Chapter 5

Determinants of Borrower's Defaults of Microcredit for Village and Urban Community Funds in Thailand

Chapters 2-4 provide the evidences of outreach performance of microcredit of village and urban community funds (MVC) or the village funds in Thailand. This chapter focuses on sustainability performance of the MVC.

Low default rate is a necessary condition for the success of microcredit programs. The purpose of this chapter is to investigate the factors that determine the probability of loan defaults and factors affecting the alternative repayment strategies of borrower who borrow from the MVC. It is possible to find the borrower's repayment decision in four strategies; (1) borrowers that have paid all the principal and interest rate on time (non-defaulters), (2) those borrowers that have paid full amount but later than the due date, (3) those borrowers that have paid just some amount and (4) those that have not paid any portion of the loan (defaulters). The findings can be used to manage the programs for better financial sustainability performance.

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Determinants of Borrower's Defaults of Microcredit for Village and Urban Community Funds in Thailand

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ABSTRACT

This study aimed to analyze the factors that determine a borrower's default and factors affecting the alternative repayment strategies of borrowers who borrow from the Microcredit for Village and Urban Community Funds (MVC) in Thailand. The data were from Thailand's 2010 Socioeconomic Survey. The study uses Probit, Bivariate probit and Multinomial Probit models. The results showed no statistically significance of the poor on the probability of the default. In other words, lending to the poor may not have more risk than giving a loan to those who are not poor. In addition, the duration of the loan, under a loan agreement, had a longer recovery period as a result of high possibility of defaulting in the payment of the debt. Borrowers who did not repay any portion of loan tend to be urban households without a supplementary income from a second occupation.

Keywords: microcredit, village fund, urban community fund, loan default

JEL classification: G21, R51, O12

5.1 Introduction

Traditional financial institutions commonly exclude the poor because of the high transaction cost for small loans and high risk from their low income and inability to fulfill collateral requirement. Thus microcredit providing small loans without collateral to the poor for starting productive activities or expanding their current economic activity may face a high risk. Loan defaults by individuals could destroy the lending capacity and finally affect the programs sustainability. However, the microfinance industry, for example Grameen Bank in Bangladesh, Banco-Sol in

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Bolivia and Bank Rakyat in Indonesia has been able to show high levels of repayment (Khawari, 2004). For example, Grameen Bank in Bangladesh reported portfolio at risk over 30 days is 6.95 percent in 2010, Banco-Sol in Bolivia reported 0.94 percent and the Foundation for International Community Assistance (FINCA) in Mexico reported 2.18 percent (www.mixmarket.org). These success stories have tend confirm that lending to the poor might not be as risky as has been traditionally assumed.

In Thailand, some studies have been conducted on the microcredit program that targeted the poor. However, few empirical studies have been done on the loan defaults of microcredit of village and urban community Funds (MVC), the government's largest microcredit program in Thailand. Defaults rate of MVC in 2010 calculated from Thailand's Socioeconomic Survey is 7.56 percent of total contract. So, this study is interested in monitoring how microcredit will be able to overcome credit default, and will try to answer the following question: "What are the determinants of loan defaults? Do microcredit programs face high risk form defaults by the poor?" The question about the determinants of loan defaults is of crucial importance because the low default rate is one of the conditions for the successful operation of microcredit programs. The findings can be used to minimize the loan default problem and manage the programs for better sustainability performance.

This study investigated the key factors that determined loan defaults of the microcredit of village and urban community funds. Borrowers and households with different characteristics, e.g. age, education and household size may have different levels of capabilities that lead to the differences in the abilities to repay the loans. In econometric modeling, this study will use a Probit model as standard binary choice and a Bivariate Probit model to treat endogeneity problem between poor borrower and loan defaults that may occur. In addition, a Multinomial Probit model will be used to analyze of multinomial choice of loan defaults.

5.2 Literature Review

In most cases, the lender might not have the full information about the risks of the borrowers' investment projects (adverse selection), and might not be able to monitor the borrower's action with respect to the purpose of loan (moral hazard) (Brehanu and Fufa, 2008). Recently, the group lending approach, which relates to

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social capital, was adopted by microfinance institutions to avoid asymmetric information issues (Al-Azzam, Carter Hill and Sarangi, 2012; Dufhues et al., 2011; Sharma and Zeller, 1997). Ahlin and Townsend (2007) used Townsend's Thai data base analyze repayment of joint liability borrowing groups of the Bank for Agriculture and Agricultural Cooperatives (BAAC), the primary formal financial institution serving rural households. The Logit results showed that repayment was affected negatively by the joint liability rate and social ties and positively by the strength of local sanctions (Ahlin and Townsend, 2007).

