THE IMPACT OF ACCESS TO CREDIT ON HOUSEHOLD WELFARE IN RURAL VIETNAM

M. H. Quach and A. W. Mullineux

ABSTRACT

In this paper, we investigate the determinants of household borrowing from the formal financial sector, the determinants of credit rationing by the formal sector and the impact of credit on household welfare in rural Vietnam. We find that education, savings, the area devoted to farming and the availability of formal credit are important determinants of both household borrowing and credit rationing by the formal sector. We also find that credit has a positive (albeit small) effect on household welfare in rural Vietnam. Our findings have policy implications for land and banking sector reform.

1. INTRODUCTION

A considerable amount of research has been devoted to understanding the functioning of credit markets, credit market imperfections and credit rationing (Amano, 1999; Bester, 1985, 1987; de Meza & Webb, 1987; Hellmann & Stiglitz, 2000; Stiglitz & Weiss, 1981; Swank, 1996). Credit

Accounting and Corporate Financial Management in Emerging Markets
Research in Accounting in Emerging Economies, Volume 7, 279–307

ISSN: 1479-3563/doi:10.1016/S1479-3563(06)07014-9

rationing is broadly regarded as an excess demand for bank loans caused by the asymmetry of information on investment projects between banks and borrowers. Credit rationing occurs if some borrowers have limited access to credit. It thus affects the number of borrowers who receive credit. The other form of rationing occurs when some borrowers are rationed by the amount of credit, i.e., receive less than the amount of credit they demanded.

There has also been a focus on the analysis of rural credit markets (Meyer & Nagarajan, 1992, 2000), which are widely believed to be characterised by high lending transaction costs and lack of collateral when farmers do not own their own land, resulting in high interest rates being charged to borrowers. A combination of the above raises a very interesting research question: How do lenders in rural credit markets select borrowers and how much do they lend?

A number of recent papers have analysed such questions (Kochar, 1997; Pham & Izumita, 2002, Ranjula, 2002; Zeller, 1994). Their approaches and findings vary and differ, largely due to inadequate data. Zeller (1994) sees credit rationing as a function of access to the market conditional on the demand function of borrowers and finds that both formal and informal lenders[1] ration loan supply. They look at total household wealth and the leverage ratio of households. Pham and Izumita (2002) assume an excess demand for credit in the rural markets and thus see credit rationing as a function of access to the market or external credit rationing. They find that reputation, the dependence ratio and the amount of credit demanded are determinants of credit rationing. Their results imply that poorer households are more likely to be rationed.

Another question that one may also pose is, What determines the amount of credit that a household receives? Theoretically, the demand and supply of credit determine the amount of credit, and thus the demand and supply functions need to be separately identified (Pitt & Khandker, 1996; Yadav, Otsuka, & David, 1992). The problem of simultaneous functions leaves the construction of variables a critical issue for the consistent estimate of the household credit functions. Various approaches have been proposed to resolve this issue. For example, based on household and province attributes, Pham and Izumita (2002) construct variables that proxy for both demand and supply. They find that farming area and the total value of livestock are decisive determinants of household borrowing from the formal sector. Others, such as Pitt and Khandker (1996), Khandker (2003) and Khandker and Faruqee (2003), consider household characteristics (such as age and education), village fixed effects (such as prices of selected products) and the competition characteristics (such as characteristics of competitor villages) as

the factors of household borrowing and find education and land owned are the core factors.

Another voluminous strand of literature on the rural credit market attempts to measure the impact of credit on household welfare.[2] Most of this research supports the idea that credit contributes positively to household welfare through improving household production or smoothing consumption over time. The literature also shows that most credit programs do not serve the poorest households, but when the poorest households are served they can definitely benefit through increased income and reduced vulnerability to "shocks" (Morduch & Haley, 2002).

In the context of rural Vietnam, there has been relatively little work (Pham & Izumita, 2002) on the three issues above: determinants of household credit access; determinants of household borrowing; and the impact of credit on household welfare.

This paper contributes to the literature by providing an empirical analysis of the rural credit market in Vietnam. The paper concentrates on formal credit,[3] as this plays a dominant role in Vietnam (Dao, 2002). The purpose of this paper is to analyse (i) the determinants of formal credit access in rural Vietnam; (ii) why and how formal lenders ration credit; and (iii) how access to credit contributes to household welfare. The rest of this paper is organised as follows. In the next section, we briefly describe the credit market in rural Vietnam. Next, we present the econometric model and the hypotheses. Section 4 discusses the characteristics of the household survey data that has been used in this paper. The results of the estimation and testing are presented in Section 5, along with an analysis of the results. The final section concludes with a summary of the findings and draws a policy conclusion.

2. THE RURAL CREDIT MARKET

The rural credit market in Vietnam has been well described in recent papers.[4] Briefly, the rural credit market in Vietnam is categorised into three core sectors: formal, semi-formal and informal. In the formal sector, key providers of microfinance services are the Vietnam Bank for Agriculture and Rural development (VBARD), the Vietnam Bank for the Poor (VBP – now known as Social Policy Bank), the People Credit Funds (PCFs) and the Rural Shareholding Banks (RSHBs). The semi-formal sector is dominated by National Programs, Microfinance Programs of Mass Organisations (such as the Women's Union or Farmer's Union), and Savings & Credit Schemes supported by NGOs and donors. 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 families, friends, traders, ROSCAs and private moneylenders.

Typically, formal and 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 in the formal sector in our study of credit exclusion.

There has been an increasing role of formal credit in the rural credit market. At the end of 1998, formal credit accounted for only 49%, but by the end of 2001, this figure was 70.2% of borrowing households in rural areas (Dao, 2002). In the formal sector, VBARD plays an important role. In 1998, it accounted for 68% of borrowing households and 75% of the outstanding loans in the formal sector (Dao, 2002). The network of VBARD branches reaches to village level using the model of village banking and/or mobile banking. The monthly interest rate charged in the formal sector is, on average, relatively low, at 1.26%, compared with the 3.95% charged in the informal sector (McCarty, 2001). The average loan size from the formal sector is higher at VND 3.2 million, compared with VND 1.7 million in the formal sector (Dao, 2002; McCarty, 2001). However, VBARD usually grants approximately 50% of the actual loan amount requested by a low-income household, and the most decisive criterion for lending is the list of assets of the potential borrower. The most commonly accepted form of asset/collateral is the Land Use Certificate (LUC).[5] If a household has not been provided with the LUC, certification by local authorities that the land is free from disputes can be used as a loan guarantee (Dao, 2002).

The rural credit market is segmented. Following government policy, formal financial institutions offer loans only for the purpose of production (Dao, 2002). In 1998, loans for production capital accounted for about 63.7% of all the loans taken from all sources (McCarty, 2001). Borrowers must present a business proposal when applying for a loan. Furthermore, although the government requires no collateral for loans of up to VND 10 million (equivalent to USD 600), households in general are required to provide their LUCs as collateral in order to a secure a loan (Dao, 2002). Business plans and LUCs are therefore important criteria for the screening of applicants (Mishkin, 2001, chap. 8, pp. 187–198) by formal lenders. The reasons for borrowing from the informal sector are various, of which smoothing consumption (Morduch & Haley, 2002; Rutherford, 1998) is

important. A survey in 2001 conducted by the Microfinance Resource Center at the National Economics University revealed that almost 99% of interviewed households took loans from the informal sector at higher interest rates as a result of restricted access to the formal sector (Dao, 2001).[6] Because rural households in Vietnam traditionally dislike being indebted to individuals, informal borrowing can be viewed either as distress borrowing or the second choice. Households may however borrow from relatives or friends at very low interest rates, but they are not normally in the form of contracts and are therefore temporary.

