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**Working Paper**

## Village funds and access to finance in rural Thailand

Diskussionsbeitrag, No. 417

**Provided in Cooperation with:**

School of Economics and Management, University of Hannover

*Suggested Citation:* Menkhoff, Lukas; Rungruxsirivorn, Ornsiri (2009) : Village funds and access to finance in rural Thailand, Diskussionsbeitrag, No. 417, Leibniz Universität Hannover, Wirtschaftswissenschaftliche Fakultät, Hannover

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# **Village Funds and Access to Finance in Rural Thailand**

by Lukas Menkhoff and Ornsiri Rungruxsirivorn

Discussion Paper No. 417

May 2009

ISSN 0949-9962

## **Abstract**

This paper examines whether recently introduced “village funds”, one of the largest microfinance programs ever implemented, improve access to finance. Village funds are analyzed in a cross-sectional approach in relation to competing financial institutions. We find, first, that they reach the target group of lower income households better than formal financial institutions. Second, village funds provide loans to those kinds of borrowers which tend to be customers of informal financial institutions. Third, village funds help to reduce credit constraints. Thus, village funds provide services in the intended direction. However, they do this to a quite limited degree, questioning their efficiency.

JEL-Classification: O 16, O 17, G 21

Keywords: informal financial institutions, microfinance, credit constraint, Thailand, Asia

We would like to thank seminar and workshop participants for useful comments, in particular Oliver Gloede, Bernd Hardeweg, Chantal Herberholz, Olaf Huebler, Somchai Jitsuchon, Sothitorn Mallikamas and Patrick Puhani. Financial support by the German Research Foundation (DFG) is gratefully acknowledged.

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# Village Funds and Access to Finance in Rural Thailand

## 1 Introduction

Lack of access to the credit market is considered one of the main reasons why the poor in developing countries remain poor. As a strategy for poverty reduction, many developing countries have developed and have been providing credit to the poor through microfinance programs. Following these initiatives, in 2001 the Thai government revolutionized the rural credit market by its decision to inject 1 million Baht, or about 28,000 US Dollars at the present exchange rate, to each of the 77,000 villages in Thailand. The vehicle of this program are so-called “village funds”, i.e. revolving credit funds which are set up in all 77,000 villages. This program is one of the largest microfinance programs in the world, costing about 77 billion Baht or approximately 1.5 percent of GDP. The village funds became from their start the single most important lender in terms of the number of loans granted. In terms of credit volume they rank second in rural credit with a market share of about 20 percent. Thus the village funds are extremely important in Thailand’s rural credit market.

Despite the importance of the village funds, there is hardly rigorous study about them. We know of two careful analyses which evaluate the performance of the village funds from their *income-generating impact* (Kaboski and Townsend, 2006, Boonperm et al., 2007), i.e. whether the village funds raise household income, consumption levels, investments and business start-ups. Our work differs from these studies in that while both studies evaluate the performance of this program from its *impact*, our work assesses the performance of the village funds from the *outreach* and *credit access* angles: does the introduction of the village funds as another microfinance institution improve access to finance in the rural areas? How well targeted are the village funds? And what can we learn from this large-scale policy experiment?

The introduction of the village funds had two motivations. First, it was part of the government at that time to bolster domestic demand (Jarvis, 2002) which is picked-up by studies on an income-generation impact. Second, there was an understanding that the financial sector has “paid little attention to the underprivileged groups, especially people in the rural area” as formulated by the Bank of Thailand (2005) in the motivation to develop a Financial Sector Master Plan since early 2002. Our study addresses this second issue which is discussed in the literature as improving “access to finance” (Beck and Demirgüç-Kunt, 2008) – or equivalently as improving “outreach” (Hermes and Lensink, 2007). We find, indeed, that the village funds reach poorer households than do formal institutions; moreover, they provide

financial services tentatively substituting informal lending with regards to lending policy and they contribute to easing credit constraints. However, we question the village funds' efficiency in reaching their ambition.

In order to analyze the contribution of the village funds in the rural credit markets, we rely on a new household survey covering almost 2,200 households in three provinces in North-East Thailand. This area of Thailand is suited for our purpose as it is still characterized by large agricultural production and by income per capita below the country's average so that rural credit is important. At the same time, there are various financial institutions operating in this area, ranging from commercial banks to moneylenders but also including others, such as cooperatives and the village funds, which provides a broad spectrum. These financial institutions have characteristics that are different from each other. It is our objective to identify what kind of households and loans are served by the village funds in relation to these other financial institutions. This identification then allows inferences about the village funds' outreach as well as the degree of competition, substitutability and overlap among these financial institutions.

As analytical framework to position the village funds we use stylized facts about the characteristics of the formal vs. informal finance. Earlier studies compare these two forms of financial institutions in several countries and at various points in time, including Ghate (1992) on Asia, Mohieldin and Wright (2000) on Egypt, Pal (2002) on India, Barslund and Tarp (2008) on Vietnam and Guikinger (2008) on Peru.<sup>1</sup> Insights converge towards the following findings with respect to the characteristics of borrowers, their purpose of borrowing and credit contracts:

- Informal *borrowers* have lower income, lower assets, tend to be less educated and realized more frequently earlier default.
- Regarding the borrowing *purpose*, informal credit is less often used for productive purposes but for consumption. It is a consequence that it is also relatively more important as means to absorb shocks in general and health costs in particular.
- The informal credit *contract* seems to be of smaller volume, shorter-term duration and higher interest rate to be paid.

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<sup>1</sup> Whereas we focus on household studies, other research about formal and informal finance focuses on firm's financing, such as recently (and controversially) Allen et al. (2005) and Ayyagari et al. (2008). Moreover, the relation between formal and informal finance can be complex, for example, when informal lenders use loans from the formal sector and intermediate them to households (see e.g. Bell, 1990, Jain, 1999). This is usually not the case in Thailand.

It is thus interesting to learn whether the village funds play their intended role as microfinance institutions in the sense that they are positioned between more conventional formal and informal financial institutions. Descriptive statistics show that the customers of the village funds have an intermediate economic condition, such as an intermediate income level, which is rather lower than for formal financial institutions; moreover, the borrowing purpose includes production as well as consumption purposes and, finally, credit terms are in between typical formal and informal terms.

We complement this description by a multinomial logit regression, explaining the use of seven groups of financial institutions by borrowing households, namely in the order of increasing informality: (1) commercial banks and specialized state financial institutions, (2) the Bank for Agriculture and Agricultural Cooperatives, (3) the village funds, (4) community-based credit groups, savings groups and cooperatives, (5) policy funds, (6) moneylenders and (7) relatives and friends. Interestingly, we find that the village funds indeed provide loans to borrowers who are more typical customers of informal than formal financial institutions, indicating that the village funds provide services towards substituting informal institutions.

Finally, we assess the role of the village funds in easing credit constraints faced by rural households. Under this program, one million Baht is given to every village regardless of the village population. We use these exogenous variations in the fund size to analyze whether the fact of individual credit constraint, proxied by a questionnaire item asking directly for this experience, is reduced by a relatively larger volume of the village fund. Evidence indicates that the village funds significantly contribute to overcoming credit constraints.

Qualifying these achievements, however, every single analysis shows that progress made by the introduction of village funds is small and this raises the question of efficiency. Thus, thorough studies on efficiency are obviously of great importance to completely evaluate the village funds but go beyond the scope of this paper.

Our research is mainly linked to three strands of literature. First, we basically apply the methodology of studies comparing the formal and the informal sector but we extend this dichotomy by considering a richer spectrum of financial institutions. Second, our study is related to research analyzing the performance of microfinance institutions regarding their outreach.<sup>2</sup> We contribute to this literature by considering a particular case being also of enormous economic importance relative to many other comparable cases. Third, we add to

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<sup>2</sup> So we also do not contribute to the large strand of microfinance literature which has been concerned with studying information asymmetries as for example discussed in Hoff and Stiglitz (1990) (see also Morduch, 1999, Conning and Udry, 2007).

earlier studies on Thailand's village funds by Kaboski and Townsend (2006) and Boonperm et al. (2007). These studies find that the introduction of the village funds increased households' expenditure and also income. Whereas these studies analyze the welfare impacts of the village funds, our work focuses on the market position of the village funds relative to the other financial institutions and the role of the village funds in providing credit access.

The paper is structured into four more sections. Section 2 informs about Thailand's rural credit market, Section 3 introduces the data used in our research. Descriptive statistics about the village funds (in relation to other financial institutions) are provided in Section 4, whereas regression approaches analyzing the contribution of the village funds are discussed in Section 5. Section 6 discusses resulting policy considerations and Section 7 concludes.

## **2 Thailand's rural credit market**

### **2.1 Rural credit market development**

The rural sector in Thailand is still an important part of the national economy. Even today, when Thailand belongs to the group of emerging markets with a middle-income level of its population, agriculture – which forms the main part of the rural economy – employs about 38 percent of the labor force, generates about 23 percent of export value and earns about 10 percent of GDP. Of course, the relative importance of agriculture was shrinking during the high growth development process of the last decades, so that the rural economy has been even more important in the past. Consequently, Thai governments have for a long time put effort into the development of the rural credit markets as part of an overall rural development strategy.

Major changes in this respect took place in the mid 1970s. The government decided to increase credit supply tremendously in rural areas by two measures: first, commercial banks were ordered to extend a significant share of their total loans in the countryside, and, second, the 1966 established state-owned Bank for Agriculture and Agricultural Cooperatives (BAAC) expanded its loan portfolio by about 20 percent per year. This expansion has, indeed, contributed to the finding of Siamwalla et al. (1990) in their 1984-85 conducted empirical study that “funds are not the scarce factor” (p.272) in Thailand's rural credit market. Moreover, due to this expansion the market share of lending by the informal sector roughly decreased from 90 percent to 50 percent within one decade (between mid 1970s to mid 1980s). Thus the credit market's limitation is not general credit availability but availability to specific households and credit terms: Siamwalla et al. (1990, p.272) state that despite all successes by

the BAAC there is still need of “innovations in institution-building to compete with the information-solving devices in place in the informal sector”.

Seen from this perspective one may ask whether the introduction of the village funds since 2001 was a right step into this direction, i.e. to shift the border between formal lending and informal lending at the cost of the latter. The BAAC was somewhat successful in this respect – do the village funds provide the next step into the desired direction?

