Hectare, Logarithm)	-0.386283	-1.111172	0.2665	0.297731	1.902234	0.0571
Price index in the region	6.269649	1.341001	0.1799	-10.62508	-2.218079	0.0265
Availability of informal funds in village (VND1000, Logarithm)	0.356408	5.142530	0.0000	1.120213	8.175622	0.0000
Number of households in commune	-4.12E-05	-0.096847	0.9228	-0.000161	-0.864821	0.3871
Availability of formal funds in province (VND1000, Logarithm)	1.129812	5.298885	0.0000			
Availability of formal funds in commune (VND1000, Logarithm)	-0.324574	-2.120559	0.0340	0.086610	0.765687	0.4439
Availability of formal funds in village (VND1000, Logarithm)	0.494974	3.956040	0.0001	0.351559	4.818852	0.0000
C	-23.94437	-3.679823	0.0002	-2.959063	-0.549737	0.5825
R-squared			0.158539			0.143696
Adjusted R-squared			0.149953			0.133665
Log likelihood			-4697.249			-3667.170
Uncensored observations			1163			949
Total observations			2377			1901

Table A3.2: First stage Tobit Regression: Determinants of household credit
1997/1998 and 1992/1993
Samples of poorer households

	1997/1998					1992/1993
	Coefficients	z-statistic	Probability	Coefficients	z-statistic	Probability
The age of household head	1.197938	1.779823	0.0751	-0.429008	-3.723920	0.0002
The age of household head squared	-0.193498	-2.561636	0.0104			
Education of household head (years)	0.128646	2.501598	0.0124	0.051385	0.968642	0.3327
Dummy variable: farm household =1; otherwise =0	-0.161231	-0.334436	0.7381	-0.513989	-1.002713	0.3160
Dummy variable: gender of household head: male =1; female=0	0.274598	0.666179	0.5053	0.024857	0.064292	0.9487
Household size (persons)	0.438137	4.840693	0.0000	0.332937	4.285694	0.0000
Farm land owned (Hectare, Logarithm)	0.316576	4.380443	0.0000	0.293848	4.231558	0.0000
Financial savings (VND1000, Logarithm)	-0.274773	-4.015568	0.0001	-0.192296	-2.641463	0.0083
Non-financial savings (VND1000, Logarithm)	-0.308241	-5.862193	0.0000	-0.285373	-4.997261	0.0000
Price of detergent in the village (VND1000/kg, Logarithm)	-0.276965	-0.577673	0.5635	0.532688	1.208473	0.2269
Price of fish source (VND1000/bottle, Logarithm)	-1.350183	-3.383665	0.0007	0.068229	0.190339	0.8490
Price of noodle (VND1000/pack, Logarithm)	2.523247	1.842784	0.0654	0.248290	0.245684	0.8059
Price of pork (VND1000/kg, Logarithm)	0.650072	0.477229	0.6332	0.096512	0.087598	0.9302
Price of normal rice (VND1000/kg, Logarithm)	-2.762737	-2.071433	0.0383	-0.095574	-0.085894	0.9316
Price of sewing service (VND1000/trouser, Logarithm)	2.252245	4.230249	0.0000	-0.023061	-0.051457	0.9590
Averaged education in commune (years)	0.118262	1.084625	0.2781	-0.029207	-0.203117	0.8390
Averaged land owned in commune (Hectare, Logarithm)	-0.070447	-0.197140	0.8437	-0.073971	-0.642651	0.5205
Price index in the region	3.402068	0.762781	0.4456	-8.633828	-1.745767	0.0809
Availability of informal funds in village (VND1000, Logarithm)	0.314011	4.915044	0.0000	0.604826	5.988348	0.0000
Number of households in commune	0.001036	2.394920	0.0166	-8.67E-05	-0.451760	0.6514
Availability of formal funds in province (VND1000, Logarithm)	-0.060398	-0.593116	0.5531			
Availability of formal funds in commune (VND1000, Logarithm)	-0.130897	-0.921561	0.3568	0.147632	1.424559	0.1543
Availability of formal funds in village (VND1000, Logarithm)	0.722338	6.118278	0.0000	0.163339	2.317389	0.0205
C	-15.98472	-3.112358	0.0019	1.116361	0.195014	0.8454
R-squared			0.157419			0.111910
Adjusted R-squared			0.145517			0.097329
Log likelihood			-3538.583			-2785.511
Uncensored observations			945			784
Total observations			1724			1363

Table A3.3: Second stage Least Squares Regression: Effect of credit on household welfares
1997/1998 – Sample of better off households

