Village Funds in the Rural Credit Market of Thailand

by Lukas Menkhoff and Ornsiri Rungruxsirivorn

Abstract

This paper examines the contribution of recently introduced village funds in rural Thailand, one of the largest microfinance programs ever implemented. We use a cross-sectional approach examining village funds in relation to competing financial institutions. We find, first, that village funds reach the target groups of lower income households better than existing institutions from the formal sector. 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. Overall, village funds seem to provide services in the intended direction.

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1 Introduction

This paper analyzes the contribution that a recently introduced large microfinance institution, i.e. "village funds", makes. Microfinance institutions intend to improve the provision of rural credit by bridging the segmentation into either formal or informal financial markets. In a sense they aim for combining advantages of formal and informal institutions by providing relatively cheap credit to poorer borrowers in ways that mirror informal institutions. We test the realization of these aims in an empirical study of so-called "village funds", introduced in Thailand since 2001 as one of the largest government microfinance programs ever. We find that village funds indeed enlarge the spectrum of existing financial institutions in the desired direction as they improve "outreach" (Hermes and Lensink, 2007) and "access to finance" (Beck and Demirgüç-Kunt, 2008). They reach poorer households than do formal institutions, they provide financial services tentatively substituting informal lending with regards to lending policy and they contribute to easing credit constraints.

The promotion of microfinance institutions during the last decades has often led to more variety of financial institutions in rural areas than before (Morduch, 1999). From an analytical point of view, researchers became interested in better understanding of various institutional arrangements in rural finance (e.g. Conning and Udry, 2007). From a policy point of view governments and non-governmental organizations introduced microfinance institutions in order to overcome shortcomings of existing rural credit markets (Hermes and Lensink, 2007). Overall, we realize that the traditional segmentation into formal vs. informal institutions – exemplified by commercial bank vs. money lender – is a polar view which may hide an interesting continuum of institutions operating in between. Thailand is a country where we indeed observe a variety of financial institutions providing rural credit. This variety was extended in an important move by the federal government's decision to introduce one fund each to all about 77,000 villages in the years 2001/02. Thus, village funds have an obvious policy motivation as other microfinance institutions have as well: they are intended to expand financial infrastructure, here in particular credit, to households whose needs were not well served before.

In order to analyze the contribution of village funds to 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 village funds, which provides a broad spectrum. It is our objective to identify the position that village funds have in relation to these other financial institutions. This identification then allows inferences about the possible realization of policy goals.

As analytical framework to position village funds we use stylized facts about the characteristics of 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 and Barslund and Tarp (2008) on Vietnam.[1] Insights converge towards the following findings with respect to the kind of borrowers, their purpose of borrowing and credit contracts:

- Informal *borrowers* have lower income, lower assets, tend to be less educated and realized more often 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.

It is thus interesting to learn that 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 its borrowers have indeed an intermediate economic situation, such as an intermediate income level, which is rather lower than for formal financial institutions; moreover, the borrowing purpose includes productive 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 or specialized state financial institutions, (2) the

[1] 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). The relation between formal and informal finance can be more complex than being relevant here, for example, when informal lenders use loans from the formal sector and intermediate them to households (see e.g. Bell, 1990, Jain, 1999).

Bank for Agriculture and Agricultural Cooperatives, (3) village funds, (4) credit cooperatives, (5) policy funds, (6) moneylenders and (7) relatives or friends. The profiles of these groups are not so sharply distinguished from each other that differences would become mostly significant but all significant differences support the assumed continuum between formal and informal institutions. More interesting, village funds are positioned beyond formerly existing formal financial institutions, indicating that they provide services towards substituting informal institutions.

Finally, we 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. This volume varies due to the fact that the fund has always one million Baht independent of the number of people living in the village which gives a per capita variation by a factor of about three. We find that a larger amount of village fund per capita helps to overcome credit constraints.