## **2.2 Village funds**

The introduction of the village funds since 2001 follows the logic of other microfinance programs that have been set up all over the world during the last decades. The initiative is intended to improve the supply side of rural credit markets by two channels: first, due to the allocation of new funds there will probably be a stimulating effect in that more credit may foster growth and employment. Second, due to its construction as microfinance initiative these funds may be better targeted to reach otherwise disadvantaged groups in the rural credit market, such as poorer households.<sup>3</sup> This research focuses on the second channel, the effect on target groups, whereas Kaboski and Townsend (2006) and Boonperm et al. (2007) focus on the first channel. They find, indeed, that the introduction of village funds has stimulated the overall level of credit, in particular short-term credit and has also stimulated economic activity, such as investment, expenditure and consumption. Moreover, the village funds seem to have structural effects, in that certain credit purposes have relatively gained (e.g. agricultural investment and consumption) and in that some lenders may have been affected (e.g. commercial banks rather gained and informal lending rather lost, at least in the very beginning).

The village funds are set up in the following way (more details e.g. in Kaboski and Townsend, 2006, Boonperm et al., 2007). They address the smallest political unit, that is the about 77,000 villages in Thailand which typically have a few hundred households, sometimes even below one hundred. At each village the fund has to be formally established, has to set its own regulations (within a given framework) and these regulations have to be accepted by the National Village and Urban Community Fund Office. Part of the requirements is that the villagers form a committee, consisting of about ten persons, which decides on the lending

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<sup>3</sup> The village funds objectives are officially stated in the “Act of National Village and Urban Community Fund” (B.E.2547) as follows: 1. to be used as a revolving fund for investments in occupational development, job creation, income generating activities and welfare improvement; 2. to be used as emergency fund to cope with urgent problems; 3. to empower the grassroots and stimulate the rural economies. As political motivation, the government had repeatedly claimed that this program should enable the underserved and poor people to have better access to capital.

policies, processes the loan applications and determines who may borrow. The village fund committees do not handle money directly. Each committee has to open their village fund account at BAAC or the Government Savings Bank (GSB). Once the loan application is approved, borrowers have to receive the loan from BAAC or GSB. In this sense the village funds operate more similar to a formal institution. However, village funds do neither have a permanent office nor its own staff, so that they are regarded as being in between formal and informal institutions.

The volume of each village fund is one million Baht, i.e. roughly about 28 thousand US Dollars, depending on the prevailing exchange rate. The typical loan amount extended should be below 20,000 Baht and must not be above 50,000 Baht. Loans are secured by guarantors among the village fund members. Loan duration is at a maximum of 12 months and the interest rate has to be positive. In the sample studied by Kaboski and Townsend (2006), the village fund group typically consisted of close to 100 members, so that loan applications could mostly be approved.

### **3 Data**

Our data come from the “Vulnerability in Southeast Asia”-project funded by the German Research Foundation (DFG). The project targets rural households who are either poor or who are at risk of falling into poverty. An initial cross sectional survey was carried out in Thailand between April and June 2007. To be in line with the overall objective of the project, the Northeastern region of Thailand was deliberately chosen as the incidence of poverty is relatively higher in this region (see Healy and Jitsuchon, 2007). Three provinces in the Northeastern region were then selected for their peripheral location along a border with their neighboring countries, Laos and Cambodia, and for a certain degree of variation in agro-climatic and ecological conditions between these provinces. The three provinces are namely Buri Ram, Ubon Ratchatani and Nakhon Phanom ([Appendix 1](#)). Ubon Ratchatani and Buri Ram are among the ten largest provinces in Thailand by area and population. According to Thailand’s National Statistical Office, Ubon Ratchatani has a population of about 1.8 million people in 2007 and Buri Ram has 1.6 million people. Nakhon Phanom is relatively smaller with a population of 0.7 million people. However the differences between the three provinces in GPP per capita are not that large with Ubon Ratchatani having a GPP per capita of 36.7 thousand Baht (1.05 thousand US\$), Buri Ram, 31.4 thousand Baht (0.9 thousand US\$) and Nakhon Phanom, 30.3 thousand Baht (0.86 thousand US\$).



We apply a three stage random sampling procedure where provinces are constituted strata and the primary sampling units (PSU) are sub-districts (Tambon). The first stage of the sampling procedure involves choosing sub-districts, which are selected with probability proportional to size by a systematic sample from a list ordered by population density, which ensures proportional coverage of densely (peri-urban) and less densely populated areas. The measure of size is the number of households as of 2005 according to the NRC2d Database (Department of Community Development, Ministry of Interior). The second stage involves choosing two villages which are sampled from each selected sub-districts with probability proportional to size. Finally, within each village, 10 households are randomly selected. All together, 2,186 households from 220 villages were interviewed. This data provides a representative sample of rural households in the surveyed provinces of Northeastern Thailand. The sampling procedure for this project is discussed in more detail in Hardeweg et al. (2007).

The survey contains rich information on the characteristics of households and household members, agricultural activities, off-farm employment, household business, household income, expenditures, assets, borrowing and lending activities. Regarding the borrowing and lending activities, we record all loans that were outstanding between May 2006 and April 2007; these include loans that were borrowed in May 2006-April 2007 as well as loans that were taken before May 2006 but still owed by households or have been completely repaid during May 2006-April 2007. We will introduce specific data more comprehensively when we use them later in this research.

#### **4 The position of the village funds as a lending institution**

In this section we provide information about the lending of the village funds in relation to six further sources which are also important in Thailand's rural credit market. For each of these seven lending institutions, we give aggregated information on activity and relative market importance (Section 4.1). We also describe characteristics of borrowing households, borrowing purposes as stated by households and characteristics of loan contracts (Section 4.2).

##### **4.1 Aggregate statistics about the village funds and other lending institutions**

The seven main lending institutions in our sample are the following, presented in the order of increasing informality: conventional formal financial institutions are commercial banks and a few specialized state financial institutions, such as the state-owned Government Savings Bank. Due to their similar behavior and the few observations available we put them in one group and name them according to the dominating commercial banks (CB). A second

lending institution is the above introduced Bank for Agriculture and Agricultural Cooperatives (BAAC). The third institution, the village funds (VF), is our main interest of research. Then there are, fourth, the semi-formal savings and credit groups (CRED).<sup>4</sup> Fifth, the government offers policy loans with a narrow focus and at subsidized lending conditions, mainly the “Student Loan Fund” and the “Poverty Eradication Scheme” (POLICY)<sup>5</sup>. A sixth lending institution is various kinds of moneylenders (ML) and finally, relatives and friends (RELA) form another source of borrowing for rural households.<sup>6</sup>

Table 1 informs about the relative importance of these institutions in our sample with regards to three dimensions: the number of loans outstanding, the number of borrowing households and the loan volume outstanding. The first three lines present data for the total sample, the last three lines present data for loans received in 2006-2007, i.e. the same period for which we have matching household data. The pattern for the total sample and the one year period are very similar because most loans have a short-term maturity of one year or even less. Already the first look at this table demonstrates the widespread use of household borrowing and the enormous variety of lending institutions in rural Thailand. More than 82 percent of all households have a loan outstanding (1,806 out of 2,186 households). Moreover, the various institutions are all quite important, as each of them serves more than 10 percent of the households; the only exception is CB. As a consequence there are multiple lending sources for many households. Regarding the position of VF, it is the most important source of household loans in terms of the number of loans and borrowers and it ranks second in terms of the volume of credit behind BAAC (due to BAAC’s larger loan sizes).

So, VF is successful with respect to outreach as it serves about two thirds of borrowing households and represents a 15 percent market share in outstanding volume.

## 4.2 Detailed information about borrower and loan characteristics

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<sup>4</sup> This category includes a variety of institutions such as community based savings and credit groups, community rice banks, and cooperative. These institutions are analyzed in more detail in Kaboski and Townsend (2005).

<sup>5</sup> The student loan fund and the poverty eradication scheme are treated as separate choice as these programs are quite distinct from other institutions in terms of the target groups, the usage of the loan, and the interest rate charged. The two programs provide 0-1% interest rate loans to households under the poverty line (approximately 62,000 Baht/household/year or US\$ 2,200/household/year). The student loan fund provides loans for education only while the poverty eradication scheme gives loans for production purpose. They are managed by government offices which also assess eligibility, approve and monitor the loan.

<sup>6</sup> We have not considered hire-purchase loans which are often used when buying a car (or related kind of loans) because they are different from regular business of lending institutions. In particular, in our case, the VF is no substitute for hire-purchase.

Descriptive statistics about the loans received in 2006-2007 from these seven institutions from our sample are presented in Table 2 in order to describe the rural credit market and in particular the position of the village funds in this market. *Panel A* of this table gives borrowers' characteristics of those households who borrow from the seven sources and the last column of the table reports the characteristics of the average borrowing household. So, one household will be counted at each institution where it is borrowing (and in case of two loans from one source it is counted just once). We also deleted 10 extreme outlier observations (loan items) for (large) loan size and (high) interest rate. The resulting sample has 3,298 loans for 1,582 households.<sup>7</sup>

Obviously, a simplified distinction between formal institutions (CB) and moneylenders (ML) would provide an extremely selective picture of the true borrowing situation as only about 249 of the relevant 1,588 households are covered, i.e. just 15 percent. By contrast, VF are the single most important lender to households when considering cases as they serve 1,076, i.e. almost 68 percent of borrowing households. Characteristics of borrowers across the seven lending institutions are clearly different, in particular in the case of CB. Their borrowers earn much higher household income, possess more assets, are more employed in the formal sector and take higher loan volumes. By contrast, VF seems to be used by more "median" borrowers which gives VF an intermediate position between formal (CB, BAAC) and informal institutions (CRED, POLICY, ML, RELA). This intermediate position applies – in the order of Table 2 – to female headed households, number of children, share of informal workers, income, assets, area of owned land and refusal of a loan. Thus, compared to formal financial institutions, VF reach households with a somewhat lower socioeconomic status, in short "lower income households".

Turning to *Panel B*, i.e. the purpose of borrowing, a clear pattern emerges: BAAC and also VF lend relatively more for agricultural production, CB lends very often for non-agricultural production and the more informal lending institutions lend for consumption purposes.

Finally, *Panel C* informs about characteristics of loan contracts. VF has an interest rate below average. As Thailand's inflation rate in the years 2006 and 2007 is close to 5 percent p.a., the real interest rate of VF loans is just slightly positive. BAAC is also still relatively "cheap" but more expensive than VF. Interestingly, the formal and the informal extremes, i.e.

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<sup>7</sup> Extreme outlier observations are defined in this study as observations more than 8 standard deviations away from the median. This definition is also used, for example, in Biddle et al. (1997) and Trà and Lensink (2008). We use 8 standard deviations from the median in order to declare an outlier with a high degree of certainty.

CB and ML, charge comparatively high interest rates. Another distinguishing feature of VF is that they do not require land as collateral but guarantors. Finally, VF does not seem to be used for shock related borrowing, probably because loan processing takes too long (up to months).

Overall, the descriptive statistics provide a first impression about VF. It is very widespread; borrowing households are tentatively less well-off compared to borrowers from BAAC; VF is used for productive and consumption purposes; its loan size is rather small, has low interest rates and has relatively favorable collateral requirements. In short, VF obviously plays an important role which is – seen from BAAC – closer to informal institutions than to CB. This stylized characterization of VF will be examined more thoroughly.

