What determines credit participation and credit constraints of the poor in peri-urban areas, Vietnam?

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What determines credit participation and credit constraints of the poor in peri-urban areas, Vietnam?

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Abstract

This paper uses a novel dataset collected by the first author from peri-urban areas of Ho Chi Minh City, Vietnam in 2008 to examine how the poor use their loans, and factors affecting their credit participation and credit constraints. The paper finds the presence of many commercial banks in the areas does not help the poor, but the poor rely heavily on informal credit. Loans in the peri-urban areas are mainly used for non-productive purposes, which stresses the importance of consumption smoothing motives. Further, households in more rural wards have a higher probability of borrowing than more urban households, thanks to better community relationships and higher interpersonal trust. Competition by borrowing neighbours adversely affects the opportunity for borrowing in urban wards where the poor households' borrowings rely much more on subsidized credit funds. A closer look at specified microcredit sources reveals that household behaviours differ in each market segment. Furthermore, the poor are highly credit-constrained. Wealthier households, in terms of asset holdings and phone possession, among the poor group appear less credit-constrained. However, except in the most rural part of the study area, the likelihood of credit constraints increases with distance to the nearest banks, which suggests that supply-side intervention could help in overcoming credit constraints. Overall, the poor in urban wards are more credit-constrained because of exclusion by commercial banks and weak interpersonal trust.

JEL Classification: C24, C25, H81, R22
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1. Introduction

Microfinance, including microcredit as the main part, and other micro financial services such as insurance and savings vehicles, has become a popular tool in poverty alleviation efforts in developing countries (Armendariz & Morduch, 2010; Microcredit Summit, 2004). The poor have inadequate access to formal credit resources because of barriers imposed by lenders and relatively high transaction costs for small-size loans that discourage lending to the poor (e.g. Khandker, 2005; Pitt & Khandker, 1998; Microcredit Summit, 2007). Thus, a sizeable proportion of poor households are almost certain to borrow from the informal credit sector (Banerjee & Duflo, 2007, 2010). In Vietnam, the poor typically fail to meet the formal credit requirements, and hence find it difficult to access formal credit. Recent studies show that in 2002 the informal credit sector provided approximately 50% of the total credit to the poor and low income households (IFC, 2006; VDR,[2] 2004).

The success of microcredit in alleviating poverty first depends on credit participation and credit constraints. The existing empirical evidence on determinants of credit participation and credit constraints is well established for rural areas (Barslund & Tarp, 2007; Diagne, 1999; Diagne, Zeller, & Sharma, 2000; Izumida & Pham, 2002; Nguyen, 2007; Thaicharoen, Ariyapruchya, & Chucherd, 2004), and for western countries (Avai & Toth, 2001; Chen & Chivakul, 2008; Crook, 2001; Crook & Hochguertel, 2005; Crook & Hochguertel, 2007; Del-Rio & Young, 2005; Margi, 2002). In contrast, investigation into determinants of credit participation and credit constraints for peri-urban households, in Vietnam and elsewhere, is rare.

Lack of analysis for peri-urban areas probably results from a belief that in these areas financial services are available to everyone. This may not be true, as the poor in developing countries who migrate to cities often dwell in peri-urban areas and usually rely on credit to smooth their consumption expenditure.[3] Unlike the rural poor who can increase labour earnings via off-farm work, reduce purchased other inputs and use more self-produced products when they face shocks, the urban or peri-urban poor cannot have the same coping strategies (Kochar, 1995). Most of the urban and peri-urban poor are unskilled and involved in the informal sector; most of them tend to work casually as wage or daily workers (Rashid, 2000, p. 247). During adverse (e.g. disaster, economic) shocks, work opportunities and wages reduce, so households are unable to offset the income decline by sending more members to labour markets or by increasing the number of working hours (Fallon & Lucas, 2002; McKenzie, 2004; Rashid, 2000). Therefore, to fill the income shortage, credit would become important in these areas, especially

[2] Vietnam Development Report

[3] For example, data from HCMC Statistical Office show that population growth rates are 2.7% and 82% for urban districts and peri-urban districts over the last 12 years (1997-2009), respectively. These data are available at http://www.pso.hochiminhcity.gov.vn/so_lieu_ktxh/2000/Dan_so_va_lao_dong/0203.htm/view, and http://www.pso.hochiminhcity.gov.vn/so_lieu_ktxh/2009/Dan_so_va_lao_dong/0201.htm/view

for the poor who have low savings (Skoufias, 2003). Nevertheless, the determinants of credit participation and credit constraints for the poor in these areas remain unknown.

This gap in the current literature prompts the current study to search for answers to the following questions: *First*, does the presence of financial institutions fully offer the peri-urban poor access to credit resources? *Second*, what are determinants of credit constraints and credit participation by the poor? *Third*, is the credit market segmented, even just amongst the poor, in the peri-urban areas?

The paper is structured as follows: the next section provides theoretical the background. Section 3 discusses the data collection and analysis framework. Empirical results are presented in Section 4. The final section offers a summary.

2. Theoretical background

Although the concept of credit access and participation has been used interchangeably, access to credit differs from credit participation. Access to credit means a household is both able to borrow, thanks to credit availability, and can satisfy lending criteria established by lenders; regardless of whether they borrow or not. On the other hand, credit participation means that a household has chosen to borrow and has already borrowed. A household that has participated in borrowing activities has, of course, access to particular credit resources, whereas a household having access to credit may choose whether or not to participate in borrowing activities.

According to Diagne (1999, p. 7), credit participation is more related to potential borrowers' choice (demand for credit), whereas credit access is more from the supply-side and related to potential lenders' choice. Therefore, the concept of credit access closely links to credit constraints. Full credit access implies no constraints imposed by lenders. Likewise, limited credit access means some forms of credit constraints being imposed.

There are two approaches to investigate household credit participation and credit constraints: the demand for consumption smoothing and the analysis of determining factors. The first approach has been widely used to examine how smooth household consumption is during adverse income shocks, and the ways by which households can cope with risks. The second approach is to determine factors affecting household credit participation and constraints. We shall discuss these approaches in turn.

2.1 Consumption smoothing approach

In the *consumption smoothing* approach, there are two ways to explain the existence of credit transactions: the permanent income hypothesis and community risk pooling/sharing.

First, *the permanent income hypothesis*: according to Friedman (1957), any change in consumption caused by shocks to income (transitory income) could be smoothed sufficiently by

borrowing under perfect capital markets,[4] because households will try to maximize their utility over the life cycle by borrowing when having transitory low income and by saving when having transitory high income. Thus, demand for household credit is derived from the demand for smoothing consumption against the income shocks. The violation of assumptions of perfect capital markets in developing countries where the financial markets are heavily distorted by asymmetric information problems, however, could be a reason to justify the existence of credit constraints and credit rationing (Conning & Udry, 2007; Morduch, 1995). Therefore, under imperfect financial markets, consumption is not completely smoothed (Dercon & Krishnan, & Studiën, 2000; Duflo & Udry, 2004; Goldstein, 2004). Dependence of consumption on not only permanent income but also transitory income implies that households are not able to borrow sufficiently to fill the income gap caused by adverse shocks; thus, under this condition the households are credit-constrained (Morduch, 1995, p. 107).

However, the violation of the permanent income hypothesis could result from not only credit constraints but also household precautionary behaviour (Deaton, 1991; Morduch, 1990; Paxson, 1992). Household savings, other accumulated assets, external assistance and remittances or cash transfers could be effective absorbers of the income shocks which help to keep household consumption smoothed even if the household is credit-constrained (Deaton, 1991; Kurosaki, 2006). In such cases, demand for credit would not be derived directly from demand for consumption smoothing, and the credit constraints could not necessarily be inferred from tests for consumption smoothing.

Moreover, many households, especially the poor, may not have enough savings. Such households may want to spend money today rather than waiting until tomorrow; and this approach to spending makes credit constraints more persistent (Armendariz & Morduch, 2005, p. 193). And of course, no savings means no accumulated assets. Armendariz and Morduch argue that credit constraints may be explained by the existence of saving constraints.

In addition, in many developing countries, a significant proportion of the population is not insured or is inadequately insured. Many governments are not able to afford safety nets for their citizens to help them mitigate adverse shocks. Therefore, adverse health shocks to non-working members of households, which do not directly affect household income, will still generate credit demand if the households have inadequate savings to pay healthcare bills (Kochar, 1995). Consequently, credit constraints may occur if the households are not able to borrow sufficiently.

[4] The theory says that both household income and consumption consists of permanent and transitory components; while permanent components of income and consumption are positively related, there is no correlation between transitory components or between either transitory component and the permanent component of the other variable. Therefore, a temporary change in income (i.e. transitory income) would have no effect on consumption.

In addition, in developing countries the demand for credit is not only for coping with income shortage, but also for financing household economic activities; under imperfect financial markets, the credit constraints may exist if the households are not able to borrow adequately to meet the demand for production capital. The credit demand would be greater if households either have larger production projects or face adverse shocks to their production activities such as animal death, harvest loss, drought, flooding, and other disasters; hence households need more capital to enlarge or restore their production.

The community relationship and risk pooling/sharing: is another channel of adverse shock absorption and risk sharing. To see how changes in current income affect household consumption, and how completely a community shares the risks, we consider the following equation (Townsend, 1995, p. 90).

$$\frac{\ln c_t^i - \ln c_\tau^i}{t-\tau} = \beta\left(\frac{\overline{\ln c_t^g} - \overline{\ln c_\tau^g}}{t-\tau}\right) + \phi\left(\frac{\ln y_t^i - \ln y_\tau^i}{t-\tau}\right) + \xi_{t,\tau}^{i,g} \qquad (1)$$

where y^i and c^i are income and consumption of household i respectively, g is the group (village or community), and ζ is the error term. The dependent variable is the consumption change for a particular household. The main explanatory variables of equation (1) are: the first component is mean consumption change for the community or risk-pooling group, and the second component is the idiosyncratic income change for a particular household, and the last is any other shocks. If the risk sharing (pooling) is complete, the coefficient of group consumption will be one (β=1), and the coefficient of idiosyncratic household income will be zero (ϕ=0).

Empirically, β is often smaller than one and ϕ is greater than zero; it implies the risk sharing is substantial, but less than perfect (Townsend, 1995, Table 2). This fact rejects the hypothesis of full risk-sharing because ϕ is greater than zero. The higher ϕ is the less complete is insurance by risk-pooling community/group; changes in household consumption are more associated with changes in current household income. For instance, Townsend (1995, p. 93-94) shows that the coefficient of risk-sharing is lower for the greater Bangkok region than for other poorer regions in Thailand because the consumption changes of the households in Bangkok are highly correlated with their own idiosyncratic income shocks, but less correlated with pooling of risk among their community. On the other hand, households in rural (poorer) areas have better risk-sharing than their counterparts in urban areas since the changes in village's average consumption affects household's consumption through borrowing transactions and other mutual help (Townsend, 1994).