The government policy framework regarding the rural credit market is also a big concern (Dao, 2002). First, although the interest rate has been liberalised gradually, the low basic interest rates have discouraged formal institutions from extending to more rural households due to high transaction costs that create financial repression (McKinnon, 1973; Shaw, 1973). Second, the issuance of LUCs has been slow and has not yet been completed in many provinces. This reduces the probability of access of rural households to formal credit. Furthermore, an effective use of LUCs as collateral requires a market for transferring LUCs, which does not exist. Third, the policy of expanding lending to rural households and the use of the group lending method[7] with support from social organizations (such as the Farmer's Union or the Women's Union) has been causing a danger of delinquency. Households are formed and certified by social organisations in order to get loans, and they may get higher loans in the next cycle if they do not default, i.e., a rotational system of lending. As a result, many households borrow from the informal sector (short-term loans from money lenders, friends and relatives), repay the formal loans and then get higher formal loans to pay back their informal lenders. Thus, a feature of the rural credit market in Vietnam is the dominance of formal credit. This is different from many other developing countries mainly because of the widespread network of VBARD branches and the supporting policy of the government to extend credit to rural households. This, together with low interest rates, explains why formal credit is preferred by rural households in Vietnam and the fact that households borrow from the informal sector simply because they lack access to the formal sector.

3. THE MODEL

Consider three sets of agents in the rural credit market: households (potential borrowers), formal lenders (such as VBARD) and informal lenders

(such as money lenders, relatives, friends and ROSCAs). Of the households, there are borrowing and non-borrowing households. Households may borrow from formal lenders, informal lenders or both in order to finance their economic activities.[8] Households have a demand for credit and apply for loans. The demand for credit depends on household attributes and the village characteristics in which homeowners are living. Lenders then screen the applications and decide to whom they will offer loans and how much to offer (as the interest rate is fixed). As credit rationing is typical in credit markets (Stiglitz & Weiss, 1981), especially under financial repression, some applicants receive loans, others are rejected and yet others receive smaller loans than they desire. There are thus three major questions that need to be answered: (i) What are the determinants of the credit supply to households? (ii) What are the determinants of credit rationing in the rural credit market? (iii) How much does credit contribute to household welfare?

3.1. The Determinants of Credit

If we consider only households with loans as those that have a demand for credit, it may lead to a sample selection bias because it is possible that households without loans may have a demand for credit but be excluded. However, we ignore the problem that some households receive less credit than they demanded at the pre-set interest rate, i.e., they were also rationed but not in the form of exclusion. In other words, to control for sample selection bias, we adopt the financial exclusion form of credit rationing. Furthermore, the amount of credit supplied to a household that a researcher can observe is the result of the interaction between demand and supply. The difficulty is that the factors that are likely to affect household demand for credit are also likely to affect the supply of credit. For example, ownership of farming land may positively affect household demand for credit, while it may also positively affect the supply of credit if the lenders regard it to be collateral in rural market (e.g., in the case of VBARD). This implies that credit supply and demand curves cannot be easily identified. Thus, the determinants of a credit model, rather than demand and supply separately, are estimated as follows using Tobit regression:

$$\boldsymbol{y} = \boldsymbol{y}_i^* = \begin{cases} \boldsymbol{f}(\boldsymbol{x}_i, \boldsymbol{z}_i) & \text{if } \boldsymbol{y}_i^* > 0 \\ 0 & \text{if } \boldsymbol{y}_i^* \leq 0 \end{cases} \tag{1}$$

where $\boldsymbol{y}_i$ represents the amount of credit that one household receives from

source i, which equals $f(\boldsymbol{x}_i)$ if a household has loans and 0 otherwise (i = source of credit such as formal, informal or total credit); $\boldsymbol{x}_i$ is a vector of explanatory variables that reflect household and local market characteristics; and $\boldsymbol{z}_i$ is a vector of *additional* explanatory variables proxied for the supply side of credit. Household characteristics include natural attributes (e.g., gender and age) and capital assets (e.g., length of education, land ownership and savings). Location characteristics represent distance-comparative-effects and consist of socio-economic factors such as prices of selected common goods and services (e.g., rice, pork and sewing), the mean of local household characteristics (e.g., average of education years in commune). QA :1

The supply of credit depends on the terms of loan contracts, the availability of credit and the competition for loans among borrowers. Given an excess demand for formal credit, as a result of financial repression, and the lack of liquid collateral, we propose that what could actually determine the supply of credit is the availability of credit. We consider the availability of credit at three levels: province, commune and village. Availability of credit from source i is proxied by the total credit from source i. How lenders allocate credit depends on the competition between households at the commune and village levels (Khandker & Faruqee, 2003). Competition is dependent on household and local characteristics, which are included in $\boldsymbol{x}_i$ and the number of potential borrowers (proxied by the number of households in the commune). Moreover, as various sources of credit are substitutes and demand for one source of credit (such as informal credit) may depend on the supply of another source (such as formal credit), we also include the variable proxy for the supply of credit from a substitute source in $\boldsymbol{z}_i$. Thus, $\boldsymbol{z}_i$ includes variables that proxy for the availability of credit, the number of competitors and the supply of credit from a substitute source.

3.2. Determinants of Credit Rationing

Eq. (1) is used to explain factors that affect the amount of credit supplied to a household. It does not specify why some households receive loans while the others are excluded or receive less than the amount demanded. In other words, we may see credit rationing in the rural market, but how do lenders ration credit? Clearly, borrowing is a function of demand for credit and thereby access to the market. What a researcher can observe as the outcome of this process is the amount of credit supplied and the outcome of applications. As the decision to offer loans is conditional on the decision to apply

for loans, it is necessary to separate these two stages: first households decide whether to apply for loans and then lenders decide whether to offer or reject the applications. We employ the Heckman approach (see Heckman, QA :2 1974,1976, 1979, 1980), in which the probability of a household receiving a loan depends first on it has a demand for credit and then on whether its application is accepted by the lender (see similar framework, for example, Zeller, 1994). The first-stage model takes the form below:

$$\boldsymbol{P}(\boldsymbol{y}_i) = \boldsymbol{f}(\boldsymbol{x}_i) \tag{2}$$

where $\boldsymbol{y}_i$ equals 1 if a household has demand for credit from source i, and 0 otherwise; $\boldsymbol{x}_i$ is a vector of explanatory variables that are similar to $\boldsymbol{x}_i$ in Eq. (1), and then

$$\boldsymbol{P}(\boldsymbol{y}_i) = \boldsymbol{f}(\boldsymbol{x}_i, \boldsymbol{z}_i, \boldsymbol{\xi}_i) \tag{3}$$

where $\boldsymbol{y}_i$ equals 1 if a household receives loans from source i; $\boldsymbol{x}_i$ and $\boldsymbol{z}_i$ are vectors of explanatory variables. $\boldsymbol{\xi}_i$ is the Mill's ratio (see Greene, 2003; Wooldridge, 2003 for details) computed from Eq. (2), which controls the sample selection bias. Vector $\boldsymbol{x}_i$ in Eq. (3) represents the household and local characteristics that the lender may use to screen applicants such as age, education, savings and land use. Vector $\boldsymbol{z}_i$ again represents the supply side of credit, which includes proxy variables for the availability of credit and competition between communes (e.g., poverty incidence in the commune and province and average education standards in the commune).

