

An Empirical Analysis of Rural Finance and Its Impacts on Household Vulnerability in Thailand

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Deutsche Kurzfassung

Wie aktuelle Daten zeigen, ist das Einkommen von Haushalten in Entwicklungsländern gering und unbeständig. Zudem fehlt diesen Haushalten auch ausreichender Zugang zu Finanzierungsmöglichkeiten. Theoretische und empirische Studien deuten auf die kritische Rolle hin, die verbesserte Finanzierungsmöglichkeiten auf Wachstum ausüben. Dennoch gab es bisher nur wenig Forschung auf Haushaltsebene, die zeigt, wie finanzieller Fortschritt zu mehr Wachstum und weniger Armutsanfälligkeit führt. Der Effekt von finanzieller Entwicklung auf schnelleres Wachstum, muss sich nicht zwangsläufig auf eine verringerte Armutsanfälligkeit replizieren. Der Grund dafür ist, dass es unklar ist, ob von finanzieller Entwicklung die gesamte Bevölkerung, die Reichen oder die Armen profitieren. Wenn die Armen nicht von finanzieller Entwicklung profitieren, wird finanzielle Entwicklung nicht zu einer Reduzierung von Armut und Armutsanfälligkeit beitragen.

Der Untersuchungsgegenstand dieser Dissertation ist zum einen die Rolle von ländlichen Finanzmärkten in der Absorption von Schocks sowie der Reduktion der Armutsanfälligkeit und zum anderen die Analyse anderer Aspekte der ländlichen Finanzmärkte. Es handelt sich um eine Sammlung von fünf einzelnen Artikeln, die unabhängig voneinander gelesen werden können. Die fünf Kapitel untersuchen verschiedene Aspekte von ländlichen Finanzmärkten und wenden verschiedene Methoden an.

Kapitel 1 untersucht die Effekte von lokalen Finanzinstitutionen und anderer Unterschiede zwischen Dörfern auf die Fähigkeit der Haushalte, ihren Konsum nach Einkommensschocks zu glätten. Kapitel 2 betrachtet näher den Mechanismus, den die Haushalte nutzen, um Konsum zu glätten und mit Schocks zu Recht zu kommen. Kapitel 3 analysiert den Effekt der Fortentwicklung lokaler Finanzmärkte auf die Verringerung der Armutsanfälligkeit und deren Wirkungskanäle. Kapitel 4 beurteilt inwiefern das village funds Programm, ein kürzlich eingeführtes Programm für Mikrokredite und eines der größten Mikrokreditprogramme überhaupt, den Zugang zu Krediten und Finanzmärkten in ländlichen Gegenden verbessert hat. Kapitel 5 untersucht die

Auswirkungen und Typen von Kreditsicherheiten, die in ländlichen Finanzmärkten benützt werden.

Die Ergebnisse deuten darauf hin, dass ländliche Finanzmärkte eine wichtige Rolle in der Absorption von Schocks und Armutsanfälligkeit von Haushalten spielen.

Schlüsselwörter: Ländliche Finanzmärkte, Armutsanfälligkeit, Strategien zur Risikobewältigung

Abstract

Recent data show that many households in developing countries have low and volatile incomes. These households also lack adequate access to finance. Theory and empirical evidence point to the critical role that improved access to finance has in promoting growth. There has been little empirical investigation at the household level, however, of the impact of finance on vulnerability reduction. The evidence that financial development leads to faster economic growth does not necessarily translate into positive impact on vulnerability reduction. The reason is that it is unclear whether financial development benefits the whole population, whether it primarily favors the rich, or whether it benefits the poor. If the poor do not benefit from financial development, then financial development may not lead to poverty and vulnerability reduction.

The goals of this dissertation are to investigate the role of rural finance in absorbing shocks and reducing vulnerability on the one hand, and explore other specific aspects of the rural financial markets on the other. It is a collection of five individual articles which can be read independently. The five chapters investigate different aspects of the rural financial markets and apply different methodologies.

Chapter 1 examines the effects of local financial institutions and other cross village differences in the ability of households to smooth consumption after income shocks. Chapter 2 looks closer at the mechanisms used by rural households to smooth consumption and cope with shocks. Chapter 3 examines the effect of local financial development on vulnerability reduction and the channels through which it reduces vulnerability. Chapter 4 evaluates whether the Village Funds, a recently introduced microfinance program in Thailand and one of the largest microfinance programs ever implemented, improve access to finance in rural areas. Chapter 5 examines the incidence and the types of collateral used in the rural credit markets.

The results suggest that rural finance play a significant role in absorbing shocks and reducing household vulnerability.

Keywords: rural finance, vulnerability to poverty, risk coping strategies

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List of Abbreviations

BAAC	Bank of Agriculture and Agricultural Cooperatives
CB	Commercial Banks
CRED	Community-based Credit Groups, Savings Groups and Cooperatives
DFG	Deutsche Forschungsgemeinschaft (German Research Foundation)
DFGFOR756	Project “Impact of Shocks on the Vulnerability to Poverty: Consequences for Development of Emerging Southeast Asian Economies”
FGLS	Three-Step Feasible Generalized Least Squares Procedure
GDP	Gross Domestic Product
GPP	Gross Provincial Product
GSB	Government Savings Bank
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFLS	Indonesian Family Life Survey
IIA	Independence of Irrelevant Alternatives
IV	Instrumental Variable
ML	Moneylenders
MOF	Thailand’s Ministry of Finance
NRC2d	Village-Level Database maintained by Department of Community Development, Thailand’s Ministry of Interior
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Square
POLICY	Special Policy Loans
PPP	Purchasing Power Parity
PSU	Primary Sampling Unit
RELA	Relatives and Friends
US	United States
VF	Village Funds

Introduction and Summary of Main Results

Rural households in developing countries like Thailand and Vietnam have low and volatile incomes. In many developing countries the majority of the population does not have access to formal financial services. Lack of access to financial markets is considered one of the main reasons why the poor in developing countries remain poor and vulnerable. Hence improving access to the financial markets remains an important challenge across the world.

There has been a longstanding interest among development economists and policy makers in the contribution that finance makes to development and economic growth. A number of empirical studies have shown evidence of positive impact of financial development on economic growth. While many studies have examined the effect of finance on economic growth, the question of whether finance helps reduce vulnerability has not been the subject of much empirical work. The evidence that financial development leads to faster economic growth does not necessarily translate into positive impact on vulnerability reduction. The reason is that it is unclear whether financial development benefits the whole population, whether it primarily favors the rich, or whether it benefits the poor. If the poor segment of the population do not benefit from financial development, then financial development may not lead to poverty and vulnerability reduction.

Financial development can directly lower vulnerability of households through two main channels. First, improving the access of the poor to financial services, particularly to savings and credit markets, allows the poor to take advantage of profitable investment opportunities. These investments tend to be lumpy and may be difficult to finance out of current household income but could provide higher income in the future. Thus access to financial services enables the poor to invest in productive assets which in turn enhance their productivity and increase the potential for achieving sustainable livelihoods. Second, an access to financial markets also provides the poor more opportunities to manage risks and smooth consumption in the face of negative shocks. Households can smooth out fluctuations in incomes by borrowing and lending through the financial

markets. In the absence of credit to households, income shocks may get reflected into consumption shocks. Thus an access to financial services can reduce households' vulnerability to shocks and minimize the adverse impacts of shocks that can sometimes have long-run impacts.

The overall objectives of this dissertation are to investigate the role of financial development and financial institutions in reducing vulnerability of rural households on the one hand, and explore several specific aspects of the rural financial markets on the other.

In order to analyze the contribution of finance on household vulnerability, this dissertation relies on two surveys. The first survey was conducted by the Thai Ministry of Finance (MOF) in 2005. The field survey was carried out in six provinces from four regions in Thailand, namely Phrae from the North region, Sisaket and Buriram from the Northeast region, Chacherngsao and Lopburi from the Central region and Satoon from the South region. Within each province, four districts were randomly selected, and within each district, four villages were chosen at random. Then within each village, fifteen households were randomly selected. The survey constitutes a cross-sectional data with a total of 1,440 households from 96 villages.