In contrast to the literature that mostly looks at repayment of joint liability borrowing groups, we focus on individual loan repayment. Repayment decision depends on the difference between the net benefits of defaulting and the net benefits of repaying. In addition, defaults' probability may result from an unwillingness to repay or inability to repay (Gonzalez, 2008). Factors related to the borrower's socioeconomic and loan characteristics could explain the differences in the rate of default (Abafita, 2003; Bhatt and Tang, 2002; Brehanu and Fufa, 2008; Godquin, 2004; Vogelgesang, 2003). Those factors can be summarizing as follows: (1) borrower characteristics, (2) occupation, experience, business growth and training in their business, (3) location of the household and business, (4) loan characteristics such as loan size, interest rate, repayment period and (5) other sources of credit.

For example, Bhatt and Tang (2002) investigated determinants of repayment from microcredit in the United State. They used six individual level socio-economic variables: gender, education, household income, degree of formality of business, experience in business, and the business' being located in the same zip code as the lending agency. The Logit results indicated that a higher education of the borrower and borrowers whose businesses were located closer to the lending agency had a higher chance of repayment. Vogelgesang (2003) analyzed determinants of default for loans from Bolivian microlender and divided the factors into four categories: personal characteristics, business characteristics, loan characteristics, and environment. The main result indicated that borrowers who got loans from multiple sources at the same time were found to be more likely to default than others. In addition, former single borrowers with a bad record were more likely to default. The amount of the loan and personal guarantee increased the probability defaults, while

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weekly repayment decreased probability. Roslan and Karim (2009) used a survey of 2,630 borrowers from Agro Bank in Malaysia to investigate the determinants of loan repayment. The results indicated that the probability of defaults was influence by the gender of the borrower, type of business, training in their business, loan size, and the repayment period. In the other words, women borrowers involved in service activity and having some training in their business had a lower probability of defaults. Furthermore, larger loan sizes and longer repayment periods also decreased the probability of defaults.

Oke, Adeyemo and Agbonlahor (2007) analyzed the factors that affect microcredit repayment of non-governmental organization clients from Nigeria and found that family income, distance between house and bank, amount of business investment, social-cultural expenses, amount of loan, and access to business information may influence repayment. An interesting result of the poverty indicator was inversely related to microcredit repayment. This implies that the poorer the borrower, the more difficult it is to repay microcredit. Poverty reduced the rate of microcredit repayment by borrowers among NGOs in the area by 0.17 per cent.

Abafita (2003) analyzed the factors that influence microfinance loan repayment in rural Ethiopia. The Probit estimation showed that the significant factors that enhanced the loan repayment were education, income, loan supervision, suitability of repayment period, availability of other credit sources and livestock, while loan diversion and loan size were found to increase loan default. Brehanu and Fufa (2008) analyzed the determinants of repayment rate of loan among small-scale farmers in Ethiopia. They found that improvement of production and participation in new technologies increased productivity and farm income thereby reducing defaults.

However, to our knowledge, little is known about what determines the probability to defaults from the MVC program. Huerta (2010) analyzed repayment behavior of MVC under joint liability lending at the community-level and focus on the role of social ties and policies such as compulsory savings and training on basic financial concepts. This empirical study was based on from the Townsend Thai panel dataset which covered four provinces from two regions in Thailand. Two main advantages of this study are as follows: first, it uses a large sample size from Thailand's Socioeconomic Survey (SES) in 2010 which includes detail from the

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MVC. Second, the analysis uses a variety of models to deal with the probability of defaults.

5.3 Research Methodology

This study used the poverty index as a testing variable to test default probability of poor borrowers. The poverty index indicates whether or not a borrower is poor, and it defines poor as when the average monthly consumption expenditure per capita is below the poverty line. For the controlled variables, the model includes borrower characteristics, household characteristics and loan characteristics.

5.3.1 The Models

This study proposed a model to explain the loan defaults of MVC's borrower. The model was based on the above mentioned testing and controlled variables. Differences in those variables may affect the ability of the borrower to repay. Three aspects are interesting in this study: (1) the response of the default probability (2) the test variable, being poor, is likely to be jointly determined with loan defaults, and (3) the response of multinomial choices of repayment decisions. The first of these will use an appropriate technique for binary choice modeling, such as a Probit model. The second will use an appropriate treatment for two simultaneously determined binary variables, which is a Bivariate Probit model. The last part will apply a Multinomial Probit model for the multiple choices of repayment.