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 working of microfinance institutions regarding their outreach.[2] 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 two earlier studies on Thailand's village funds by Kaboski and Townsend (2004, 2007). Whereas these studies analyze the time dimension, i.e. the reaction of households to the introduction of village funds, we focus on the cross-section, i.e. the position of village funds relative to the other financial institutions.

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

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

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 tremendously increase credit supply 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 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 village funds provide the next step into the desired direction?

2.2 Village funds

The introduction of 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.[3] This research focuses on the second channel, the effect on target groups, whereas Kaboski and Townsend (2004) focus more 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, 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).

Village funds are set up in the following way (more details e.g. in Kaboski and Townsend, 2004). 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 policies and determines who may borrow. In this sense 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 so that the VF's incentives are similar to many other joint liability revolving funds. Loan duration is at maximum 12 months and the interest rate has to be positive. In the sample studied by Kaboski and Townsend (2004), the village fund group typically consisted of close to 100 members, so that loan applications could mostly be approved.

[3] 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.

3 Data

Our data are drawn from a household survey in Thailand collected by the Vulnerability in Southeast Asia Project. The survey was conducted in April to June 2007 and covers 2,186 households from three provinces in the Northeastern region. The three provinces are namely Buriram, Nakhon Phanom and Ubon Ratchatani.

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 quite representative sample of rural households in Northeastern Thailand.

The survey includes information on the characteristics of households, the purpose of borrowing and characteristics of loan contracts. We will introduce specific data more comprehensively when we use them later in this research.

4 The position of village funds as a lending institution

In this section we provide information about the lending of village funds in relation to six further sources which are 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 village funds and other lending institutions

The seven main lending institutions in our sample are the following, presented in order of increasing informality: conventional formal financial institutions are commercial banks as well as a few special 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 (CREDIT).[4] 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)[5]. A sixth lending institution is various kinds of moneylenders (ML) and finally, relatives and friends (RELA) form another source of borrowing for rural households.[6]

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 of 2,186). 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 the 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] This category includes a variety of institutions such as community based savings and credit groups, community rice banks, and cooperative stores. These institutions are analyzed in more detail in Kaboski and Townsend (2005).

[5] 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 USD 1,800/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.

[6] 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.

4.2 Detailed information about borrower and loan characteristics

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 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 delete 10 extreme outlier observations (loan items) for loan size and interest rate. The resulting sample has 3,298 loans for 1,582 households.[7]

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 income, possess more assets, are more employed in the formal sector and take higher loan volumes. By contrast, VFs seem to be used by more "median" borrowers which gives the VF an intermediate position between formal (CB, BAAC) and informal institutions (CREDIT, 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 refusion 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: The 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. The 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. The BAAC is also still relatively "cheap" but more expensive than VF. Interestingly, the formal and the informal

7 Extreme outlier observations are defined in this study as observations more than 8 standard deviations 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.

extremes, i.e. 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 do not seem to be used for shock related borrowing, probably because loan processing takes too long.

Overall, the descriptive statistics provide a first impression about the VF. It is very wide-spread, borrowing households are tentatively less well-off compared to borrowers from the 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, the VF obviously plays an important role which is – seen from the BAAC – closer to informal institutions than to CB. This stylized characterization of the VF will be examined more thoroughly.

5 Analyzing the contribution of village funds

This section shows that village funds (VF) do indeed provide financial services different from earlier existing institutions. First, we analyze 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 the VF which is to mitigate the credit constraints of rural households (Section 5.2).

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. 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, so that the analysis is performed at the loan level.

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, Prob(y_{ij}=k) is given by:

$$\text{Prob}(y_{ij} = k) = \exp(\alpha_k X_i + \beta_k Z_j + \gamma_k D_p) / \Sigma_{m=1,\ldots,7}(\alpha_m X_i + \beta_m Z_j + \gamma_m D_p) \qquad (1)$$

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: farm 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. Results are shown in Table 3. In the following we discuss statistically significant coefficients which seem to give a pattern mainly confirming the finding from Section 3, i.e. an intermediate role for VF.