The second survey was collected as part of the project "Impact of shocks on the vulnerability to poverty: consequences for development of emerging Southeast Asian economies" (DFGFOR756), funded by the German Research Foundation (DFG). An initial cross sectional survey took place in Thailand and Vietnam between April and June 2007. Within each country, three provinces were deliberately chosen. The six provinces are namely Buri Ram, Ubon Ratchatani and Nakhon Phanom from the Northeast region of Thailand and Dak Lak from the Central Highlands of Vietnam and Thua Thien-Hue and Ha Tinh from the North Central Coast of Vietnam. In total, 2,186 households from 220 villages in Thailand and 2,195 households from 220 villages in Vietnam were interviewed in this initial cross sectional survey. Further secondary data are obtained from Thailand National Statistical Office.

The dissertation is organized in five main chapters based on five individual articles which can be read independently of each other. Each chapter focuses on different aspects of the rural financial markets and applies different methodologies.

Chapter 1 examines the effects of local financial institutions and other cross-village differences on consumption insurance – the ability of households to maintain their consumption after specific shocks and fluctuations in their income. While recent evidence indicates that different degrees of consumption insurance are reached by different villages, very little is known about the source of heterogeneity across villages. Unlike previous work, this chapter focuses on the effects of cross-village differences and attempts to pinpoint which local institutions help facilitate consumption insurance. The analysis is based on the survey collected by Thailand’s Ministry of Finance. Empirical results suggest that local financial institutions within villages matter. In particular, the results show that the number of institutions providing loans and savings services, the level of community social capital, and the extent to which shocks are idiosyncratic significantly increase the ability of households to insure consumption.

Chapter 2 looks closer at the mechanisms or tools used by rural households to smooth consumption and cope with shocks. It documents the nature of risks facing rural households in Thailand and Vietnam and the mechanisms that are used by these households to mitigate the adverse effects of shocks. It also attempts to explain why households chose one smoothing mechanism over the other. The data used in the analysis come from the project “Impact of shocks on the vulnerability to poverty: consequences for development of emerging Southeast Asian economies” (DFGFOR756). An empirical model is developed to explain why households chose one smoothing mechanism over the other. Two levels of decision making are distinguished. The first of which includes the choice of financial (asset depletion, borrowing) versus non-financial smoothing mechanisms (mutual insurance, increase labor supply and asset smoothing). The second level focuses on the choice of financial smoothing mechanisms (use of monetary savings, selling livestock, formal borrowing and informal borrowing). Based on data from Thailand and Vietnam, the primary coping strategy used by households in both countries is borrowing, with informal borrowing playing a more important role than formal borrowing. Other important responses are assets depletion and increasing labor supply. Interestingly, receiving public assistance is quite important in Thailand. However the estimation results do not provide much pattern in the smoothing mechanisms used by Thai households as few variables explain the choice of coping strategy. Interestingly, the

Vietnamese data show a much more diversified picture as numerous variables explain the choice of coping strategy. The differences between Thailand and Vietnam may be rooted in country-specific institutional settings.

Using DFGFOR756 data on Thailand, Chapter 3 examines the impact of local financial development not only on absorbing shocks but on reducing the overall vulnerability of households. To identify the effects, an indicator of local financial development based on the procedure of Guiso et al. (2004) is estimated as well as the measure of household vulnerability. The results show that financial development robustly decreases household vulnerability and it does so through fostering both investment and consumption.

Using the same data set, Chapter 4 looks at the role of a specific microfinance institution in Thailand, namely “village funds”. The village funds program is one of the largest microfinance programs ever implemented and is currently one of the main providers of household loans in rural Thailand. In particular, Chapter 4 assesses the poverty outreach of the village funds and examines whether the introduction of the village funds improves access to finance in the rural areas. This chapter has two parts. The first part aims to identify what kind of households and loans are served by the village funds relative to other existing institutions, which would then allows inferences about the village funds’ outreach as well as the degree of competition, substitutability and overlap among these financial institutions. Estimation results from a multinomial logit regression show 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. The second part examines whether the village funds help in easing credit constraints faced by rural households. Evidence indicates that the village funds significantly contribute to overcoming credit constraints.

Chapter 5 explores another specific aspect of the rural financial markets – the use of collateral in the rural credit markets. Collateral is an important element in the lending business. In general, collateral serves two functions. First it minimizes the expected losses for the lenders which may be incurred in the case of loan defaults. Second it provides additional incentives for borrowers to repay. Due to informational opaqueness

and weak legal enforcement, the need for collateral is expected to be even higher in developing countries. Yet the rural households typically do not have adequate assets to pledge as collateral. How do lenders and borrowers in the rural areas deal with this problem? This chapter aims to answer this question. Preliminary analysis shows that land and asset substitutes are rarely used as collateral in the rural credit markets and that a large and significant quantity of credit in rural areas is provided without any collateral. The lenders in the rural areas can enforce collateral-free loans mainly through third party guarantees and borrower-lender relationship.

Putting all results together, this dissertation serves to provide empirical evidence of the positive role that financial development and financial institutions play in absorbing shocks and reducing vulnerability.

Several implications for further research clearly emerge. First, in contrast to the enormous emphasis on credit outreach, savings receive little attention. The data reveal that formal savings are rarely used by rural households. This low use of savings may be due to lack of appropriate savings services available to rural households. Future research on household savings is needed in order to provide appropriate savings services and mobilize savings.

Second and more importantly, given the current emphasis on financial development and vulnerability reduction on policy agendas of many developing countries, results reported in this dissertation provide a justification to undertake more detailed investigations of how specific financial development measures can be set up as effective instruments for achieving vulnerability reduction. Further research addressing efficiency and sustainability of financial institutions is clearly warranted in order to recommend future directions for policy on rural finance in Thailand.

Chapter 1

1. Village Heterogeneity and Partial Consumption Insurance: Evidence from Thai Villages¹

1.1 Introduction

It is generally acknowledged that rural households in developing countries are not only poor but also subject to substantial income fluctuations. Economic theory on consumption insurance tells that with uncertainty, risk averse households will try to smooth their consumption streams against the fluctuations in household incomes. There has been a number of work in recent years that empirically tests consumption smoothing in developing countries (Rosenzweig, 1988; Udry, 1994; Townsend, 1995; Grimard, 1997; Ravallion and Chaudhuri, 1997; Kochar, 1999; Kim et al., 2006). The general findings of these studies are that, first, households can achieve some level of consumption smoothing but only partial. Second, the degree of consumption smoothing among households varies across countries, regions or even villages.

While recent evidence indicates that different villages reach different degrees of consumption insurance, very little is known about the effect of heterogeneity across villages on the extent of consumption insurance. Previous studies on consumption insurance usually focus on analyzing the relation between *household* characteristics and the ability to insure consumption, with little attention to the *cross-village* differences. These studies typically control for differences across villages by adding the village dummies. The drawback of this approach is that it provides no explicit information on the role of other village characteristics which partly determine the possibilities of what households can do to smooth consumption. Given different economic environments of the households, it is very unlikely that similar households in different locations are able to smooth their consumption to the same extent.

¹ This chapter is based on the following article “Village Heterogeneity and Consumption Insurance: Empirical Evidence in Thai Villages” written by Ornsiri Rungruxsirivorn. I would like to thank Thailand’s Ministry of Finance for providing the data. Financial support from the German Research Foundation (DFG) is gratefully acknowledged.