3.3. The Impact of Credit on Household Welfare

The purpose of this subsection is to estimate the effect of household credit (borrowings) on household welfare. Since household welfare (e.g., expenditure) is positively affected by factors that also affect household credit, a simple regression of a welfare equation conditional on household credit may generate biased results. Pitt and Khandker (1996) outline three possible sources of endogeneity of household credit. First, it is possible that credit is not randomly allocated. Lenders (especially formal lenders) may allocate credit based on local socio-economic conditions (e.g., poverty incidence). Second, even if the allocation of credit is random, it is possible that unobservable local attributes may well affect both household demand for credit and household welfare. Third, unmeasured household attributes may affect both household demand for credit and household welfare. For example, households with more effort and dedication may demand more

credit and thus create higher quality welfare. Recent studies have proposed different techniques but the same approach to this problem (e.g., Khandker & Faruqee, 2003; Pham & Izumita, 2002; Pitt & Khandker, 1996). The prevalent approach uses instrumental variables to control the endogeneity of credit in the first stage and then corrects it for the household welfare equation in the second stage. We adopt the econometric framework proposed in Pitt and Khandker (1996) and Khandker and Faruqee (2003). Consider the reduced form of the household welfare equation, as follows:

$$\boldsymbol{y}_i = \boldsymbol{f}(\boldsymbol{C}_i, \boldsymbol{x}_i, \boldsymbol{u}_i^{\boldsymbol{Y}}) \tag{4}$$

where the subscript indicates household i; $\boldsymbol{y}_i$ indicates the outcome of interest (e.g., per capita expenditure); C is the amount of credit borrowed; $\boldsymbol{x}_i$ is a vector of observable factors affecting household welfare; and $\boldsymbol{u}^{\boldsymbol{Y}}$ is a vector of unobservable factors of welfare. Vector $\boldsymbol{x}_i$ includes household and location characteristics (e.g., age, gender, savings and prices of selected goods and services). As $\boldsymbol{u}^{\boldsymbol{Y}}$ is unobservable, it is possible that household credit may serve as an indicator of these unobservable variables, and thus it causes biased results in the estimation of Eq. (4).

To offer a solution for endogenous credit, we first estimate the determinants of household credit, which include instrumental variables that will not be included in Eq. (4) but can be used to predict the amount of household credit that does not depend on household characteristics. Appropriate instrumental variables should not be correlated with household welfare but must be closely correlated with the amount of credit borrowed. In Eq. (1), there are two sets of variables, of which we can see the availability of credit may well serve as instruments. It is safe to assume that the availability of credit at the commune and village levels does affect the total household borrowing but it does not affect the welfare at the household level. Thus the first stage equation is similar to Eq. (1). However, we use the total household borrowings as a dependent variable, rather than borrowing from one specific source. The reason for using the total credit is that if we use one source of credit, it is possible that another source of credit, rather than the controlled source, affects the household welfare. The predicted values are then used instead of actual values in the second stage (i.e., Eq. (4)) to correct for selection bias. The alternative option is to insert both the actual values and the predicted residuals computed from first stage into the second stage equation. The coefficient of the predicted residual in the second stage equation then indicates whether or not the endogeneity of credit is significant.

4. DATA AND MEASUREMENT

The data are drawn from the Vietnam Living Standards Survey – VLSS 1997/1998. The survey was conducted in 1997/1998 by the General Statistical Office. The survey was funded by the UNDP and the Swedish International Development Authority (SIDA). The survey is a part of the Living Standards Measurement Study (LSMS) household surveys conducted in a number of developing countries with technical assistance from the World Bank. The survey covers a sample of 5,999 households, 194 communes and 388 villages. The proportion of rural households is 71.2% (4,269 households), and there are 38.9% of rural households borrowing from all sources. However, after adjusting for data omission, we have selected a sample of 4,101 rural households, of which there are 2,108 borrowing households. Of the borrowing households, 1,246 households borrow from formal sources; 1,213 households borrow from informal sources, resulting in a number of 351 households having loans from both sources. The informal sources of credit include money lenders, relatives and friends, ROSCAs and other individuals. If we exclude all households with zero-interest rate loans from informal sources (most of them have loans from friends and relatives), the sample of borrowing households reduces to 1,645 households. Table 1 gives a brief description of the sample, and Table 2 provides a statistical description of the key variables. Further analysis of variables is undertaken in the following sections.

5. THE RESULTS

5.1. Determinants of Formal Credit

We conducted two separate tests to estimate the determinants of household formal credit allocation. The first test (Test 1.1) is based on the whole sample of rural households with 4,101 observations, of which 1,246 households have formal loans. The second (Test 1.2), which looks at those who receive formal credit, uses the sample of borrowing households with 2,108 observations. The dependent variable is the log of household formal credit extended by time of interview.[9] The explanatory variables include household and location characteristics, the availability of credit and the variables that proxy for competition at the commune and village levels. We also use the proxy variable for the availability of informal credit at the village level for the reason that this source of credit may affect household demand for

Table 1. Summary of Borrowing Households.

	Households	Percentage	Average Loan Size (VND1,000)	Monthly Interest Rate
Borrowing households	2,108			
Formal source	1,246	100%	3,209	1.26%
Private banks and cooperatives		4.4%	2,230	1.59%
Government banks		82.2%	3,512	1.27%
Government programs and others		13.4%	1,547	0.87%
Informal source	1,213	100%	1,752	3.95%
Money lenders		19%	2,141	4.56%
Relatives		48%	1,861	2.63%
ROSCAs and other individuals		33%	1,366	3.69%
Non-borrowing households	1,993			
Total	4,101			

formal credit, as explained in Section 3. Table 3 presents the Tobit regression of the household borrowing equation (Eq. (1)).

At the 95% confidence level, we find that the age of the head of the household (AGE98) is positively and significantly related to the amount of formal credit supplied to households. The significance of the squared age indicates that middle-aged households receive the largest amount of formal credit. The amount of credit is therefore a nonlinear function of the age of the head of household. Education of households (EDUCYR98) is significant, implying that more educated households receive more formal credit. Farm households (FARM98) are seen to receive more credit, indicating that in rural Vietnam, farm households are the preferred clients. Formal credit extension is also dependent on the size of the household (HHSIZE), possibly implying that households with more members either demand more credit or formal lenders provide more credit to them because of their high earning capacity.

The total farming area of households (LGLAND980) is seen as an indicator of both collateral and the size of farm production and is positively

Table 2. Statistics of Key Variables.

Variables	Explanation of Variables	Non-Borrowing HHs		All HHs		Borrowing HHs		Formal Borrowing	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
AGE98	Age group of household head	4.543402	1.504427	4.284565	1.412567	4.039848	1.272664	4.084270	1.217065
AGE98*AGE98	Age squared	22.90467	14.51875	20.35235	13.19449	17.93928	11.29129	18.16132	10.80074
EDUCYR98	Education years of household head	6.150861	4.228838	6.492725	4.050438	6.815939	3.847384	6.857945	3.794083
FARM98	Dummy: Farm households = 1	0.753638	0.431000	0.758839	0.427840	0.763757	0.424874	0.795345	0.403611
GENDER98	Dummy: Male = 1	0.746613	0.435060	0.782004	0.412935	0.815465	0.388012	0.826645	0.378706
HHSIZE	Households size	4.511791	2.025933	4.849549	1.937950	5.168880	1.793819	5.344302	1.835241
LGLAND980	Log of farming area owned	6.435767	3.261838	6.683171	3.157325	6.917079	3.037519	7.064593	3.059102
LGFISA980	Log of financial savings (saving books, deposits .etc)	5.083349	2.323899	4.820754	2.385538	4.572486	2.416824	4.718702	2.456173
LGNFSA980	Log of non-financial savings (savings in kinds)	3.981200	3.834011	3.432162	3.758125	2.913075	3.609820	3.192871	3.668047
LGDETE98	Log of price of detergent in commune (VND 1,000/kg)	1.939069	0.328720	1.940150	0.327640	1.941172	0.326690	1.938566	0.327976
LGFSOU98	Log of price of fish source in commune (VND 1,000/bot)	1.542432	0.395370	1.509139	0.407122	1.477662	0.415575	1.444695	0.432034
LGNOO98	Log of price of noodle in commune (VND1,000/pack)	0.105278	0.119876	0.109959	0.125294	0.114385	0.130083	0.115257	0.137191
LGPORK98	Log of price of pork in commune (VND1,000/kg)	2.998697	0.167860	3.003199	0.168737	3.007455	0.169491	3.026338	0.171293
LGRICE98	Log of price of rice in commune (VND 1,000/kg)	1.235146	0.128080	1.234837	0.127256	1.234545	0.126501	1.233832	0.129430
LGSEW98	Log of price of sewing (VND 1,000/trouser)	2.675130	0.330479	2.694550	0.343081	2.712911	0.353682	2.759295	0.338541
EDUYR98C	Mean of education year in commune	6.442730	2.042569	6.493202	1.951857	6.540920	1.861263	6.412705	1.844661
LGLAN98C	Mean of log of farming area in commune	8.038560	0.583207	8.080288	0.598650	8.119739	0.610412	8.170626	0.608952
RCPIGS98	Price index by region	0.977015	0.045514	0.979988	0.046528	0.982798	0.047306	0.988350	0.045113
LGVIIN980	Log of total informal credit in village	8.218244	2.804840	8.556792	2.597069	8.876870	2.340075	8.414376	2.840987
NOHHS98	Number of households in commune	667.3593	427.3440	654.3011	424.3382	641.9554	421.2058	596.4518	393.1924
LGPRFO980	Log of total formal credit at province level	14.60518	1.758588	14.80475	1.664795	14.99344	1.547901	15.22616	0.959694
LOGCFO980	Log of total formal credit at commune level	9.414417	2.432611	9.728391	2.208659	10.02524	1.927795	10.56044	0.906908
LGVIFO980	Log of total formal credit at village level	8.258445	2.986495	8.756093	2.640434	9.226593	2.162982	9.907602	0.983726
Observations	Number of households	1,993		4,101		2,108		1,246	