Dependent variable	Per capita expenditure (VND1000, Logarithm)			Per capita food expenditure (VND1000, Logarithm)			Per capita non food expenditure (VND1000, Logarithm)		
Explanatory variables	Coeff.	t-statistic	Prob.	Coeff.	t-statistic	Prob.	Coeff.	t-statistic	Prob.
The age of household head	0.105239	3.846885	0.0001	0.080154	3.097539	0.0020	0.150628	3.416559	0.0006
The age of household head squared	-0.007210	-2.433567	0.0150	-0.006171	-2.201853	0.0278	-0.010496	-2.198155	0.0280
Education of household head (years)	0.015954	8.181388	0.0000	0.006913	3.747514	0.0002	0.027094	8.621462	0.0000
Dummy variable: farm household =1; otherwise =0	-0.024470	-1.604713	0.1087	-0.033422	-2.317186	0.0206	-0.011651	-0.474116	0.6355
Dummy variable: gender of household head: male =1; female=0	-0.028193	-1.747057	0.0808	0.031109	2.038015	0.0417	-0.100704	-3.872222	0.0001
Household size (persons)	-0.058316	-11.49840	0.0000	-0.071708	-14.94772	0.0000	-0.037955	-4.643786	0.0000
Farm land owned (Hectare, Logarithm)	-0.012373	-5.753556	0.0000	-0.007664	-3.767768	0.0002	-0.014441	-4.166934	0.0000
Financial savings (VND1000, Logarithm)	0.035423	11.23859	0.0000	0.023019	7.720933	0.0000	0.049985	9.840436	0.0000
Non-financial savings (VND1000, Logarithm)	0.024978	10.89509	0.0000	0.012115	5.586715	0.0000	0.041458	11.22114	0.0000
Price of detergent in the village (VND1000/kg, Logarithm)	0.023680	1.226756	0.2200	0.058599	3.209374	0.0013	-0.025966	-0.834678	0.4040
Price of fish source (VND1000/bottle, Logarithm)	0.031532	1.969558	0.0490	0.032220	2.127657	0.0335	0.025938	1.005330	0.3148
Price of noodle (VND1000/pack, Logarithm)	0.166974	3.306420	0.0010	0.139007	2.910065	0.0036	0.179743	2.208577	0.0273
Price of pork (VND1000/kg, Logarithm)	0.358520	6.668940	0.0000	0.299330	5.886400	0.0000	0.424301	4.897411	0.0000
Price of normal rice (VND1000/kg, Logarithm)	-0.018917	-0.348569	0.7274	0.096908	1.887775	0.0592	-0.111001	-1.269146	0.2045
Price of sewing service (VND1000/trouser, Logarithm)	0.059863	2.075867	0.0380	-0.021146	-0.775214	0.4383	0.161764	3.480762	0.0005
Averaged education in commune (years)	0.002321	0.458462	0.6467	0.008353	1.744110	0.0813	-0.001158	-0.141975	0.8871
Averaged land owned in commune (Hectare, Logarithm)	0.034388	2.540981	0.0111	0.061016	4.766437	0.0000	0.008081	0.370524	0.7110
Price index in the region	-1.263575	-6.942171	0.0000	-1.294024	-7.516126	0.0000	-1.327817	-4.526709	0.0000
Total household credit (VND1000, Logarithm)	0.026106	4.016450	0.0001	0.015926	2.590315	0.0096	0.039319	3.753593	0.0002
Predicted residuals	-0.023924	-3.596091	0.0003	-0.017496	-2.780305	0.0055	-0.031944	-2.979476	0.0029
C	7.120872	28.33292	0.0000	6.753054	28.40636	0.0000	5.885884	14.53181	0.0000
R-squared			0.262783			0.207108			0.226162
Adjusted R-squared			0.256524			0.200378			0.219592
F-statistic			41.99005			30.77011			34.42816
Probability (F-statistic)			0.000000			0.000000			0.000000
Observations			2377			2377			2377

Table A3.4: Second stage Least Squares Regression: Effect of credit on household welfares
1997/1998 - Sample of Poorer Households