Furthermore, Townsend (1994) finds that household consumption co-moves with village average consumption, but is not much influenced by current household income, sickness,

unemployment, and other household idiosyncratic shocks. He also finds that responses to changes in income in order to smooth consumption could be borrowing activities from the community or banks. Moreover, responses to household income fluctuations are credit transactions rather than sales of assets (Lim & Townsend, 1994; Townsend, 1994).

Kochar (1995, 1999) argues that income shocks do not necessarily require credit participation because households are able to prevent the decline of household income by increasing labour earnings and reducing other inputs. On the other hand, income fluctuations caused by demographic shocks (e.g. death, sickness) can only be smoothed by using credit and depleting non-financial assets since households have lost potential earning labour. Kurosaki (2006, p. 75) provides evidence that villagers in Pakistan used credit, especially informal credit, as the most important mechanism to cope with adverse income shocks.

Furthermore, the demand for insurance and credit is high in most low-income economies (Morduch, 1995, p. 105) because income is not only low but also unstable. Households become vulnerable when consumption declines after adverse income shocks. In well-functioning markets, households may not be vulnerable to income shocks because all risks should be diversified away, hence idiosyncratic or transitory shocks should have no impact on consumption. Households can borrow or save to fill up or send off the changes in their income, therefore, consumption smoothing is complete. When credit markets are imperfect, households are constrained in their ability to obtain credit, and the effect of transitory income on consumption would help explain unsmoothed consumption.

In short, the response to consumption fluctuations is complex. It can be community risk sharing, production diversification, labour earnings, external assistance, sales of accumulated assets, and borrowing. Labour income may be one of the solutions, but it is ineffective in conditions of inadequate employment (both wage and self-employment) during economic downturn/crises (McKenzie, 2004); credit access is the other absorber of the shocks. However, capital market imperfection may result in imperfect risk sharing and credit constraints.

2.2 Analysis of determining factors approach

This approach to investigating credit participation and credit constraints uses household information, such as physical and human capital endowments, in a reduced-form regression equation, to identify the determinants of credit participation and constraints (Barslund & Tarp, 2007; Chen & Chivakul, 2008; Crook & Hochguertel, 2005, 2007; Diagne, Zeller & Sharma, 2000; Jappelli, 1990; Zeller, 1994). Most of the studies define credit-constrained households as the rejected applicants and discouraged households. Kedir, Ibrahim, and Torres (2007) add another group of households; those who are lent an amount less than the amount they demanded (borrower's optimum amount). However, few of the studies define precisely the credit-

unconstrained households. They implicitly treat all households who did not borrow as credit-constrained; but in fact, some households did not borrow because they had enough resources. These households should be considered credit-unconstrained.

Credit participation should be determined by borrowers' demand for credit and their creditworthiness, which is used as criteria to sort out clients by the lenders. Therefore, factors determining credit participation should represent either borrowers' demand for credit or borrowers' creditworthiness. If borrowers are from the general population rather than just from poor households, better endowments (physical and human resources) may enable the households to participate in borrowing activities (Johnston & Morduch, 2007). For example, income, farm size, land and house value, other durable and fixed assets, education, household size or labour force, occupation and ages are important determinants of credit participation (Crook, 2001; Del-Rio & Young, 2005; Diagne, 1999; Izumida & Pham, 2002; Margi, 2002; Nguyen, 2007).

On the other hand, if focusing on poor households, the above determinants may play other roles in explaining credit participation. They could be driving demand factors rather than components of creditworthiness. For example, physical endowments (e.g. assets/land) and human endowments (e.g. education) have a negative relationship with credit participation (Khandker, 2001; Khandker, 2005; Thaicharoen, Ariyapruchya, & Chucherd, 2004).

The different determinants of credit participation for different groups of borrowers imply that the credit markets in developing countries are segmented. The lenders may apply different strategies to screen applications and evaluate clients' creditworthiness for different credit segments (Conning & Udry, 2005, p. 7).

Credit constraint is the typical feature of the credit market in developing countries (Conning & Udry, 2005). Potential borrowers are often excluded, discouraged, rejected, or rationed to smaller loans relative to what they might have optimally demanded. Potential borrowers are systematically sorted out due to their low endowments.

Determinants of credit constraints would better represent barriers to credit markets than those of credit participation because credit constraints reflect obstacles on the credit supply side that block borrowers from accessing credit sources. Thus, the factors affecting credit constraints are components of creditworthiness or lending criteria, and are often used by the lenders to evaluate their clients' creditworthiness in order to sort out potential borrowers. Factors such as age, income, assets, education, occupation, and borrowing experience are empirically found to be significant determinants of credit constraints (Avai & Toth, 2001; Chen & Chivakul, 2008; Crook & Hochguertel, 2005, 2007; Kedir et al, 2007; Jappelli, 1990; Zeller, 1994).

In addition, in many poor countries, especially in rural areas where real estate markets are rigid due to asymmetric information problems and difficulties in enforcing contracts (Morduch, 1995), the fixed assets are often under-valued. As a result, fixed assets such as land and dwellings may not be important determinants of credit constraints and credit rationing. For example, Zeller (1994) shows that physical collateral plays an insignificant role in credit rationing in both informal and formal credit markets. Even in urbanised areas, where the real estate markets function better, lack of legal documents for household property would also cause lenders to not accept the pledge of the fixed assets as collateral or else they substantially undervalue the assets when they are lodged as collateral.

Another obstacle to borrowing involves invisible barriers such as complicated or ambiguous procedures. These discourage potential borrowers, especially the poor, who are likely to have little education and limited social networks. Further, many households "fear" commercial banks and civil servants when they deal with them to have documentation completed for borrowing from formal credit suppliers. Consequently, poorer households may treat the banks and civil servants as alien entities, so the close geographical proximity fails to help the urban poor access formal credit. For example, Barslund and Tarp (2007) find that in Vietnam distance to nearest banks has no effect on credit rationing. It is likely that nearby households are not impeded by the distance to the banks, but are probably blocked by the invisible obstacle of complicated procedures. Therefore, improving education and simplifying lending procedures may be necessary to mitigate credit constraints.

3. Data and Analytical Framework

3.1 Data

A sample of 411 borrowing and non-borrowing households was interviewed in early 2008 in the peri-urban District 9, Ho Chi Minh City (HCMC), Vietnam.[5] Since our focus is on microcredit impacts on poor households, the sample was selected from a list of poor households whose initial income per capita was below the HCMC general poverty line of VND 6 million (approximately US$1 per day).[6] The target sample size was set at 500 households, including 100 reserves, to achieve a realised sample of 400. In fact, 411 households were successfully interviewed, accounting for 26% of the total number of poor households in each of the selected wards in the district. The interviewed sample provides 304 borrowing households and 107 non-borrowing households, with 2,062 members, 955 (46.3%) males and 1,102 (53.7%) females. The sample is likely to be representative for the poor group whose initial income per capita is below the poverty line at the survey time in the district but will not be representative for Ho Chi Minh City nor for Vietnam.

[5] HCMC has 24 Districts. District 9 has the 5th lowest population density, with a population of 227,816 (in 2008).
[6] The list was provided by the District Department of Labour, Invalids and Social Affairs.

The survey was designed to collect data on household and individual demographic-economic variables, commune characteristics, household durable and fixed assets, child schooling and education expenditure, healthcare, food, non-food, housing expenditure, and borrowing activities. We also utilised GPS receivers to collect data on locations of households and facilities in order to measure distances from each household to facilities. The surveyed areas are located in the most dynamic region, HCMC in Vietnam. The city is the biggest economic-financial centre in the country; it accounts for only 6.6% of the country's population in 2005 but one third of GDP. The city economy has recently been growing at above 10% per annum.[7]

The surveyed district is the 5th lowest population density district, and one of the peri-urban districts of HCMC. When it was established in 1997, the district relied heavily on agricultural production, but its economic structure has changed drastically due to current fast industrialisation and urbanisation. The average growth rate of industrial production and services has been very high for the period 1997-2008, namely 24.7% and 28.1% per year respectively. The total number of enterprises, approximately 400 in 1997, increased to 1,658 in 2006.[8] In addition, the district population growth rate is very high; it increased 59% over the period 1997-2008. Population density within the surveyed district in 2008 is heterogeneous. Some wards are very highly populated (called more urban wards) e.g. Phuoc Binh (PB) (18,981 people/km^2), Tang Nhon Phu A (TNPA) (6,546 people/km^2), while others are relatively low (called more rural wards) e.g. Long Phuoc (LP) (300 people/km^2), Long Truong (577 people/km^2). The main economic activities of the district are non-farm economic activities such as industrial production, construction and services, accounting for more than 90%. For our sample, 72% of household heads are small traders, housewives, casual workers, factory workers and the jobless.

3.2 Models for the probability of credit participation and credit constraints

In this study, the aim is to determine possible factors affecting credit participation and credit constraints. Credit participation and credit constraints are binary variables where participating in credit (or being credit-constrained) takes a value of one, and zero otherwise. Thus, to estimate the probability of credit participation and credit constraints when dependent variable Y equals one given a set of explanatory variables x_i, the Probit model is employed. The Probit model is written as follows.

$$p(Y=1|\, x_1, x_2, \ldots, x_k) = \Phi(z) = \Phi(\beta_0 + \beta_1.x_1 + \beta_2.x_2 + \ldots + \beta_\kappa x_k)$$

where p_j is the outcome of the dummy (0-1) variable for the jth observation, Φ is the standard cumulative normal, x_j is the vector of explanatory variables for observation j and β is the vector

[7] See at http://www.hochiminhcity.gov.vn/gioithieu/lists/posts/post.aspx?Source=/gioithieu/&Category=Gi%E1%BB%9Bi+thi%E1%BB%87u+chung&ItemID=9&Mode=1

[8] See at http://www.quan9.hochiminhcity.gov.vn/Office_Infor.asp?Cat=9&ID=192

of coefficients to be estimated. The Probit coefficients are not directly interpretable, but marginal effects for continuous variables could be calculated (at the mean) as:

$$\left.\frac{\partial \Phi(\mathbf{x}\beta)}{\partial x_k}\right|_{\mathbf{x}=\bar{\mathbf{x}}} = \phi(\bar{\mathbf{x}}\beta)\beta_k$$

where x_k is a vector of independent variable (k is the number of independent variables), β is the vector of estimated coefficients, and ϕ is the normal density function. For dummy variables, the discrete change in probability when the dummy variable switches from zero to one is calculated as $\Phi(\bar{\mathbf{x}}_1\beta) - \Phi(\bar{\mathbf{x}}_0\beta)$ where $\bar{\mathbf{x}}_1 = \bar{\mathbf{x}}_0 = \bar{\mathbf{x}}$ except that the *i*th elements of $\bar{\mathbf{x}}_1$ and $\bar{\mathbf{x}}_0$ are set to one and zero respectively (StataCorp, 1997).