Table 3. Results from Tobit Regression: Determinants of Formal Credit..

	Test 1.1		Test 1.2	
	Coefficient	*z*-Statistic	Coefficient	*z*-Statistic
AGE98	3.758498	4.829326*	2.196420	3.872094*
AGE98*AGE98	–0.456323	–5.265458*	–0.214564	–3.333159*
EDUCYR98	0.185905	3.453552*	0.148874	3.690984*
FARM98	0.730163	1.612231	0.714636	2.130596*
GENDER98	0.476951	1.058321	0.314248	0.930317
HHSIZE	0.616284	6.420827*	0.222580	3.107933*
LGLAND980	0.465386	7.175849*	0.241026	5.013996*
LGFISA980	–0.165587	–2.211143*	0.135384	2.503009*
LGNFSA980	–0.261559	–5.118806*	0.042807	1.115107
LGDETE98	0.508889	0.954907	0.382457	0.969152
LGFSOU98	–1.488011	–3.492921*	–0.351738	–1.137395
LGNOO98	2.226429	1.672403**	0.622205	0.636572
LGPORK98	–0.996639	–0.658557	0.754390	0.667149
LGRICE98	–3.169625	–2.175630*	–2.563133	–2.367508*
LGSEW98	1.991168	2.920890*	0.618908	1.263769
EDUYR98C	–0.192808	–1.480780	–0.166986	–1.731353**
LGLAN98C	–0.747076	–2.058645*	–0.706285	–2.671740*
RCPIGS98	–2.380690	–0.505146	–5.937609	–1.725125**
LGVIIN980	–0.111652	–1.697568**	–0.420104	–8.006437*
NOHHS98	–0.000263	–0.552376	–0.000449	–1.278521
LGPRFO980	–0.052588	–0.231004	–0.388116	–2.359462*
LOGCFO980	0.728956	1.867763*	0.571618	1.984287*
LGVIFO980	2.872957	9.253923*	1.964455	8.633500*
C	–37.16056	–5.882620*	–10.25352	–2.220564*
Log likelihood	–5598.107		–4424.520	
Adjusted *R*-squared	0.196636		0.270345	
Total observations	4,101		2,108	
Positive observations	1,246		1,246	

*Significant at 5% level
**Significant at 10% level.

and significantly related to the formal credit extended. This indicates that households owning more farm land demand more credit and formal lenders in fact offer more credit to those households.

Household financial and non-financial savings (LGFISA980 and LGNFSA980) are significantly related to formal credit, but with negative signs in the first test and positive signs in the second test. It is possible that

households with high savings demand less credit and thus they receive less. But it is also possible that (in the second test) when we use as control only those households who are clearly revealed to be demanding credit, the positive signs of financial savings indicate that households with more financial savings are seen to be more creditworthy by formal lenders and thus receive more credit.

We find that the availability of formal credit at the commune level (LOGCFO980) and at the village level (LGVIFO980) is positively and significantly related to the formal credit extended to households. However, at the province level (LGPRFO980), the availability of credit is found to be negatively and significantly related in the second test. This implies that the availability of formal credit is an important determinant of the amount of formal credit that one household may receive, but either there is an inequality in allocation of formal credit between communes or there are too many communes within a province. Specifically, some communes may receive less credit than the others in the same province, and thus households living in these communes may receive less credit compared with other households living in other provinces. The availability of informal credit at the village level (LGVIIN980) is negatively and significantly related to household formal credit at the 90% confidence level in the first test and at the 95% level in the second test, implying that where there is an excess demand for formal credit, i.e., the formal sector does not meet the demand of credit by households, there exists a market for informal credit.

Of the proxy variables for location (fixed) effects, we find that the mean of education in the commune (EDUYR98C), the mean of farming area in the commune (LGLAN98C) and the price index of the province (RCPIGS98) are negatively and significantly related to household formal credit, especially in the second test. A possible explanation of this result is that because households in "better" communes often demand more credit, the amount of formal credit that any one household receives is less (but the number of households receiving credit might be higher). This may imply the fact that there is rationing in the amount of credit as well as financial exclusion.

In short, we have found that total farming area, financial and non-financial savings and availability of formal credit are significant determinants of household formal credit. Households owning more farming land demand more credit, and formal lenders are more likely to offer larger amounts of credit since LUCs can be used as collateral in rural Vietnam. Households with higher savings may demand less credit. However, if they have more savings and do have a need for credit, they may receive more generous formal credit allocation. The availability of formal credit at the village and

commune levels is important to the amount of formal credit that one household receives. The results also show that there is an inequality in allocation of credit within a province or across communes within a province.

5.2. Determinants of Credit Rationing by the Formal Sector

In this section, we test two forms of credit rationing: credit exclusion and rationing of amounts of credit. In the first stage of testing, we use Eq. (2) and conduct tests on whether households demand formal credit. We use the sample of 4,101 households, of which 2,108 households request both formal and informal loans. Given that formal credit is a cheaper source and that it dominates the rural credit market in rural Vietnam as discussed above, we assume that if households request loans, they first seek formal loans and thus the dependent variable equals 1 for those who have either formal or informal loans. However, for a more reasonable assumption, households with zero-interest informal loans are excluded in the second test for the reason that non-zero interest borrowers are most likely to demand loans from the cheaper (rather than interest charging informal lenders) formal sector. There are 1,645 households with non-zero interest loans. Thus, the two alternative tests are presented in Table 4a, namely (2.1) and (2.2), respectively.

In the second stage, we use Eq. (3) and conduct the tests on how formal lenders decide to offer loans. The sample we use for these tests is those households who have loans, i.e., 2,108 and 1,645 households, respectively. There are two possibilities: (i) credit exclusion if a household does not receive any formal loans and (ii) rationing in the amount of credit if a household has both formal and informal loans.

For the test of credit exclusion, if households have formal loans (1,246 households), the dependent variable takes a value of 1, and otherwise 0. The inverse Mill's ratios, which are computed from the first stage, are included as explanatory variables in the second stage. Table 4b represents the second stage tests, Test 3.1 and Test 3.2. The significance of the Mill's ratios and high percentages of correct prediction (71.96% and 78.12%) indicate that the two-stage regressions are more appropriate.

For the test of rationing in amounts of credit, two types of tests were conducted: (i) If households have informal loans (1,213 and 750 households for the first and second samples, respectively), the dependent variable takes the value of 1, otherwise 0. The purpose of these tests is to see why households are being rationed either being excluded or rationed in amount of QA :3

Table 4a. Results from Probit Regression: Probability of Applying for Formal Credit.