(a) Probit Model

Probit has been used frequently in cases where the dependent variable is binary outcomes. It assumes the normal distribution of the error term. Logically, a borrower chooses to default when the utility of default exceeds the utility of repayment on time. The utility of default, y_i^*, is a latent variable and depends on some factors. For each borrower *i*, the utility can be presented as a function of observed components, X_i, and unobserved components, ε_i. Probit model is described by Maddala (2006) as follows:

$$y_i^* = X_i\beta + \varepsilon_i$$

$$y_i = 1 \quad if \quad y_i^* > 0 \qquad (5.1)$$

$$y_i = 0 \quad if \quad y_i^* \le 0$$

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where the dependent variable, y_i, is the binary outcome which is equals to one for loan defaults and otherwise it is zero. The variables *Xi* are including testing variable (poverty index) and controlled variables.

(b) Bivariate Probit Model

The Bivariate Probit model is a joint model for two binary outcomes that extend from one latent variable to two latent variables that may be correlated. As discussed above, testing variable, being poor, is likely to be jointly determined with loan defaults. The Bivariate Probit model is described by Cameron and Trivedi (2009) as follows:

$$\begin{aligned} y_1^* &= X_1\beta_1 + \varepsilon_1, \\ y_2^* &= X_2\beta_2 + \varepsilon_2 \end{aligned} \tag{5.2}$$

where y_1^* is the utility of default and y_2^* stand for latent variable of the poor. Both y_1^* and y_2^* are depend on observed components, *X*, and unobserved components, ε. ε_1 and ε_2 are joint normal distributions with zero means, variances one and correlation ρ. Then, the Bivariate Probit model specifies the observed outcomes can write as follows:

$$y_1 = \begin{cases} 1 & if \quad y_1^* > 0 \\ 0 & if \quad y_1^* \le 0 \end{cases} \quad \text{and} \quad y_2 = \begin{cases} 1 & if \quad y_2^* > 0 \\ 0 & if \quad y_2^* \le 0 \end{cases} \tag{5.3}$$

where the dependent variables are binary outcomes which y_1 is equals to one for defaulters and otherwise it is zero, whereas y_2 is equals to one for poor borrowers and otherwise it is zero. The variables *Xi* are including testing variable (poverty index) and controlled variables. This model collapses to two separate Probit models for y_1 and y_2 when rho equal to zero (Cameron and Trivedi, 2009).

(c) Multinomial Probit Model

The Multinomial Probit Model (MNP) avoids the problem of independence of irrelevant alternative (IIA) property, which is the main limitation of the Multinomial Logit model (Maddala, 2006). It is possible to find the borrower's repayment decision in four categories; (1) borrowers that have paid all the principal and interest rate on time (non-defaulters), (2) those borrowers that have paid full amount but later than the due date, (3) those borrowers that have paid just some

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amount and (4) those that have not paid any portion of the loan (defaulters). The borrower will choose the alternative that maximizes his utility.

Considering the case of the four alternatives, the utility of the *j*th choice given as follow (adapted from Maddala, 2006):

$$Y_{ij}^{*} = V_{ij} + \varepsilon_{ij}, \qquad j = 1, 2, 3, 4 \tag{5.4}$$

suppose Y_{ij}^{*} is the outcome from alternative j for individual i. V_{ij} denotes the deterministic component which equal $X_i\beta_j$ for case specific variables and ε_{ij} denotes the random component (Cameron & Trivedi, 2009). Assume that the residuals have a multivariate normal distribution with a mean vector of zero and a covariance matrix Σ.

Considering the probability that the first alternative will be chosen.

$\Pr(Y_i^{*} = 1) = \Pr\{\varepsilon_{ik} - \varepsilon_{i1} \le (V_{i1} - V_{ik})\}$, for all k

write $\eta_{21} = \varepsilon_{i2} - \varepsilon_{i1}$, $\eta_{31} = \varepsilon_{i3} - \varepsilon_{i1}$, $\eta_{41} = \varepsilon_{i4} - \varepsilon_{i1}$, $V_{12} = V_{i1} - V_{i2}$, $V_{13} = V_{i1} - V_{i3}$, and $V_{14} = V_{i1} - V_{i4}$. Thus the probability that alternative 1 will be chosen is given by

$$P_1 = \Pr(Y_1^{*} = 1) = \int_{-\infty}^{V_{12}}\int_{-\infty}^{V_{13}}\int_{-\infty}^{V_{14}} f(\eta_{21}, \eta_{31}, \eta_{41}) d\eta_{21}\eta_{31}\eta_{41} \tag{5.5}$$

where $f(\eta_{21}, \eta_{31}, \eta_{41})$ has a trivariate normal distribution with a covariance matrix Ω_1 and a mean vector of zero. The probabilities P_2, P_3 and P_4 can be similarly calculated. The specification of the model is as follows:

Default = f(testing variable, borrower characteristics, household characteristics, loan characteristics)