The current literature suggests using physical and human capital endowment as explanatory variables to predict the probability of credit participation and credit constraints. Therefore, the Probit models include the household head's gender, age, education, marital status, household size,[9] pre-survey income per capita,[10] pre-survey assets (land/house/durable assets),[11] a dummy variable for phone ownership,[12] location dummies, and distance to nearest bank.[13] Effects of other borrowing neighbours may affect the probability of credit participation and constraints because neighbouring households are likely to share information and borrowing experiences. So the proportion of borrowing neighbours within a radius of one kilometre of each respondent is used as a proxy for information flows.[14] Accordingly, the model for credit participation is as follows:

$$\text{BORROWER}_{ij} = \beta_0 + X_{1ij}\beta_1 + X_{2ij}\beta_2 + X_{3j}\beta_3 + \varepsilon_{ij} \qquad (2)$$

where BORROWER_{ij} is a binary variable representing whether household i in ward j borrowed (1) or not (0). X_{1ij} is a vector of household characteristics and X_{2ij} is the physical endowment of household i in ward j, while X_3 is a vector of ward-level characteristics. These include the proportion of borrowing households within a radius of one kilometre and the distance to the nearest bank within a ward.

[9] The number of under-18-year old children and number of older-than-60-year old members are collinear with household size. However, the ratios of various age groups to total household size may not collinear with household size, thus we ran a regression with ratio of children to household size and ratio of the older-than 60 years old members to household size, but the estimates are statistically insignificant. As a result, we dropped the variables.

[10] The income was collected by the District 9 Department of Labour, Invalids and Social Affairs in collaboration with the Hunger Elimination and Poverty Reduction Unit of each ward in the district from December 2005 to January 2006 in order to classify poor households who are eligible for receiving assistance including preferred loans from the HEPRF.

[11] We use only assets acquired over 24 months prior to oursurvey (rather than all assets) and pre-survey income (rather than current expenditure) to avoid possible endogeneity and reverse causality.

[12] We use the dummy as a proxy for information access; we do not classify phones as durable assets because recently phones, especially landline phones, are given free by the service suppliers. Subscribers have to pay connection fees, monthly fixed charge and actual call charges.

[13] To avoid the collinearity between ward dummy and the distance, the interactions between the distance and ward dummy are used instead of the distance itself.

[14] Alternatively, borrowing neighbours may cause a crowding-out effect because they could be potential competitors when credit resources are limited.

In equation (2), all borrowers are treated the same in the sense that there is no difference between those who borrowed from formal credit sources and those who borrowed from informal credit suppliers. However, it is possible that segmented markets may exist causing the determinants of who can borrow from formal credit to be distinct from the determinants of who can access only informal credit. As a result, multinomial models may help to uncover the roles of each factor in segmented credit markets. Accordingly, the model can be as follows:

$$\text{SPECIFIED\_BORROWER}_{ij} = \beta_0 + X_{1ij}\beta_1 + X_{2ij}\beta_2 + X_{3j}\beta_3 + X_{4ij}\beta_4 + \varepsilon_{ij} \quad (3)$$

where $\text{SPECIFIED\_BORROWER}_{ij}$ is a multinomial variable representing whether a household i in ward j did not borrow (N), or borrowed from the informal credit only (I), or from both the informal and formal credit (B), or from the formal credit only (F). X_is are the same as previously defined.

The results of equation (3) are reported as the Relative Risk Ratios (RRR). For example, for binary independent variables, suppose beta (β) is for the head's gender (1, 0 for male and female respectively), then to get the RRR:

$$e^{\beta_1} = \frac{\frac{P(Y=Y_1)}{P(Y=Y_0)} \mid X=1}{\frac{P(Y=Y_1)}{P(Y=Y_0)} \mid X=0} \qquad e^{\beta_2} = \frac{\frac{P(Y=Y_2)}{P(Y=Y_0)} \mid X=1}{\frac{P(Y=Y_2)}{P(Y=Y_0)} \mid X=0} \qquad e^{\beta_3} = \frac{\frac{P(Y=Y_3)}{P(Y=Y_0)} \mid X=1}{\frac{P(Y=Y_3)}{P(Y=Y_0)} \mid X=0}$$

where $e^{\beta 1}$, $e^{\beta 2}$, and $e^{\beta 3}$ is RRR of household head's gender of corresponding outcome Y_1, Y_2, and Y_3.

For a continuous variable (e.g. head's age),[15] the RRR (or e^{β}) is obtained as follows:

$$e^{\beta_1} = \frac{\frac{P(Y=Y_1)}{P(Y=Y_0)} \mid X+1}{\frac{P(Y=Y_1)}{P(Y=Y_0)} \mid X} \qquad e^{\beta_2} = \frac{\frac{P(Y=Y_2)}{P(Y=Y_0)} \mid X+1}{\frac{P(Y=Y_2)}{P(Y=Y_0)} \mid X} \qquad e^{\beta_3} = \frac{\frac{P(Y=Y_3)}{P(Y=Y_0)} \mid X+1}{\frac{P(Y=Y_3)}{P(Y=Y_0)} \mid X}$$

To examine the determinants of credit constraints, the following model is used:

$$\text{CONSTRAINT}_{ij} = \alpha_0 + X_{1ij}\alpha_1 + X_{2ij}\alpha_2 + X_{3j}\alpha_3 + X_{4ij}\beta_4 + \upsilon_{ij} \quad (4)$$

where CONSTRAINT_{ij} is a binary variable representing whether household i in ward j is credit-constrained (1) or not (0). Credit-constrained households include rejected households, discouraged households, and partial borrowers; credit-unconstrained households consist of full borrowers and other households who do not want to borrow because they have sufficient

[15] If continuous variables in log form, we now are measuring the marginal increase in the RRR ratios for 100% increase in X at the mean.

resources to meet their demand for credit. X_is are the same as defined in credit participation modelling.

3.3 Tobit Type 2 model for credit amount received

Regarding credit amounts received, the dependent variable is continuous and can vary between zero (for non-borrowers) and a certain positive value. Therefore, in this case the Tobit model provides an appropriate estimator (Verbeek, 2004).

Let Y* denote credit amount borrowed, and Z_i is vector of explanatory variables, the estimation equation is postulated as follows:

$$Y_i^* = \beta.Z_i + u_i \qquad u_i \sim NID(0, \sigma^2)$$

However, for a large number of households the credit amount is zero; Tobin (1958) suggests the following model:

$$Y_i \begin{cases} = \beta.Z_i + u_i & \text{if } Y_i^* > 0 \quad \text{for households with credit amount is positive, and} \\ 0 & \text{if } Y_i^* \leq 0 \quad \text{for households with credit amount is zero} \end{cases}$$

A shortcoming of standard Tobit model regression is that the model may produce biased and inconsistent estimates if heteroscedasticity exists (Amemiya, 1984; Johnston & Dinardo, 1997, p. 441). To overcome the problem, a Tobit Type 2 model, which can account for heteroscedasticity, is used. The model is implemented by using the interval regression estimator, which is a generalisation of the Tobit model, where responses can be point data, interval data, left-censored or right-censored. The error terms of the regression are presumed to be normally distributed, and the log likelihood function is as follows:

$$L = -\frac{1}{2}\sum_{j\in C} w_j \left[\left(\frac{y_j - x\beta}{\sigma} \right)^2 + \log 2\pi\sigma^2 \right] + \sum_{j\in L} w_j \log \Phi\left(\frac{y_{Lj} - x\beta}{\sigma} \right)$$
$$+ \sum_{j\in R} w_j \log\left[1 - \Phi\left(\frac{y_{Rj} - x\beta}{\sigma} \right) \right] + \sum_{j\in I} w_j \log\left[\Phi\left(\frac{y_{2j} - x\beta}{\sigma} \right) - \Phi\left(\frac{y_{1j} - x\beta}{\sigma} \right) \right]$$

where $\Phi(\ )$ is the standard cumulative normal and w_j is the sampling weight for the jth observation. The vector of parameters of interest, β plus σ, are chosen to maximize the likelihood by a modified Newton-Raphson routine. For $j \in L$ the data are left-censored, where the unobserved y_j is only known to be less than or equal to the threshold y_{Lj}. For $j \in R$ the data are right-censored, with the unobserved y_j only known to be greater than or equal to the threshold y_{Rj}. The other $j \in I$ observations are intervals, where all that is known is that the unobserved y_j is in the interval $[y_{1j}, y_{2j}]$. in the current case, the data of credit amounts received are left-censored, the unobserved y_i is known to be equal to zero for non-borrowing.

4. Empirical results

4.1 Main features of poor households' credit

As a preview to the econometric results, a general overview of poor households' credit in the peri-urban study areas of HCMC is provided. Formal credit provides 55% of credit (Table 1), which is mainly credit resources from government subsidised sources such as Vietnam Bank for Social Policy (VBSP), social political organisations, the Job Creation Support Fund (JCSF) and the Hunger Elimination and Poverty Reduction Fund (HEPRF). These lenders provide 'preferred' or sometimes called 'soft' or 'subsidised' loans (low interest rate and easy lending conditions), and are the main sources of credit accounting for 51% of the total loans to the poor in the peri-urban areas (Table 2).

However, the informal credit sector still plays a substantial role in providing credit to the poor; approximately 45% of loans, albeit of a smaller average value than formal loans. Amongst informal credit providers, mutual help amongst relatives, friends and neighbours provide more than one third of all loans. The Rotating Saving and Credit Associations (ROSCAs), private moneylenders and pawnbrokers only provide 8.4% of total loans to the poor (Table 2). This low share may be because interpersonal trust and social ties are weak in peri-urban and urban areas (Allcott et al, 2007; Debertin, n.d; Hofferth & Iceland, 1998).

Interest rates for the poor's loans vary widely, from 0.78% per month on average for the formal credit to 2.14% (about 26% per year) for the informal sector with a large standard deviation of 5.9% (Table 2). The interest rate for informal credit is high compared to formal credit, but still lower than in many other developing countries. For example, a survey of 13 developing countries by Banerjee and Duflo (2007, 2010) shows that informal credit lenders charged annual rates of 40% to 80% per annum. However, when loans from friends, relative and neighbours that are almost interest-free are excluded, the informal lenders charge very high interest rates at 11.3% per month or about 130% per year, higher than in many other developing countries. According to another survey by Conning and Udry (2005, p. 8), informal credit lenders charge interest at 40% to 120% annually in Pakistan, 20% to 120 % in India, 24% to 84% in rural Thailand, and over 90% annually in Nigeria.

Table 3 shows that the main purpose of the loans taken by the poor in the peri-urban areas is for non-production (73.4%). Consumption expenditure such as food, school fees and healthcare accounts for about 64% of total loans. On the other hand, only a quarter (in terms of both number of loans and loan value) is used for small production and businesses. This usage pattern is similar to the pattern found by Kedir et al (2007) in urban Ethiopia, but is much different from typical loan usage patterns in rural areas (Barslund & Tarp, 2007; Johnson & Morduch, 2007).