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 wealthier households, 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. We also find that, among the informal lenders, households borrowing from RELA have lower income and more dependents. This indicates 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 a less restricted collateral compared with BAAC. This is also shown in Table 2; 96 percent of loans from VF are issued with guarantors as collateral. Furthermore, according to BAAC rules, loans beyond 100,000 baht must be secured by tangible collateral, usually through mortgage of land and buildings. Therefore landless households are not able to pledge land as collateral and thus fail to obtain loans from BAAC. VF tentatively fills this gap as land is not important in obtaining a loan from VF.

Regarding credit history, it appears that village funds are more willing to provide credit to households with bad credit history. 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 or CRED. This is probably due to restrictions on the supply side as BAAC and CRED may ration households with bad credit history.[8] As a result, those households have to direct their demand towards VF and the more informal lenders.

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 channelled to both production and consumption purposes.

Contrary to our expection 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.

[8] According to BAAC, the consequences of defaulting on a loan or making late repayment are not being able to get loan from BAAC again or having to pay higher interest rate.

So, there are interesting differences in borrowing households across the seven lending institutions. Seen from the VF, and in a very rough classification, the 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. In this sense, the VF tentatively substitutes informal institutions to some extent.

5.2 The relation between village funds and credit constraint

In this section we examine whether the village fund (VF) helps to reduce households' credit constraints. Such analysis also provides an evaluation of the program as a core objective of VF is to reduce poverty by mitigating the credit constraints of rural households.

To illustrate the correlation 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 value of 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 ask 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. The instruments are, first, the inverse number of households in the village. Under this program, one million baht is injected into each village regardless of the village population. Thus the probability that a household in a given village receives the village fund credit is inversely correlated with the number of village households. The second instrument is the interest rate on VF credit. Under this program, individual VF committees have some discretion in setting interest rates, maximum loan amounts, and terms of loans. 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 a Heckman 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 form:

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

where i indexes households. The variable 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. These household characteristics include 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 and years of education, household income, household asset holdings, area

of landholdings and a measure of household credit history. Finally 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:

$$\text{Prob}(\text{ration}_i = 1) = \exp(\alpha_1 X2_i + \beta_1 w_i + \gamma_1 D_p)[1+\exp(\alpha_1 X2_i + \beta_1 w_i + \gamma_1 D_p)] \quad \text{if apply}_i = 1 \qquad (3)$$

$$w_i = \alpha_2 X2_i + \beta_2 Z_i + \gamma_2 D_{pi} + \varepsilon_i \qquad (4)$$

where ration_i is a binary variable taking a value of one if a household is fully or partially credit rationed.[9] $X2_i$ is a vector of household characteristics that are expected to affect credit rationing. We specify the same set of household characteristics for both selection and credit constraint equations. 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, namely the inverse number of village households and the VF interest rate. The variable D_p represents province dummies.

The estimation results are presented in Table 4. *Panel A* of the table shows the results for the selection equation. *Panel B* presents the results from the first stage regression where the endogenous variable – the amount of VF credit – is regressed on all exogenous variables including the instruments. *Panel C* shows the results from the second stage regression where the probability of credit constraint is estimated.

Results from the first stage regression show that our instruments are significant predictors of the endogenous credit variable. The number of village households and the interest rate are strongly correlated with the amount of VF credit.

In the second stage regression, the most interesting result is that, at the 10 percent significance level, VF credit reduces the probability of being credit constrained. This result suggests cautiously that the program is successful in achieving its goal (see also Zeller, 1994).

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. Panel A shows that richer households are less likely to apply for credit. This finding implies that low income households may self-select to apply for credit while high income households choose not to. We also find that younger households, households with more

[9] 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.

children and households with bad credit history have a higher probability of applying for credit.