Dependent variable	Per capita expenditure (VND1000, Logarithm)			Per capita food expenditure (VND1000, Logarithm)			Per capita non food expenditure (VND1000, Logarithm)		
Explanatory variables	Coeff.	t-statistic	Prob.	Coeff.	t-statistic	Prob.	Coeff.	t-statistic	Prob.
The age of household head	0.056421	2.375696	0.0176	0.071065	2.869664	0.0042	0.044997	1.022921	0.3065
The age of household head squared	-0.001746	-0.662550	0.5077	-0.005477	-1.992781	0.0464	0.003913	0.801493	0.4230
Education of household head (years)	0.007530	3.819046	0.0001	0.003411	1.658872	0.0973	0.015331	4.197849	0.0000
Dummy variable: farm household =1; otherwise =0	-0.030852	-1.759911	0.0786	-0.024258	-1.327044	0.1847	-0.044075	-1.357371	0.1748
Dummy variable: gender of household head: male =1; female=0	0.007381	0.496646	0.6195	0.031361	2.023623	0.0432	-0.035619	-1.293862	0.1959
Household size (persons)	-0.050471	-14.18605	0.0000	-0.053460	-14.41048	0.0000	-0.051043	-7.745743	0.0000
Farm land owned (Hectare, Logarithm)	-0.005088	-1.931651	0.0536	0.003123	1.137299	0.2556	-0.022155	-4.541323	0.0000
Financial savings (VND1000, Logarithm)	0.033740	12.87706	0.0000	0.027061	9.904767	0.0000	0.052782	10.87606	0.0000
Non-financial savings (VND1000, Logarithm)	0.025455	12.43450	0.0000	0.012910	6.047718	0.0000	0.054611	14.40236	0.0000
Price of detergent in the village (VND1000/kg, Logarithm)	-0.037814	-2.169528	0.0302	-0.035464	-1.951326	0.0512	-0.055983	-1.734122	0.0831
Price of fish source (VND1000/bottle, Logarithm)	0.062700	3.967621	0.0001	0.033311	2.021521	0.0434	0.139590	4.768889	0.0000
Price of noodle (VND1000/pack, Logarithm)	-0.134074	-2.671820	0.0076	-0.038547	-0.736685	0.4614	-0.390420	-4.200484	0.0000
Price of pork (VND1000/kg, Logarithm)	-0.025062	-0.518647	0.6041	-0.072393	-1.436765	0.1510	-0.016379	-0.183004	0.8548
Price of normal rice (VND1000/kg, Logarithm)	0.262849	5.245271	0.0000	0.262120	5.016368	0.0000	0.338816	3.650309	0.0003
Price of sewing service (VND1000/trouser, Logarithm)	-0.001137	-0.053896	0.9570	-0.013539	-0.615417	0.5384	0.033399	0.854679	0.3928
Averaged education in commune (years)	0.009653	2.516500	0.0119	0.007000	1.750196	0.0803	0.021643	3.046293	0.0024
Averaged land owned in commune (Hectare, Logarithm)	0.022750	1.736243	0.0827	0.014338	1.049396	0.2941	0.046316	1.908402	0.0565
Price index in the region	-0.517644	-3.311883	0.0009	-0.076998	-0.472444	0.6367	-1.439054	-4.970789	0.0000
Total household credit (VND1000, Logarithm)	0.051041	9.501470	0.0000	0.018306	3.268044	0.0011	0.124351	12.49764	0.0000
Predicted residuals	-0.046597	-8.444651	0.0000	-0.017880	-3.107590	0.0019	-0.111824	-10.94111	0.0000
C	6.926433	37.77503	0.0000	6.504283	34.01904	0.0000	5.813469	17.11730	0.0000
R-squared			0.304514			0.199055			0.319078
Adjusted R-squared			0.296347			0.189648			0.311081
F-statistic			37.28245			21.16187			39.90105
Probability (F-statistic)			0.000000			0.000000			0.000000
Observations			1724			1724			1724

Table A3.5: Second stage Least Squares Regression: Effect of credit on household welfares
1992/1993 – Sample of Better off households