5.3.2 Data Collection

The data in this study were collected from Thailand's Household Socioeconomic Survey in 2010, conducted by the National Statistical Office. The survey from the Village and Urban Community Funds (MVC) section interviewed 10,340 borrowers throughout the country. Borrowers living in municipal and rural households accounted for 37 and 63 percent, respectively. The data were collected every month throughout the year. The survey collected detailed information on the borrower, the household and loan characteristics. A key question in the questionnaire is "Did you repay your debt to the Village and Urban Community Fund by the due date as indicated in the loan registered form?" The survey found that 797 borrowers

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(or 7.7 percent) were defaulters who could not repay the MVC debt on the due date. We can separate those defaulters into three categories including 318 borrowers that have not paid any portion of the loan, 231 borrowers that have repaid some of the loan, and 248 borrowers that had paid the full amount but later than the due date.

5.3.3 Data Description

After eliminating observations with missing data, the sample consisted of 10,030 borrowers. Those borrowers of MVC program included 758 defaulters and 9,272 repayers. The borrower being poor was 5.2 percent. The average age of borrowers was 49.5 years old, around 53% were female, and 65% had their own business. The borrower, household and loan characteristics are summarized in Table 5.1.

Table 5.1: Descriptive Statistics of Variables

	Repayer (non-default)		Defaulter		Total	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Testing Variable:						
Being poor (yes=1)	0.051	0.220	0.062	0.241	0.052	0.222
Borrower characteristics:						
Age	49.607	10.874	48.799	10.848	49.546	10.873
Women (yes=1)	0.530	0.499	0.538	0.499	0.531	0.499
Education (years)	6.166	3.277	6.150	3.296	6.165	3.278
Married (yes=1)	0.830	0.375	0.794	0.405	0.828	0.378
Occupation						
Employer (yes=1)	0.055	0.228	0.029	0.168	0.053	0.224
Employee (yes=1)	0.198	0.398	0.306	0.461	0.206	0.405
Own business (yes=1)	0.665	0.472	0.551	0.498	0.656	0.475
Unemployed (yes=1)	0.083	0.275	0.113	0.317	0.085	0.279
Secondary occupation (yes=1)	0.391	0.488	0.310	0.463	0.385	0.487
Have been a committee (yes=1)	0.173	0.378	0.128	0.334	0.169	0.375
Household characteristics:						
Number of earners	2.237	1.006	2.203	1.030	2.235	1.008
Household size (persons)	3.680	1.585	3.909	1.659	3.698	1.592
Dependency ratio	0.373	0.298	0.398	0.289	0.375	0.298
Land tenure (yes=1)	0.937	0.243	0.883	0.322	0.933	0.250
Number of cars	0.392	0.622	0.315	0.577	0.386	0.619
Number of motorcycles	1.467	0.851	1.351	0.842	1.459	0.851
Number of mobile phones	1.912	1.096	1.916	1.112	1.912	1.097
Rural household (yes=1)	0.631	0.482	0.583	0.493	0.628	0.483

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Table 5.1 (Continued)

	Repayer (non-default)		Defaulter		Total	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Loan characteristics:						
Frequency of borrowing (since 2002)	6.000	2.727	3.757	2.774	5.831	2.794
Interest rate	5.958	2.372	5.825	3.244	5.948	2.449
Term of loan (month)	11.999	2.333	12.455	4.820	12.034	2.608
Purpose of loan						
Farm business (yes=1)	0.432	0.495	0.309	0.462	0.423	0.494
Non-farm business (yes=1)	0.146	0.353	0.164	0.370	0.147	0.354
Consumption (yes=1)	0.422	0.494	0.528	0.500	0.430	0.495
Need for future loan (yes=1)	0.912	0.283	0.739	0.440	0.899	0.301
MVC debt remaining (Million Baht)	0.078	0.148	0.059	0.144	0.076	0.147
Loan size (THB 1,000)	17.241	11.289	16.751	11.740	17.204	11.324
Number of observations	9,272		758		10,030	

5.4 Results

The results present two specifications of the empirical model (Table 5.2). The first column provided the results of Probit model. A concern with endogeneity problem, Bivariate Probit model is applied and the test could not reject the exogeneity of the testing variable in the determination of the loan defaults. In this case, the Bivariate Probit model was not necessary (Cameron and Trivedi, 2009). However, the results are reported in column two and three.