In contrast with previous research, the focus of this paper is on the effect of the cross-*village* economic differences. The characteristics of village that are considered in this paper are the level of social capital, the availability of credit and the income correlation. These variables have been put forward in the theoretical literature as potential determinants of consumption smoothing but some have not yet been empirically studied. Using a new survey of 1,440 households across 96 villages in Thailand, this paper studies the characteristics of these villages, examines their impacts on consumption insurance, and tests whether the observed impacts are consistent with what theories predict. Answers to these questions will have profound policy implications if the government aims to reduce households' vulnerability as it is important to understand why some villages or economies do much better than others in smoothing consumption and responding to shocks. The main results of the paper suggest that village social capital, the number of institutions providing both loans and savings services and the extent to which shocks are not correlated significantly affect the ability of households to insure consumption.

The remainder of this paper is organized as follows. The next section presents a brief literature review on consumption insurance and its determinants. Section 1.3 describes the data as well as how the variables relevant to the model are constructed from the original data. Some characteristics of households and villages in Thailand are also discussed in section 1.3. Section 1.4 presents an empirical specification. Section 1.5 discusses the empirical results. Finally, section 1.6 gives some concluding remarks.

1.2 Review of related literature

There are two strands of literature on the determinants of consumption insurance. The first strand of literature focuses on the role of social capital in consumption insurance. From a theoretical perspective, social capital affects consumption insurance through various channels. Social capital can help facilitate the informational flows (Granovetter, 1995), enable enforcement of the informal risk sharing arrangements (Coate and Ravallion, 1993), allow financially constrained households access to credit (Udry, 1994), and provide avenues for risk sharing (Rosenzweig, 1988). Therefore villages with higher social capital or more integrated networks are in a better position to

implement consumption insurance arrangements. Over the past few years, there has been a substantial increase in empirical research on the role of social capital in consumption smoothing. For example, Rosenzweig (1988) examines the role of family in providing consumption insurance in low-income countries. He finds that within family transfers play important roles in insuring household consumption against income shocks. Grimard (1997) examines the extent of consumption smoothing through ethnicities in Cote d'Ivoire. He finds that the extent of consumption smoothing is greater when households are sorted along ethnicities than the non-sorted data. Philips and Massey (2000) find that social capital among Mexican migrants in the US helps increase consumption smoothing. Using the Indonesian Family Life Survey (IFLS), Gertler, Levine and Moretti (2006) examine whether consumption declines less after a negative health shock for households that have more social capital. They use several measures of social capital such as participation in community organizations, tenure of residence, and the presence of extended family within community but find little evidence that social capital helps households smooth consumption against health shocks. Jacob (2005) also examines consumption smoothing in Indonesia using IFLS. He uses different measures of social capital and classifies households into households who increase their stock of social capital and those who experience a decline in social capital. He finds that households who increase their stock of social capital over time are more able to smooth consumption. Finally, Udry's (1994) study of Northern Nigeria finds that even in the presence of limited information, a large number of loans in northern Nigeria are given without any formal written contract, specific repayment date, and collateral. Udry (1994) finds that, among other factors, long-term community relations play a significant role in obtaining credit and easing the credit contracts – an evidence of the importance of social capital in providing access to credit market.

The second strand of literature focuses on the role of credit as an instrument of consumption insurance. An access to credit markets allows people to smooth out fluctuations in incomes by borrowing and lending through them. In the absence of credit to households, income shocks may get reflected into consumption shocks. One of the perceived benefits of having access to credit markets is that there are more opportunities to cope with risks. There has been a number of studies in recent years that empirically

examines the role of credit as consumption insurance. For instance, Rosenzweig's (1988) study of the ICRISAT villages finds that household borrowing moves in response to fluctuation in income. Udry (1994) finds that credit flows between village members do not only depend on the financial condition of the borrower but also on that of the lender. This finding suggests that credit flows behave similar to insurance in responding to changes in financial situations. Kim et al. (2006) examine the degree of consumption insurance among the East Asian countries and compare with OECD countries. They find that less developed regional credit markets in the East Asian countries help explain why the East Asian countries achieve less consumption smoothing than OECD countries. Finally, Ravi (2006) examines the role of credit institutions as insurance mechanisms in rural India. She finds that access to credit helps households in smoothing consumption but the results depend on the source of credit. Credit from cooperative groups provides the best consumption insurance during a period of income shortfalls.

Other factors that may affect the extent of consumption insurance are the extent to which shocks are aggregate and the correlation of household incomes. If shocks are aggregate or household incomes are highly correlated, then there is less scope for risk sharing and less opportunity for consumption insurance. To the best of my knowledge, the effects of income correlation and shock variations on the ability to insure consumption have not yet been empirically examined.

A vast array of studies that have been written on this matter suggest what may be the underlying source of heterogeneity in the ability of households to insure consumption. Previous studies usually focus on one particular aspect, mostly social capital or credit access. But in studying one aspect only, the researcher may miss the effects of other determinants of consumption smoothing. In contrast, this paper simultaneously considers all factors mentioned in the literature, namely social capital, credit availability, shock and income correlation. Several village-specific variables are used in this paper to capture these characteristics.

1.3 Data

1.3.1 Data source

The data come from the household and village survey carried out by the Thai Ministry of Finance (MOF) between July and September 2005. The survey is designed to be representative of rural and semi-urban households in Thailand. Thailand is usually classified into four geographical regions: the North, the Northeast, the Central and the South. Aware of regional disparities, MOF selected representative provinces from each region to be included in the survey. In total, six provinces were chosen. These six provinces are Phrae from the North, Sisaket and Buriram from the Northeast, Chacherngsao and Lopburi from the Central and Satoon from the South.

Within each province, four districts were chosen, and within each district, four villages were chosen at random. In each village, fifteen households were randomly selected. The survey, thus, constitutes a relatively large cross-sectional data with a total of 1,440 households from 96 villages.

The household survey contains information on the demographic characteristics of households, households' responses to income shortfalls, household incomes, expenditures, assets, borrowings and savings. The village survey contains information on the village population, organizations within villages such as credit and savings groups, social structure and welfare, and village economy including income fluctuations. In both surveys, retrospective questions were included to capture information about past shocks, the corresponding coping strategies, changes in household composition, changes in village-level organizations, and changes in social structure and welfare.

1.3.2 Construction of variables

This section describes how the variables relevant to the model are constructed from the original data. The summary statistics of these variables are reported in section 1.3.3.

1.3.2.1 Social capital

Because social capital has multiple aspects, it is difficult to measure and quantify social capital by a single measure. As a consequence, this paper uses four measures of social capital. While no single measure can adequately capture all that one may mean by social capital, taken together these measures fill some of the gaps.

The first measure of social capital is ethnic diversity. A number of theoretical and empirical studies suggest that diversity, racial diversity in particular, seriously undermines a sense of community, social cohesion and interactions among community members.² Households living in ethnically diverse communities are more likely to interact less frequently, which in turn leads to lower level of social capital. The data set contains the information on the number of households in each village and the number of households belonging to each ethnic group. Households are classified into one of the four main ethnic groups according to the language used at home. The four ethnic groups are Thai, Chinese, Muslims, and others. Ethnic diversity is calculated according to the following formula.

$$ethdiv(j) = 1 - \sum_k s^2(k, j) \quad (1.1)$$

where j indexes villages and k indexes ethnic groups. The term $s(k, j)$ represents a proportion of households belonging to group k in village j . The index increases as diversity increases. When every household living in a village belongs to the same ethnic group, the index is equal to zero. When households are equally split among the four groups, the index is equal to 0.75.

The second measure of social capital is the percentage of village income spent on festivals and ceremonies.³ As Breman (2001) argues that festivals and ceremonies serve

² Refer to Coleman (1988) for seminal work on social capital, and to Costa and Khan (2003) for a recent review of the economics literature on social capital, community heterogeneity and collective action. Alesina and LaFerrara (2000) find that ethnically diverse communities in the U.S. have lower levels of social capital as measured by participation in social activities. Miguel and Gugerty (2005) find that ethnically diverse communities in rural Kenya have lower local school funding and weaker school committees.

³ Miguel et al. (2005) also use ceremonial expenditure as a measure of social capital.

to enhance social connections, thus villages with more ceremonial expenditure are more likely to have higher level of social capital.