6 Conclusions

This study examines whether the introduction of 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 complementing earlier time-series studies (Kaboski and Townsend, 2004, 2007). The role of village funds is assessed in relation to competing financial institutions: which role do village funds play and, in particular, do they provide desired services "better" than existing formal financial institutions? We find, indeed, that village funds seem to function as intended by its founders.

In detail, our empirical tests yield three results: first, 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, village funds provide loans to those kinds of borrowers which are more typical customers of informal than formal financial institutions. Third, village funds help to reduce credit constraints. Overall, these results indicate a positive role of village funds, a finding which is tentatively in line with Kaboski and Townsend (2007) who state that village funds provide a kind of social protection.

So, Thailand's experience with the microfinance institution of village funds may provide some stimulus for other countries to think about following this institutional innovation. However, there are two caveats to our study which are important from a policy perspective: (1) we do not and cannot analyze whether the introduction of village funds in Thailand was an efficient instrument in the sense that the cost-benefit-ratio is superior to alternatives. Concerns may be nurtured by three facts: VF is an "intermediate" institution and thus an imperfect substitute for informal institutions, second, VF does not seem to be effective as shock-absorber, and, third, VF has a limited role for investment financing due to its restricted amount of single loans and restricted duration. (2) Due to the allocation mechanism in villages, one has to face the possibility that there may be discrimination against minor interest groups or generally less powerful persons and groups in the villages. These gaps in existing evidence will hopefully stimulate further research.

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

	CB	BAAC	VF	CREDIT	POLICY	ML	RELA	Total
Total Sample								
Number of outstanding loan contracts	134	1,288	1,629	347	275	368	301	4,342
Number of borrowing households [a]	112	949	1,153	254	235	301	245	1,806
Volume of credit (mil Baht)	22.8	75.3	27.1	26.7	4.8	19.1	9.5	187
Loans received in 2006-2007								
Number of outstanding loan contracts	64	927	1,427	272	165	228	225	3,308
Number of borrowing households [b]	57	696	1,076	205	147	194	192	1,588
Volume of credit (mil Baht)	9.9	45.5	23.3	14.8	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 received 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	CREDIT	POLICY	ML	RELA	Overall
Panel A: Characteristics of Borrower								
Age of household head	50.5	55.3	53.2	53.6	51.4	53.6	50.5	53.6
Proportion female headed household (%)	22.8%	20.7%	25.8%	28.8%	26.5%	29.4%	25.5%	25.4%
Number of adults	2.8	2.8	2.7	2.6	2.5	2.7	2.6	2.7
Number of children	1.2	1.3	1.4	1.4	1.4	1.7	1.6	1.4
Household occupation (%)								
farmer	38.6%	77.2%	69.7%	62.4%	71.4%	65.5%	68.8%	68.9%
informal worker	8.8%	7.3%	12.3%	13.7%	10.2%	18.0%	18.8%	12.7%
formal worker	31.6%	6.9%	7.8%	14.1%	12.2%	8.2%	5.7%	9.1%
business owner	21.1%	8.6%	10.2%	9.8%	6.1%	8.2%	6.8%	9.3%
Years of education	6.8	4.7	4.8	5.4	5.0	4.6	4.9	4.8
Income	231,490	114,776	112,564	140,679	102,061	109,182	91,906	116,914
Assets	545,601	305,493	247,380	271,932	215,561	281,504	218,435	259,527
Area of owned land	3.4	3.9	3.1	2.7	2.7	2.9	3.0	3.2
Value of loans defaulted or repaid late to total loan outstanding (%)	6.6%	4.3%	8.5%	5.2%	6.0%	8.6%	10.7%	7.5%
Ever refused a loan? (%)	10.5%	9.8%	11.8%	12.2%	12.2%	19.1%	20.8%	11.1%
Amount of credit per borrowing household	173,456	65,425	21,678	72,203	12,148	48,184	34,339	70,018
Panel B: Purpose of Borrowing								
agricultural production	21.1%	51.8%	44.9%	30.0%	39.4%	24.3%	24.4%	42.1%
non-agricultural production	40.4%	17.0%	15.6%	12.1%	10.3%	15.3%	18.9%	16.3%
consumption	36.8%	29.7%	38.5%	57.2%	49.7%	59.0%	56.2%	40.6%
Panel C: Characteristics of Loan Contract								
Loan size	104,705	49,122	16,346	36,548	10,823	41,135	29,303	31,136
Loan duration	3.8	2.0	1.0	1.4	2.2	1.3	1.2	1.5
Average interest rate (%)	22.9%	9.9%	6.3%	11.0%	3.1%	55.0%	10.6%	11.5%
Weighted average interest rate (%)	21.4%	9.9%	6.1%	11.2%	3.9%	48.2%	9.0%	13.2%
Proportion of loans with 0% interest rate (%)	0.0%	1.2%	0.4%	9.0%	53.3%	2.6%	67.6%	8.7%
Collateral requirement (%)								
land	27.9%	36.0%	0.4%	0.0%	0.6%	27.7%	5.8%	13.1%
other assets	6.6%	1.0%	1.0%	5.3%	0.6%	9.4%	1.3%	2.0%
guarantor	54.1%	60.8%	96.4%	75.9%	84.1%	13.8%	3.6%	71.4%
none	11.5%	2.3%	2.2%	18.8%	14.6%	49.1%	89.2%	13.5%
Shock related Borrowing? (%)	9.8%	6.4%	6.5%	9.0%	6.7%	14.1%	23.6%	8.40%