Table 5.2: Probit and Bivariate probit Estimation for Determinants of Loan Defaults

	Probit	**Bivariate Probit**	
Dependent variable:	Dummy of default	Dummy of default	Dummy of Being poor
Testing Variable:			
Being poor	-0.0234	-0.3738	
	(0.092)	(0.293)	
Borrower characteristics:			
Age	0.0007	0.0005	-0.0122***
	(0.002)	(0.002)	(0.003)
Women	-0.0520	-0.0550	-0.1295**
	(0.043)	(0.043)	(0.057)
Education (years)	-0.0194***	-0.0196***	-0.0350***
	(0.007)	(0.008)	(0.013)

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Table 5.2 (Continued)

	Probit	Bivariate Probit	
Dependent variable:	Dummy of default	Dummy of default	Dummy of Being poor
Married	-0.0719	-0.0705	0.0881
	(0.055)	(0.055)	(0.081)
Occupation			
Employer	-0.2333*	-0.2427*	-0.5825***
	(0.132)	(0.133)	(0.226)
Employee	0.1723*	0.1581*	-0.3182**
	(0.089)	(0.090)	(0.128)
Own business	-0.0393	-0.0397	-0.0368
	(0.085)	(0.084)	(0.102)
Secondary occupation	-0.0603	-0.0608	-0.1207**
	(0.045)	(0.045)	(0.057)
Have been a committee	0.0061	0.0077	
	(0.060)	(0.060)	
Household characteristics:			
Number of earners	-0.0531*	-0.0527*	0.0230
	(0.031)	(0.031)	(0.040)
Household size (persons)	0.0993***	0.1198***	0.4584***
	(0.020)	(0.026)	(0.025)
Dependency ratio	-0.0771	-0.0786	0.3184***
	(0.083)	(0.084)	(0.107)
Land tenure	-0.1423*	-0.1400*	-0.0130
	(0.073)	(0.073)	(0.124)
Number of cars	-0.0818**	-0.0998**	-0.9669***
	(0.039)	(0.043)	(0.100)
Number of motorcycles	-0.0912***	-0.1024***	-0.3180***
	(0.027)	(0.029)	(0.043)
Number of mobile phones	-0.0079	-0.0248	-0.3953***
	(0.024)	(0.028)	(0.037)
Rural household	-0.0495	-0.0488	0.0643
	(0.043)	(0.043)	(0.059)
Central region			-0.4783***
			(0.085)
North region			0.0355
			(0.062)
South region			-0.8988***
			(0.213)
Loan characteristics:			
Frequency of borrowing (since 2002)	-0.1385***	-0.1376***	
	(0.008)	(0.008)	
Interest rate	0.0029	0.0031	
	(0.008)	(0.008)	
Term of loan (month)	0.0119**	0.0116*	
	(0.006)	(0.006)	

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Table 5.2 (Continued)

	Probit	Bivariate Probit	
Dependent variable:	Dummy of default	Dummy of default	Dummy of Being poor
Purpose of loan			
Farm business	-0.1354**	-0.1359**	
	(0.064)	(0.064)	
Consumption	-0.0386	-0.0366	
	(0.062)	(0.062)	
Need for future loan	-0.5053***	-0.5034***	
	(0.053)	(0.053)	
MVC debt remaining (Million Baht)	-0.0634	-0.0493	
	(0.161)	(0.161)	
Loan size (THB 1,000)	0.0008	0.0007	
	(0.002)	(0.002)	
Constant	-0.1208	-0.1080	-1.5405***
	(0.225)	(0.225)	(0.277)
rho			0.2103
Pseudo R-squared	0.1278		
Log pseudo likelihood	-2,343.03	-3,737.63	
Wald chi2	$\chi^2(26)$ = 619.73***	$\chi^2(45)$ = 1418.00***	
Wald test of exogeneity		$\chi^2(1)$ = 1.41	
Number of observations	10,030	10,030	

Notes: Numbers in parenthesis indicate robust standard errors.
***, ** and * represent level of significance at 99%, 95% and 90%.

The results from both models indicate that testing variable of loan defaults of the poor are nonsignificant. These results indicate that the poor do not have larger loan defaults than the non-poor.

Moreover, results from Table 5.2 indicate that borrowers with lower education levels are more likely to have larger default probabilities. The signs on occupations of borrowers indicated that employers have a lower probability to default while employees were more likely to have larger default probability compared with the unemployed people, which are the base case of the model. Borrowers' household with lower earnings and larger household size are likely to have larger probability to default. Borrowers with more assets both in land and vehicles tend to default less. In addition, borrowers with a higher frequency of borrowing since 2002 stated that there is a need for future MVC's loan to have smaller default probabilities. Borrowers who used loan for farm business are likely to have smaller defaults' probability. The longer the term of loan tend to have a larger probability to default.