## **5 Analyzing the contribution of the village funds**

This section shows that VF do indeed provide financial services different from earlier existing institutions. First, we identify what kind of households and loans are served by VF relative to other institutions, which would then allow us to draw an inference about outreach of VF. We do this by analyzing the factors underlying the decision by borrowing households to utilize credit from the seven distinguished lending institutions (Section 5.1). Second, we assess the aimed impact of VF which is to mitigate the credit constraints of rural households (Section 5.2). Finally, Section 5.3 provides some robustness analyses.

### **5.1 Choice of lending institutions by borrowing households**

In this section we analyze how households sort themselves among different lenders and what factors affect households' decisions of which lending institution to borrow from. We apply the multinomial logit model to study the household's choice of lender.

The multinomial logit model is frequently applied in analyzing multinomial choice data because of its computational simplicity as the probability of a given alternative is expressed in a simple form. However, the multinomial *logit* model assumes the independence of irrelevant alternatives (IIA). Under IIA, the odds of choosing one outcome over another are independent of the set of alternatives considered. If IIA does not hold, the estimates may be inconsistent. By contrast, the multinomial *probit* model does not assume IIA but is computationally intense. In this study, we present the results from multinomial logit estimation as the baseline case because the Hausman test and the Small-Hsiao test show that the assumption of IIA is maintained. Reassuringly the multinomial probit estimation yields qualitatively the same results (see Section 5.3).

The analysis is performed at the loan level as we observe several households borrowing multiple loans from different sources. We treat each loan as a separate borrowing decision as is common in the literature, such as for example Siamwalla et al. (1990). Thus multiple loans contracted by one household are treated as separate transactions. As loans from the same household may be correlated, we use the multinomial logit model with robust standard errors clustered by household to allow for possible correlation of the error term within each household.

The structure of the model is as follows. A borrowing household chooses between the seven lending institutions. Assuming that the error terms of the utility functions are i.i.d. and extreme value distributed, the probability that household  $i$  chooses to borrow loan  $j$  from lender  $k$ ,  $\text{Prob}(y_{ij}=k)$  is given by:

$$\text{Prob}(y_{ij} = k) = \frac{\exp(\alpha_k X_i + \beta_k Z_j + \gamma_k D_p)}{\sum_{m=1}^7 \exp(\alpha_m X_i + \beta_m Z_j + \gamma_m D_p)} \quad (1)$$

where  $y_{ij}$  is a categorical dependent variable representing borrower's choice of lender.  $X_i$  is a vector of characteristics of household  $i$ .  $Z_j$  is a vector of characteristics of loan  $j$ . Since the economic performance may differ by region, dummy variables for each province,  $D_p$ , are also included in the regression.

It is important to note that the use of credit source by a particular borrower is determined by both the decision of lender as well as the choice of borrower. The data used in this analysis are observed equilibrium outcomes in the credit markets, and thus cannot be used to separately identify the demand and supply factors. Our estimates should be seen as reduced-form equations for the use of credit from the seven different sources.

For our analysis, we use only loans that were granted in 2006-2007 as we have information on household characteristics in this period. We use the following household characteristics: the age of the household head, gender of the household head, number of adults, number of children (below 18 years old), occupation of the household head, years of education of the household head, household income, household asset holdings, total area of owned land and household credit history. We classify household occupations into four groups: farmer households, wage earners in the informal sector, wage earners in the formal sector and business owners. As a measure of household's credit history, we use the value of defaulted loans and loans that are repaid late divided by the total loan outstanding. The loan

characteristics include borrowing purpose and whether a loan is taken to cope with shock. Borrowing purposes are classified into three broad categories: agricultural production, non-agricultural production and consumption. After missing observations on various household characteristics are dropped, the sample consists of 3,246 loan items.

We explain households' choice of lending institutions by way of a multinomial logit model. The VF is taken as benchmark so that coefficients for the six other lending institutions indicate (significant) differences in relation to VF. Before we discuss our results, we need to determine whether the assumption of IIA holds for our model. The results of the Hausman test and the Small-Hsiao test of IIA are presented in [Table 3](#). The test results suggest that the null hypothesis that IIA holds cannot be rejected. In the following we discuss our results from the multinomial logit estimation which are shown in [Table 4](#).

Our regression displays an interesting result with respect to household socioeconomic status. With the exception of CB and BAAC, households borrowing from VF and other informal lenders are similar in terms of occupation, education, income, assets and landholding. CB appear to serve non-farm households with better education (of household head), those working in the formal sector, having higher income and less dependents. BAAC services households with more assets but lends less to informal workers, landless households and small landholders. VF and other informal lenders are more common to those with lower socioeconomic status. As indicators of socioeconomic status are related to each other, we also conduct tests for the joint significance of education, income, assets and landholdings, where the null hypothesis is that all the coefficients equal zero for the particular outcome comparison. We find that these socioeconomic characteristics of borrowers from VF are statistically different from CB and BAAC but are not statistically different from CRED, POLICY, ML and RELA. We also find that, among the informal lenders, households borrowing from RELA have lower income and more dependents. This may indicate that the poorest households may rely more on RELA than other institutions.

It is worth noting that, despite BAAC's adoption of joint liability as principal form of security for loans, small landholders are less likely to obtain credit from BAAC than from VF. It could be that land is picking up some of the occupation effect as most BAAC customers are farm households. However, our regression already controls for occupation, thus the land coefficient reflects the effect of land that is not due to occupation. Another hypothesis is that VF accepts less restricted collateral compared with BAAC. This is also shown in [Table 2](#) as 96 percent of the loans from VF are issued with guarantors as collateral while only 60 percent of the loans from BAAC use guarantors as collateral and nearly 40 percent of the loans from

BAAC are secured by land. According to BAAC rules, loans beyond 100,000 Baht must be secured by tangible collateral, usually through mortgage of land and buildings. Furthermore borrowers who are not member of joint liability groups have to pledge land or other assets as collateral. VF seems to fill this gap as land is not important in obtaining a loan from VF. This may indicate that VF plays a complementary role to BAAC by serving those households who cannot pledge the collateral required by BAAC.

Regarding credit history, it appears that VF provides credit to households with bad credit history more than BAAC. The estimates show that households with bad credit history, measured by the value of defaulted loans as ratio of total loan outstanding, have higher probability of getting a loan from VF than from BAAC. This is probably due to restrictions on the supply side as BAAC may ration households with bad credit history.<sup>8</sup> As a result, those households may have to direct their demand towards VF and the more informal lenders. It could also be that VF and the other informal lenders have informational and enforcement advantages over BAAC; thus they are more willing to provide credit to households with bad credit history than BAAC.

Regarding the use of credit, the formal and informal lenders appear to serve different credit demands. There is also an indication that VF plays an intermediate role in bridging this gap. Production loans are primarily served by the formal lenders: CB lend very often for non-agricultural production purposes while BAAC services loans for agricultural production purposes. Informal lenders such as CRED, ML and RELA tend to provide loans for consumption needs. Loans from VF are channeled to both production and consumption purposes.

Contrary to our expectation of the role of VF as shock absorbing institution, we find that loans that are taken to cope with shocks have a higher probability of coming from ML and RELA than from VF. This is consistent with Fafchamps and Lund (2003) who find this role for relatives in the Philippines too. The prominence of informal institutions for shock-related borrowing is probably due to the relative speed of acquiring credit from ML and RELA as other lenders usually require a few weeks or even months to process the loan application. This is also the case for VF as the VF committees do not handle money directly. The VF committees only process the loan applications and determine who may borrow. Once the loan application is approved, the applicant has to get the money from the VF account which is kept

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<sup>8</sup> According to BAAC, the consequences of having defaulted on a loan or making late repayment include paying higher interest rate and denial of future loan. For VF, about 50 percent of the cases of loan default report no consequence.

in either BAAC or GSB branch. This means that the applicant is required to visit BAAC or GSB in order to receive or repay the loan.

So, there are significant differences in characteristics of loans and borrowing households between VF and other existing lending institutions. Seen from VF, and in a very rough classification, VF stands between more formal institutions, i.e. CB and BAAC, on the one side and the most informal institutions, i.e. ML and RELA, on the other side. Thus, the VF is in this sense an intermediate institution servicing different borrowers than formal financial institutions did before. When considering the type of household, VF serves households which are more typical customers of informal than formal financial institutions. In this sense, the VF substitutes informal institutions to some extent.

## **5.2 The relation between the village funds and credit constraint**

In this section we examine whether VF helps to reduce households' credit constraints. Such analysis also provides an evaluation of the program as one of the core objectives of VF is to reduce poverty by mitigating the credit constraints of rural households.

To illustrate the relationship between credit constraint and VF credit, [Figure 1](#) plots the proportion of credit constrained households within village against the average amount of VF credit received by a household in a given village. An observation is a village. The proportion of credit constrained households in a given village is measured by the number of households being credit constrained divided by the number of households applying for credit. Also shown in the figure is the fitted value for the proportion of constrained households. The fitted value is obtained from a linear regression of this variable on the average amount of VF credit only. The proportion of credit constrained households ranges from 0 to 1. A value equal to 0 indicates no constrained households in a village while a value equal to 1 indicated that all households within a village are credit constrained. As is evident from Figure 1, the proportion of credit constrained households is inversely correlated with the amount of VF credit to household. Yet caution is needed before drawing any conclusion about the causal relation between village funds and credit constraint.

Three main issues arise in estimating the impacts of VF credit on households' credit constraints. The first issue is to conceptually define credit constraints (see Petrick, 2005). We use a broader definition of credit constraints. In this paper, households are classified as credit constrained if they receive less credit amount than they demand. In our questionnaire, households are asked to report whether they ever applied for a loan and whether their loan application was completely rejected or whether they obtained some amount but less than they



applied for. Thus according to our definition, households whose loan applications are completely rejected are credit constrained as well as those households who are given some credit but less than the amount they asked for. According to our data, 209 out of 2,186 households in the total sample are credit constrained.

The second challenge is that we need an exogenous variation in the fund size in order to make comparisons in the cross-section of households. An OLS estimate of the effect of VF credit on credit constraint may suffer from the potential endogeneity of VF credit as there may be some unobserved factors that determine both the amount of VF credit obtained and the probability of being credit constrained. To address this problem, we use the IV method to control for the endogeneity associated with the amount of VF credit. Our first instrument is the number of households in the village.<sup>9</sup> As one million Baht is injected into each village regardless of the village population, the probability that a household in a given village receives the village fund credit and the average fund size are inversely correlated with the number of village population. The number of village households seems to be a good instrument as it is clearly related to the fund size but unrelated to the credit constraint beyond its effect through VF. The second instrument is the interest rate on VF credit. Under this program, individual VF committees have some discretion in setting the interest rates which are the same for all households in a given village. This provides an exogenous variation in VF interest rates across villages, which implies variation in VF impact.