Variable	Test 2.1		Test 2.2	
	Coefficient	*z*-Statistic	Coefficient	*z*-Statistic
AGE98	0.166910	1.847101**	0.404057	4.265932*
AGE98*AGE98	–0.031483	–3.183275*	–0.054266	–5.170551*
EDUCYR98	0.010287	1.553428	0.010036	1.491136
FARM98	–0.061831	–1.130932	0.067442	1.202834
GENDER98	0.035150	0.649202	0.020321	0.364873
HHSIZE	0.096402	8.065885*	0.091849	7.588738*
LGLAND980	0.024723	3.170051*	0.014459	1.818839**
LGFISA980	–0.049451	–5.241171*	–0.032069	–3.388112*
LGNFSA980	–0.052710	–8.623011*	–0.048846	–7.782064*
LGDETE98	0.056098	0.882392	0.037159	0.573068
LGFSOU98	–0.279683	–5.383893*	–0.312052	–5.939800*
LGNOO98	0.467778	2.768203*	0.308479	1.820298**
LGPORK98	0.241978	1.389808	0.503740	2.853129*
LGRICE98	–0.392533	–2.223284*	–0.750968	–4.203524*
LGSEW98	0.462954	5.742108*	0.526625	6.459547*
EDUYR98C	0.050313	3.379183*	0.051269	3.390795*
LGLAN98C	0.113579	2.501985*	0.194549	4.240019*
RCPIGS98	–0.075613	–0.133571	1.203721	2.119201*
C	–2.701407	–3.646798*	–5.985611	–7.964278*
Log likelihood	–2609.430		–2526.231	
R-squared	0.081505		0.085321	
LR statistic	463.1079		471.2892	
Probability(LR stat)	0.000000		0.000000	
Total observations	4,101		4,101	
Dependent variable = 1	2,108		1,645	
Percentage correct prediction	63.35		64.81	

*Significant at 5% level
**Significant at 10% level.

credit. Table 5a presents the test results (Test 3.3 and Test 3.4 for samples 1 and 2, respectively), and the significance of the Mill's ratios indicates that the two-stage regressions are appropriate. (ii) If households have both formal and informal loans (351 households for both samples), the dependent variable takes the value of 1, otherwise 0. The purpose of this test is to see why households are being rationed in amount of credit. Table 5b shows the results (Test 3.5 and Test 3.6). The Mill's ratios are not significant in this test, and thus, the two-stage regression is not necessary.

Table 4b. Results from Probit Regression: Probability of Being Granted Credit.

Variable	Test 3.1		Test 3.2	
	Coefficient	*z*-Statistic	Coefficient	*z*-Statistic
AGE98	0.407103	2.809102*	0.106084	3.322559*
AGE98*AGE98	–0.032640	–1.914274**		
EDUCYR98	0.030897	3.025259*	0.041918	3.416101*
FARM98	0.259537	3.145633*	0.144148	1.476160
GENDER98	0.005030	0.060198	0.032832	0.339170
LGFISA980	0.046000	3.105118*	0.029831	1.808339**
LGNFSA980	0.029256	2.663487*	0.050780	4.029634*
EDUYR98C	–0.052447	–2.231807*	–0.045546	–1.641288
LGLAN98C	–0.234607	–3.469965*	–0.393176	–4.731628*
PORU98	–0.000670	–0.267192	–0.000686	–0.233648
NOHHS98	–0.000263	–3.230685*	–0.000290	–3.033580*
NOFPOR98	–0.000159	–1.073828	–0.000515	–2.950293*
LGPRO980	0.055014	4.108307*	0.057827	3.756366*
LGPRFO980	–0.128837	–3.329671*	–0.180923	–3.506067*
LOGCFO980	0.160149	2.407301*	0.007671	0.095329
LGVIFO980	0.371513	6.937432*	0.347980	5.416588*
MILLS (1 and 2)	–0.822340	–3.867150*	–0.735897	–3.894671*
C	–1.958554	–2.049839*	3.075123	2.701524*
Log likelihood	–1155.080		–792.9777	
R-squared	0.189976		0.129876	
LR statistic	541.8052		236.7214	
Probability (LR stat)	0.000000		0.000000	
Total observations	2,108		1,645	
Dependent variable = 1	1,246		1,246	
Percentage correct prediction	71.96		78.12	

*Significant at 5% level.
**Significant at 10% level

5.3. Who Receives Formal Credit or Who Is Excluded?

As shown in Table 4b, of the household attributes, we find that the age of the head of the household (AGE98) is positively and significantly related to the probability of applying for formal loans and the probability of being offered them. Education (EDUYR98) is not significantly related to the probability of applying but is significantly related to the probability of being offered credit, implying that formal lenders screen applications by using education levels. More interestingly, household savings (LGFISA980,

Table 5a. Probability of Being Excluded from the Formal Sector.

Variable	Test 3.3		Test 3.4	
	Coefficient	*z*-Statistic	Coefficient	*z*-Statistic
AGE98	–0.172633	–1.217220	–0.047822	–1.654851***
AGE98*AGE98	0.010842	0.651303		
EDUCYR98	–0.025805	–2.627402*	–0.025915	–2.392328**
FARM98	–0.223021	–2.764176*	–0.132880	–1.493275
GENDER98	0.011265	0.138057	–0.018445	–0.209019
LGFISA980	–0.066026	–4.600638*	–0.059837	–4.065854*
LGNFSA980	–0.036795	–3.501435*	–0.051019	–4.566935
EDUYR98C	0.022214	1.010183	0.010843	0.447920
LGLAN98C	0.136742	2.134553**	0.199247	2.720781*
PORU98	0.003735	1.582073	0.004931	1.909509***
NOHHS98	0.000436	5.354588*	0.000493	5.462981*
NOFPOR98	0.000135	0.938981	0.000374	2.364500**
LGPRO980	–0.033255	–2.593995*	–0.024726	–1.781610***
LGPRFO980	0.211338	5.691731*	0.301982	6.379988*
LOGCFO980	–0.228339	–3.597153*	–0.149362	–2.041934**
LGVIFO980	–0.219530	–4.569855*	–0.137358	–2.508216**
MILLS (1 and 2)	0.653818	3.248622*	0.554439	3.278574*
C	0.700191	0.816742	–3.538992	–3.387448*
Log likelihood	–1251.282		–1034.956	
R-squared	0.129286		0.087202	
LR statistic	371.5890		197.7450	
Probability (LR stat)	0.000000		0.000000	
Total observations	2,108		1,645	
Dependent variable = 1	1,246		750	

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

LGNFSA980) reduce the probability of applying for credit but increase the probability of being offered it. This indicates that if households have savings, they are less likely to demand loans, but if they apply, they are more likely to be successful. In other words, banks are most willing to lend to those that least need to borrow. The productivity of farming land (LGPRO980), which is a proxy for the value of collateral, is also found to be positively and significantly related to the probability of being offered a loan.

As a proxy for competition among households within one location, the number of households in a commune (NOHHS98) reduces the probability

Table 5b. Probability of Being Rationed in Amount of Credit.

Variable	Test 3.5		Test 3.6	
	Coefficient	*z*-Statistic	Coefficient	*z*-Statistic
AGE98	0.381049	2.386669**	0.049810	1.589881
AGE98*AGE98	–0.037446	–2.080031**		
EDUCYR98	0.007475	0.666501	0.009271	0.789857
FARM98	0.004259	0.046046	–0.026075	–0.266399
GENDER98	0.025261	0.277560	0.005615	0.058386
LGFISA980	–0.043559	–2.987450*	–0.051701	–3.337208*
LGNFSA980	–0.020256	–1.882536***	–0.017048	–1.492603
EDUYR98C	–0.006331	–0.249587	–0.014025	–0.528158
LGLAN98C	–0.076753	–1.116748	–0.129386	–1.801081**
PORU98	0.004244	1.567901	0.004838	1.712917
NOHHS98	0.000264	2.940412*	0.000332	3.457073*
NOFPOR98	9.84E–05	0.584729	–8.28E–07	–0.004688
LGPRO980	0.034881	2.372414**	0.033052	2.161167**
LGPRFO980	0.136843	3.011024*	0.181051	3.590752*
LOGCFO980	–0.088627	–1.179738	–0.197566	–2.461886**
LGVIFO980	0.254907	3.913084*	0.241596	3.472660*
C	–5.175718	–5.462623*	–3.274568	–3.466064*
Log likelihood	–894.8133		–822.5585	
R-squared	0.057343		0.035411	
LR statistic	108.8660		60.39470	
Probability (LR stat)	7.77E–16		2.16E–07	
Total observations	2,108		1,645	
Dependent variable = 1	351		351	

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

of receiving formal loans. This may be because there are more applicants for loans from large communes and thus the probability of success for each applicant is less. Similarly, the number of poor households in a commune (NOFPOR98) is negatively significant in the second sample (Test 3.2). This implies either that more applicants reduce the probability of success or that formal lenders may be discouraged from offering loans where there are more poor households. The mean of productivity of the farming area in a commune (LGPRO98C) reduces the probability of being offered credit. The possible reason is that in communes with high productivity, there are more households applying for loans and thus the probability of success for each

household is low. This might imply a quota system of credit allocation by the formal lenders.