The third measure of social capital is the level of assistance among village members. In the survey, households are asked whether they helped relatives or non-relatives within the same village with rice, labor or money. The actual questions are shown in the appendix (see [Appendix 2](#)). I use the proportions of the households who help relatives or non-relatives with rice, labor or money as proxy variables for village-level informal assistance.⁴

The fourth measure is the level of information flows within a village. In the survey, households are asked for their own assessment of whether the majority of village members experience severe shortfalls in incomes in each year. The same question is asked to the village headmen. A household is said to be well-informed if its own assessment about its neighbors' financial conditions is correct.⁵ I measure the village-level information flows by the proportion of well-informed households. The higher the proportion of well-informed households, the more public is the information.

1.3.2.2 Availability of credit

This paper uses three measures of the availability of credit: (1) the number of groups providing loans only; (2) the number of groups providing both loans and savings services; and (3) the interest rate on loans from village-level financial institutions. For the number of groups providing loans or saving services, I use only the number of groups or branches of financial institutions that are located within villages although it is possible that households may be customers of financial institutions that are located outside their villages. The reason for using the interest rate as a proxy variable is based on a prior

⁴ To be more specific, the six measures of village-level informal assistance are the proportion of the households sharing rice with relatives in the village; the proportion of the households helping relatives in the village with free labor; the proportion of the households helping relatives in the village with money; the proportion of the households sharing rice with non-relatives in the village; the proportion of the households helping non-relatives in the village with free labor; and the proportion of the households helping non-relatives in the village with money.

⁵ I assume that the assessments by the village headmen are correct. To be more specific, a household is said to be well-informed if its own assessment about its neighbors' financial conditions is the same as that of the village headman.

expectation that a higher interest rate should limit households' access to credit. The interest rate is the village average and weighted according to the size of the loans.

1.3.2.3 Income correlation

This paper uses two variables as proxies for the within village income correlations: (1) the measure of variation in the year that shocks hit households in the same village and (2) the occupational diversity.

In the survey, households are asked whether they experienced a severe shortfall in income during the last five years and to name the worst income year. The possible answers are last year, two years ago, three years ago, four years ago, five years ago, and no changes in income. Using this information, the measure of variation in the years that shocks hit households in each village is calculated as follows.

$$shockvar(j) = 1 - \sum_k s^2(k, j) \quad (1.2)$$

where j indexes villages and k indexes years. The term $s(k, j)$ represents a proportion of households experiencing income shortfalls in year k . The index increases as variation increases. For instance, 0 means that shocks hit households uniformly at the same time, and 1 means that every household is hit by a shock at a different time.

Occupational diversity is computed according to the following formula.

$$occddiv(j) = 1 - \sum_k s^2(k, j) \quad (1.3)$$

where j indexes villages and k indexes occupational groups. The term $s(k, j)$ represents a proportion of a given occupational group in the village. There are 25 occupational groups (see [Appendix 3](#)). All members of households are classified into one of the 25 groups according to their reported primary occupation. Instead of using a broader classification of occupations such as farmers, business owners, wage labors, this paper uses the more detailed occupational classification. The reason for not using a broad classification is that the incomes of households may move much less together even if they belong to the same

broad occupational group. Two farmers growing two different crops may have weakly or negatively correlated returns. By putting the two farmers in the same occupational group, the measured occupation diversity will underestimate the true income correlation.

1.3.2.4 Household characteristics

As the abilities to insure consumption may vary across households, I also include some household characteristics as control variables. The household characteristics that are used in this paper are commonly used in the literature (Kaboski and Townsend, 2005). These variables are the age and age squared of the household head, the years of education of the household head, sex of the household head, number of adult males, number of adult females, number of children (below 18 years old), household net income (in natural log), household asset holdings (in natural log) and household occupation. For the occupation of the household, I use the primary occupation of the head of the household. If the head of the household is retired or inactive, I use the occupation of the spouse. If both the head and the spouse are retired or inactive, the occupation of the oldest son or daughter is used. The households are then classified into one of the three major groups according to their occupations. The three groups are farm households, wage earners and business owners. The dummy variables for the years that shocks hit households are also included to capture country-wide economic conditions.

1.3.3 Summary statistics

Table 1.1 presents the basic characteristics of households and villages as derived from the survey. The average household in Thailand earns a gross income of 404,703 baht, which is approximately equal to \$10,100 since the exchange rate is about 40 baht/USD at the time of the survey. The net income of average household is 222,577 baht per year (\$5,500 per year) and the average income per household member is 122,268 baht (\$3,000). The average value of asset holdings owned per household is 766,209 baht (\$20,000). As to the type of assets⁶, land is the dominant asset for Thai households,

⁶ Household assets are broken into the following categories: land and buildings, household durable goods, farm machinery and non-farm business equipment, agricultural assets such as livestock and stored rice, and savings.

accounting for 40 percent of the value of all assets. After land, the other major assets are durable household goods and farm machinery and non-farm business equipment, accounting for 30 percent and 15 percent of the value of total assets. Savings and agricultural assets including livestock and stored rice account for very small shares of total assets. Regarding household composition, the average Thai household has 4.27 members. About 37 percent of the households is female-headed. The average household head has 7.15 years of education. About 40 percent of the household heads has only four years of education. Turning to household expenditures on ceremonies, the average Thai household spends 568 baht (\$140) per year on ceremonies. These expenditures are on the order of 0.3 percent of annual income, suggesting that Thai households spend relatively small amount of income on ceremonies. Yet, the data also show that there are significant differences in the amount of these expenditures between households. While some households have no ceremonial expenditures, other households spend as much as 12,000 baht (\$300) per year on ceremonies.

An important question that has to be addressed is whether there are enough differences in village characteristics to cause any potential variations in consumption insurance across villages. A closer look at the data reveals that this is indeed the case. Regarding the measures of village-level social capital, ceremonial expenditures range from 3,284 baht (\$80) in one village to 19,500 baht (\$4,800) in another, with an average of 8,523 baht (\$200) per year. There are also differences in the level of assistance between villagers. For example, while the proportion of the households giving rice to non-relatives in one village is only 6 percent, this proportion is as high as 93 percent in another. Similarly, the proportion of the households helping non-relatives in the same village with money ranges from 0 percent in one village to 66 percent in another, with an average of 27 percent. The level of intra-village information flows also varies across villages. Using the proportion of well-informed households as a measure of intra-village information flows, this proportion ranges from 0 percent in one village to 100 percent in another, with an average of 69 percent and a standard deviation of 22 percent. However, there appears to be not much racial diversity within villages as about 80 percent of the villages has no racial diversity.

There seem to be differences in the number of lending and savings groups between villages. While some villages have no lending group, other villages have as many as 13 lending groups. Similarly for the groups offering both lending and savings services, while one village has only 2 groups, the other village has 9 groups. The interest rates also show significant dispersion between villages. The weighted average interest rate on loans from village-level financial institutions ranges from 1 percent in one village to 24 percent in another.

The variation in the year that shocks hit households also differs between villages. In, one village, the measure of shock variation is 0, suggesting that shocks hit households uniformly at the same time. In another village, this measure is 0.83, suggesting that villagers' incomes move much less together in this village. As to the measure of occupational diversity, the occupational diversity also varies across villages, ranging from 0.58 to 0.89, with an average of 0.79. Note that the occupational diversity is relatively high, indicating that villagers are engaged in different activities which further suggests that the villagers' incomes may not be very correlated.