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Table 5.3 shows the results from the Multinomial Probit model, where the borrowers who repaid the full amount on time are the base case outcome. The result from Multinomial Probit model indicates that higher interest rate had significantly larger default probability in the case of borrowers who repaid the full amount of loan but late than the due date. For borrowers who repaid just some amount of loan, older borrowers are likely to have larger default probability. In addition, larger loan size had a significantly larger probability to default. In the case of borrowers who did not repay any portion of loan, rural borrowers who had a secondary occupation are more likely to have smaller loan defaults.

Table 5.3: Multinomial Probit Estimation for Determinate Multiple Choices of Repayment

	Multinomial Probit		
Dependent variable:	default (2) Repaid full but late	default (3) Repaid just some amount	default (4) Did not repay
Testing Variable:			
Being poor	-0.0605	-0.0671	0.0506
	(0.170)	(0.197)	(0.166)
Borrower characteristics:			
Age	0.0001	0.0089**	-0.0044
	(0.004)	(0.005)	(0.004)
Women	-0.0635	-0.0322	-0.0713
	(0.080)	(0.087)	(0.083)
Education (years)	-0.0305**	-0.0166	-0.0245*
	(0.014)	(0.016)	(0.014)
Married	-0.0331	-0.0729	-0.1706
	(0.105)	(0.110)	(0.105)
Occupation			
Employer	-0.7126**	-0.2463	0.0285
	(0.291)	(0.273)	(0.239)
Employee	0.0459	0.4111**	0.2724*
	(0.174)	(0.179)	(0.160)
Own business	-0.1488	0.0191	0.0301
	(0.159)	(0.173)	(0.154)
Secondary occupation	-0.0489	0.0101	-0.2006**
	(0.084)	(0.089)	(0.090)
Have been a committee	0.1003	0.0469	-0.1642
	(0.107)	(0.118)	(0.132)
Household characteristics:			
Number of earners	-0.0293	-0.0811	-0.1151**
	(0.057)	(0.064)	(0.058)

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Table 5.3 (Continued)

Dependent variable:	Multinomial Probit		
	default (2) Repaid full but late	default (3) Repaid just some amount	default (4) Did not repay
Household size (persons)	0.1011***	0.1281***	0.1599***
	(0.038)	(0.037)	(0.038)
Dependency ratio	0.0508	-0.3555**	-0.0391
	(0.150)	(0.167)	(0.165)
Land tenure	-0.2998**	-0.2568*	0.0371
	(0.137)	(0.137)	(0.131)
Number of cars	-0.0566	-0.1406*	-0.1328*
	(0.072)	(0.082)	(0.075)
Number of motorcycles	-0.0975**	-0.1038*	-0.1511***
	(0.049)	(0.060)	(0.051)
Number of mobile phones	-0.0144	-0.0025	0.0021
	(0.044)	(0.049)	(0.046)
Rural household	-0.0495	0.0380	-0.1634**
	(0.080)	(0.084)	(0.083)
Loan characteristics:			
Frequency of borrowing (since 2002)	-0.0948***	-0.1731***	-0.2688***
	(0.014)	(0.017)	(0.019)
Interest rate	0.0221*	-0.0005	-0.0134
	(0.013)	(0.017)	(0.016)
Term of loan (month)	0.0279***	0.0171**	0.0000
	(0.010)	(0.008)	(0.012)
Purpose of loan			
Farm business	-0.0875	-0.2992**	-0.1417
	(0.123)	(0.124)	(0.127)
Consumption	0.0069	-0.1633	-0.0035
	(0.119)	(0.118)	(0.122)
Need for future loan	-0.1875	-0.8164***	-0.8298***
	(0.117)	(0.097)	(0.094)
MVC debt remaining (Million Baht)	-0.1215	-0.2186	0.0643
	(0.297)	(0.342)	(0.312)
Loan size (THB 1,000)	-0.0017	0.0052**	-0.0052
	(0.004)	(0.003)	(0.005)
Constant	-1.8878***	-1.4043***	0.0655
	(0.411)	(0.442)	(0.429)
Pseudo R-squared			
Log pseudo likelihood		-3,077.99	
Wald chi2		$\chi^2(78) = 745.09^{***}$	
Number of observations		10,030	

Notes: Defaults (1) or repaid full amount on time is the base outcome for Multinomial Probit model. Numbers in parenthesis indicate robust standard errors. ***, ** and * represent level of significance at 99%, 95% and 90%.

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Table 5.4 presents the results of marginal effect at the mean of three models. It provides an effect of explanatory variables on loan defaults. For example, in a Probit model, the marginal effect of education indicates that an additional year of education would decrease the probability of default of borrower by average of 0.21 percent. Whereas the marginal effect of household size indicates that an increase in members of the family would increase the probability of default by 1.09 percent on average.