Availability of credit at the province, commune and village levels is found to be significantly related to the probability that one household is offered a loan. At the province level (LGPR980) it is found to be negatively significant, but at the commune level (LOGCFO980) and the village level (LGVIFO980) it is positively related. The different signs at different levels are not surprising as they imply inequalities in the distribution of formal credit between communes and villages within a province. However, the implication is that if formal credit is more available at the village and commune levels, an applicant household has a greater probability of receiving loans.

The results thus show that the age of the household head, education, savings, availability of credit and competition among households are the determinants of credit rationing in the rural credit market. Household savings may increase the probability of being offered loans as savings are seen either as collateral or as an indicator of household wealth. The availability of credit at the village and commune levels also increases the probability of being offered it as the gap narrows between demand and supply. However, the number of households and the number of poor households in the commune are variables that reduce the probability of being offered loans from formal lenders.

5.4. Who Faces Credit Rationing?

The above results have shown why some households receive loans from the formal sector while others do not. As an attribute of the Probit model, the results also indicate (with adverse signs of the coefficients) that households that do not receive any formal loans are those that are completely excluded from the formal sector. Looking further at those that are excluded from the formal sector, we conducted further tests to see why they are excluded and determine the difference, if any, between completely excluded and partly excluded households.

As shown in Table 5a, most of the key coefficients are with the adverse signs, compared with those resulting from the tests of households that have loans from the formal sector. This strengthens the above findings and once again indicates that the level of household education, the level of household savings and the availability of formal credit at the commune and village levels reduces the probability of being excluded.

However, when we look at those who are being rationed in amount of credit, i.e., those who receive loans from both formal and informal sectors, the results are interesting. As seen in Table 5b, clear evidence is not found of the effect of age and education levels of the household head on the probability of being rationed in amount of credit. The number of households in a commune increases the probability of being rationed in amount of credit from the formal sector at the 1% level of significance in both samples, indicating that there may be a quota system of credit allocation.

The level of financial savings is found to be negatively and significantly related to the probability of being rationed in amount of credit at the 99% level of confidence, again indicating that household savings reduce the probability of being excluded and being rationed in the amount of credit. The level of non-financial savings is negatively and significantly related to the probability of being partly excluded at the 95% level of confidence and for the second sample only.

Surprisingly, at the 99% level of confidence, the availability of formal credit at the province and village levels is positively and significantly related to the probability of being rationed in the amount of credit from formal credit for both samples, while the availability of formal credit at the commune level is negative and significantly related to the probability of being partly excluded at 5% significance for the second sample. The positive effect of the availability of credit at the village level indicates that demanding households may have a high probability of getting formal loans in the village where formal credit is available, but the amount of the loan is insufficient, and thus they have to borrow from the informal sector. This seems to prove the case of VBARD, which usually grants 50% of the loan amount requested and meets only 14% of the effective demand[10] for loans from the low income households in rural Vietnam (Dao, 2002).

The result thus suggests that the key reason why households are being rationed in the amount of credit is the quota system of credit allocation by formal lenders (mainly VBARD). It also indicates that savings are important factors influencing the amount of credit being granted in rural Vietnam.

5.5. The Impact of Credit on the Welfare of Households

The first stage regression uses Eq. (1). We use the sample of 4,101 households, of which 2,108 households have loans. The dependent variable is the log of total household borrowings, including formal and informal loans.

Table 6a. Results from Tobit Regression: Determinants of Household Borrowings.

Variable	Coefficient	*z*-Statistic
AGE98	1.349238	2.743424*
AGE98*AGE98	–0.222313	–4.091714*
EDUCYR98	0.074426	2.079463*
FARM98	–0.218607	–0.737600
GENDER98	0.308263	1.041345
HHSIZE	0.523353	8.092091*
LGLAND980	0.231562	5.406392*
LGFISA980	–0.216638	–4.325020*
LGNFSA980	–0.313294	–9.322477*
LGDETE98	–0.110967	–0.319148
LGFSOU98	–1.196459	–4.213158*
LGNOO98	2.887991	3.191280*
LGPORK98	0.798256	0.815365
LGRICE98	–1.209699	–1.243912
LGSEW98	2.166007	4.950512*
EDUYR98C	0.017579	0.209168
LGLAN98C	–0.248341	–1.000495
RCPIGS98	5.121724	1.625574
LGVIIN980	0.391335	8.247937*
NOHHS98	0.000433	1.435173
LGPRFO980	0.292953	3.189332*
LOGCFO980	–0.231167	–2.201784*
LGVIFO980	0.667861	7.758944*
C	–22.05987	–5.381328*
Log likelihood	–8284.762	
Adjusted *R*-squared	0.140771	
Total observations	4,101	
Positive observations	2,108	

**Significant at 10% level.
*Significant at 5% level.

QA :8

Explanatory variables include all variables that have been used in Section 3.1. The test results are presented in Table 6a.

Basically, there are no differences in the effects of household and location attributes on total borrowings, as compared with borrowing from formal sources of credit (see Tables 6a and 3). However, for the variables reflecting the availability of formal credit, there are some points to note: (i) availability of formal credit at the province level is found to be positively and

significantly related to household borrowings, while it is found to be negatively and significantly related to formal credit and (ii) availability of formal credit at the commune level is found to be negatively and significantly related to household borrowings but positively and significantly related to formal credit. This possibly implies that where formal credit supply is restricted, households may borrow more from informal lenders.

In the second stage, Eq. (4) is employed. We use the sample of 4,109 households with three dependent variables in logarithmic form as proxies for household welfare: per capita expenditure, per capita food expenditure and per capita non-food expenditure. The explanatory variables, among others, include the log of total household borrowings and the predicted residuals computed from the first stage. The results are presented in Table 6b. The significance of predicted residuals to dependent variables indicates that the two-stage regressions are more appropriate.

The results show that household borrowing is indeed statistically and significantly related to household welfare. At the 95% confidence level, a 10% increase in total borrowings results in a 0.5% increase in per capita expenditure, 0.3% in per capita food expenditure and 1.1% in per capita non-food expenditure. This result confirms the hypothesis that access to credit increases household welfare and reconfirms findings from recent studies (Khandker, 2003; Khandker & Faruqee, 2003; Pitt & Khandker, 1996). However, the effect is found to be small, and it may raise the issue of cost-effectiveness in providing financial services to rural areas.

6. CONCLUSION

In this paper, an analysis of the rural credit market in Vietnam and its impact on household welfare has been attempted. Unlike many other countries, the formal sector has dominated the rural credit market in Vietnam, and so the results may potentially differ in the case of Vietnam. The market share of the formal sector has actually increased from 49% in 1998 to more than 70% in mid-2001. A study by Dao (2001) indicates that if households demand credit, they first apply for loans from the formal sector (e.g., government banks), largely because interest rates are subsidised and thus lower than in the informal sector. However, for many reasons, households choose to borrow from the informal sector at much higher interest rates. They are either those who are completely excluded from the formal sector or those being rationed in the amount of credit. A number of households borrow

Table 6b. Results from Second Stage Least Squares: Impacts of Credit on Household Welfare..