1.3.4 The extent of consumption insurance

As the focus of this paper is on consumption insurance, it is important to see whether households can protect their consumption during the periods of income shocks. In the survey, households are asked for their own assessment of whether they experienced an income shortfall in the last five years, to name the reason for a shortfall in income, and whether they have to reduce consumption or input expenditure as a consequence of income shortfalls.⁷

Table 1.2 presents the number of households experiencing a severe shortfall in income and the main reason for an income shortfall. Out of 1,440 households, 815 households, or 57 percent of the households, report to experience a severe shortfall in income during the last five years. As to the cause of an income shortfall, the dominant

⁷ Interviewers were given a list of various responses to risks. For households reporting to experience income shortfalls, interviewers asked whether the households undertook any response specified in the list. Among these responses is whether a household reduced consumption or input use. Then among the responses that a household undertook, the household was asked to name the three most important responses.

problems are higher household expenditures (16.7 percent of the households experiencing income shocks), lower income due to retirement or being laid off (16.2), bad year for household's business (15.8), higher input prices and high investment cost (15.7), and lower crop prices (14.4 percent).⁸

Table 1.3 shows the number of households who have to reduce consumption or input use as a consequence of a shortfall in income. About 50 percent of the households has to reduce consumption during the periods of income shortfalls. In other words, about half of the households can smooth out fluctuations in income and maintain consumption level during bad times.

1.4 Empirical specification

The extent to which households are able to protect their consumption from income shocks is expressed as a function of household characteristics and village characteristics. This paper measures the extent to which households are able to protect their consumption by whether or not a household has to reduce consumption or input use after a negative income shock. The error term is assumed to follow the standard logistic distribution. With this assumption, the probability that household i has to reduce consumption is given by:⁹

$$Prob(cutexp_{i,j} = 1) = \frac{\exp(\alpha X_i + \gamma Z_j)}{[1 + \exp(\alpha X_i + \gamma Z_j)]} \quad (1.4)$$

⁸ The cause of an income shortfall can be classified into seven broad categories: (1) higher household expenditures such as higher educational fee, higher house rent, higher land rent; (2) lower income due to retirement or being laid off; (3) bad year for household's business; (4) higher input prices and higher investment cost; (5) lower crop prices and higher agricultural input prices; (6) weather-related shocks, for example drought, flood and pests; and (7) random factors affecting household demographics, for example birth, death and incidence of illness within a family.

⁹ I also estimate the probability of reducing consumption using the probit model as robustness test. The estimates from the probit model are similar to the logit model in terms of sign and significance.

where $cutexp_{i,j}$ is a binary variable taking a value of one if household i had to reduce consumption during a period of an income shortfall. X_i is a vector of household i 's characteristics and Z_j is a vector of village j 's characteristics in the year that a shock hits household i . Year dummies indicating the years that shocks hit households are also included in the regression to capture country-wide economic shocks.

As a first step, one must first examine whether different degrees of consumption insurance are reached by different villages. To do this, this paper runs a regression of the dependent variable on a full set of 96 village dummies and household characteristics. The village dummies are included to capture any factors that are unique to each village. Thus, equation (1.4) becomes:

$$Prob(cutexp_{i,j} = 1) = \frac{\exp(\alpha X_i + \sum_{j=1, \dots, M} \beta_j V_j)}{1 + \exp(\alpha X_i + \sum_{j=1, \dots, M} \beta_j V_j)} \quad (1.5)$$

where $\{V_j\}_{j=1, \dots, M}$ are village dummies.

The estimation results of equation (1.5) are shown in [Table 1.4](#).¹⁰ The separate constant terms across villages demonstrate clear village differences. For instance, the dummy coefficients vary from 0.9 in one village to 5.2 in another village. Testing these results against the null hypothesis of a single constant yields a Chi-square test statistic of 118.7, with a corresponding p-value of 0.01. The test suggests that the degree of consumption smoothing varies across villages for this data set. This reinforces our belief that significant economic differences exist between villages and should affect consumption insurance behavior. Note that there are not significant differences between all village dummies because some villages have similar characteristics which make the village-specific constant terms statistically indistinguishable from each other.

As the results indicate that different villages reach different levels of consumption insurance, I then examine some characteristics of these villages and investigate their impacts on the extent of consumption insurance. Possible village heterogeneity includes

¹⁰ In the estimation, eight village dummies are dropped and 24 observations are not used because they predict success or failure perfectly. The coefficients on 96 village dummies are not shown in the table.

the different levels of social capital, the varying flows of information, the availability of credit and the extent to which incomes are correlated. Some theoretical predictions about the effects of these variables on consumption smoothing are summarized as follows.

1. Villages with more social capital are more likely to insure consumption than otherwise similar villages with less social capital.

2. If the availability of credit increases the opportunity to smooth consumption, then villages with more access to credit markets are more likely to smooth consumption.

3. Villages with less correlated income will achieve higher degree of consumption insurance.

To analyze whether these variables produce the impacts as predicted by theory, I estimate the baseline equation (1.4).

1.5 Empirical results

Table 1.5 presents the results from the estimation of equation (1.4) with *cutexp* as a dependent variable. The table reports four specifications, varying across the three sets of village characteristics (social capital, credit availability, income correlation). *Column (1)* reports the estimates when excluding measures of income correlation. *Column (2)* presents the estimates when excluding measures of credit availability. *Column (3)* shows the estimates when excluding measures of social capital. Finally, *Column (4)* reports the estimates when including a full set of village characteristics. Out of 815 households, there are three households whose reported incomes are missing. After missing observations are discarded, the sample consists of 812 households.

Regarding the effect of social capital on consumption insurance, the results show that households living in villages with higher level of social capital measured in terms of ceremonial expenditure, assistance among villagers and information flows are more likely to protect consumption after negative income shocks.¹¹ The coefficient estimate for ethnic diversity is insignificant. A closer look at the data shows that although there is some ethnic diversity in regions or provinces, there is little diversity within villages. Thus

¹¹ The measures of village-level informal assistance are jointly significant at the 5 percent level.

the low diversity within villages may help explain why ethnic diversity has no significant impact on consumption insurance.

Turning to our measures of credit availability, the interest rate has no significant effect on consumption insurance. The number of groups offering both loans and savings services is negative and significant at the 5 percent level but the number of groups providing loans only has no significant impact. This finding suggests that institutions that offer savings services appear to play a more important role in consumption insurance than institutions that offer loans only. This is possibly because the institutions that offer savings services enable households to build up a buffer stock in order to protect themselves against negative income shocks. Another hypothesis is that as the institutions that provide loans only tend to have fewer members, these institutions may be too small to provide adequate risk sharing. According to our survey, the village institutions that offer loans and savings services have, on average, 150 members while institutions that offer loans only have about 60 members. As the number of members in the credit group becomes larger, there is more scope for risk diversification and more opportunity to insure consumption.

In all specifications, the measure of shock variation is negative and significant at the 5 percent level. This result implies that consumption insurance is more likely to be achieved in villages where the occurrences of incomes shocks are less correlated. This finding is consistent with the theoretical prediction that consumption insurance is more feasible when shocks are more idiosyncratic. In contrast, occupational diversity seems to have no effect on consumption insurance. The lack of effect may be due to the trade-off as villages where villagers are engaged in different occupations may have less correlated income but they will also have less information flows and less social capital which make risk sharing more difficult. Although low income correlation associated with high occupational diversity increases the feasibility of consumption insurance, information about the occurrence of income shocks may be more difficult to verify when occupations are more diverse.

Regarding household characteristics, the coefficients on income are positive and significant across all specifications, indicating that household's ability to insure consumption increases with household income. In particular, a one unit increase in the

log of net income reduces the odds of reducing consumption by a factor of 0.7. High income households are more able to protect their consumption possibly because they may be better able to self-insure or may face less borrowing constraints.

In contrast, the results show that total assets have no significant impact on whether a household reduces consumption or not. This is interesting and might seem surprising at first as one may expect that, similar to the effect of income, households with fewer assets are more likely to face borrowing constraints and have more difficulties with consumption smoothing. The lack of effect may be due to high correlation between income and assets. The data show that the correlation between net income and total assets is about 0.40. To further examine whether this is the case, I compare the effect of assets when income is included with the results when income is excluded. When income is excluded from the regression, the estimated coefficient on assets remains insignificant, indicating that the income variable is not picking up the effect of assets. A closer look at the data reveals that most of the household assets are in the form of land, household durable goods, machines and equipment which are mostly illiquid assets. Therefore the reason that assets have no significant impact on consumption smoothing is possibly that households cannot readily convert these assets into cash when facing income shortfalls.