Dependent variable	Per capita expenditure (VND1000, Logarithm)			Per capita food expenditure (VND1000, Logarithm)			Per capita non food expenditure (VND1000, Logarithm)		
Explanatory variables	Coeff.	t-statistic	Prob.	Coeff.	t-statistic	Prob.	Coeff.	t-statistic	Prob.
The age of household head	0.041344	7.036635	0.0000	0.029877	4.748102	0.0000	0.064350	6.790454	0.0000
Education of household head (years)	0.012416	5.247050	0.0000	0.004943	1.950727	0.0512	0.023584	6.179458	0.0000
Dummy variable: farm household =1; otherwise =0	-0.090185	-4.983810	0.0000	-0.055646	-2.871361	0.0041	-0.140524	-4.814774	0.0000
Dummy variable: gender of household head: male =1; female=0	-0.064586	-3.483095	0.0005	-0.014724	-0.741470	0.4585	-0.147289	-4.924863	0.0000
Household size (persons)	-0.046938	-10.62202	0.0000	-0.053527	-11.31064	0.0000	-0.036158	-5.073252	0.0000
Farm land owned (Hectare, Logarithm)	-0.006680	-2.621830	0.0088	-0.003217	-1.178899	0.2386	-0.006521	-1.586770	0.1127
Financial savings (VND1000, Logarithm)	0.019549	6.944836	0.0000	0.017005	5.640697	0.0000	0.026395	5.813831	0.0000
Non-financial savings (VND1000, Logarithm)	0.025267	10.86411	0.0000	0.010263	4.120372	0.0000	0.046210	12.31882	0.0000
Price of detergent in the village (VND1000/kg, Logarithm)	-0.068484	-3.023574	0.0025	-0.063628	-2.623074	0.0088	-0.066988	-1.833685	0.0669
Price of fish source (VND1000/bottle, Logarithm)	-0.017290	-0.977541	0.3284	-0.030982	-1.635654	0.1021	-0.006957	-0.243891	0.8073
Price of noodle (VND1000/pack, Logarithm)	-0.129367	-2.602030	0.0093	-0.145947	-2.741044	0.0062	-0.168673	-2.103455	0.0356
Price of pork (VND1000/kg, Logarithm)	0.074835	1.520333	0.1286	0.127805	2.424435	0.0154	-0.001632	-0.020555	0.9836
Price of normal rice (VND1000/kg, Logarithm)	-0.106613	-1.919724	0.0550	0.107255	1.803345	0.0715	-0.393201	-4.389786	0.0000
Price of sewing service (VND1000/trouser, Logarithm)	0.107449	5.208157	0.0000	-0.001997	-0.090405	0.9280	0.277898	8.351556	0.0000
Averaged education in commune (years)	-0.002704	-0.442579	0.6581	-0.003935	-0.601355	0.5477	0.006353	0.644628	0.5192
Averaged land owned in commune (Hectare, Logarithm)	0.000914	0.132145	0.8949	-0.000205	-0.027684	0.9779	-0.003246	-0.290820	0.7712
Price index in the region	0.554354	2.460321	0.0140	0.309643	1.283203	0.1996	0.841229	2.314821	0.0207
Total household credit (VND1000, Logarithm)	0.022210	2.993245	0.0028	0.014053	1.768436	0.0772	0.045279	3.783517	0.0002
Predicted residuals	-0.016701	-2.176149	0.0297	-0.010844	-1.319384	0.1872	-0.037521	-3.031199	0.0025
C	6.484279	26.34712	0.0000	6.256163	23.73613	0.0000	4.962927	12.50283	0.0000
R-squared			0.299244			0.147856			0.313963
Adjusted R-squared			0.292166			0.139249			0.307034
F-statistic			42.27599			17.17758			45.30715
Probability (F-statistic)			0.000000			0.000000			0.000000
Observation			1901			1901			1901

Table A3.6: Second stage Least Squares Regression: Effect of credit on household welfares
1992/1993 – Sample of Poorer Households