Table 3: Multinomial Logit Model Predicting the Choice of Lender by Borrowing Household

	CB	BAAC	CREDIT	POLICY	ML	RELA
Household characteristics						
Age of household head	-0.0139	0.0136**	0.0031	-0.0092	-0.0064	-0.0178**
	(-0.91)	(3.45)	(0.51)	(-1.17)	(-0.95)	(-2.28)
Female headed household	-0.0600	-0.2463**	0.1754	0.1118	0.1715	0.0979
	(-0.17)	(-2.26)	(1.10)	(0.57)	(0.96)	(0.54)
Number of adults	0.1003	-0.0686	0.0263	-0.0971	0.0695	-0.0198
	(0.79)	(-1.62)	(0.41)	(-1.17)	(1.07)	(-0.28)
Number of children	-0.3295**	-0.0268	-0.0072	-0.0744	0.2351**	0.1733**
	(-2.15)	(-0.63)	(-0.11)	(-0.82)	(3.63)	(2.50)
Farm household	-0.8051*	0.1732	-0.0391	0.4456	-0.0083	0.1478
	(-1.93)	(1.01)	(-0.16)	(1.10)	(-0.03)	(0.47)
Informal worker	-0.5000	-0.3810*	-0.0600	0.0736	0.5337	0.5439
	(-0.90)	(-1.67)	(-0.20)	(0.16)	(1.59)	(1.52)
Formal worker	1.1073**	0.1605	0.1829	0.7056	0.4298	-0.1252
	(2.60)	(0.69)	(0.59)	(1.53)	(1.04)	(-0.29)
Years of education	0.0663	0.0089	0.0429	0.0171	-0.0465	0.0001
	(1.39)	(0.45)	(1.51)	(0.50)	(-1.28)	(0.00)
Income (10,000 Baht)	0.0089*	-0.0028	0.0063	-0.0041	-0.0033	-0.0124*
	(1.91)	(-0.90)	(1.46)	(-0.53)	(-0.54)	(-1.79)
Assets (10,000 Baht)	0.0018	0.0025**	-0.0005	-0.0002	0.0022	-0.0054
	(0.65)	(2.01)	(-0.30)	(-0.08)	(1.12)	(-1.46)
Area of landholding	0.0152	0.0456**	-0.0786**	-0.0508	0.0233	0.0329
	(0.26)	(2.97)	(-2.29)	(-1.46)	(0.91)	(1.37)
Ratio of defaulted loans to total loan outstanding	-0.0301	-0.8688**	-0.7138**	-0.5704	-0.0010	0.1759
	(-0.04)	(-3.24)	(-2.00)	(-1.23)	(-0.00)	(0.51)
Loan characteristics						
Agricultural production loan	-1.2720**	-0.0591	-0.0643	0.1589	-0.5588**	-0.8528**
	(-3.27)	(-0.47)	(-0.29)	(0.55)	(-2.40)	(-3.71)
Consumption loan	-0.7250**	-0.4203**	0.6117**	0.6107**	0.3874*	0.0189
	(-2.36)	(-3.20)	(2.88)	(2.17)	(1.85)	(0.09)
Shock related borrowing	0.4293	0.1412	0.1377	0.0032	0.8285**	1.4390**
	(0.87)	(0.80)	(0.56)	(0.01)	(3.64)	(7.01)
Province dummies						
Buriram	0.1061	0.4056**	-0.4886**	0.0009	0.6816**	-0.0188
	(0.25)	(2.70)	(-2.41)	(0.00)	(3.06)	(-0.08)
Ubon	-0.2424	0.2562*	-0.4359**	-0.1629	-0.6939**	-0.1719
	(-0.60)	(1.75)	(-2.29)	(-0.65)	(-2.83)	(-0.78)
Constant	-1.8111*	-1.3076**	-1.8262**	-1.8311**	-2.2180**	-1.0525*
	(-1.94)	(-3.90)	(-3.74)	(-2.90)	(-3.97)	(-1.67)
Pseudo R2	0.059					
N	3246					