Table 4 shows the incidence of credit participation and credit constraints. Less than 10% of households had sufficient capital and did not want to borrow. Another 10% were discouraged from seeking capital. Amongst those households seeking credit in the 24 months prior to our survey, 43.8% of all households had borrowed sufficiently, 30% borrowed amounts less than the value they demanded, and 7.5% were denied by credit providers. Overall, three quarters of the surveyed households borrowed in the 24 months prior to the survey (304 households).[16] Almost all households had loans in both periods; 0-12 months and 12-24 months prior to the survey.

For credit participation, we simply treated households as borrowers if they had at least one loan during the 24 months prior to the survey, and otherwise they were classified as non-borrowers. Meanwhile, potential borrowers are often excluded, discouraged, rejected, or rationed to smaller loans relative to what they might have optimally demanded; these potential borrowers are deemed credit-constrained. Accordingly, the number of credit-constrained households, unconstrained households, and credit participants were estimated and presented in Table 4. Although there are more than ten banks and credit institutions in the surveyed areas, the poor are highly credit-constrained (48% of the surveyed households). Since approximately 45% of the poor's loans were from the informal credit sector, and the poor might have been excluded from the formal credit, we could regard them as the formal credit-constrained. If that is true, the incidence of credit constraints would be higher than the current estimates suggest.

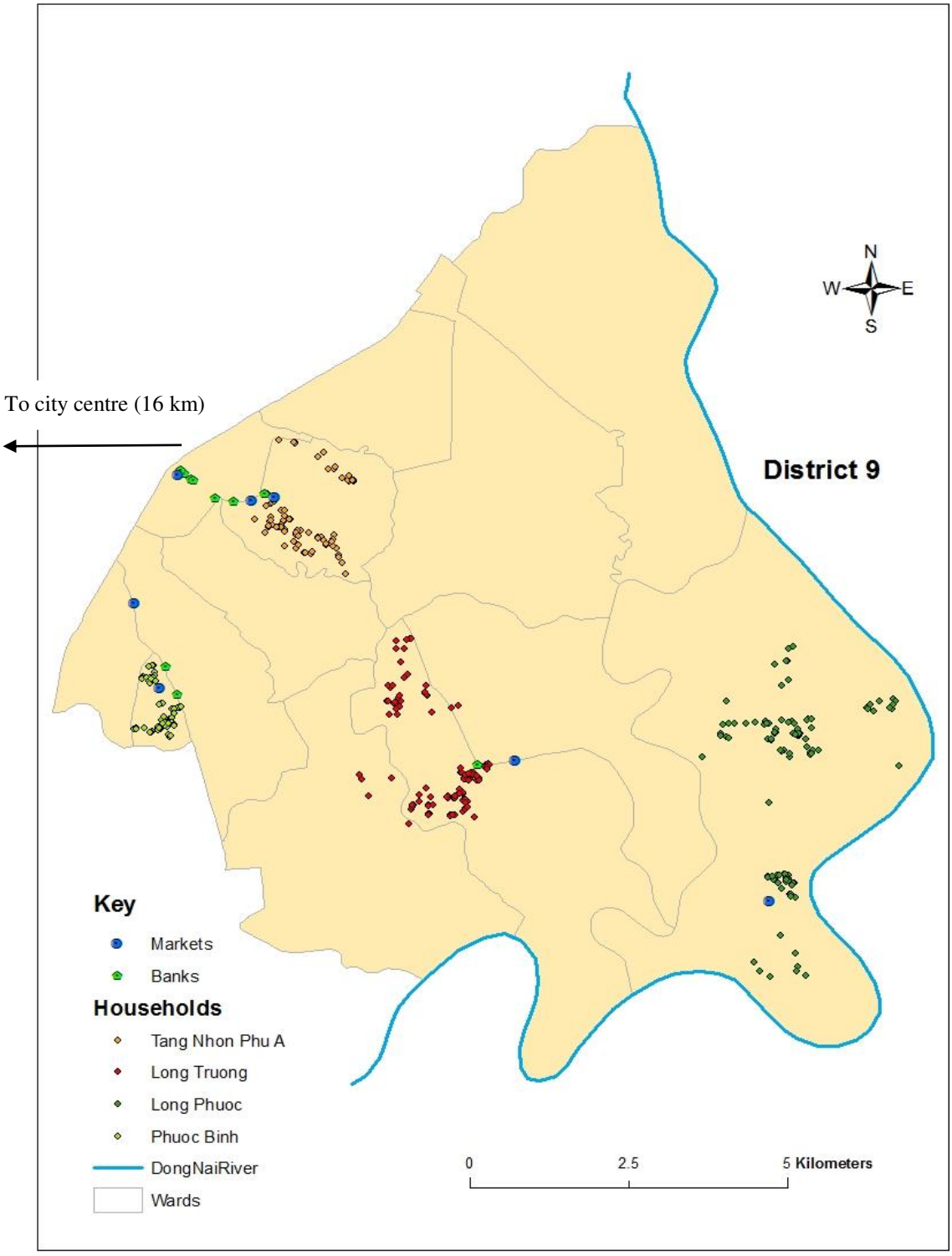
Finally, Table 5 provides some preliminary information about differences between borrowers and non-borrowers. Overall, the borrowers and non-borrowers are no different in terms of occupations, gender, education, and marital status of the household head, access to internet/newspapers, TV/radio ownership, initial income, and assets acquired more than 24 months prior to the survey. However, the borrowers are younger, have bigger households and more young household members, and own fewer assets acquired during the two years preceding the survey.

In addition, borrowers tend to dwell in more rural wards and further away from markets and banks. We used GPS receivers to collect data on coordinates of each household and facility such as bank branch and market in order to estimate distance from each household to the nearest market and nearest bank. Figure 1 shows that there are many bank branches and credit institutions in the urban wards (or nearby) of Tang Nhon Phu A (TNPA) and Phuoc Binh (PB), while only one bank branch in the rural ward of Long Truong (LT) and no bank branch in (or nearby) the other surveyed rural ward of Long Phuoc (LP). Similarly for market presence, only one market in each rural ward, but many in urban wards or nearby. Clearly, the proximity to

[16] Households often borrowed more than one loan, some loans during the past 12 months, some loans somewhere between 12 and 24 months prior to the survey.

financial institutions does not help the poor to have access to credit. Other barriers rather than the proximity may play a role in obstructing the poor on the way to obtaining credit.

Figure 1: Study household and financial facility locations in District 9



Note: DongNai River is a large river and there is no bridge between District 9 and other side (DongNai province) of the river. All banks and credit institutions in the district appear in the blue pentagons.

4.2 Determinants of credit participation by the poor: An econometric analysis

4.2.1 The Probit estimates

Estimates from probit models of the determinants of credit participation are presented in Table 6. Because of highly heterogeneous population density across the wards and possible multicollinearity between ward dummies and distance to the nearest banks (which vary mainly by ward), three separate estimation models are reported.

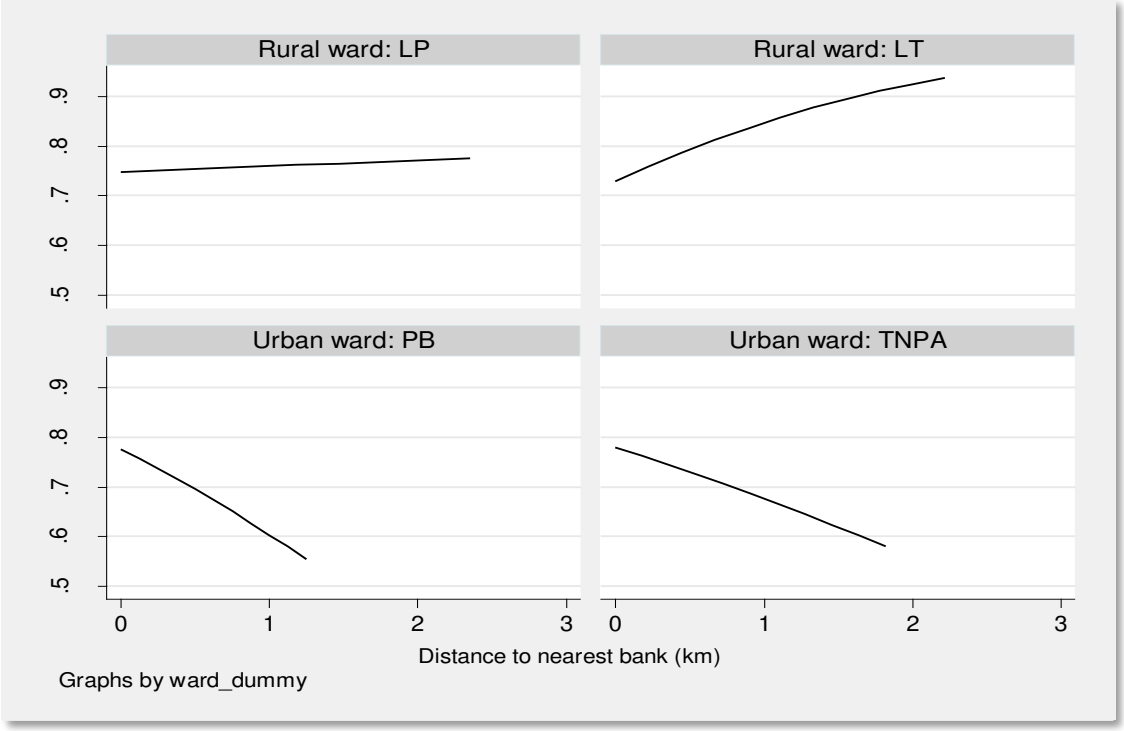
The estimates reveal several determinants of credit participation by the poor in peri-urban areas. Households with older heads, and less significantly those currently married have a lower probability of borrowing. This may reflect the fact that households with unmarried-heads are smaller and have to borrow to smooth consumption when they have adverse shocks because they have lower ability to increase income from labour (Kochar, 1995, 1999). Indeed, the estimates show that larger households are more likely to be borrowers, perhaps because they are better credit risks because they have more relationships with community and more diversified sources of income (Schreiner & Nagarajan, 1998). It is also the case that initially richer households are more likely to be borrowers. The pre-survey income per capita, which is closely associated with labour income of the poor, has a significantly positive impact on credit participation. In addition, phone ownership that represents household wealth through the ability to afford phone bills and connection fees, and represents better conditions to communicate and maintain social networks, also positively influences credit participation (Table 6). In contrast, total values of fixed assets such as house, land,[17] and other durable asset acquired over the 24 months prior to the survey have no impacts on borrowing (Table 6, columns 1, 2 and 3). The poor in peri-urban areas often lack or have incomplete legal documentation for the assets, e.g. land-use right certificates and house ownership certificates (Kim, 2004) because they do not have money to pay fees and do not know how and where to get the certificates done, hence the assets are unable to be lodged as collateral for their desired loans.