The third issue is that there is a potential selection bias as we observe the occurrence of credit rationing only for those households who apply for credit. To address this problem, we employ the Heckman's two-step selection model, where the selection into the sample of those who apply for credit is first modeled, and the inverse Mills ratio from this regression is incorporated into the credit constraint equation (see Kochar, 1997).

To estimate the impact of VF controlling for both endogeneity and selection bias, we split our estimation in two steps. The first step is to estimate the selection equation. From the first step, we can compute the inverse Mills ratio and include it in the second step. In the second step, we estimate the probability of credit constraint by IV method with the number of village households and VF interest rate as instruments for VF credit.

The selection equation which estimates the probability of applying for credit takes the following form:

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<sup>9</sup> The number of households from our sampled villages exhibits a high variation. This number ranges from 39 households in one village to 736 households in another village, with an average of 122.4 households and a standard deviation of 61.4.

$$\text{Prob}(\text{apply}_i = 1) = \frac{\exp(\delta X1_i + \phi D_p)}{1 + \exp(\delta X1_i + \phi D_p)} \quad (2)$$

where  $i$  indexes households. The variable  $\text{apply}_i$  is an indicator of whether a household applies for a loan.  $X1_i$  is a vector of household characteristics that are expected to affect household credit demand. The variable  $D_p$  represents province dummies. The analysis is performed at the household level.

The second stage regression which estimates the probability that a household is credit constrained takes the following form:

$$\text{Prob}(\text{ration}_i = 1) = \frac{\exp(\alpha_1 X2_i + \beta_1 w_j + \gamma_1 D_p)}{1 + \exp(\alpha_1 X2_i + \beta_1 w_j + \gamma_1 D_p)} \quad \text{if } \text{apply}_i = 1 \quad (3)$$

$$w_i = \alpha_2 X2_i + \beta_2 Z_i + \gamma_2 D_p + \varepsilon_i \quad (4)$$

where  $\text{ration}_i$  is a binary variable taking a value of one if a household is fully or partially credit rationed.<sup>10</sup>  $X2_i$  is a vector of household characteristics that are expected to affect credit rationing. The variable  $w_i$  is the amount of VF credit to household which is a potential endogenous variable.  $Z_i$  is a vector of VF instruments, i.e. the inverse number of village households and the VF interest rate. The variable  $D_p$  represents province dummies.

The set of household characteristics in the selection equation ( $X1$ ) and the credit constraint equation ( $X2$ ) are the age of the household head, gender of the household head, number of adults, number of children (below 18 years old), household head's occupation, years of education, household income, household asset holdings, area of landholdings, and ratio of loans that were defaulted or repaid late to total outstanding loans as a measure of household credit history. In addition, to have credible estimates, we need at least one variable that affects loan application but not the credit rationing. We use the dummy for shock experience as the exclusion restriction.

The estimation results are presented in [Table 5](#). *Column A* of the table shows the estimated coefficients for the selection equation. *Column B* presents the estimated coefficients

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<sup>10</sup> Credit rationing can be full or partial. Full credit rationing occurs when the loan application is completely rejected by the lender. Partial credit rationing occurs when the borrower receives credit less than the amount demanded even if the borrower is willing to pay at the on-going interest rate.

from the first stage regression where the endogenous variable – the amount of VF credit – is regressed on all exogenous variables including the instruments. *Column C* shows the estimated coefficients from the second stage regression where the probability of credit constraint is estimated.

Results from the first stage regression (column B) show that our instrument, the number of village households, is a significant predictor of the endogenous VF credit variable. Households living in villages with more population receive smaller amount of VF credit. The estimated effect of the number of village households on VF credit (rescaled by 10,000) is -0.011, indicating that an increase of one household in a village reduces the amount of VF credit given to a household in that village by 110 Baht. The estimated coefficient for the interest rate on VF loan is also negative but only significant at 15 percent level.

In the second stage regression, the most interesting result is that the estimated coefficient on VF credit is negative and significant. Calculating the marginal effects, holding the other variables at their sample means, we find that the marginal effect of VF credit (rescaled by 10,000) is -0.16. This number implies that an increase of 10,000 Baht in VF credit per household reduces the probability of being credit constrained by 16 percent. In other words, when there is no VF credit, the probability of an average household being credit constrained is about 16 percent. This probability is reduced to about 13 percent when the household is given 10,000 Baht of VF credit. This result suggests that the program is successful in achieving its goal of expanding credit access to rural households (see also Zeller, 1994).

We also find that informal workers more likely to face credit constraint. Other household characteristics are not important predictors of the probability of being credit constrained. However some of these variables show to be significant in the selection equation. Column A shows that shock experience increases the probability of applying for credit. Older households and those working in the informal sector are less likely to apply for credit. Households with bad credit history and those with more children have a higher probability of applying for credit.

### **5.3 Robustness**

This section tackles several possible concerns with the baseline results. First, we check the robustness of our results in Section 5.1 with regard to using the multinomial probit model. We find that the multinomial probit model obtains results similar (in terms of signs and significance levels) to the results of the multinomial logit model (see [Appendix 2](#)).

Second, we evaluate the robustness of the main findings in Section 5.2 to the use of an alternative measure for credit constraint. In Section 5.2 we measure credit constraint by a binary variable,  $\text{ration}_i$ , equal to one if the household reported full or partial credit rationing. As an alternative measure, we use the degree of credit constraint measured by the difference between the amount of credit applied and the amount of credit received divided by the amount of credit demanded.<sup>11</sup> We find that, at 10 percent significance level, the degree of credit constraint is reduced by a larger amount of VF credit ([Appendix 3](#)). This analysis confirms that the estimated effect of VF is robust to a different measure of credit constraint.

Third, we investigate the robustness of our results in Section 5.2 with regard to the use of an alternative measure for VF impact. Recall that in Section 5.2, we proxy the impact of VF by the size of VF credit to household and analyze whether household credit constraint is reduced by a relatively larger volume of the village fund. As an alternative measure of VF impact, we use a dummy for receiving a loan from VF (or participation in the program) and reexamine whether higher probability of getting VF credit reduces household credit constraint. Consistent with the baseline results, we find that first, the probability for receiving a VF loan decreases with the number of village households, and second, participation in VF reduces the probability of credit constraint ([Appendix 4](#)).

Our fourth robustness check concerns the critique of the Heckman's two-step estimator. The most important line of criticism is based on the degree of collinearity between the inverse mills ratio and the set of variables in the equation of interest. The collinearity problems may occur if the set of variables in the selection equation (X1) is almost identical to the set of variables in the equation of interest (X2). It has been shown that if collinearity problems are present, the Heckman's two-step estimates become very imprecise and the subsample OLS is the most robust and simple to calculate estimator (Puhani, 2000, Wooldridge, 2002). As robustness check, we estimate our credit constraint equation using the IV method only. Consistent with the main findings, we confirm also for this method that VF reduces the probability of credit constraint faced by households ([Appendix 5](#)).

Our final extension refers to the gender issue. Women in developing countries often face disadvantage in gaining access to credit. Many microfinance programs target households or sectors where women are not well represented, such as small and medium-scale farmers or entrepreneurs, and thus intentionally have an uneven impact on men and women. In order to examine whether the village funds have similar impacts for men and women, we rerun the

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<sup>11</sup> Degree of credit constraint = 1 - (amount of credit actually received/ amount of credit applied).

analyses in Sections 5.1 and 5.2 separately for male and female headed households. Our results for male headed households are in line with the main findings using the pooled sample. For female headed households, VF does not reach poorer households than BAAC ([Appendix 6a, 6b](#)). We also find that VF has significant impact in reducing credit constraint for male headed households but not so for female headed households ([Appendix 7a, 7b](#)). Inferences drawn from these findings are that VF may not be successful in responding to the needs for credit of women and that gender issues should be taken into account in the design and implementation of VF.

## **6 Policy considerations**

Our analyses have shown that the VF is targeted into the desired direction. However, we have also seen that the degree of targeting might be better as VF does not really reach the poorest households, do not provide lending very similar to the informal institutions and do not eliminate credit constraints for female headed households. What does this mean for policy making?

There are basically two possible reasons for this imperfect targeting: either the government does not want to have VF better targeted or the government does not realize room for improvement. Regarding political ambition, we mentioned earlier that VF was started with two motivations, i.e. to increase demand and to improve access to finance. The demand stimulus seems to work as Kaboski and Townsend (2006) and Boonperm et al. (2007) show although efficiency is not clear here either. Moreover, even if demand stimulus would be the primary objective, this does not preclude the possibility to target the stimulus in a way that is desired by policy. A related argument sometimes put forward in the public debate in Thailand is that VF is in the end another way of “support buying” in rural areas. We note, however, that a wish for electoral vote buying is typically implemented in a discretionary nature in order to inject funds in advance of elections, such as revealed in India by Cole (2009). The VF in Thailand, by contrast, has an ongoing impact over time. Moreover, support buying is an unfavorable characterization of what is consistent with the finding by Kaboski and Townsend (2006) that VF has an impact similar to some kind of social policy and redistribution. Again, even if demand stimulus is the primary objective, this could make a better targeting worthwhile. So, whatever angle we take, there seems to be room for choosing VF’s design in a more conscious way.

Some important issues are the following:

(1) Customer target group: If VF is really intended to serve the *poor*, there should be respective incentives for the VF committees to target this group better than presently. If VF would aim for supporting *female headed households* it had to be better targeted.

(2) Borrowing purpose: If VF wants to stimulate investments then neither the limited amount (of up to 20,000 Baht) nor the limited duration (of up to 12 months) is appropriate.

(3) Shock absorption: The VF loans' limited amount and duration make more sense if VF is intended to help people absorbing shocks. We find, however, that this does not work at all and that people still rely on informal lending in this respect. An obvious reason is the inflexibility of VF loans which can only be approved at committee meetings which take place at longer intervals, such as several months.

(4) Substitution of informal lending: Although VF's lending behavior is closer to informal lenders than the BAAC is in many respects, VF does not really substitute informal lenders. A major obstacle seems to be the bureaucratic character of VF.

(5) Further issues: There are four further issues beyond the scope of this study which have to be considered, i.e. cost efficiency of the overall VF system, repayment behavior of customers, possible dynamic effects and non-discrimination. It is to be expected (but has not been shown yet) that *administrative costs* are reasonable as the VF relies on existing bureaucratic structures and voluntary service. Regarding *repayment behavior* it is known from the 2004 Thailand Socioeconomic Survey that about 8 percent of VF borrowers say to be overdue with repayment. Regarding *dynamic effects*, there is some evidence that due to the limited duration of VF loans several borrowers repay them by taking another credit. According to the above mentioned 2004 survey this applies to about 16 percent and will often lead to borrowing from the informal sector. This may be an important reason why the VF does not seem to succeed in reducing lending from informal sources (Kaboski and Townsend, 2006). Finally, the allocation mechanism in villages leaves the possibility open that there may be *discrimination* against minor interest groups or generally less powerful persons and groups in the villages. So far literature does not provide evidence on this concern.