Table 5.4: Results of Marginal Effect for Loan Defaults

	Probit	Bivariate Probit	Multinomial Probit		
Dependent variable:	Dummy of default	Dummy of default	default (2) Repaid full but late	default (3) Repaid just some amount	default (4) Did not repay
Testing Variable:					
Being poor[a]	-0.0025	-0.3738	-0.0022	-0.0017	0.0015
	(-0.26)	(-1.28)	(-0.37)	(-0.35)	(0.35)
Borrower characteristics:					
Age	0.0001	0.0005	0.0000	0.0003**	-0.0001
	(0.33)	(0.21)	(-0.05)	(2.03)	(-1.20)
Women[a]	-0.0057	-0.0550	-0.0023	-0.0006	-0.0015
	(-1.20)	(-1.27)	(-0.73)	(-0.27)	(-0.78)
Education (years)	-0.0021***	-0.0196***	-0.0011**	-0.0004	-0.0005
	(-2.59)	(-2.62)	(-2.10)	(-0.84)	(-1.47)
Married[a]	-0.0082	-0.0705	-0.0008	-0.0017	-0.0043
	(-1.26)	(-1.28)	(-0.19)	(-0.54)	(-1.44)
Occupation					
Employer[a]	-0.0216**	-0.2427*	-0.0176***	-0.0049	0.0021
	(-2.12)	(-1.83)	(-4.21)	(-0.90)	(0.34)
Employee[a]	0.0205*	0.1581*	0.0001	0.0132*	0.0065
	(1.78)	(1.75)	(0.02)	(1.86)	(1.35)
Own business[a]	-0.0044	-0.0397	-0.0062	0.0008	0.0010
	(-0.46)	(-0.47)	(-0.94)	(0.18)	(0.28)
Secondary occupation[a]	-0.0065	-0.0608	-0.0015	0.0007	-0.0046**
	(-1.36)	(-1.36)	(-0.48)	(0.28)	(-2.31)
Have been a committee[a]	0.0007	0.0077	0.0043	0.0013	-0.0039
	(0.10)	(0.13)	(0.95)	(0.39)	(-1.48)
Household characteristics:					
Number of earners	-0.0058*	-0.0527*	-0.0007	-0.0020	-0.0026*
	(-1.69)	(-1.68)	(-0.33)	(-1.14)	(-1.82)
Household size (persons)	0.0109***	0.1198***	0.0034**	0.0031***	0.0034***
	(5.01)	(4.61)	(2.28)	(3.03)	(3.67)
Dependency ratio	-0.0085	-0.0786	0.0029	-0.0099**	-0.0005
	(-0.92)	(-0.94)	(0.50)	(-2.14)	(-0.13)

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Table 5.4 (Continued)

	Probit	Bivariate Probit	Multinomial Probit		
Dependent variable:	Dummy of default	Dummy of default	default (2) Repaid full but late	default (3) Repaid just some amount	default (4) Did not repay
Land tenure[a]	-0.0172*	-0.1400*	-0.0134*	-0.0076	0.0019
	(-1.77)	(-1.92)	(-1.79)	(-1.48)	(0.69)
Number of cars	-0.0090**	-0.0998**	-0.0016	-0.0036	-0.0029
	(-2.09)	(-2.33)	(-0.59)	(-1.59)	(-1.61)
Number of motorcycles	-0.0100***	-0.1024***	-0.0033*	-0.0024	-0.0033***
	(-3.31)	(-3.49)	(-1.72)	(-1.49)	(-2.64)
Number of mobile phones	-0.0009	-0.0248	-0.0006	0.0000	0.0001
	(-0.33)	(-0.88)	(-0.33)	(-0.03)	(0.08)
Rural household[a]	-0.0055	-0.0488	-0.0017	0.0014	-0.0040*
	(-1.15)	(-1.15)	(-0.54)	(0.63)	(-1.87)
Loan characteristics:					
Frequency of borrowing (since 2002)	-0.0152***	-0.1376***	-0.0028***	-0.0042***	-0.0060***
	(-18.05)	(-16.65)	(-5.27)	(-10.06)	(-13.34)
Interest rate	0.0003	0.0031	0.0009*	0.0000	-0.0004
	(0.35)	(0.38)	(1.78)	(-0.10)	(-0.95)
Term of loan (month)	0.0013**	0.0116*	0.0011***	0.0004*	-0.0001
	(1.98)	(1.93)	(2.65)	(1.80)	(-0.28)
Purpose of loan					
Farm business[a]	-0.0146**	-0.1359**	-0.0025	-0.0077**	-0.0028
	(-2.14)	(-2.12)	(-0.52)	(-2.36)	(-0.95)
Consumption[a]	-0.0042	-0.0366	0.0006	-0.0045	0.0001
	(-0.62)	(-0.59)	(0.14)	(-1.43)	(0.05)
Need for future loan[a]	-0.0759***	-0.5034***	-0.0024	-0.0338***	-0.0302***
	(-7.30)	(-9.46)	(-0.49)	(-5.20)	(-5.09)
MVC debt remaining (Million Baht)	-0.0070	-0.0493	-0.0044	-0.0059	0.0021
	(-0.39)	(-0.31)	(-0.38)	(-0.63)	(0.29)
Loan size (THB 1,000)	0.0001	0.0007	-0.0001	0.0002**	-0.0001
	(0.45)	(0.42)	(-0.40)	(2.20)	(-1.19)