Other household characteristics such as age, years of education, number of children and occupation do not turn out as significant. In most specifications, household occupations have no significant impact on whether a household reduces consumption or not. Occupation matters only when the measures of social capital are excluded from the regression. Then farm households are more able to protect consumption than other occupations and wage earners are most vulnerable to income shocks.

This paper also reports two robustness tests. First, I test whether the results are sensitive to the functional form of the model. To do this, I estimate the baseline equation with the probit model. The estimation results are shown in [Table 1.6](#). *Column (1)* in the table reports the coefficient estimates using the logit model while *Column (2)* reports the results using the probit model. Estimates using the logit and probit models give similar results in terms of sign and significance.

Second, as the variables of interest may be picking up the effects of some omitted village characteristics, I include all possible village characteristics in the regression. The

additional village characteristics that are controlled for are village average income, village average asset holdings, urban-rural indicator¹², and local labor market condition proxied by unemployment rate. The regression results are presented in [Table 1.7](#). This does not change the conclusion significantly. Most coefficient estimates have the same signs and significance. The variables with less explanatory power are the intra-village information flow and ceremonial expenditure. Yet, they are still significant at the 10 percent level.

1.6 Conclusions

Starting with the idea that different villages achieve different degrees of consumption insurance, this paper attempts to pinpoint the sources of heterogeneity in the degrees of consumption insurance across villages. A number of potential determinants of consumption insurance mentioned in the literature (social capital, income correlation and availability of credit) are empirically investigated. Using data on 815 Thai households in 2005, this paper empirically examines whether these determinants have an impact on households consumption insurance as predicted by theories.

This paper begins the empirical analysis by testing whether the ability of households to protect consumption after negative income shocks varies across villages. The initial results indicate that the degree of consumption insurance does vary across villages in Thailand. As to the sources of heterogeneity, this paper finds that community social capital, the number of institutions providing loans and savings services and the extent to which shocks are not correlated significantly affect the ability of households to insure consumption. In particular, the results show that households living in villages with more informal assistance, more ceremonial expenditure and more information flow are more likely to protect their consumption from income shortfalls. Institutions offering both credit and savings services play more important role in consumption smoothing than institutions offering credit only. The ability to smooth consumption is weakened in those villages where the occurrence of shocks to households is more uniform.

¹² The urban indicator is proxied by whether a village is located in the district town or not.

It should be noted that this paper has thus far investigated the effects of some *village* characteristics on consumption insurance. Although this paper has provided a number of possible explanations for the results, further research is required to understand the underlying mechanisms of how these determinants affect consumption insurance. Such analysis would complement the existing studies and also give more concrete policy recommendations.

Table 1.1: Definition and Summary Statistics of Explanatory Variables

<i>Variables</i>	<i>Definition</i>	<i>Mean</i>	<i>Std. dev.</i>
Household characteristics (n=1440)			
age	Age of household head	51.5	11.5
female	Female headed household	37%	48%
edu	Years of education	7.15	4.2
hhsiz	Number of household members	4.27	1.85
nomale	Number of adult males	1.44	0.9
nofemale	Number of adult females	1.7	0.91
nochild	Number of children (<18 years old)	1.14	1.12
farm	= 1 if household occupation is farmer	8%	27%
wage	= 1 if household occupation is wage earner	42%	49%
biz	= 1 if household occupation is business owner	49%	51%
inc	Gross income (baht)	404,703	1,103,885
netinc	Net income (baht)	222,577	331,869
assets	Assets (baht)	766,209	1,091,946
land	Land	387,591	734,245
hhassets	Household durable goods	225,428	307,776
machine	Farm Machinery and non-farm equipment	123,519	440,667
savings	Savings	23,945	116,373
agriassets	Livestock and stored rice	5,726	30,694
hhcere	Household's ceremonial expenditure (baht)	568.5	706.14
hhcere%	Household's ceremonial expenditure (% of income)	0.3%	0.5%
Village characteristics (n=96)			
ethdiv	Ethnic diversity	0.03	0.09
vilcere	Village ceremonial expenditure (baht)	8,523	3,269
vilcere%	Village ceremonial expenditure (% of income)	0.2%	0.1%
ricehelp1	Fraction of households helping relatives with rice	61%	17%
laborhelp1	Fraction of households helping relatives with labor	39%	23%
cashhelp1	Fraction of households helping relatives with money	35%	19%
ricehelp2	Fraction of households helping non-relatives with rice	61%	18%
laborhelp2	Fraction of households helping non-relatives with labor	39%	20%
cashhelp2	Fraction of households helping non-relatives with money	27%	17%
Info	Fraction of well-informed households	69%	22%
interest	Interest rate on loans	8.6%	3.6%
noinst_L	No. institutions offering loans only	2.5	2.5
noinst_S&L	No. institutions offering loans and savings	4.9	1.8
shockvar	Shock variation	0.58	0.21
occddiv	Occupation diversity	0.79	0.07

Table 1.2: The Main Reason for an Income Shortfall

<i>Reason</i>	<i>No. households</i>	<i>%</i>
Higher household expenditures	136	16.71
Labor-related shocks, e.g. being laid off, retired	132	16.22
Bad year for household's business	129	15.85
Higher investment cost	128	15.72
Lower crop prices	117	14.37
Weather-related shocks, e.g. flood, drought	94	11.55
Illness, death within a family	78	9.58
Total⁽¹⁾	815	100

Note: (1) Out of 1440 households, 815 households report to experience an income shortfall during the last 5 years.

Table 1.3: Number of Households Reducing Consumption after an Income Shortfall

<i>Does your household have to reduce consumption or input use as a consequence of an income shortfall?</i>	<i>No. households</i>	<i>%</i>
Yes	413	50.67
No	402	49.33
Total	815	100

Table 1.4: Regression Results from the Estimation of Equation (1.5)

<i>Cut consumption</i>	<i>Coef.</i>	<i>Std. dev.</i>
age	-0.005	(0.06)
age2	0.000	(0.00)
female	0.054	(0.20)
edu	0.014	(0.02)
nomale	-0.086	(0.12)
nofemale	0.114	(0.10)
nochild	0.012	(0.08)
farm	-0.249	(0.37)
wage	0.365*	(0.20)
Log (netinc)	-0.374**	(0.13)
Log (assets)	0.067	(0.09)
F-test of village dummies	118.75**	
Chi2	149.54	
Prob	0.001	
No. Obs	794	

Note: Standard errors in parentheses. * p<0.10, ** p<0.05.

The estimates for village and year dummies are not shown in the table.

Table 1.5: Regression Results from the Estimation of Equation (1.4)