So, what can other countries learn from the Thai experience with setting up such a gigantic microfinance program? The encouraging aspect is probably having demonstrated that it can be realized if the government is decided to do so and if some minimal institutional requirements are fulfilled. On the positive side may be moreover that this move realizes an economic stimulus and has an allocation effect in the desired direction (which has been the focus of our research). On the downside are many questions on the efficiency of this overall

project. Therefore, it seems highly probable that one can learn more and improve the functioning of VF by careful examinations of their past performance.

## **7 Conclusions**

This study examines whether the introduction of the village funds in rural Thailand – one of the largest microfinance programs ever implemented – has realized its ambitions. We contribute to this discussion by providing a novel cross-sectional approach comparing the village funds to competing financial institutions which complements earlier studies focusing on changes in households' expenditures and income (Kaboski and Townsend, 2006, Boonperm et al., 2007). So, which role do the village funds play in relation to existing financial institutions, and, in particular, do they provide desired services “better” than existing formal financial institutions? We find, indeed, that the village funds provide contributions as intended by its founders.

In detail, our empirical tests yield three results: first, the village funds reach the target groups of households with a lower socioeconomic status to a higher degree than competing institutions from the formal sector. Second, the village funds provide loans to those kinds of borrowers which are more typical customers of informal than formal financial institutions. Third, the village funds help to reduce credit constraints. Overall, these results indicate a role of the village funds which improves “access to finance”.

However, the degree to which these ambitions are realized is less convincing and raises natural questions about the program's efficiency. Even if “access to finance” may have been a less important objective than the economic stimulus of village funds, the targeting of village funds could probably be improved.

So, Thailand's experience with the microfinance institution of the village funds may provide some stimulus for other countries to think about following this institutional innovation. However, there are substantial gaps in evidence which need to be addressed before definite conclusions can be drawn. Further research is clearly warranted.

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**Table 1: Number of Loans, Number of Borrowing Households and Volume of Credit by Lending Institution**

	CB	BAAC	VF	CRED	POLICY	ML	RELA	Total
<b><i>Total Sample</i></b>								
Number of outstanding loan contracts	134	1,030	1,629	605	275	368	301	4,342
Number of borrowing households <sup>a</sup>	112	759	1,153	459	235	301	245	1,806
Volume of credit (mil Baht)	22.8	62.4	27.1	39.7	4.8	19.1	9.5	187
<b><i>Loans received in 2006-2007</i></b>								
Number of outstanding loan contracts	64	757	1,427	442	165	228	225	3,308
Number of borrowing households <sup>b</sup>	57	569	1,076	336	147	194	192	1,588
Volume of credit (mil Baht)	9.9	38.6	23.3	21.7	1.8	9.3	6.6	111

There are 4,342 loans outstanding in May06-April07. Out of these, 3,308 loans (76.2%) were borrowed in 2006-07.

Note:

- a) Summing the number of borrowing household over the seven institutions is not equal to 1,806 as some households are customers of more than one lending institutions.
- b) Summing the number of borrowing household over the seven institutions is not equal to 1,588 as some households are customers of more than one lending institutions.

**Table 2: Descriptive Statistics on Borrower and Loan Characteristics by Lending Institution**

	CB	BAAC	VF	CRED	POLICY	ML	RELA	Average Borrower
<b><i>Panel A: Characteristics of Borrower</i></b>								
Age of household head	50.5	54.9	53.1	54.6	51.4	53.6	50.3	53.5
Proportion female headed household (%)	22.7%	19.3%	25.7%	28.6%	26.5%	29.1%	25.8%	25.3%
Number of adults	2.8	2.8	2.7	2.8	2.5	2.7	2.6	2.7
Number of children	1.2	1.4	1.4	1.3	1.4	1.7	1.6	1.4
Household occupation (%):								
farmer	38.6%	77.1%	69.6%	68.7%	71.4%	65.2%	68.8%	69.0%
informal worker	8.7%	7.1%	12.1%	10.6%	10.2%	18.1%	19.4%	12.5%
formal worker	31.7%	7.0%	7.9%	12.2%	12.3%	8.3%	5.9%	9.2%
business owner	21.1%	8.8%	10.4%	8.5%	6.1%	8.3%	5.9%	9.3%
Years of education	6.8	4.8	4.8	5.0	5.0	4.6	4.9	4.8
Income (Baht)	231,766	118,007	112,742	126,482	102,207	109,177	91,996	117,147
Assets (Baht)	547,080	303,591	246,712	273,801	215,660	274,222	187,910	252,653
Area of landholding	2.7	2.5	2.5	1.9	1.7	1.5	1.9	2.1
Value of loans defaulted or repaid late to total loan outstanding (%)	6.5%	3.9%	8.3%	5.9%	6.0%	8.6%	10.7%	7.5%
Ever refused a loan? (%)	10.5%	9.7%	11.9%	12.8%	12.2%	19.2%	21.0%	11.2%
Amount of credit per household (Baht)	173,247	66,968	21,681	63,715	12,188	45,160	30,971	69,095
<b><i>Panel B: Purpose of Borrowing (%)</i></b>								
Agricultural production	21.3%	51.9%	44.9%	38.3%	37.6%	24.7%	24.4%	42.1%
Non-agricultural production	37.7%	18.4%	15.5%	13.1%	10.9%	15.0%	20.0%	16.3%
Consumption	39.3%	28.5%	38.5%	47.2%	50.9%	59.0%	55.1%	40.6%
<b><i>Panel C: Characteristics of Loan Contract</i></b>								
Loan size (Baht)	104,705	51,043	16,345	38,114	10,823	41,135	29,303	31,136
Loan duration (year)	3.8	2.1	1.0	1.4	2.2	1.3	1.2	1.5
Average interest rate (%)	22.9%	9.5%	6.3%	11.1%	3.1%	55.0%	10.6%	11.5%
Weighted average interest rate (%)	21.4%	9.6%	6.1%	11.3%	3.9%	48.2%	9.0%	13.2%
Proportion of loans with 0% interest rate (%)	0.0%	1.1%	0.4%	6.2%	53.3%	2.6%	67.6%	8.7%
Collateral requirement (%):								
land	27.9%	36.7%	0.4%	12.8%	0.6%	27.7%	5.8%	13.1%
other assets	6.6%	1.1%	1.0%	3.4%	0.6%	9.4%	1.3%	2.0%
guarantor	54.1%	60.0%	96.4%	71.3%	84.1%	13.8%	3.6%	71.4%
none	11.5%	2.3%	2.2%	12.4%	14.6%	49.1%	89.2%	13.5%
Shock related Borrowing? (%)	9.8%	6.9%	6.5%	7.1%	6.7%	14.1%	23.6%	8.4%

**Table 3: Results of the Hausman test and the Small-Hsiao test for IIA**

Omitted Category	Hausman Test			Small-Hsiao Test		
	test statistic	p-Value	evidence	test statistic	p-Value	evidence
CB	-0.838	- <sup>(a)</sup>	-	93.413	0.382	for IIA
BAAC	-27.01	- <sup>(a)</sup>	-	93.282	0.385	for IIA
VF	-30.427	- <sup>(a)</sup>	-	90.918	0.453	for IIA
CREDIT	2.306	1	for IIA	93.382	0.383	for IIA
POLICY	4.7	1	for IIA	88.348	0.53	for IIA
ML	4.74	1	for IIA	86.097	0.597	for IIA
RELA	-1.709	- <sup>(a)</sup>	-	93.633	0.376	for IIA

Note:

(a) The test statistic takes on a negative value, which can be interpreted as strong evidence against rejecting the null hypothesis that the IIA assumption holds. (Hausman and McFadden, 1984, footnote 4)

**Table 4: Multinomial Logit Model Predicting the Choice of Lender by Borrowing Household**

	CB	BAAC	CRED	POLICY	ML	RELA
<i>Household characteristics</i>						
Age of household head	-0.0157 (-0.97)	0.0129** (3.03)	0.0088 (1.60)	-0.0094 (-1.11)	-0.0051 (-0.71)	-0.0177** (-1.99)
Female headed household	-0.0506 (-0.13)	-0.3180** (-2.61)	0.1215 (0.88)	0.1310 (0.65)	0.1525 (0.78)	0.0886 (0.46)
Number of adults	0.0858 (0.62)	-0.0716 (-1.59)	0.0145 (0.26)	-0.1048 (-1.19)	0.0757 (1.07)	-0.0188 (-0.26)
Number of children	-0.3283** (-2.03)	-0.0154 (-0.35)	-0.0341 (-0.57)	-0.0729 (-0.80)	0.2330** (3.24)	0.1727** (2.20)
Farm household	-0.8545** (-2.08)	0.1965 (1.07)	0.0608 (0.25)	0.3876 (1.03)	0.0903 (0.27)	0.1767 (0.49)
Informal worker	-0.5089 (-0.90)	-0.3973* (-1.68)	-0.1172 (-0.41)	0.0672 (0.15)	0.5549 (1.48)	0.5444 (1.35)
Formal worker	1.0969** (2.47)	0.1030 (0.42)	0.2797 (0.94)	0.7001 (1.58)	0.4545 (1.06)	-0.1169 (-0.25)
Years of education	0.0681 (1.32)	0.0205 (1.04)	0.0153 (0.53)	0.0157 (0.43)	-0.0462 (-1.20)	0.0006 (0.02)
Income (10,000 Baht)	0.0085* (1.76)	0.0001 (0.02)	0.0007 (0.16)	-0.0054 (-0.66)	-0.0021 (-0.31)	-0.0118 (-1.54)
Assets (10,000 Baht)	0.0014 (0.48)	0.0025** (2.25)	0.0013 (0.84)	-0.0007 (-0.21)	0.0030* (1.82)	-0.0053 (-1.44)
Area of landholding	0.0775 (1.53)	0.0331** (1.97)	-0.0511** (-2.02)	-0.0269 (-0.74)	-0.0350 (-0.84)	0.0318 (1.08)
Ratio of defaulted loans	0.0543 (0.07)	-1.1591** (-3.46)	-0.4332 (-1.43)	-0.5763 (-1.22)	-0.0314 (-0.08)	0.1844 (0.53)
<i>Loan characteristics</i>						
Agricultural production loan	-1.3117** (-3.28)	-0.0555 (-0.39)	0.0114 (0.06)	0.1424 (0.45)	-0.5351** (-2.24)	-0.8458** (-3.42)
Consumption loan	-0.7464** (-2.39)	-0.4552** (-3.09)	0.3328* (1.79)	0.6033* (1.93)	0.3908* (1.79)	0.0157 (0.07)
Shock related borrowing	0.4689 (0.94)	0.2458 (1.32)	-0.0004 (-0.00)	0.0050 (0.01)	0.8104** (3.44)	1.4341** (6.34)
<i>Province dummies</i>						
Buri Ram	0.1844 (0.40)	0.2779* (1.75)	-0.0001 (-0.00)	-0.0227 (-0.09)	0.6669** (2.71)	0.0143 (0.06)
Ubon	-0.2354 (-0.57)	0.1427 (0.93)	-0.0514 (-0.28)	-0.1833 (-0.76)	-0.6690** (-2.49)	-0.1535 (-0.65)
Constant	-1.7871* (-1.84)	-1.3554** (-3.79)	-1.8469** (-4.28)	-1.8038** (-2.84)	-2.2833** (-3.86)	-1.0698 (-1.55)
Pseudo R2	0.052					
No. Obs	61	745	429	165	226	217

VF is the reference category. t-statistics in parentheses, \* p<0.10, \*\* p<0.05.