Variable	Per-Capita Expenditure		Per-Capita Food Expenditure		Per-Capita Non-Food Expenditure	
	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic
AGE98	0.177633	7.306821*	0.141211	6.645651*	0.236982	6.203212*
AGE98*AGE98	–0.011968	–4.495937*	–0.010793	–4.638587*	–0.013962	–3.337507*
EDUCYR98	0.021521	11.73443*	0.011561	7.211788*	0.035329	12.25802*
FARM98	–0.023968	–1.597689	–0.024622	–1.877764**	–0.021334	–0.904948
GENDER98	0.001698	0.114598	0.042384	3.272195*	–0.057059	–2.450155*
HHSIZE	–0.102083	–27.05984*	–0.095099	–28.84122*	–0.115973	–19.56257*
LGLAND980	–0.011821	–5.475450*	–0.005308	–2.813256*	–0.019447	–5.732373*
LGFISA980	0.058729	22.25537*	0.041436	17.96455*	0.086300	20.81076*
LGNFSA980	0.045339	23.76919*	0.025533	15.31461*	0.077134	25.73254*
LGDETE98	0.005053	0.288457	0.025555	1.668933**	–0.032365	–1.175645
LGFSOU98	0.063933	4.294735*	0.048672	3.740697*	0.093392	3.992248*
LGNOO98	0.081608	1.738382**	0.101111	2.464200*	–0.042754	–0.579544
LGPORK98	0.406621	8.407764*	0.296651	7.017768*	0.520518	6.848926*
LGRICE98	0.210225	4.321962*	0.247643	5.824863*	0.204924	2.680927*
LGSEW98	0.070426	2.987775*	0.007520	0.365022	0.162953	4.399208*
EDUYR98C	0.011397	2.747349*	0.010979	3.027804*	0.020441	3.135507*
LGLAN98C	0.058936	4.704746*	0.065031	5.939285*	0.063567	3.229086*
RCPIGS98	–1.925638	–12.36355*	–1.486674	–10.92062*	–2.830734	–11.56548*
WTTOCREDIT	0.058897	10.76278*	0.031550	6.596244*	0.114328	13.29480*
RESIDTOBIT1	–0.051599	–9.149071*	–0.029587	–6.002171*	–0.098780	–11.14564*
C	6.471063	31.34931*	6.224408	34.49953*	5.165934	15.92564*
F-statistic	184.2145		128.1238		162.6414	
Prob(*F*-statistic)	0.000000		0.000000		0.000000	
Adjusted *R*-squared	0.471941		0.382760		0.440870	
Total observations	4,101		4,101		4,101	

*Significant at 5% level.
**Significant at 10% level.

from their relatives and friends at zero-interest rates, but these households have been excluded from the analysis of credit rationing by formal lenders.

For those who receive loans from formal sources, the amount of credit that they may receive is affected by various factors, of which education, household savings, the availability of credit and the area devoted to farming are important. Apart from the availability of credit, education, household savings and farming area all represent the wealth of households. The results thus indicate that formal lenders tend to provide more credit to households that are better off. Similarly, we found that households with higher educational standards, higher savings and higher productivity of land are more likely to receive loans. This again strengthens the hypothesis that formal credit is for wealthier rural households and that formal lenders are most willing to grant loans to those who are better off. Interestingly, we have found that for households who are being rationed in the amount of credit, the quota system in credit allocation is the key factor and this seems to prove the case of VBARD.

This analysis has also demonstrated that credit has a positive effect on household welfare as represented by per capita expenditure (food/non-food). Although the effect is small, it does contribute to the notion that QA :5 access to credit may be an essential tool for poverty reduction in rural areas. It also raises the issue of the cost-effectiveness of this approach to poverty reduction. It may be that a policy better aimed at the poor is required.

Since the government of Vietnam is committed to providing credit to rural households as a key component of its strategy for rural development and poverty reduction (Dao, 2002), the policy implications drawn from the findings in this paper are as follows: First, given the effect of farming area and its productivity on household formal credit, land reforms should be accelerated. Many provinces have not yet finished the issuance of LUCs (Dao, 2002) and thus rural households may find it hard to gain access to formal credit as LUCs can be used as collateral. Second, the importance of the availability of credit at the village and commune levels indicates that the government should encourage the expansion of bank branch networks. Although interest rates in the banking sector are gradually being liberalised, the requirement to charge centrally determined interest rates plus a small margin (0.3% and 0.5% per month for short-term and medium-/long-term loans, respectively (Dao, 2002)), remains a constraint on banks' ability to cover lending costs and to develop lending at risk-premium based rates. Thus, a further liberalisation of interest rates could create more incentives for banks (VBARD, VBP) and induce more efficient lending. Third, better-off households seem to benefit more from formal credit. In order to ensure

that poorer households gain access to formal credit, the applicant-screening process should not be based on criteria representing a household's wealth. More emphasis should, for example, be placed on business plans, pre- and post-loan training and group borrowing. Last but not least, using local information obtained from NGOs and other social organisations could be a good policy, but it may raise the danger of delinquency because the rotating system of lending employed by these organisations may hide the nature of repayment.

UNCITED REFERENCES

Ashenfelter & Heckman (1974); Dao (2000); Panjaitan-Drioadisuryo & Kathleen (1999); Pitt & Khandker (1998); Quach (2002); Remenyi & Quinones (2000).

NOTES

1. According to the CGAP, formal providers are sometimes defined as those that are subject not only to general laws but also to specific banking regulation and supervision (development banks, savings and postal banks, commercial banks, and non-bank financial intermediaries). Formal providers may also be any registered legal organisations offering any kind of financial services. Semi-formal providers are registered entities subject to general and commercial laws but are not usually under bank regulation and supervision (financial NGOs, credit unions and cooperatives). Informal providers are non-registered groups such as rotating savings and credit associations (ROSCAs) and self-help groups.

2. See for examples Khandker (1998), Panjaitan–Drioadisuryo (1999), Remenyi (2000), Wright (2000), Khandker (2001), Coleman (2002), Pham and Izumita (2002), QA :4 Khandker and Faruqee (2003), Quach, Mullineux, and Murinde (2003), etc.

3. We include the semi-formal sector in formal sector, and thus the formal sector includes banks, credit and savings institutions, microfinance programs by NGOs, national programs, etc. The informal sector includes loans from relatives, friends, revolving credit associations, etc.

4. See for examples McCarty (2001), Quach (2001), Dao (2002), Pham and QA :5 Izumita (2002), and Quach et al. (2003).

5. An LUC allows households to manage and use their farming land for farm production and it can be transferred. It is not a certificate of possession.

6. M. H. Quach participated in this survey as a team leader, conducting household interviews and processing data in 15 selected provinces across the country from May to July 2001.

7. It is described as a small group of people, each of whom borrows money from a bank. The bank does not require collateral because the borrowers are relatively poor

and do not own much property. Instead, the bank requires group members to be jointly liable for each other's loans – that is, if a member defaults on a loan, the rest of the group is liable for the remainder of the loan. If the group does not honour this joint obligation, then the entire group is cut off from future access to credit.

8. We imply both production and consumption. However, we assume that formal credit is mainly for the purpose of small business and farm production.

9. Including outstanding loans and loans already paid within 12 months.

10. Calculated as the ratio of (total low-income households receiving loans × amount of loan granted) over (total low income households × amount of loan requested) (Dao, 2002).

REFERENCES

Amano, M. (1999). Credit rationing of a Bayesian bank with simple screening technologies. *Japan and the World Economy*, *11*(4), 545–556.

Ashenfelter, O., & Heckman, J. (1974). The estimation of income and substitution effects in a model of family labor supply. *Econometrica*, *42*(1), 73–86.