<i>Cut</i> <i>consumption</i>	(1)		(2)		(3)		(4)	
	Coef.	Std. dev.	Coef.	Std. dev.	Coef.	Std. dev.	Coef.	Std. dev.
Household characteristics								
age	-0.001	(0.05)	0.003	(0.05)	-0.009	(0.05)	0.002	(0.05)
age2	0.000	(0.00)	0.000	(0.00)	0.000	(0.00)	0.000	(0.00)
female	0.060	(0.18)	0.077	(0.18)	0.152	(0.17)	0.048	(0.18)
edu	0.003	(0.02)	0.001	(0.02)	0.006	(0.02)	0.002	(0.02)
nomale	-0.139	(0.10)	-0.139	(0.11)	-0.106	(0.10)	-0.137	(0.11)
nofemale	0.129	(0.09)	0.108	(0.09)	0.122	(0.08)	0.129	(0.09)
nochild	-0.019	(0.07)	-0.009	(0.07)	-0.045	(0.07)	-0.008	(0.07)
farm	-0.140	(0.26)	-0.197	(0.28)	-0.482*	(0.27)	-0.173	(0.26)
wage	0.297*	(0.18)	0.261	(0.17)	0.352**	(0.17)	0.284	(0.18)
Log (netinc)	-0.277**	(0.12)	-0.288**	(0.11)	-0.193*	(0.11)	-0.290**	(0.11)
Log (assets)	0.084	(0.07)	0.106	(0.07)	0.114	(0.07)	0.094	(0.07)
Village characteristics								
Social capital								
ethdiv	0.282	(0.58)	0.457	(0.51)			0.360	(0.53)
vilcere%	-1.486**	(0.63)	-1.833**	(0.64)			-1.407**	(0.66)
ricehelp1	-1.761**	(0.63)	-1.736**	(0.63)			-1.748**	(0.62)
laborhelp1	-0.186	(0.81)	-0.183	(0.79)			-0.316	(0.80)
cashhelp1	-2.318**	(0.58)	-2.148**	(0.61)			-2.607**	(0.58)
ricehelp2	0.495	(0.49)	0.447	(0.51)			0.292	(0.48)
laborhelp2	-0.367	(0.62)	-0.004	(0.60)			-0.211	(0.63)
cashhelp2	-2.325**	(0.62)	-2.083**	(0.70)			-1.943**	(0.63)
info	-0.778**	(0.39)	-0.893**	(0.37)			-0.775*	(0.40)
Credit availability								
interest	0.020	(0.02)			0.025	(0.03)	0.019	(0.02)
noinst_L	0.030	(0.04)			-0.050	(0.04)	0.032	(0.04)
noinst_S&L	-0.111**	(0.05)			-0.050	(0.06)	-0.107**	(0.05)
Income correlation								
shockvar			-1.248**	(0.60)	-1.758**	(0.62)	-1.389**	(0.62)
occdv			2.095*	(1.22)	1.473	(1.73)	1.531	(1.29)
constant	2.786	(1.74)	0.843	(1.94)	1.392	(2.18)	2.221	(1.95)
Pseudo R2	0.121		0.120		0.051		0.124	
Chi2	243.19		261.75		40.05		313.12	
Prob	0.000		0.000		0.005		0.000	
No. Obs	812		812		812		812	

Note: Standard errors in parentheses. * p<0.10, ** p<0.05.

The estimates for year dummies are not shown in the table.

Table 1.6: Robustness Test – Regression Results from Logit and Probit Estimations

<i>Cut consumption</i>	<i>(1) Logit</i>		<i>(2) Probit</i>	
	Coef.	Std. dev.	Coef.	Std. dev.
Household characteristics				
age	0.002	(0.05)	0.000	(0.03)
age2	0.000	(0.00)	0.000	(0.00)
female	0.048	(0.18)	0.026	(0.11)
edu	0.002	(0.02)	0.001	(0.01)
nomale	-0.137	(0.11)	-0.083	(0.06)
nofemale	0.129	(0.09)	0.079	(0.05)
nochild	-0.008	(0.07)	-0.003	(0.04)
farm	-0.173	(0.26)	-0.104	(0.15)
wage	0.284	(0.18)	0.176	(0.11)
Log (netinc)	-0.290**	(0.11)	-0.174**	(0.07)
Log (assets)	0.094	(0.07)	0.056	(0.04)
Village characteristics				
Social capital				
ethdiv	0.360	(0.53)	0.206	(0.32)
vilcere%	-1.407**	(0.66)	-0.851**	(0.40)
ricehelp1	-1.748**	(0.62)	-1.056**	(0.38)
laborhelp1	-0.316	(0.80)	-0.231	(0.48)
cashhelp1	-2.607**	(0.58)	-1.614**	(0.36)
ricehelp2	0.292	(0.48)	0.172	(0.29)
laborhelp2	-0.211	(0.63)	-0.113	(0.38)
cashhelp2	-1.943**	(0.63)	-1.152**	(0.37)
info	-0.775*	(0.40)	-0.474**	(0.24)
Credit availability				
interest	0.019	(0.02)	0.012	(0.01)
noinst_L	0.032	(0.04)	0.020	(0.03)
noinst_S&L	-0.107**	(0.05)	-0.065**	(0.03)
Income correlation				
shockvar	-1.389**	(0.62)	-0.859	(0.38)
occddiv	1.531	(1.29)	0.966	(0.79)
constant	2.221	(1.95)	1.331	(1.19)
Pseudo R2	0.124		0.124	
Chi2	313.12		372.27	
Prob	0.000		0.000	
No. Obs	812		812	

Note: Standard errors in parentheses. * p<0.10, ** p<0.05.
The estimates for year dummies are not shown in the table.

Table 1.7: Robustness Test – Regression Results Controlling for Other Village Characteristics

<i>Cut consumption</i>	<i>Coef.</i>	<i>Std. dev.</i>
Household characteristics		
age	-0.001	(0.05)
age2	0.000	(0.00)
female	0.058	(0.18)
edu	0.002	(0.02)
nomale	-0.133	(0.11)
nofemale	0.137	(0.09)
nochild	-0.005	(0.07)
farm	-0.192	(0.27)
wage	0.297	(0.19)
Log (netinc)	-0.308**	(0.12)
Log (assets)	0.089	(0.08)
Village characteristics		
Social capital		
ethdiv	0.253	(0.45)
vilcere%	-1.225*	(0.67)
ricehelp1	-1.701**	(0.61)
laborhelp1	-0.415	(0.86)
cashhelp1	-2.533**	(0.63)
ricehelp2	0.193	(0.48)
laborhelp2	-0.302	(0.63)
cashhelp2	-2.029**	(0.62)
info	-0.638*	(0.38)
Credit availability		
interest	0.024	(0.02)
noinst_L	0.027	(0.05)
noinst_S&L	-0.128**	(0.05)
Income correlation		
shockvar	-1.435	(0.66)
occdv	1.967	(1.42)
Other village characteristics		
Log (village netinc)	0.130	(0.27)
Log (village assets)	-0.045	(0.17)
urban	-0.157	(0.17)
unemployment rate	-1.964	(1.12)
constant	1.538	(2.93)
Pseudo R2	0.126	
Chi2	321.88	
Prob	0.000	
No. Obs	812	

Note: Standard errors in parentheses. * p<0.10, ** p<0.05.
The estimates for year dummies are not shown in the table.

Chapter 2

2. Shocks and Coping Strategies in Rural Thailand and Vietnam¹³

2.1 Introduction

This research examines financial decision making not from the perspective of the ordinary but the extraordinary. Shocks are extraordinary. Events such as excessive rainfall or drought, illness or death of a household member have the potential to dramatically impair household income streams. Shocks to income are shocks to consumption unless households manage to mitigate or avoid the reduction in consumption through the choice of an appropriate smoothing mechanism. Affected households take such measures under the commonly employed assumption that households prefer smooth over fluctuating consumption. It is the purpose of this research to analyze household financial decision making after the occurrence of a shock.

The literature suggests a number of smoothing mechanisms through which households attempt to stabilize their consumption streams in the presence of fluctuating incomes. Deaton (1991) examines the use of assets (in a quite general sense) for smoothing purposes. Among many other, Rosenzweig and Wolpin (1993) analyze livestock selling for shock-coping. Life-cycle models examine saving and dissaving (of monetary saving) for income smoothing (see Paxson, 1992, and many others). Udry (1994) examines the use of state-contingent informal loans as insurance substitute. Eswaran and Kotwal (1989) analyze the use of credit as insurance in agrarian economies.

But there are also common smoothing mechanisms outside the financial nexus. Kochar (1995) analyzes the elasticity of labor supply to shocks. Further, Platteau (1997) argues, that formally uninsured households engage in informal reciprocal arrangements. Finally, Zimmerman and Carter (2003) object that poor households with a subsistence

¹³ This chapter is based on the following article “Financial and Other Shock-Coping Mechanisms in Rural Thailand and Vietnam” written by Niels Kemper, Rainer Klump, Lukas Menkhoff and Ornsiri Rungruxsirivorn. Financial support by the German Research Foundation (DFG) is gratefully acknowledged.

constraint rather attempt to smooth their productive assets than to stabilize their consumption streams.