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 4: Impact of Village Fund Credit on Probability of Credit Constraint

Panel A: Selection Equation	**Coef.**	**Std. Err.**	**t-stat**
Household characteristics			
Age of household head	-0.015**	0.003	-4.85
Female headed household	0.021	0.073	0.29
Number of adults	0.031	0.034	0.91
Number of children	0.073**	0.033	2.21
Farm household	0.011	0.147	0.07
Informal worker	-0.312*	0.167	-1.87
Formal worker	0.036	0.188	0.19
Years of education	0.022	0.015	1.41
Income (10,000 Baht)	0.000**	0.000	-2.29
Assets (10,000 Baht)	0.000	0.000	1.16
Area of landholding	0.019	0.017	1.1
Ratio of defaulted loans to total loan outstanding	1.692**	0.413	4.1
Province dummy, Buriram	0.172*	0.096	1.8
Province dummy, Ubon	0.199**	0.088	2.26
Constant	1.299**	0.241	5.38
Number of observation	2141		

* p<0.10, ** p<0.05

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

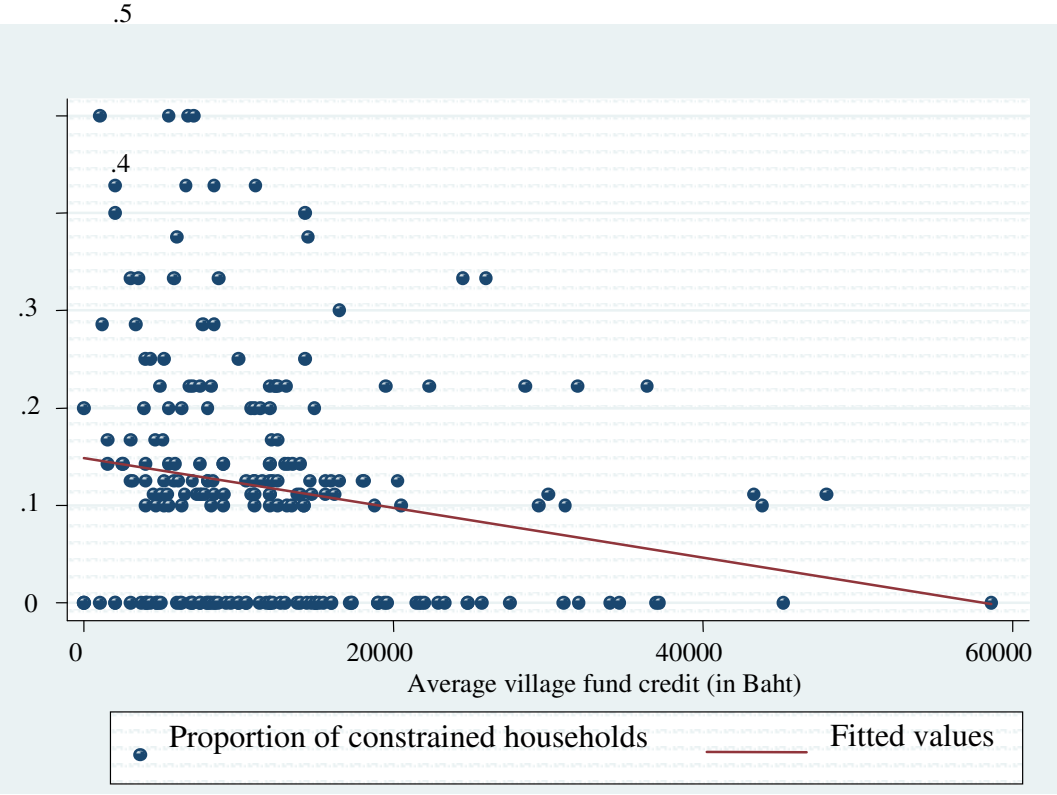
Table 4: Impact of Village Fund Credit on Probability of Credit Constraint (Continued)

Panel B: Regress Village Fund Credit on Instruments	**Coef.**	**Std. Err.**	**t-stat**
Household characteristics			
Age of household head	-33.933	59.512	-0.57
Female headed household	1101.176	1163.924	0.95
Number of adults	1167.814**	375.110	3.11
Number of children	-646.973	470.191	-1.38
Farm household	176.780	1721.256	0.1
Informal worker	-17.917	2314.953	-0.01
Formal worker	-2630.567	1760.243	-1.49