Income and assets are divided by 10,000 to rescale estimates into convenient numbers.

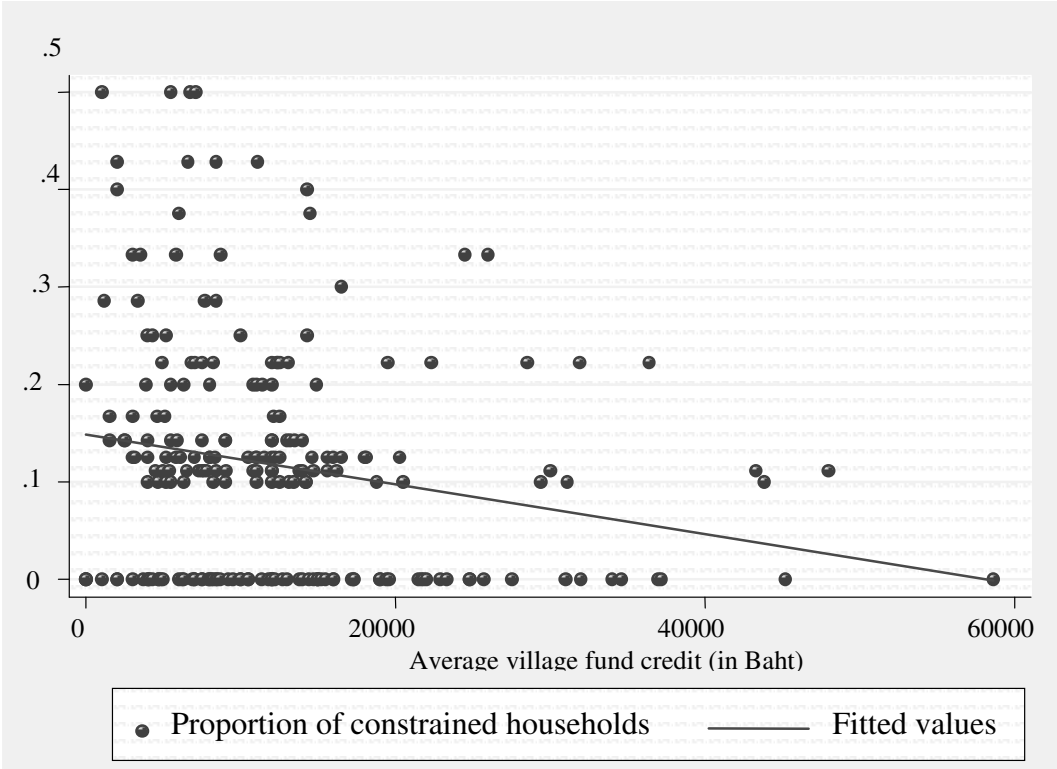
**Table 5: Impact of Village Fund Credit on Probability of Credit Constraint**

<b>Probability of Credit Constraint</b>	<b>A</b>	<b>B</b>	<b>C</b>
<i>Household characteristics</i>			
Age of household head	-0.0141** (-5.08)	-0.0153 (-1.39)	0.0071 (0.94)
Female headed household	-0.0206 (-0.28)	0.1674 (1.01)	0.0493 (0.53)
Number of adults	0.0291 (0.89)	0.1927** (3.26)	0.0233 (0.60)
Number of children	0.0836** (2.67)	-0.0690 (-0.89)	-0.0739* (-1.70)
Farm household	-0.0320 (-0.23)	-0.0897 (-0.41)	-0.0810 (-0.60)
Informal worker	-0.3525** (-2.26)	-0.3858 (-1.14)	0.4455* (1.92)
Formal worker	-0.0424 (-0.23)	-0.6339** (-2.39)	-0.1764 (-0.90)
Years of education	0.0017 (0.12)	0.0144 (0.58)	-0.0088 (-0.52)
Income (in 10,000 Baht)	-0.0022 (-1.37)	-0.0060 (-1.54)	-0.0014 (-0.51)
Assets (in 10,000 Baht)	0.0016* (1.72)	0.0010 (0.46)	-0.0011 (-0.91)
Area of landholding	-0.0129 (-1.38)	-0.0196 (-0.66)	-0.0171 (-0.92)
Ratio of defaulted loans	0.6621** (3.53)	-0.3367 (-0.71)	-0.0572 (-0.20)
Dummy for shock experience last year	0.1667** (2.04)		
Province dummy, Buriram	0.1398 (1.46)	0.1884 (0.54)	-0.4333** (-3.84)
Province dummy, Ubon	0.2134** (2.39)	0.2259 (0.66)	-0.2489* (-1.96)
Inverse mills ratio		-0.6820 (-0.37)	-2.5881** (-2.34)
Constant	1.3582** (5.98)	3.2797** (4.55)	-0.0905 (-0.30)
<i>Instruments</i>			
Number of village households		-0.0111** (-2.78)	
Interest rate on VF credit		-0.0768 (-1.55)	
<i>Amount of VF credit (in 10,000 Baht, predicted)</i>			-0.1552** (-2.29)
No. Obs	2141	1742	1742

t-statistics in parentheses, \* p<0.10, \*\* p<0.05.

Income, assets and the amount of VF credit are divided by 10,000 to rescale estimates.

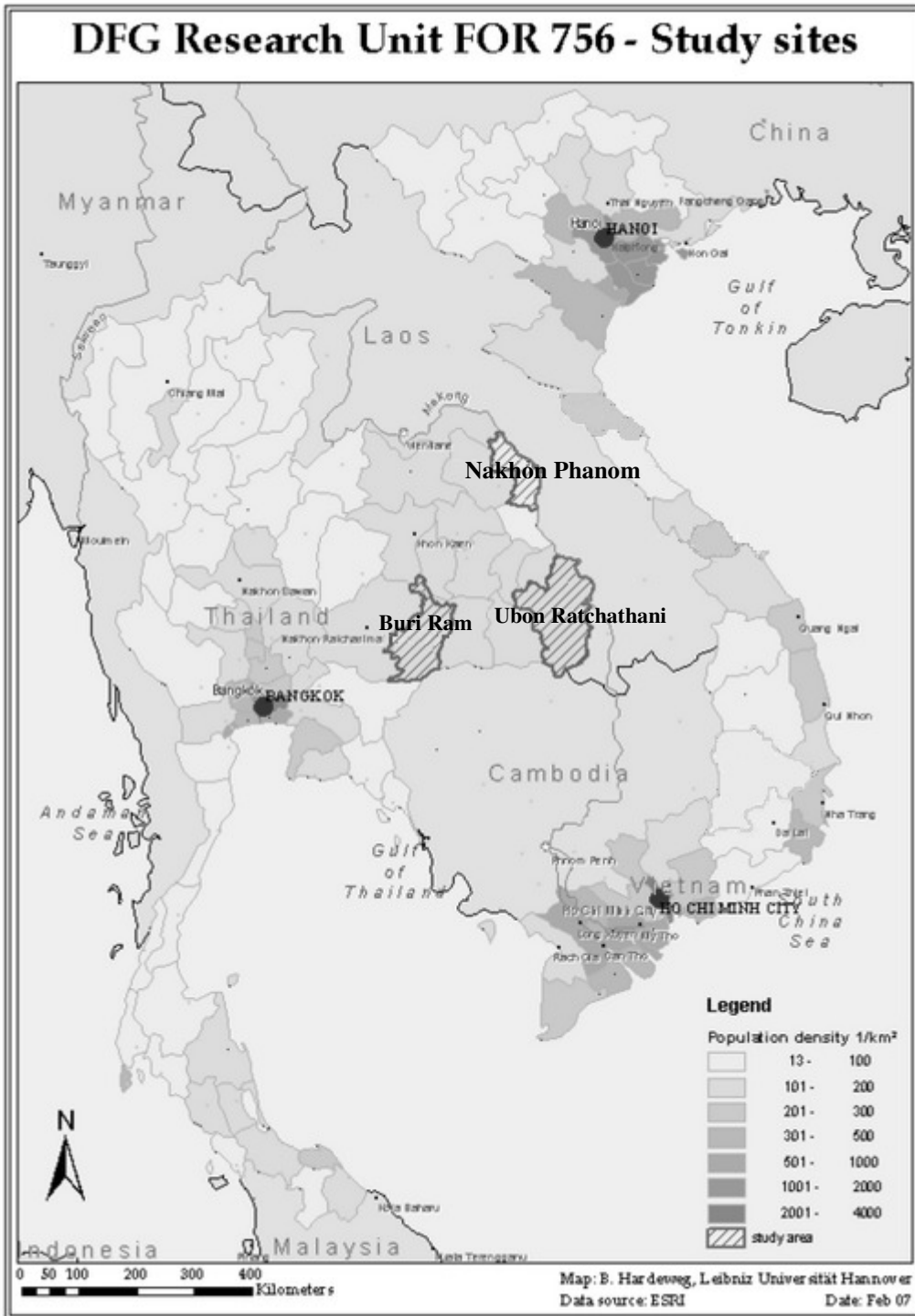
**Figure 1: Proportion of Credit Constrained Households within Village against Average Village Fund Credit**



Note: An observation is a village, so there are 220 observations. The value of the proportion of credit constrained households must be in  $[0, 1]$ . However, there is no value between 0 and 0.1 in our sample because a maximum of ten households is interviewed per village. Thus the minimum positive value of this variable is 0.1 which correspond to the case where, out of ten households, only one household reported being credit constrained. However, there may be also one out of nine or eight households being credit constrained according to our measure which gives a proportion of 0.111 and 0.125, respectively, etc.