There is no gender bias in microcredit participation in the peri-urban areas, contrast to what is in rural Vietnam found by Barslund and Tarp (2007) and Nguyen (2007). Our results also show that education of household heads does not significantly influence credit participation. The poor's household heads in our survey have low education, only 4.7 years of schooling compared to 8.4 years of schooling for general household heads in Vietnam surveyed in 2004 (VHLSS, 2004). Moreover, these poor household heads usually work in unskilled sectors, such as small trade, factory workers, housewives and casual workers, where education is not rewarded well. Our finding is contrary to other studies from other developing countries where education has an important role in credit participation (Swain, 2007; Zeller, 1994).

[17] No single household acquired land and house within the last 24 months from the survey.

Households' dwelling location is an important determinant of credit market participation in the peri-urban areas. Almost all loans by the poor are small, collateral-free, and mainly based on social capital or interpersonal trust. Households in the more rural parts of the peri-urban area have better social capital than more urban households, thus they have higher likelihood of credit participation. This is shown by the significantly positive coefficients on the two rural wards, Long Truong (LT) and Long Phuoc (LP), in column 1 of Table 6.[18] When exploring the role of distance within each ward, in the rural ward of Long Truong (LT), households that are far away from the nearest bank (also far away from the ward centre where households are more urban) are also found more likely to borrow (Figure 2).[19] This re-confirms the role of social relationship and interpersonal trust in credit transactions in peri-urban areas.

Figure 2: Predicted probabilities of credit participation by distance to the nearest bank



The data exploration shows that most borrowing households (56%) in urban wards (TNPA and PB) borrowed from the formal (subsidised) credit channels, in contrast, most borrowing households in rural wards (LT and LP) borrowed from the informal credit sector. This means that the more rural poor households rely more on informal credit, whereas their more urban counterparts rely on government subsidised funds.

The impact of distance to the nearest banks and main sources of the poor's credit in rural and urban areas could imply that households far away from ward centres (dwelling in rural countryside) could have better community relationships and interpersonal trust; better social

[18] Inclusion of distance to nearest market (interacted with ward dummies) in the models gives the similar result as distance to nearest bank, thus we do not report results of the regression with the distance to nearest market.

[19] In LT ward, households living far away from the centre are rural household farmers or casual workers, while households near the ward centre are small traders, grocery shop keepers. In LP ward, all households are involved in rural economic activities.

capital help to ease access to informal credit sources, such as relatives, neighbours, friends, and other providers who mainly lend money on the basis of interpersonal trust rather than collateral.

The proportion of borrowing neighbours influences negatively and significantly the likelihood of borrowing in urban wards (TNPA and PB), but not in rural wards (LT and LP) (Table 6, column 2). This implies that households in urban areas compete against their neighbours in accessing limited credit resources from subsidised funds, but this is not the case in the rural wards because the poor there rely more on informal credit.

In summary, household size, younger households, initial income, phone ownership, and living in more rural countryside areas are important determinants of credit participation by the peri-urban poor. On the other hand, gender, education and assets do not matter in credit participation of poor households. Further, households in rural wards with presumably better relationships and interpersonal trust have advantages in accessing credit, especially informal credit. Competition by other borrowing neighbours in accessing credit resources, especially subsidised funds, is also an influential factor for credit participation by the poor in urban areas.

4.2.2 Tobit Type 2 for loan amounts received by the poor

The Tobit model estimates in Table 7 reveal some key findings: *First,* gender does not really matter in credit participation as found and discussed in the preceding section, but it plays a role in explaining loan size. Male-headed households received lower amounts of loans than female-headed households. The finding is contrary to the common trend in developing countries because females are often involved in small businesses which need smaller loans (Armendariz & Morduch, 2005, p. 181); however, in peri-urban areas loans are mainly used for non-production so the type of business activity of females may matter less for loan size.

Second, the age of household heads has a slightly positive effect on loan size. The older households tend to receive greater loans, with a maximum at about 46 years old. Very young or very old headed-households have a smaller labour force, and hence have lower ability to earn and repay.[20] Therefore, they may be lent smaller amounts, or they themselves favour smaller loans to fit with their demand and ability to repay.

Third, the initial income per capita and household sizes are important determinants of loan size because an increase in household size would help to increase labour income and diversify income sources (Schreiner & Nagarajan, 1998), and also increase demand for consumption. *Finally*, education level of household heads, head's marital status, assets acquired prior to borrowing, location dummies, distance to the nearest banks and the proportion of borrowing neighbours make no significant difference to loan sizes.

[20] Scatter plot of household size against head's age or regression household size on head's age and head's age squared give a clear inverse U-shaped relationship between household size and head's age.

4.2.3 The Multinomial Logit estimates for credit participation

The binary Probit models help examine the roles of household characteristics and endowments in credit participation regardless of credit sources and of possibly different roles of each factor in specified credit market segments. Pooling credit market segments would conceal the roles of each factor. Therefore, to provide more nuanced insights, the surveyed households are classified into four groups: Non-borrowing, borrowing from informal credit, borrowing from formal credit, and borrowing from both informal and formal credit. The Multinomial Logit model (MNL) is then employed to examine factors influencing the probability of specified credit participation.

Amongst 411 households, 26.0% of the surveyed households did not borrow, 23.6% borrowed from only informal sources, 25.3% borrowed from only formal sources, and 26.0% borrowed from both formal and informal credit. The purpose of the MNL model is to compare each outcome probability with the base outcome of the non-borrower group. The estimates are presented in Table 8, in the form of the relative risk ratios (RRR).

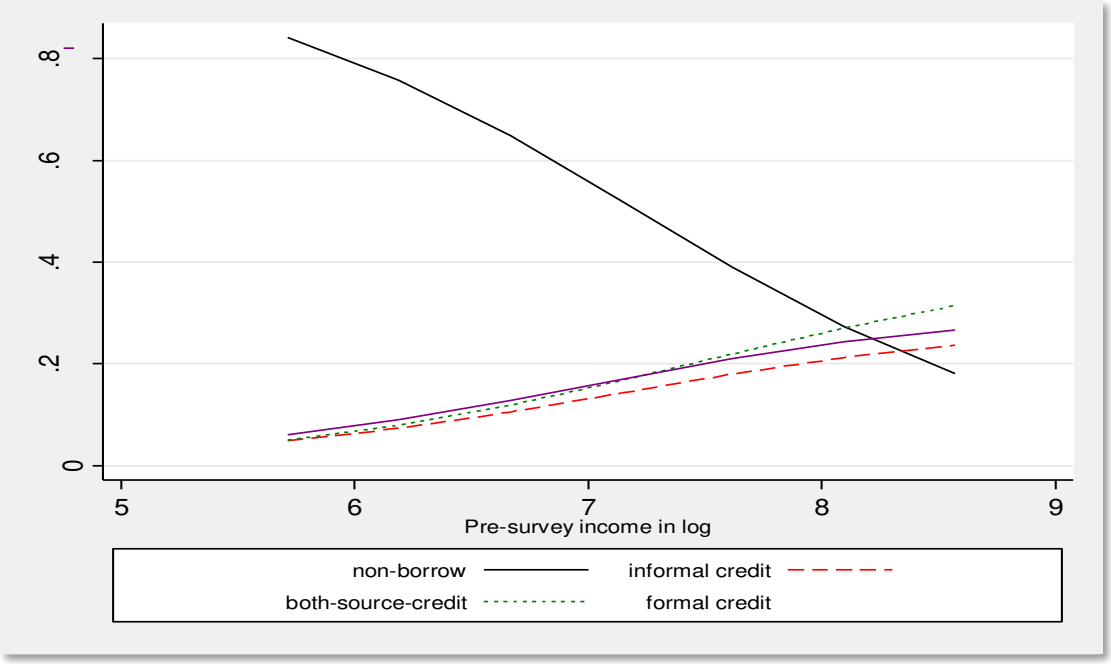
Household heads' gender and age

To interpret the estimated coefficients, we provide two illustrations by using a dummy (e.g. gender) and a continuous variable coefficient (e.g. age). The head's gender coefficient $e^{\beta 1}$ =1.3865 (Table 8, Model 1, column 1) means that the probability of borrowing from informal credit by males is 38.65% (i.e. 1.3865-1.00) higher than for females. Similarly, $e^{\beta 3}$ = 0.8756 means that the probability of borrowing from formal credit by males is 12.44% (i.e. 0.8756-1.00) lower than for females. Nevertheless, the effect of head's gender is not statistically significant across models and credit market segments. For a continuous variable of head's age, the RRR is about 0.96 across models and sources of credit, smaller than one, meaning that when a household head gets an additional year older the ratio of credit participation probability will decline by about 4%, keeping other things constant.

Household size, phone ownership, and pre-survey income

The estimates show that the ratios of borrowing probability increase with household size in all credit market segments. Greater household size represents a bigger demand for consumption and a better ability for income generation and debt repayment. Similarly, having a phone has a positive influence on the likelihood of participation in all credit markets, but the effect is highly significant *only* in the formal credit market. Owning a phone has advantages to communicate and obtain information about formal credit sources, and also proxies for household wealth through affordability of connection charges and phone bills. Similar to phone ownership, the pre-survey income per capita positively affects credit participation in all credit market segments (Table 8 and Figure 3).

Figure 3: Predicted probabilities of participation in specified credit sources by pre-survey income (in logarithm)



Note: The slope-downward line depicts the declining probability of being non-borrowers as the income increases.

Marital status of household heads

Single-head households such as the divorced, separated, widowed and unmarried tend to borrow more from informal credit than the current married-head households. In Vietnam, the single-head households are often considered 'less lucky' or 'disadvantaged', and thus have difficulties in social networks. These single-head households are often older-headed households who have less ability to smooth consumption by themselves if they face adverse shocks, especially demographic shocks, because they do not have enough working household members to increase income by increasing labour working hours. Therefore they are forced to borrow especially from informal credit as discussed in Kochar (1995).