Years of education	59.048	179.577	0.33
Income (10,000 Baht)	-0.001	0.003	-0.24
Assets (10,000 Baht)	0.001	0.002	0.42
Area of landholding	-58.715	169.837	-0.35
Ratio of defaulted loans to total loan outstanding	-7814.586*	4601.395	-1.7
Province dummy, Buriram	1630.373	2698.316	0.6
Province dummy, Ubon	-878.295	2504.547	-0.35
Inverse Mills ratio	-15045.680	10726.810	-1.4
Constant	30977.78**	5172.563	5.99
Instruments			
Number of village households	-63.914**	26.574	-2.41
Interest rate on VF credit	-801.030**	373.550	-2.14
Panel C: Regress Probability of Credit Constraint on Predicted Village Fund Credit	**Coef.**	**Std. Err.**	**t-stat**
Village fund credit (predicted)	-1.24E-05*	6.48E-06	-1.92
Age of household head	0.000	0.007	0
Female headed household	0.034	0.094	0.36
Number of adults	0.037	0.039	0.96
Number of children	-0.020	0.042	-0.48
Farm household	-0.139	0.140	-0.99
Informal worker	0.238	0.208	1.14
Formal worker	-0.234	0.195	-1.2
Years of education	-0.021	0.019	-1.11
Income (10,000 Baht)	0.000	0.000	-0.41
Assets (10,000 Baht)	0.000	0.000	-0.5
Area of landholding	-0.022	0.015	-1.53
Ratio of defaulted loans to total loan outstanding	-0.049	0.436	-0.11
Province dummy, Buriram	-0.381**	0.119	-3.21
Province dummy, Ubon	-0.122	0.119	-1.02
Inverse Mills ratio	-1.451	1.085	-1.34
Constant	-0.221	0.345	-0.64
Number of observation	1767		

* 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.