**Appendix 1: Map of Selected Provinces in Thailand**



**Appendix 2: Multinomial Probit Model Predicting the Choice of Lender by Borrowing Household**

	<b>CB</b>	<b>BAAC</b>	<b>CRED</b>	<b>POLICY</b>	<b>ML</b>	<b>RELA</b>
<i>Household characteristics</i>						
Age of household head	-0.0051 (-0.69)	0.0095** (2.99)	0.0059 (1.58)	-0.0039 (-0.81)	-0.0032 (-0.72)	-0.0092* (-1.75)
Female headed household	-0.0904 (-0.50)	-0.2139** (-2.41)	0.0728 (0.77)	0.0678 (0.58)	0.0957 (0.81)	0.0488 (0.41)
Number of adults	0.0246 (0.35)	-0.0537 (-1.62)	0.0053 (0.14)	-0.0617 (-1.26)	0.0375 (0.83)	-0.0147 (-0.32)
Number of children	-0.1646** (-2.08)	-0.0095 (-0.29)	-0.0208 (-0.52)	-0.0321 (-0.63)	0.1404** (3.13)	0.1111** (2.29)
Farm household	-0.3468 (-1.57)	0.1479 (1.07)	0.0530 (0.32)	0.2411 (1.22)	0.0293 (0.15)	0.0838 (0.39)
Informal worker	-0.2094 (-0.74)	-0.2669 (-1.57)	-0.0721 (-0.37)	0.0525 (0.21)	0.2828 (1.25)	0.2951 (1.22)
Formal worker	0.6858** (2.66)	0.0986 (0.54)	0.2196 (1.07)	0.4438* (1.82)	0.2678 (1.07)	-0.0479 (-0.18)
Years of education	0.0337 (1.19)	0.0150 (1.02)	0.0112 (0.58)	0.0125 (0.59)	-0.0243 (-1.06)	0.0036 (0.15)
Income (10,000 Baht)	0.0053* (1.66)	-0.0001 (-0.07)	0.0003 (0.10)	-0.0034 (-0.78)	-0.0015 (-0.40)	-0.0069 (-1.53)
Assets (10,000 Baht)	0.0013 (0.82)	0.0019** (2.21)	0.0010 (0.98)	0.0002 (0.09)	0.0022** (2.07)	-0.0027 (-1.41)
Area of landholding	0.0320 (1.24)	0.0255** (1.97)	-0.0314* (-1.92)	-0.0148 (-0.73)	-0.0167 (-0.73)	0.0197 (1.07)
Ratio of defaulted loans	-0.1231 (-0.32)	-0.7895** (-3.48)	-0.3294 (-1.59)	-0.3982 (-1.50)	-0.0721 (-0.30)	0.0557 (0.25)
<i>Loan characteristics</i>						
Agricultural production loan	-0.6322** (-3.26)	-0.0588 (-0.54)	-0.0190 (-0.15)	0.0290 (0.17)	-0.3256** (-2.27)	-0.5028** (-3.42)
Consumption loan	-0.3543** (-2.14)	-0.3186** (-2.93)	0.2134* (1.72)	0.3251* (1.94)	0.2485* (1.84)	0.0144 (0.10)
Shock related borrowing	0.3432 (1.41)	0.2037 (1.50)	0.0554 (0.35)	0.0911 (0.50)	0.5223** (3.40)	0.9584** (6.30)
<i>Province dummies</i>						
Buri Ram	0.0729 (0.32)	0.2065* (1.77)	0.0227 (0.18)	0.0371 (0.25)	0.4606** (3.00)	0.0538 (0.35)
Ubon	-0.1749 (-0.84)	0.0860 (0.77)	-0.0402 (-0.32)	-0.1044 (-0.73)	-0.3594** (-2.25)	-0.1007 (-0.68)
Constant	-1.3392** (-2.57)	-1.0159** (-3.80)	-1.3042** (-4.41)	-1.3436** (-3.75)	-1.5132** (-4.23)	-0.8760** (-2.16)
Chi-square	457.81					
No. Obs	61      745      429      165      226      217					

VF is the reference category. t-statistics in parentheses, \* p<0.10, \*\* p<0.05.

Income and assets are divided by 10,000 to rescale estimates into convenient numbers.

### Appendix 3: Impact of Village Fund Credit on Degree of Credit Constraint

Degree of Credit Constraint	A	B	C
<i>Household characteristics</i>			
Age of household head	-0.0141** (-5.08)	-0.0153 (-1.39)	0.0042 (1.05)
Female headed household	-0.0206 (-0.28)	0.1674 (1.01)	-0.0023 (-0.04)
Number of adults	0.0291 (0.89)	0.1927** (3.26)	-0.0025 (-0.11)
Number of children	0.0836** (2.67)	-0.0690 (-0.89)	-0.0452* (-1.82)
Farm household	-0.0320 (-0.23)	-0.0897 (-0.41)	-0.0539 (-0.72)
Informal worker	-0.3525** (-2.26)	-0.3858 (-1.14)	0.2557* (1.95)
Formal worker	-0.0424 (-0.23)	-0.6339** (-2.39)	-0.1332 (-1.23)
Years of education	0.0017 (0.12)	0.0144 (0.58)	-0.0053 (-0.57)
Income (in 10,000 Baht)	-0.0022 (-1.37)	-0.0060 (-1.54)	-0.0004 (-0.27)
Assets (in 10,000 Baht)	0.0016* (1.72)	0.0010 (0.46)	-0.0004 (-0.56)
Area of landholding	-0.0129 (-1.38)	-0.0196 (-0.66)	-0.0115 (-1.13)
Ratio of defaulted loans	0.6621** (3.53)	-0.3367 (-0.71)	0.0008 (0.01)
Dummy for shock experience last year	0.1667** (2.04)		
Province dummy, Buriram	0.1398 (1.46)	0.1884 (0.54)	-0.2381** (-3.39)
Province dummy, Ubon	0.2134** (2.39)	0.2259 (0.66)	-0.1488** (-2.00)
Inverse mills ratio		-0.6820 (-0.37)	-1.3160** (-2.19)
Constant	1.3582** (5.98)	3.2797** (4.55)	-0.0948 (-0.55)
<i>Instruments</i>			
Number of village households		-0.0111** (-2.78)	
Interest rate on VF credit		-0.0768 (-1.55)	
<i>Amount of VF credit (in 10,000 Baht, predicted)</i>			-0.0787* (-1.93)
No. Obs	2141	1742	1742

t-statistics in parentheses, \* p<0.10, \*\* p<0.05.

Income, assets and the amount of VF credit are divided by 10,000 to rescale estimates.

**Appendix 4: Impact of Village Fund Participation on Probability of Credit Constraint**

<b>Probability of Credit Constraint</b>	<b>A</b>	<b>B</b>	<b>C</b>
<b><i>Household characteristics</i></b>			
Age of household head	-0.0141** (-5.08)	-0.0070 (-1.22)	0.0055 (0.74)
Female headed household	-0.0206 (-0.28)	0.0438 (0.59)	0.0405 (0.45)
Number of adults	0.0291 (0.89)	0.0699** (2.35)	0.0261 (0.69)
Number of children	0.0836** (2.67)	-0.0155 (-0.37)	-0.0671 (-1.57)
Farm household	-0.0320 (-0.23)	-0.2367* (-1.97)	-0.1588 (-1.18)
Informal worker	-0.3525** (-2.26)	-0.3159 (-1.63)	0.3382 (1.40)
Formal worker	-0.0424 (-0.23)	-0.5005** (-3.40)	-0.2996 (-1.54)
Years of education	0.0017 (0.12)	-0.0113 (-0.87)	-0.0149 (-0.89)
Income (in 10,000 Baht)	-0.0022 (-1.37)	-0.0042** (-2.39)	-0.0021 (-0.83)
Assets (in 10,000 Baht)	0.0016* (1.72)	-0.0006 (-0.63)	-0.0015 (-1.24)
Area of landholding	-0.0129 (-1.38)	-0.0179 (-1.39)	-0.0202 (-1.11)
Ratio of defaulted loans	0.6621** (3.53)	0.0528 (0.22)	0.0067 (0.02)
Dummy for shock experience last year	0.1667** (2.04)		
Province dummy, Buriram	0.1398 (1.46)	0.0178 (0.13)	-0.4345** (-3.96)
Province dummy, Ubon	0.2134** (2.39)	0.3207** (2.35)	-0.1266 (-0.93)
Inverse mills ratio		-0.2902 (-0.33)	-2.4641** (-2.29)
Constant	1.3582** (5.98)	1.3993** (4.85)	0.4647 (1.09)
<b><i>Instruments</i></b>			
Number of village households		-0.0025** (-2.58)	
Interest rate on VF credit		-0.0290 (-1.41)	
<b><i>VF participation (predicted)</i></b>			-0.9416** (-2.79)
No. Obs	2141	1742	1742

t-statistics in parentheses, \* p<0.10, \*\* p<0.05.

Income, assets and the amount of VF credit are divided by 10,000 to rescale estimates.