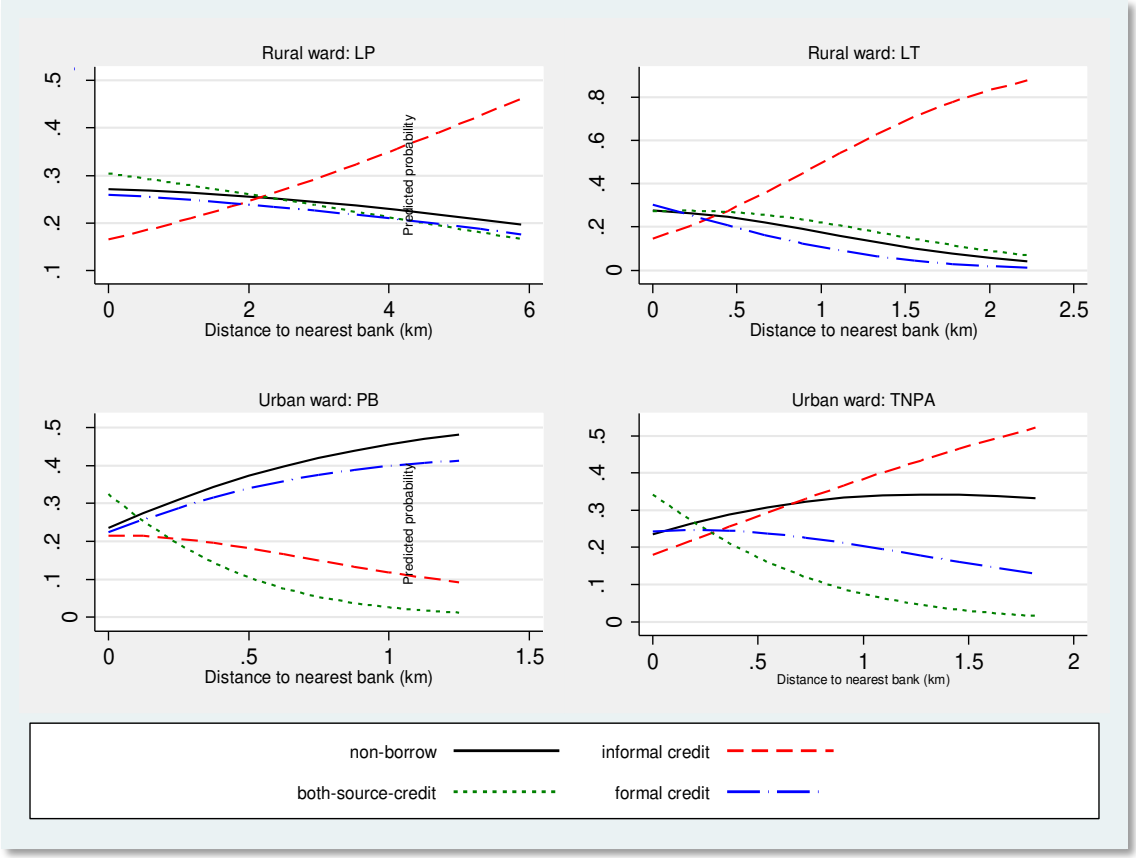
Household dwelling locations and distance to the nearest banks

In addition, loans to the poor are small, collateral-free, and based mainly on social capital or interpersonal trust. As discussed earlier, households in the rural wards have more advantages compared to urban households when accessing informal and both-credit sources, hence the ratio of credit participation probability in informal and both-credit-sources by households in rural wards (LT and LP) is higher (Table 8, Model 1). In contrast, household dwelling locations and distance to the nearest bank do not affect the ratios of probability of formal credit participation. In other words, formal credit is evenly distributed across wards (Table 8, Model 1, column 3) and within each ward (Table 8, Model 3, column 3).

On the other hand, when considering distance to the nearest banks within each ward, the distance does not significantly affect the ratio of probability of informal credit participation in

the urban wards, but it positively affects the ratio of probability of informal credit participation in rural wards. In other words, the ratios of probability of informal credit participation increase significantly with distance to the nearest banks *only* in rural wards (Figure 1 and Figure 4).

Figure 4: Predicted probabilities of participation in specified credit sources by distance to the nearest bank



The upward-slope of the curves indicates that the probability of participation in a specified credit markets will increase with the distance from each household to the nearest bank. However, the multinomial Logit models report the ratio of probability of a specified credit participation and probability of being in the base (non-borrowing) group. Therefore, the gap between each curve for a particular borrower group and the base curve becomes the issue of interest, for example the gap between informal credit borrowing (the red dashes) and the base curve of non-borrowing (solid-curve) represents the ratio of the probability of informal credit participation and the probability of being in non-borrowing group. In rural wards (two top panels of Figure 4), the gaps become larger when households dwell far away from banks which are often located at ward centres. These households have easier access to informal credit thanks to possibly better community relationships and higher interpersonal trust.

In short, households in rural wards have greater propensity to borrow from informal credit compared to urban households; and within a rural ward, households far away from ward centres

rely more on informal credit because of either better social capital or further distance to the banks.

Proportion of borrowing neighbours: Competition or crowding-out effects

The estimates of the interactions between the proportion of borrowing neighbours and ward dummies reveals that there is a crowding-out effect from the neighbours in accessing *only* formal (subsidised) credit in all the wards. For example, the RRR is 0.0159 (Table 8, Model 2, column 3), meaning that when the rate of borrowing neighbours in LP ward increases by 10 percentage points the ratio of formal credit participation probability will decline by about 9.8% [i.e. (1.00-0.0159)x10%], keeping other things constant.

Other insignificant factors

Controlling for other variables, education and the initial assets play no significant roles in credit participation even in the formal credit sector. However, as previously discussed, most formal credit to poor households in the studied areas are from the government subsidised funds, such as the HEPRF, VBSP, and other supporting funds, but very few of the loans are from commercial banks. Consequently, the key lenders require neither collateral nor specific education when making lending decisions.

In summary, age, household size, and pre-treatment income have important roles in all credit market segments. In contrast, gender, education, and pre-survey assets are found to have no role in explaining credit participation in any specified credit market segments. The household location, phone ownership, and marital status of household heads have different roles in different credit segments for the poor in the peri-urban areas. Finally, credit subsidies may lead to credit demand excess and crowding-out effect amongst the borrowers.

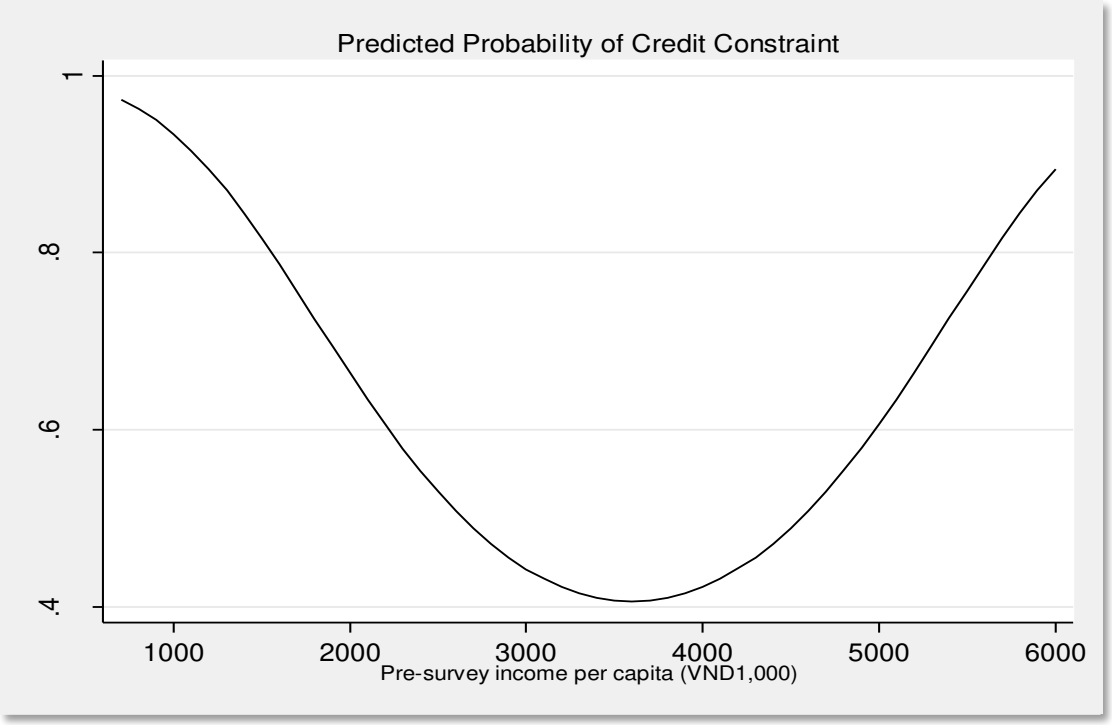
4.3 Determinants of credit constraints of poor households

Though 74% of surveyed households borrowed, the predicted probability of credit constraints is high, at 48% (Table 9). If credit constraints are more related to the credit supply side, then the determinants of credit constraints could be more related to obstacles in the credit markets of developing countries. Similar to Crook and Hochguertel (2005), Jappelli (1990), Magri (2002), and Thaicharoen et al (2004), we find that higher income reduces the likelihood of being credit-constrained, even though all studied households were poor.

Surprisingly, the income also has a U-shaped effect on the probability of credit constraints (Figure 5) with the minimum probability at the income level of about VND 3.5 million (about US$210). This U-shape effect of income on credit constraints is contrary to Chen and Chivakul (2008) who found the inverted-U shape effect for general households rather than the poor in Bosnia and Herzegovina. All households in our sample were poor and most of them borrowed

from informal and preferred formal credit; extremely poor households, however, were excluded by both informal lenders and government subsidised funds.[21] Therefore, the higher is income per capita the lower the credit constraints. On the other hand, households whose income per capita is higher than VND 3.5 million were more credit-constrained as income increased. The credit constraints from the income level of VND 3.5 million onward could not be due to the exclusion by the microcredit lenders but due to higher demand for credit to finance bigger projects, businesses or spending. This demand for credit should be financed by formal credit, especially commercial banks, but the demand for credit was not yet met, and hence the households were still credit-constrained.

Figure 5: Predicted probabilities of credit constraints by pre-survey income per capita



In addition to income, in the Vietnamese context, assets such as land, house and durable fixed assets mainly represent household wealth because households usually lack investment choices for their savings due to unstable capital markets and high inflation (Barslund & Tarp, 2007). In oursurveyed areas, fast industrialisation and urbanisation have caused real estate to be more marketable and increase property values. This enabled the poor to access credit because lenders may consider the property or fixed assets as collateral, if asset owners have legal documentation, when they sort out their clients (Crook & Hochguertel, 2005; Kedir et al, 2007; Jappelli, 1990; and Zeller, 1994). Without documentation the assets are not used as collateral, but the assets may indicate potential repayment ability because the peri-urban and urban poor also have informal property transactions without legal documents since informal property

[21] According to local HEPRF officers, even all the poor are eligible for preferred loans, they did not lend to the extreme poor because the households could not repay. They should have received direct assistance rather than credit.

markets function well in developing countries, including Vietnam (Kim, 2004; Mooya & Cloete, 2007). As a result, the households owning higher asset values are less likely to be credit-constrained since the assets can be informally sold to repay debts even though they are not able to be lodged as collateral when borrowing.

Contrary to Barslund and Tarp (2007), Izumida and Pham (2002), Kedir et al, (2007), Jappelli (1990), and Zeller (1994), the credit-constrained and unconstrained households are homogenous in terms of household heads' gender, age, education, marital status, and household size,[22] perhaps because the current study focuses on the poor rather than general population. In addition, the probability of the constraints is not different across wards, and not affected by the proportion of borrowing neighbours (Table 9, Model 2).