Notes: [a] dy/dx is for discrete change of dummy variable from 0 to 1. Numbers in parenthesis indicate *z*-statistics. ***, ** and * represent level of significance at 99%, 95% and 90%.

The probability of default would decrease on average by 7.59 percent when they needed the next loan from the MVC, and 1.52 percent on average when increasing borrowing since 2002. The marginal effect of term loans indicates that an additional month of duration of a loan would increase the probability of default by on average of 0.13 percent.

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5.5 Discussion

Empirical evidence has shown that there was no statistical significance of the poor borrowers on the probability of defaulting. Results from both the Probit and Bivariate probit models confirmed that the poor do not have larger default than the non-poor. In addition, Multinomial Probit results indicate that the poor do not affect the alternative of repayment strategies of borrower.

Borrowers with lower levels of education have higher loan defaults. The higher education results in a greater ability to create income and thus the ability to repay the loan on time (Ahlin and Townsend, 2007). The borrower is an employee tends to have higher probability of default. It may be difficult to split their fixed wage to pay the debt. For borrowers who have been a committee (both at present and in the past), no statistical significance for loan default. This group is knowledgeable about the rules of the MVC as well and controls the operation of the MVC directly. However, they do not behave in the default of MVC better than other members.

In addition, households with more earners are more likely to have lower probability of default because they do not rely only on head of household's income. Since households have an additional source of income and more ability to repay the debt. However, households with more members will need more money to take care and meet the needs of members. They could use the money that reserve for repayment to meet the needs of family members. While the MVC does not require asset collateral by the borrower, wealth indicators such as land and vehicle ownership may improve the capacity of the borrower to meet repayment requirement on time.

In rational, a long duration of loan seemed likely to have created the opportunity to generate income from the loan. However, the results of this study have shown that longer the duration of a loan increase in the debt defaults. The reason may result from a term of loan longer than project's business cycle (Roslan and Karim, 2009). Revenue should be allocated to debt repayment that will pay for the other activities. The results also have shown that borrowers who used the loan for farm business investment tended to decrease the probability of defaulting. Poor households borrow about 47 percent and 43 percent, for consumption loan, for non-poor households. However, consumption loan was not statistically significant in the probability of defaulting. In case of borrowers need loans in the future it tends

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defaults less in order to have the opportunity to borrow in the future. The frequency of borrowing make fewer default because the borrowers often have experience of the rules and know how to manage credit well.

Although, urban households have monthly MVC's repayment expenditures averaging 9.7 percent of their monthly total expenditure and 11.08 percent for rural households. It seems that the debt burden from MVC of rural households is more than in urban households. However, the results from the multinomial probit model indicated that the repayment of loans in rural areas is higher than in urban households. Rural borrowers may have other source of income from second occupations such as textiles, food processing, and work in factories after the harvest season. Thus, it is more likely for them to repay the debt on time. Another reason may explain by social capital, which is higher in rural areas, as an important factor to determine rate of defaults. For example, social sanctions can lead to increased repayment rates (Ahlin and Townsend, 2007; Bhatt and Tang, 2002; Oke, Adeyemo and Agbonlahor, 2007). Huerta (2010) suggested that social ties such as cooperation and social sanctions play a central role in explain the success of the program in terms of repayment rates in rural and urban communities in case of a joint liability lending MVC program in Thailand.

5.6 Conclusion

Traditional financial institutions have the idea that the poor are high risk. The empirical evidence of MVC in Thailand shows that the poor do not have higher risks than a loan to those who are not poor. The duration of the loan is an important factor to determine the possibility of default. For borrowers who did not repay any portion of loan tended to be urban households without a second occupation.

Policy recommendations to improve sustainability performance of the MVC are presented as follows. First, the MVC should not deprive the poor because they do not as risky as has been traditionally financial institutions assumed. Second, the most of loan agreements set a one year term for a loan, however, the frequency of repayments such as every month or bimonthly may result in fewer defaults. Last, there should be promoted income generating activities as a source of extra income for the borrower.

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