Bester, H. (1985). Screening vs. rationing in credit markets with imperfect information. *American Economic Review*, *75*(4), 850–855.

Bester, H. (1987). The role of collateral in credit markets with imperfect information. *European Economic Review*, *31*(4), 887–899.

Coleman, B. E. (2002). *Microfinance in northeast Thailand: Who benefits and how much*? (Economics and Research Department Working Paper No. 9). Manila, Philippines: Asian Development Bank.

Dao, V. H. (2000). *Socio-economic impact assessment: Rural credit project funded by the Asian Development Bank*. Hanoi, Vietnam: Microfinance Resource Center, National Economics University of Vietnam.

Dao, V. H. (2001). *Socio-economic impact assessment: Rural finance project financed by the World Bank*. Hanoi, Vietnam: Microfinance Resource Center, National Economics University of Vietnam.

Dao, V. H. (2002). *Outreach diagnostic report: Improving household access to formal financial services in Vietnam*. Hanoi, Vietnam: Vietnam–Canada Rural Finance Outreach Project.

de Meza, D., & Webb, D. (1987). Too much investment: A problem of asymmetric information. *Quarterly Journal of Economics*, *102*(2), 281–292.

Greene, W. H. (2003). *Econometric analysis* (5th ed.). Upper Saddle River, NJ: Prentice Hall.

Heckman, J. (1976). The common structure of statistical models of truncation, sample selection and limited dependent variables. *Annals of Economic and Social Measurement*, *5*, 475–492.

Heckman, J. (1979). Sample selection bias as a specification error. *Econometrica*, *47*(1), 153–161.

Heckman, J. (1980). Sample selection bias as a specification error with an application to the estimation of labor supply functions. In: J. Smith (Ed.), *Female labor supply: Theory and estimation* (pp. 206–248). Princeton, NJ: Princeton University Press.

Hellmann, T., & Stiglitz, J. E. (2000). Credit and equity rationing in markets with adverse selection. *European Economic Review*, *44*(2), 281–304.

Khandker, S. R. (1998). *Fighting poverty with microcredit: Experience in Bangladesh*. New York: Oxford University Press.

Khandker, S. R. (2001). *Does micro-finance really benefit the poor? Evidence from Bangladesh. Asia and Pacific Forum on Poverty: Reforming Policies and Institutions for Poverty Reduction*. Manila, Philippines: Asian Development Bank.

Khandker, S. R. (2003). *Microfinance and poverty: Evidence using panel data from Bangladesh* (World Bank Policy Research Working Paper No. 2945). Washington, DC: World Bank.

Khandker, S. R., & Faruqee, R. R. (2003). The impact of farm credit in Pakistan. *Journal of Agricultural Economics*, *28*, 197–213.

Kochar, A. (1997). An empirical investigation of rationing constraints in rural credit markets in India. *Journal of Development Economics*, *53*(2), 339–371.

McCarty, A. (2001). *Microfinance in Vietnam: A survey of schemes and issues*. Hanoi, Vietnam: British Department of International Development.

McKinnon, R. I. (1973). *Money and capital in economic development*. Washington, DC: Brookings Institution.

Meyer, R., & Nagarajan, G. (1992). An assessment of the role of informal finance in the development process. In: G. H. Peters & B. F. Stanton (Eds), *Sustainable agricultural development: The role of international cooperation* (pp. 644–654). Brookfield, VT: Dartmouth Press.

Meyer, R., & Nagarajan, G. (2000). *A study of rural Asia No. 3. Rural financial markets in Asia: Policies, paradigms, and performance: Asian Development Bank*. New York: Oxford University Press.

Mishkin, F. S. (2001). *The economics of money, banking and financial markets* (6th ed.). New York: Addison-Wesley. QA :6

Morduch, J., & Haley, B. (2002). *Analysis of the effects of microfinance on poverty reduction* (NYU Wagner Working Paper No. 1014) (Prepared by RESULTS Canada for Canadian International Development Agency).

Panjaitan-Drioadisuryo, D. M. R., & Kathleen, C. (1999). Gender, self-employment and microcredit programs: An Indonesian case study. *Quarterly Review of Economics & Finance*, *39*(5), 769–779.

Pham, B. D., & Izumita, Y. (2002). Rural development finance in Vietnam: A microeconometric analysis of household surveys. *World Development*, *30*(22), 319–335.

Pitt, M., & Khandker, S. (1996). Household and intrahousehold impact of the Grameen Bank and similar targeted credit programs in Bangladesh (World Bank Discussion Paper No. 320). Washington, DC: World Bank.

Pitt, M., & Khandker, S. (1998). The impact of group-based credit programs on poor households in Bangladesh: Does the gender of participants matter? *Journal of Political Economy*, *106*(5), 958–995.

Quach, M. H., Mullineux, A. W., & Murinde, V. (2003, September). Microcredit and household poverty reduction in rural Vietnam. Paper presented at the annual conference of the Development Studies Association, University of Strathclyde (also presented at the ESRC seminar on microfinance and rural poverty reduction, October, University of Manchester).

Quach, M. H. (2002). *Towards a sustainable microfinance in Vietnam.* Unpublished MBA dissertation, University of Birmingham, England.

Ranjula, B. S. (2002). Credit rationing in rural India. *Journal of Economic Development*, *27*(2), 1–20.

Remenyi, J., & Quinones, B. (2000). *Microfinance and poverty alleviation: Case studies from Asia and the Pacific*. London**:** Pinter (pp. 131–134, 253-263).

Rutherford, S. (1998). *The poor and their money: An essay about financial services for poor people*. (Working Paper Series 3). Manchester, England: Institute for Development Policy and Management, University of Manchester.

Shaw, E. S. (1973). *Financial deepening in economic development*. New York: Oxford University Press.

Stiglitz, J. E., & Weiss, A. (1981). Credit rationing in markets with imperfect information. *American Economic Review*, *71*(3), 393–410.

Swank, J. (1996). Theories of the banking firm: A review of the literature. *Bulletin of Economic Research*, *48*(3), 173–207.

Wooldridge, J. M. (2003). *Introduction to econometrics* (2nd ed.). Mason, OH: South-Western.

Wright, G. A. N. (2000). *Microfinance systems: Designing quality financial services for the poor*. London: Zed Books.

Yadav, S., Otsuka, K., & David, C. C. (1992). Segmentation in rural financial markets: The case of Nepal. *World Development*, *20*(3), 423–436.

Zeller, M. (1994). Determinants of credit rationing: A study of informal lenders and formal credit groups in Madagascar. *World Development*, *22*(12), 1895–1907.

QA :7

AUTHOR QUERY FORM

ELSEVIER	**Book : RAEE-V007** **Chapter : 7014**	**Please e-mail or fax your responses and any corrections to:** **E-mail:** **Fax:**

Dear Author,

During the preparation of your manuscript for typesetting, some questions may have arisen. These are listed below. Please check your typeset proof carefully and mark any corrections in the margin of the proof or compile them as a separate list*.

Disk use
Sometimes we are unable to process the electronic file of your article and/or artwork. If this is the case, we have proceeded by:
- Scanning (parts of) your article
- Rekeying (parts of) your article
- Scanning the artwork

- *Uncited references*: This section comprises references that occur in the reference list but not in the body of the text. Please position each reference in the text or delete it. Any reference not dealt with will be retained in this section.

Queries and / or remarks

Location in Article	Query / remark	Response
AQ 1	Please verify if words are missing in this sentence.	
AQ 2	Heckman (1974) is not listed in the reference list.	
AQ 3	Please check if the meaning is clear in the sentence "The purpose of these ..."	
AQ 4	Remenyi (2000) is not listed in the reference list.	
AQ 5	Quach (2001) is not listed in the reference list. Please check if the year has to be 2002.	
AQ 6	Please verify the publisher location introduced.	
AQ 7	The volume and page range information were identical in Yadav et al. (1992) and the next reference. Please verify the edits made with information found on the Internet.	
AQ8	Please provide a link to ** inside Table 6a.	

Thank you for your assistance