Finally, households dwelling far away from banks within each ward had a higher probability of being credit-constrained. The effect of the distance to the nearest bank is significant for TNPA, PB, and LT wards, but is not for LP ward (Table 9, Model 3). LP ward is a purely rural area where the distance does not obstruct the poor households from credit resources, and the likelihood of credit participation and credit constraints are not determined by where the households are situated. Better community, relatives, neighbouring relationships and interpersonal trust may help households in pure rural areas like LP ward to have not only a higher probability of credit participation (Table 6), especially credit from informal sector, but also lower the likelihood of being credit-constrained (Table 9) compared to the other wards in the areas. This suggests that community mutual help systems through credit could do a good job in smoothing consumption and investing in healthcare and children's schooling. On the other hand, given the condition of weak community relationships in more urban wards, poor households find it hard to borrow and are highly credit-constrained. Subsidised funds are usually the last resort for lenders to help the poor in the urban areas.

For the purely rural ward of LP, the distance to the nearest bank does not affect the probability of credit participation and credit constraints. This finding is consistent with Barslund and Tarp (2007, p. 499) who find that distance to district centres where there are bank offices does not affect the likelihood of credit rationing in rural Vietnam. On the contrary, in our case, all poor households sited near banks in the urban wards have lower probability of being credit-constrained. Thus, it suggests that one would better consider the effect of distance within each region or area (i.e. using interaction terms between the distance and dummy of areas) rather than compare across various areas because each area has its own socio-economic conditions, and thus distance matters in credit constraints in some certain areas.

[22] We also checked with household labour force (persons aged 18-60 years old), the estimation result is similar to the case of household size.

5. Summary of findings

Examining factors affecting credit participation and credit constraints in peri-urban areas in Vietnam reveals: *First*, the presence of many commercial banks does not help the poor to access to formal credit, and hence the poor in the peri-urban areas rely heavily on informal credit. Furthermore, unlike the usage pattern of loans in rural Vietnam, loans in the peri-urban areas are mainly used for consumption. *Second*, households in rural wards have a higher probability of borrowing than their counterparts in the urban wards because of better social relationships in rural areas. Moreover, competition from borrowing neighbours adversely affect the propensity of borrowing *only* in urban wards where the poor depend more on government subsidised credit funds, which are limited.

Third, a closer look at specified microcredit sources reveals that the roles of marital status, communication facilities, dwelling places, and competition from neighbours vary across different credit market segments. Accordingly, married-head households tend to avoid informal credit, whereas the better-communicating households borrow more from formal credit lenders. Households far away from banks were unable to borrow from the formal credit resources; however, these households in rural areas were more likely to borrow from informal credit lenders. Moreover, the competition among households exists *only* in formal credit markets which provide mostly subsidised credit loans. Overall, pooling formal and informal credit market segments would blur the picture of determining factors of credit participation.

Finally, wealthier households in terms of asset holdings and phone ownership amongst the poor group appear less credit-constrained. O*nly* in a purely rural ward (LP) does the likelihood of credit constraints not increase with distance to the nearest banks. Further, the poor in urban wards are slightly more credit-constrained in formal commercial credit due to exclusion by commercial banks, and by informal credit presumably due to weak community relationships and interpersonal trust.

There remain some caveats in this study; the determinants of credit participation and constraints would come from the unobservable attributes such as households' entrepreneurial ability, attitude to risks, and access to social networks, which are assumed to be associated with pre-survey incomes and assets in this study. Further advances on the current research should control for these attributes by employing fixed effects methods to panel data on confirm the finding in this paper.

TABLES

Table 1: Sources and sizes of loans by credit provider

Sources of loans	Frequency (no of loans)	Percent in total (%)	Mean (VND 1,000)	Standard Deviation
Formal credit	**336**	**55.26**	**9,327**	**33,421**
VBSP (1)	37	6.06	9,622	15,764
Agribank (2)	18	2.96	26,444	46,482
Other commercial banks (3)	8	1.32	119,000	176,254
JCSF (4)	29	4.77	4,564	3,655
Social political organisations (5)	62	10.20	4,564	3,472
HEPRF (6)	182	29.93	5,176	4,189
Informal credit	**272**	**44.74**	**5,229**	**12,760**
Moneylenders, ROSCAs, pawnbrokers, others (7)	51	8.39	9,218	15,870
Friends, relatives, neighbours (8)	221	36.35	4,308	11,780
Overall	608	100	7,494	26,330

Source: own calculation from author's survey;
VBSP: Vietnam Bank for Social Policies; JCSP: Job Creation Support Fund; *HEPRF: The Hunger Elimination and Poverty Reduction Funds; ROSCAs: Rotating savings and credit associations*

Table 2: Sources, sizes and interest rates of loans

Credit sector	Percent in total (%)	Loan sizes (VND 1,000)		Monthly interest rates (%)	
		Mean	Std.Dev	Mean	Std.Dev
By formal/informal sector					
Formal	55.26	9,327	33,421	0.78	0.70
Informal	44.74	5,229	12,760	2.14	5.93
Friends, relatives & neighbours	36.35	4,308	11,780	0.033	0.27
Other informal sources	8.39	9,218	15,870	11.29	9.22
By preferred sources					
Preferred loans	51.00	5,503	6,725	0.76	0.72
Non-preferred loans	49.00	9,564	36,897	2.05	5.67
Overall	100	7,494	26,330	1.40	4.05

Source: own calculation from author's survey
Notes: Preferred loans include items 1, 4, 5, and 6; Non-preferred loans are of 2, 3, 7, and 8 in Table 1.

Table 3: Shares and sizes of loans by purposes

Purpose of loans	Percent in total (%)	Mean (VND 1,000)	Standard deviation
Production/business	**26.64**	**6,512**	**5,729**
Non-production	**73.36**	**7,850**	**30,550**
Consumption	30.92	3,163	4,846
Debt payment	4.61	14,661	37,752
House acquisition/repairs	3.62	40,977	63,517
Schooling fees	16.94	3,665	2,239
Health care	16.12	11,346	51,013
Others	1.15	15,143	17,478
Overall	100	7,494	26,330

Source: own calculation from author's survey
Note: Exchange rate in USD/VND = 16,481

Table 4: Demand for credit, credit participation and credit constraints

Specified categories	Number of households	Percent in total (%)
Household has demand for credit in the past 24 months prior to the survey?	**411**	**100**
No, do not want to borrow	**76**	**18.49**
Sufficient capital, no need credit (a)	35	8.52
Discouraged households (b)	41	9.97
Yes, households need capital	**335**	**81.51**
Was not lent any money (denied) (c)	31	7.54
Was lent amounts less than what households wanted (d)	124	30.17
Was lent fully (e)	180	43.80
Credit participation in the past 24 months	**411**	**100**
Borrowers (d & e)	304	73.97
Non-borrowers (a, b & c)	107	26.03
Credit constraints	**411**	**100**
Credit-constrained (b, c & d)	196	47.69
Credit-unconstrained (a & e)	215	52.31

Source: own calculation from author's survey

Table 5: Means of some main variables and *t*-values for equal means by borrowing status

Variable	Borrowers		Non-borrowers		*t*-value
	Mean	Std. Dev	Mean	Std. Dev	
Job (favourable jobs=1)	0.122	0.327	0.140	0.349	0.48
Head's sex (male=1)	0.507	0.501	0.505	0.502	0.03
Head education (year)	4.911	3.35	4.664	3.76	0.60
Head's married (yes=1)	0.648	0.478	0.607	0.491	0.74
Head's age	52.901	13.97	59.467	15.46	3.87**
Household size	5.191	2.343	4.523	2.597	2.34*
Child under 6 years old (yes=1)	0.309	0.463	0.178	0.384	2.89**
Children aged 6-18	1.118	1.024	0.869	1.100	2.05*
Persons aged 18-60	3.230	1.694	2.692	1.793	2.71**
Older-than-60 person (yes=1)	0.352	0.478	0.533	0.352	3.25**
Rural area (LT & LP =1)	0.635	0.482	0.477	0.502	2.83**
Distance to nearest bank (Km)	2.226	2.098	1.804	1.900	1.92+
Distance to nearest market (Km)	1.409	1.032	1.085	0.872	3.10**
Have a phone (yes=1)	0.809	0.394	0.644	0.481	3.18**
Internet/newspapers (yes=1)	0.053	0.224	0.037	0.191	0.68
Have a TV and radio (yes=1)	0.944	0.230	0.925	0.264	0.66
Durable & fixed assets acquired within 24 months prior to survey	4,372	6,264	9,057	11,693	2.78**
Durable & fixed assets acquired over 24 months prior to survey	849,924	821,335	786,097	795,593	0.71
Pre-survey income per capita	3,592	814	3,505	925	0.86

Notes: t statistics significant at 10% (+), 5% (*), and 1% (**); assets, income, and expenditure are in VND 1,000.

Table 6: Marginal effects on the probability of credit participation (Probit estimation)

Explanatory Variables	Model (1)	Model (2)	Model (3)
Head's sex (male=1)	-0.0285	-0.0302	-0.0211
	(0.55)	(0.59)	(0.41)
Head's age (years)	-0.0073	-0.0072	-0.0073
	(4.29)**	(4.28)**	(4.32)**
Head's education (years of schooling)	0.0017	0.0019	0.0027
	(0.22)	(0.27)	(0.37)
Marital status (yes=1)	-0.1033	-0.0974	-0.1094
	(1.86)+	(1.75)+	(1.95)+
Household size in log[(a)]	0.1932	0.1951	0.1932
	(3.56)**	(3.63)**	(3.59)**
Pre-survey income per capita in log	0.1781	0.1730	0.1884
	(2.15)*	(2.13)*	(2.28)*
Pre-survey assets in log (assets acquired	-0.0010	0.0018	-0.0014
over 24 months prior to survey)	(0.06)	(0.11)	(0.09)
Phone ownership (yes=1)	0.1309	0.1232	0.1389
	(2.26)*	(2.14)*	(2.34)*
Phuoc Binh – PB (urban)	0.0185		
	(0.27)		
Long Truong – LT (rural)	0.1570		
	(2.58)**		
Long Phuoc – LP (rural)	0.1146		
	(1.95)+		
Interaction terms			
Borrowing neighbour proportion x TNPA		-0.6642	
		(1.95)+	
Borrowing neighbour proportion x PB		-0.5928	
		(1.81)+	
Borrowing neighbour proportion x LT		-0.3297	
		(1.14)	
Borrowing neighbour proportion x LP		-0.3921	
		(1.35)	
Distance to nearest bank (Km) x TNPA			-0.0968
			(1.20)
Distance to nearest bank (Km) x PB			-0.1534
			(1.06)
Distance to nearest bank (Km) x LT			0.1277
			(2.09)*
Distance to nearest bank (Km) x LP			0.0113
			(0.70)
Wald χ^2 test	44.56**	46.80**	53.35**
Prob> χ^2	0.0000	0.0000	0.0000
Predicted probability at x bar	0.760	0.761	0.763
Pseudo R-squared	0.12	0.12	0.13
Observations	411	411	411

Notes: Robust z statistics in parentheses; statistically significant at 10% (+), at 5% (*), and at 1% (**). Tang Nhon Phu A (TNPA) ward is set as a base for ward dummies. [(a)] The marginal effect of household size (hhsize) on the predicted probability is calculated as, suppose $Y=\alpha + \beta.\ln(hhsize)$, so that $dY/dU = dY/d(hhsize)= \beta.(1/hhsize)$, keep other things equal.