**Appendix 6a: Multinomial Logit Model of Lender Choice for Male Headed Households**

<b>Male</b>	<b>CB</b>	<b>BAAC</b>	<b>CRED</b>	<b>POLICY</b>	<b>ML</b>	<b>RELA</b>
<i>Household characteristics</i>						
Age of household head	-0.0027 (-0.14)	0.0108** (2.18)	0.0065 (0.91)	-0.0090 (-0.84)	0.0028 (0.31)	-0.0188* (-1.81)
Number of adults	-0.0561 (-0.39)	-0.0838* (-1.78)	-0.0204 (-0.30)	-0.0847 (-0.79)	-0.0552 (-0.64)	-0.0819 (-0.97)
Number of children	-0.4394** (-2.24)	-0.0306 (-0.62)	-0.0378 (-0.52)	-0.0350 (-0.32)	0.2253** (2.66)	0.1991** (2.29)
Farm household	-0.3104 (-0.58)	0.2169 (1.09)	0.0345 (0.10)	0.2623 (0.59)	0.1763 (0.39)	0.4495 (1.01)
Informal worker	0.0533 (0.08)	-0.6002** (-2.01)	-0.1316 (-0.34)	-0.0381 (-0.07)	0.6885 (1.39)	0.6588 (1.32)
Formal worker	1.5052** (2.46)	0.1026 (0.39)	0.3137 (0.82)	0.8089 (1.58)	0.4851 (0.90)	0.0523 (0.09)
Years of education	0.0415 (0.62)	0.0297 (1.36)	0.0102 (0.29)	0.0017 (0.04)	-0.0521 (-1.14)	-0.0298 (-0.62)
Income (10,000 Baht)	0.0132** (2.25)	0.0012 (0.35)	-0.0066 (-1.21)	-0.0019 (-0.21)	0.0007 (0.09)	-0.0062 (-0.74)
Assets (10,000 Baht)	0.0023 (0.68)	0.0025** (2.20)	0.0014 (0.81)	-0.0011 (-0.29)	0.0028 (1.32)	-0.0035 (-0.91)
Area of landholding	0.0300 (0.42)	0.0450** (2.60)	-0.0351 (-1.23)	-0.0081 (-0.18)	-0.0321 (-0.62)	0.0536 (1.49)
Ratio of defaulted loans	0.1954 (0.22)	-1.4641** (-3.84)	-0.4747 (-1.28)	-0.3607 (-0.68)	0.1520 (0.35)	0.0147 (0.04)
<i>Loan characteristics</i>						
Agricultural production loan	-1.0785** (-2.39)	-0.0039 (-0.02)	-0.0724 (-0.32)	0.1077 (0.28)	-0.1622 (-0.57)	-1.0401** (-3.71)
Consumption loan	-0.5878 (-1.55)	-0.4752** (-2.87)	0.2552 (1.14)	0.7459** (2.01)	0.4707* (1.73)	-0.1217 (-0.48)
Shock related borrowing	0.0506 (0.07)	0.2382 (1.11)	-0.0360 (-0.12)	-0.2524 (-0.56)	0.8199** (2.92)	1.5857** (5.93)
<i>Province dummies</i>						
Buri Ram	0.1675 (0.31)	0.3751** (2.08)	0.1454 (0.64)	0.0173 (0.06)	0.9715** (3.22)	-0.1360 (-0.46)
Ubon	-0.0919 (-0.19)	0.2657 (1.56)	0.0710 (0.31)	-0.2511 (-0.87)	-0.5724* (-1.67)	-0.1723 (-0.62)
Constant	-2.3623* (-1.88)	-1.3928** (-3.51)	-1.5767** (-3.02)	-1.8744** (-2.32)	-2.7963** (-3.57)	-0.9382 (-1.29)
Pseudo R2	0.056					
No. Obs	47	596	307	122	161	160

VF is the reference category. t-statistics in parentheses, \* p<0.10, \*\* p<0.05.

Income and assets are divided by 10,000 to rescale estimates into convenient numbers.

**Appendix 6b: Multinomial Logit Model of Lender Choice for Female Headed Households**

<b>Female</b>	<b>CB</b>	<b>BAAC</b>	<b>CRED</b>	<b>POLICY</b>	<b>ML</b>	<b>RELA</b>
<i>Household characteristics</i>						
Age of household head	-0.0410 (-1.23)	0.0129 (1.39)	0.0133 (1.54)	-0.0061 (-0.45)	-0.0158 (-1.27)	-0.0139 (-0.81)
Number of adults	0.6014* (1.80)	-0.0258 (-0.22)	0.1031 (0.98)	-0.1845 (-1.15)	0.4242** (2.77)	0.1568 (1.08)
Number of children	0.2101 (0.88)	0.0542 (0.52)	-0.0122 (-0.12)	-0.1682 (-1.01)	0.3898** (2.52)	0.1303 (0.82)
Farm household	-2.6925** (-2.19)	0.1503 (0.39)	0.1718 (0.50)	0.5508 (0.76)	-0.0145 (-0.03)	-0.3738 (-0.59)
Informal worker	-1.0197 (-1.06)	-0.1342 (-0.32)	0.0084 (0.02)	0.1507 (0.19)	0.5033 (0.88)	0.1424 (0.21)
Formal worker	1.5261* (1.85)	-0.1629 (-0.26)	0.2009 (0.35)	-0.5245 (-0.42)	0.7433 (1.05)	-0.1755 (-0.19)
Years of education	0.1192 (1.56)	-0.0327 (-0.64)	0.0220 (0.43)	0.0457 (0.68)	-0.0178 (-0.23)	0.0793 (0.98)
Income (10,000 Baht)	-0.0050 (-0.72)	-0.0082 (-0.77)	0.0087 (1.56)	-0.0211 (-1.10)	-0.0129 (-0.91)	-0.0325** (-2.23)
Assets (10,000 Baht)	0.0029 (0.61)	0.0010 (0.29)	0.0018 (0.56)	-0.0003 (-0.06)	0.0051 (1.63)	-0.0166** (-1.99)
Area of landholding	0.1778** (2.83)	0.0024 (0.08)	-0.0866 (-1.44)	-0.0946 (-1.36)	-0.0389 (-0.65)	-0.0285 (-0.47)
Ratio of defaulted loans	-0.8664 (-0.41)	-0.2895 (-0.47)	-0.3058 (-0.58)	-1.0993 (-1.02)	-0.8799 (-0.98)	0.5284 (0.85)
<i>Loan characteristics</i>						
Agricultural production loan	-2.6701** (-1.97)	-0.2855 (-0.92)	0.1641 (0.48)	0.2014 (0.37)	-2.0056** (-3.85)	-0.3252 (-0.66)
Consumption loan	-1.5579** (-1.98)	-0.4232 (-1.35)	0.4522 (1.34)	0.1978 (0.35)	0.2484 (0.66)	0.3183 (0.71)
Shock related borrowing	1.6529* (1.77)	0.2488 (0.66)	0.0030 (0.01)	0.5402 (1.13)	0.8038* (1.73)	1.2251** (2.68)
<i>Province dummies</i>						
Buri Ram	0.0231 (0.02)	0.0540 (0.17)	-0.3320 (-0.99)	-0.1706 (-0.35)	0.0883 (0.18)	0.4346 (0.93)
Ubon	-0.9622 (-1.15)	-0.1141 (-0.36)	-0.2937 (-0.94)	-0.0727 (-0.15)	-0.6637 (-1.47)	-0.1108 (-0.23)
Constant	-1.7868 (-0.89)	-1.2223 (-1.54)	-2.3222** (-3.20)	-1.4211 (-1.32)	-1.9846** (-2.14)	-1.5157 (-0.91)
Pseudo R2	0.081					
No. Obs	14	149	122	43	65	57

VF is the reference category. t-statistics in parentheses, \* p<0.10, \*\* p<0.05.

Income and assets are divided by 10,000 to rescale estimates into convenient numbers.

**Appendix 7a: Impact of Village Fund Credit on Probability of Credit Constraint for Male Headed Households**

<b>Probability of Credit Constraint</b>	<b>A</b>	<b>B</b>	<b>C</b>
<i>Household characteristics</i>			
Age of household head	-0.0196** (-5.87)	-0.0103 (-0.62)	0.0079 (0.72)
Number of adults	0.0090 (0.23)	0.2508** (3.84)	0.0423 (0.96)
Number of children	0.0872** (2.44)	-0.0665 (-0.69)	-0.0995** (-2.02)
Farm household	0.0898 (0.52)	-0.1113 (-0.40)	-0.0694 (-0.46)
Informal worker	-0.2416 (-1.22)	-0.3313 (-0.96)	0.5481** (2.28)
Formal worker	0.0195 (0.08)	-0.4941 (-1.61)	-0.2077 (-0.98)
Years of education	0.0044 (0.27)	0.0173 (0.58)	-0.0088 (-0.45)
Income (in 10,000 Baht)	-0.0037** (-2.32)	-0.0040 (-0.78)	-0.0007 (-0.21)
Assets (in 10,000 Baht)	0.0018 (1.59)	-0.0010 (-0.42)	-0.0005 (-0.37)
Area of landholding	-0.0104 (-0.86)	-0.0338 (-0.99)	-0.0200 (-0.91)
Ratio of defaulted loans	0.6074** (2.95)	-0.4576 (-0.89)	-0.0784 (-0.24)
Dummy for shock experience last year	0.1346 (1.41)		
Province dummy, Buriram	0.1608 (1.48)	0.0895 (0.24)	-0.3141** (-2.32)
Province dummy, Ubon	0.2408** (2.28)	0.0388 (0.11)	-0.2618* (-1.83)
Inverse mills ratio		-1.9662 (-0.89)	-2.3330* (-1.86)
Constant	1.3582** (5.98)	3.2797** (4.55)	-0.0905 (-0.30)
<i>Instruments</i>			
Number of village households		-0.0115** (-2.83)	
Interest rate on VF credit		-0.0737 (-1.36)	
<i>Amount of VF credit (in 10,000 Baht, predicted)</i>			-0.2395** (-3.62)
No. Obs	1578	1302	1302

t-statistics in parentheses, \* p<0.10, \*\* p<0.05.

Income and assets are divided by 10,000 to rescale estimates into convenient numbers.

**Appendix 7b: Impact of Village Fund Credit on Probability of Credit Constraint for Female Headed Households**

<b>Probability of Credit Constraint</b>	<b>A</b>	<b>B</b>	<b>C</b>
<i>Household characteristics</i>			
Age of household head	-0.0020 (-0.37)	-0.0067 (-0.61)	-0.0005 (-0.07)
Number of adults	0.0920 (1.60)	-0.0150 (-0.11)	0.0608 (0.67)
Number of children	0.0472 (0.87)	-0.2679** (-2.29)	0.1480* (1.79)
Farm household	-0.1277 (-0.70)	0.4466 (1.35)	-0.2881 (-1.20)
Informal worker	-0.4222* (-1.97)	0.5043 (0.89)	-0.3594 (-0.91)
Formal worker <sup>(a)</sup>			
Years of education	0.0026 (0.09)	-0.0255 (-0.50)	0.0099 (0.33)
Income (in 10,000 Baht)	0.0068 (1.21)	-0.0093 (-1.02)	-0.0054 (-0.75)
Assets (in 10,000 Baht)	0.0012 (0.54)	0.0067 (1.13)	-0.0056 (-1.57)
Area of landholding	-0.0156 (-0.88)	0.0352 (0.62)	-0.0334 (-0.96)
Ratio of defaulted loans	0.8949** (2.21)	-1.1818 (-1.31)	0.5031 (0.85)
Dummy for shock experience last year	0.2545* (1.73)		
Province dummy, Buriram	0.1195 (0.71)	0.2409 (0.48)	-0.7663** (-2.88)
Province dummy, Ubon	0.1767 (1.11)	0.3708 (0.72)	-0.1320 (-0.52)
Inverse mills ratio		-2.3155 (-0.94)	-1.1269 (-0.66)
Constant	0.4817 (1.08)	3.5721** (2.40)	-0.6486 (-0.68)
<i>Instruments</i>			
Number of village households		-0.0093** (-2.17)	
Interest rate on VF credit		-0.0882 (-1.05)	
<i>Amount of VF credit (in 10,000 Baht, predicted)</i>			0.1082 (0.61)
No. Obs	563	440	440

t-statistics in parentheses, \* p<0.10, \*\* p<0.05.

Income and assets are divided by 10,000 to rescale estimates into convenient numbers.

Note: (a) Fwork is dropped as it is collinear with other variables.