Dependent variable	Per capita expenditure (VND1000, Logarithm)			Per capita food expenditure (VND1000, Logarithm)			Per capita non food expenditure (VND1000, Logarithm)		
Explanatory variables	Coeff.	t-statistic	Prob.	Coeff.	t-statistic	Prob.	Coeff.	t-statistic	Prob.
The age of household head	0.026701	4.780936	0.0000	0.011697	1.875111	0.0610	0.071063	6.253407	0.0000
Education of household head (years)	0.007150	2.966701	0.0031	0.003237	1.202542	0.2294	0.018259	3.723619	0.0002
Dummy variable: farm household =1; otherwise =0	-0.007879	-0.338412	0.7351	0.018823	0.723854	0.4693	-0.066460	-1.402895	0.1609
Dummy variable: gender of household head: male =1; female=0	0.024795	1.450950	0.1470	0.050790	2.661083	0.0079	-0.035783	-1.029111	0.3036
Household size (persons)	-0.030593	-7.441198	0.0000	-0.027767	-6.046751	0.0000	-0.046269	-5.530911	0.0000
Farm land owned (Hectare, Logarithm)	-0.003111	-0.958966	0.3377	-0.004170	-1.150952	0.2500	-0.008000	-1.212083	0.2257
Financial savings (VND1000, Logarithm)	0.019858	5.878008	0.0000	0.011793	3.125528	0.0018	0.039096	5.687614	0.0000
Non-financial savings (VND1000, Logarithm)	0.016887	5.588296	0.0000	0.005654	1.675170	0.0941	0.050253	8.173033	0.0000
Price of detergent in the village (VND1000/kg, Logarithm)	-0.052944	-2.640912	0.0084	-0.045502	-2.032126	0.0423	-0.081626	-2.001075	0.0456
Price of fish source (VND1000/bottle, Logarithm)	-0.063558	-3.926671	0.0001	-0.069941	-3.868698	0.0001	-0.071027	-2.156590	0.0312
Price of noodle (VND1000/pack, Logarithm)	-0.084872	-1.890003	0.0590	0.035793	0.713632	0.4756	-0.377734	-4.134090	0.0000
Price of pork (VND1000/kg, Logarithm)	0.172069	3.529359	0.0004	0.086797	1.593979	0.1112	0.321720	3.243144	0.0012
Price of normal rice (VND1000/kg, Logarithm)	0.105205	2.181204	0.0293	0.197888	3.673340	0.0002	-0.056652	-0.577259	0.5639
Price of sewing service (VND1000/trouser, Logarithm)	0.009028	0.458984	0.6463	-0.043014	-1.957845	0.0505	0.126553	3.161953	0.0016
Averaged education in commune (years)	0.017448	2.688828	0.0073	0.023651	3.263192	0.0011	0.000578	0.043760	0.9651
Averaged land owned in commune (Hectare, Logarithm)	-0.006312	-1.299133	0.1941	-0.004198	-0.773571	0.4393	-0.008353	-0.844861	0.3983
Price index in the region	0.654225	2.894228	0.0039	0.114078	0.451845	0.6515	1.278659	2.780066	0.0055
Total household credit (VND1000, Logarithm)	0.049039	5.273333	0.0000	0.027171	2.615912	0.0090	0.132783	7.017389	0.0000
Predicted residuals	-0.049317	-5.173894	0.0000	-0.027813	-2.612428	0.0091	-0.133928	-6.905298	0.0000
C	5.308913	20.57519	0.0000	5.770885	20.02457	0.0000	2.779027	5.293293	0.0000
R-squared			0.102579			0.101323			0.162216
Adjusted R-squared			0.089883			0.088609			0.150363
F-statistic			8.079503			7.969395			13.68619
Probability (F-statistic)			0.000000			0.000000			0.000000
Observations			1363			1363			1363

Table A3.7: Effect of credit on per capita food expenditure
1992/1993 – Sample of Better off Households
Least squares without predicted residuals

Explanatory variables	Coefficient	Std. Error	t-Statistic	Prob.
The age of household head	0.026384	0.005710	4.621038	0.0000
Education of household head (years)	0.004525	0.002515	1.799338	0.0721
Dummy variable: farm household =1; otherwise =0	-0.055831	0.019383	-2.880435	0.0040
Dummy variable: gender of household head: male =1; female=0	-0.012332	0.019779	-0.623469	0.5331
Household size (persons)	-0.050274	0.004040	-12.44310	0.0000
Farm land owned (Hectare, Logarithm)	-0.003549	0.002718	-1.306063	0.1917
Financial savings (VND1000, Logarithm)	0.015525	0.002799	5.547022	0.0000
Non-financial savings (VND1000, Logarithm)	0.009068	0.002321	3.907405	0.0001
Price of detergent in the village (VND1000/kg, Logarithm)	-0.061161	0.024190	-2.528374	0.0115
Price of fish source (VND1000/bottle, Logarithm)	-0.031646	0.018939	-1.670963	0.0949
Price of noodle (VND1000/pack, Logarithm)	-0.133605	0.052427	-2.548387	0.0109
Price of pork (VND1000/kg, Logarithm)	0.130336	0.052691	2.473610	0.0135
Price of normal rice (VND1000/kg, Logarithm)	0.098917	0.059151	1.672285	0.0946
Price of sewing service (VND1000/trouser, Logarithm)	0.005578	0.021340	0.261382	0.7938
Averaged education in commune (years)	-0.004639	0.006523	-0.711212	0.4770
Averaged land owned in commune (Hectare, Logarithm)	0.002059	0.007211	0.285538	0.7753
Price index in the region	0.247368	0.236690	1.045113	0.2961
Total household credit (VND1000, Logarithm)	0.003979	0.002202	1.806958	0.0709
C	6.321087	0.258988	24.40685	0.0000
R-squared				0.147068
Adjusted R-squared				0.138910
F-statistic				18.02809
Probability (F-statistic)				0.000000
Observations				1901