Table 7: Interval regression (Tobit Type 2) for loan amounts received

Explanatory Variable	Model (1)	Model (2)	Model (3)
Head's sex (male=1)	-3,962.37	-3,977.1	-3,762.87
	(2.01)*	(2.02)*	(1.92)+
Head's age (years)	528.75	525.4	500.85
	(1.45)	(1.43)	(1.37)
Head's age squared	-5.57	-5.50	-5.38
	(1.78)+	(1.75)+	(1.72)+
Head's education (years)	147.38	153.9	142.50
	(0.51)	(0.53)	(0.47)
Marital status (yes=1)	1,972.25	2,041.4	1,762.18
	(0.90)	(0.94)	(0.81)
Household size in log	4,621.38	4,631.5	4,636.29
	(2.48)*	(2.48)*	(2.43)*
Pre-survey income per capita in log	7,322.34	7,252.5	7,272.70
	(2.01)*	(2.02)*	(1.98)*
Pre-survey assets in log (assets acquired	624.64	653.2	572.99
over 24 months prior to survey)	(1.14)	(1.19)	(1.04)
Phone ownership (yes=1)	5,024.36	4,963.4	4,965.04
	(2.89)**	(2.85)**	(2.81)**
Phuoc Binh – PB (urban)	-1,606.15		
	(0.61)		
Long Truong – LT (rural)	2,389.45		
	(1.09)		
Long Phuoc – LP (rural)	874.92		
	(0.41)		
Interaction terms			
Borrowing neighbour proportion x TNPA		-6,635.6	
		(0.82)	
Borrowing neighbour proportion x PB		-8,489.4	
		(1.15)	
Borrowing neighbour proportion x LT		-2,397.1	
		(0.38)	
Borrowing neighbour proportion x LP		-4,124.7	
		(0.60)	
Distance to nearest bank (Km) x TNPA			-2,526.62
			(0.87)
Distance to nearest bank (Km) x PB			-7,899.71
			(1.53)
Distance to nearest bank (Km) x LT			304.95
			(0.18)
Distance to nearest bank (Km) x LP			-280.37
			(0.54)
Constant	-85,633	-81,289	-81,505
	(2.40)*	(2.25)*	(2.28)*
Wald χ^2 test	28.32**	29.42**	27.22*
Prob> χ^2	0.0050	0.0057	0.0116
Sigma (test for Tobit model)	13720.32	13722.66	13715.53
	(8.90)**	(8.89)**	(8.94)**
Observations	405	405	405

Notes: Robust z statistics in parentheses; statistically significant at 10% (+), at 5% (*), and at 1% (**). Five extreme outliers (of loan amounts) are dropped.

Table 8: The multinomial Logit estimation with Relative Risk Ratios for credit participation in specified credit sources

Explanatory Variables	Model 1			Model 2			Model 3		
	RRR[(b)] Outcome for			RRR Outcome for			RRR Outcome for		
	Informal Credit	Both-source Credit	Formal Credit	Informal Credit	Both-source Credit	Formal Credit	Informal Credit	Both-source Credit	Formal Credit
	22.63%	26.03%	25.30%	22.63%	26.03%	25.30%	22.63%	26.03%	25.30%
Head's gender (male=1)	1.3865 (0.87)	0.5995 (1.43)	0.8756 (0.36)	1.3846 (0.87)	0.6006 (1.43)	0.8604 (0.41)	1.6307 (1.23)	0.6397 (1.25)	0.8694 (0.38)
Head's age	0.9534 (3.81)**	0.9628 (3.38)**	0.9641 (3.07)**	0.9539 (3.79)**	0.9633 (3.35)**	0.9644 (3.03)**	0.9524 (3.79)**	0.9614 (3.48)**	0.9645 (3.05)**
Head's education (years)	0.9523 (0.91)	1.0346 (0.67)	1.0179 (0.35)	0.9555 (0.85)	1.0381 (0.74)	1.0165 (0.32)	0.9598 (0.76)	1.0311 (0.60)	1.0264 (0.52)
Marital status (yes=1)	0.3492 (2.55)*	0.7396 (0.76)	0.6627 (1.01)	0.3616 (2.47)*	0.7390 (0.77)	0.7269 (0.79)	0.3084 (2.66)**	0.6911 (0.92)	0.6253 (1.14)
Household size in logarithm	2.2269 (2.17)*	3.2430 (3.15)**	3.3899 (3.23)**	2.2499 (2.20)*	3.2414 (3.12)**	3.4761 (3.31)**	2.0855 (1.96)*	3.5470 (3.37)**	3.3700 (3.22)**
Pre-survey income in logarithm	2.6851 (1.66)+	3.7543 (2.11)*	2.4145 (1.70)+	2.5350 (1.58)	3.4970 (2.01)*	2.3867 (1.65)+	2.9895 (1.71)+	3.2606 (2.07)*	2.8708 (1.99)*
Pre-survey assets in logarithm	1.0871 (0.69)	0.9553 (0.38)	0.9591 (0.35)	1.1010 (0.80)	0.9578 (0.36)	0.9756 (0.21)	1.1197 (0.91)	0.9367 (0.54)	0.9351 (0.57)
Phone ownership (yes=1)	1.4456 (1.00)	1.7160 (1.45)	3.4660 (2.98)**	1.3881 (0.89)	1.6439 (1.35)	3.4750 (2.95)**	1.5408 (1.11)	1.7119 (1.42)	3.4014 (2.89)**
PB ward (urban)	0.3026 (1.83)+	1.5091 (0.80)	1.3147 (0.63)						
LT ward (rural)	3.3774 (2.68)**	6.0195 (3.78)**	0.6904 (0.76)						
LP ward (rural)	1.7661 (1.31)	4.0763 (3.15)**	1.2173 (0.46)						

(*Continued next page)*

Table 8: The multinomial Logit estimation with Relative Risk Ratios for credit participation in specified credit sources (continued)

Explanatory Variables	Model 1			Model 2			Model 3		
	RRR Outcome for			RRR Outcome for			RRR Outcome for		
	Informal Only	Both sources	Formal only	Informal Only	Both sources	Formal only	Informal only	Both sources	Formal only
	22.63%	26.03%	25.30%	22.63%	26.03%	25.30%	22.63%	26.03%	25.30%
Effects of the proportion of borrowing neighbours within each ward									
Borrowing neighbour proportion x TNPA				0.0258 (1.43)	0.2249 (0.57)	0.0061 (2.31)*			
Borrowing neighbour proportion x PB				0.0058 (2.03)*	0.4571 (0.31)	0.0122 (2.09)*			
Borrowing neighbour proportion x LT				0.2312 (0.67)	2.8864 (0.48)	0.0084 (2.54)*			
Borrowing neighbour proportion x LP				0.1050 (1.02)	1.8797 (0.28)	0.0159 (2.23)*			
Effects of the distance to the nearest bank from households within each ward									
Distance to nearest bank x TNPA							1.4795 (0.68)	0.1511 (2.84)**	0.5846 (1.00)
Distance to nearest bank x PB							0.2846 (0.85)	0.0419 (2.93)**	0.9219 (0.09)
Distance to nearest bank x LT							5.2577 (3.63)**	1.2746 (0.57)	0.5532 (1.09)
Distance to nearest bank x LP							1.2595 (1.85)+	0.9533 (0.45)	0.9895 (0.10)
Wald χ^2 test	106.20			116.97			114.35		
Prob> χ^2	0.0000			0.0000			0.0000		
Pseudo R2	0.1144			0.1215			0.1288		
Observations	411			411			411		

Notes: Robust z statistics in parentheses; statistically significant at 10% (+), at 5% (*), and at 1% (**); the base outcome (0) is non-borrowing households (non-borrowers which accounts for 26.03% observations).

[(b)]RRR coefficient is exponentiated coefficient = e^{β} = exp(β), e.g. exp(0.3268)=1.3865 where β=0.3268 is the estimated outcome of the standard multinomial Logit model.

Table 9: Marginal effects on the probability of credit constraints (probit model)

Explanatory Variables	Model (1)	Model (2)	Model (3)
Head's sex (male=1)	0.0669	0.0676	0.0652
	(1.07)	(1.08)	(1.04)
Head's age (years)	0.0016	0.0016	0.0021
	(0.82)	(0.83)	(1.04)
Head's education (years)	0.0002	0.0006	0.0016
	(0.02)	(0.07)	(0.18)
Marital status (yes=1)	-0.0218	-0.0257	-0.0177
	(0.31)	(0.37)	(0.25)
Household size in log	-0.0255	-0.0264	-0.0287
	(0.41)	(0.42)	(0.46)
Pre-survey income per capita	-0.0007	-0.0007	-0.0007
	(3.22)**	(3.20)**	(3.40)**
Pre-survey income per capita squared	1.01e-07	1.01e-07	1.03e-07
	(3.27)**	(3.25)**	(3.47)**
Pre-survey assets in log (acquired over	-0.0399	-0.0407	-0.0344
24 months prior to survey)	(1.96)+	(2.00)*	(1.67)+
Phone ownership (yes=1)	-0.2171	-0.2158	-0.2070
	(3.33)**	(3.30)**	(3.12)**
Phuoc Binh – PB (urban)	0.0347		
	(0.37)		
Long Truong – LT (rural)	-0.0012		
	(0.01)		
Long Phuoc – LP (rural)	-0.0978		
	(1.28)		
Interaction terms			
Borrowing neighbour proportion x TNPA		0.2815	
		(0.73)	
Borrowing neighbour proportion x PB		0.3216	
		(0.89)	
Borrowing neighbour proportion x LT		0.2406	
		(0.76)	
Borrowing neighbour proportion x LP		0.1234	
		(0.39)	
Distance to nearest bank (km) x TNPA			0.1813
			(1.78)+
Distance to nearest bank (km) x PB			0.3732
			(2.09)*
Distance to nearest bank (km) x LT			0.1685
			(2.30)*
Distance to nearest bank (km) x LP			0.0115
			(0.61)
Wald χ^2 test	34.99**	34.33**	40.40**
Prob> χ^2	0.0005	0.0011	0.0001
Predicted probability	0.4790	0.4790	0.4790
Pseudo R-squared	0.0700	0.0700	0.0800
Observations	411	411	411

Notes: Robust z statistics in parentheses; statistically significant at 10% (+), at 5% (*), and at 1% (**). Tang Nhon Phu A (TNPA)

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