These approaches resort to a partial analysis of particular smoothing mechanisms. That is, while analyzing one particular mechanism, they do not account for the existence of others. Motivated by the actual use of smoothing mechanisms after the occurrence of shocks in Thailand and Vietnam (see [Table 2.5](#)), we suggest an integrated empirical approach to account for the whole variety of smoothing mechanisms household's have at hand and attempt to analytically identify the factors that cause households to prefer one approach over the other.

Given the prevalence of formal and informal finance in the actual use of smoothing mechanisms, we opted to model decision making after a shock on two levels. The first level integrates the decision to self-insure and borrow with other commonly employed smoothing mechanisms such as mutual insurance and an increased labor supply. The second level is more finance specific and differentiates the decisions to use monetary savings, sell livestock and to borrow formally or informally. We estimate the choice probabilities with a sequential multinomial logit approach.

The paper proceeds as follows: Section 2.2 gives a very detailed description of the data set. It also provides a number of descriptive statistics on the key variables employed in the analysis of household shock coping. Section 2.3 discusses the theoretical considerations. Section 2.4 details the empirical approach. In section 2.5, we discuss the empirical results in the country-specific setting in Thailand and Vietnam and conclude.

2.2 Data and descriptive statistics

2.2.1 Data collection

Data used in this study were collected as part of the project “Impact of shocks on the vulnerability to poverty: consequences for development of emerging Southeast Asian economies” (DFGFOR756), funded by the German Research Foundation (DFG). An initial cross sectional survey was carried out in Thailand and Vietnam between April and June 2007. Within each country, three provinces were deliberately chosen. The six provinces are namely Buri Ram, Ubon Ratchatani and Nakhon Phanom from the Northeast region of Thailand and Dak Lak from the Central Highlands of Vietnam and

Thua Thien-Hue and Ha Tinh from the North Central Coast of Vietnam (see [Appendix 1](#)).

Within each country, households were selected following a three-stage stratified sampling procedure where provinces are constituted strata and the primary sampling units (PSU) are sub-districts (communes in Vietnam). 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 (rural) areas. 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, a total of 2,186 households from 220 villages in Thailand and 2,195 households from 220 villages in Vietnam were interviewed in this initial cross sectional survey. Further details on the sampling procedure and questionnaire design are reported in Hardeweg et al. (2007).

The survey contains rich information on household demographics, occupation, health status, educational attainment, agricultural activities, off-farm employment activities, household businesses, income, expenditures, assets, borrowing, and transfers in the one year period of May 2006-April 2007. Retrospective questions were also included to capture information about shock events in the past five years and the corresponding coping strategies. Respondents were asked whether their household had experienced a shock event in the past five years, to name up to three major shock events, the type of shocks, the year that shocks occur, and what measures were taken in response to the shocks.

2.2.2 Profile of sample households

[Table 2.1](#) summarizes the basic characteristics of rural households in Thailand and Vietnam as derived from the survey. The average family size is 4 persons in Thailand and 4.3 persons in Vietnam. The majority of households are male headed but female-headed households are not uncommon. Nearly 25% of the Thai households are female-headed whereas it is only 16% in Vietnam. The average year of schooling for the head of household is 5 years in Thailand and 7.4 years in Vietnam. Although not shown in this

table, we find that less than 15% of the Thai population accomplish primary education (6th grade), whereas nearly 70% of the Vietnamese population obtain the primary education.

We classify household occupations into six groups according to the main occupation of the head of household. These groups are farm households, wage earners in the informal sector¹⁴, wage earners in the formal sector¹⁵, government official, business owners and the “economically inactive” group. Agriculture is the most important sector in both countries, providing employment for more than 60% of the households. The dominant crop in both countries is rice but coffee is also important in the Dak Lak province of Vietnam. Next in importance to agriculture is the “economically inactive” group. A large proportion of the population in this group is found to be the elderly.

Household income and other currency variables are measured at purchasing power parity (PPP) adjusted prices to make comparisons in real terms between the two countries possible. We note that annual household income is composed of net income from farming, net income from household business, wage labor income and other non-labor income such as land rent but excludes remittances and transfers. We exclude the latter two because we want income before any coping strategy is taken. The PPP adjusted annual household income is, on average, 5,200 \$US dollars PPP adjusted in Thailand and 4,000 US dollars PPP adjusted in Vietnam.

The annual consumption expenditures for the average household in Thailand is 4,600 \$US dollars PPP adjusted and about 4,400 \$US dollars PPP adjusted in Vietnam. Food accounts for the largest proportion of household expenditures. The share of household expenditures on food is 40% in Thailand and nearly 60% in Vietnam.

The average Thai household owns twice as many assets as the average Vietnamese household. As to the type of assets¹⁶, land is the dominant asset for rural households, accounting for about 70 percent of the value of all assets. Next in importance

¹⁴ Wage earners in the informal sector include casual labor in non-agriculture and off-farm labor in agriculture. However the share of off-farm labor in agriculture in this group is very small.

¹⁵ Wage earners in the formal sector include permanently employed workers in non-agriculture, employed workers in agriculture. A large proportion of the population in this group is found to be workers in non-agricultural sector.

¹⁶ Household assets are broken into the following categories: land and buildings; household durable goods including farm machinery and non-farm business equipment; agricultural assets such as livestock and stored rice; and savings and other financial assets.

to land are durable household assets which include farm machinery and non-farm business equipment. Savings and agricultural assets including livestock and stored crops account for very small shares of total assets.

Turning to the indicators of household access to credit markets, about 10% of the Thai households are credit rationed whereas nearly 20% of the Vietnamese households report credit rationing. Of these credit rationed households, about a half report being fully denied access to the credit markets¹⁷. The default rate is very low in both countries as less than 3% of the households report that they have ever defaulted on loans. The incidence of late repayment is relatively higher. As a ratio of total loan outstanding, the value of loans defaulted or repaid late is on the order of 6-8% of total loan outstanding for the average household. When we consider only households who report loan defaults or late repayment, this ratio is about 60% on average and reaches 100% for some households.

2.2.3 Shocks and coping strategies

In this section we provide information about the shock events causing serious hardship to rural households in Thailand and Vietnam. The main coping strategies used by households are also examined. Table 2.2 shows the number of households reported to have been affected by shock events in the period 2002-2007. Rural households in Thailand and Vietnam report a high incidence of shocks. A total of 1,383 Thai households (63% of the total sample) and 1,847 Vietnamese households (84% of the total sample) have experienced at least one shock event over the past five years. Risk is therefore a central part of life for rural households in both countries.

Most households experience single shock per year. Nearly 86% of the Thai households reporting shocks in 2006 were hit by one shock that year. Only 11% of the Thai households report having two shocks that year and 3% report having three or more shocks. For those households who have experienced shocks over the past five years, the average number of shock events per household per year is in the range of 1.0-1.2 for Thai

¹⁷ 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. Households whose loan applications are completely rejected are classified as fully credit rationed. Households who are given some credit but less than they asked for are classified as partially credit rationed.

households and 1.0-1.23 for Vietnamese households. Our data also reveal that households who experienced shocks in a given year tend to be repeatedly hit by shocks in subsequent periods. For example, 25% of the Thai households experiencing shocks in 2005 also report being hit by shocks in 2006. The number is even higher for Vietnam; almost 50% of the households experiencing shocks in 2005 also hit by shocks in 2006. An implication of this finding is that there seems to be recurrent shocks for a number of households. The recurrent exposure to shocks may limit the asset accumulation by households which, in turn, makes it more difficult for households to escape poverty.

There is evidence that the most recent shocks are more likely to be reported as nearly a half of all shock events occur in the period of 2006-April 2007. For this reason and because we have information on household characteristics in the period of 2006-2007, in what follows and in the empirical analysis we will focus on the shocks reported for the period 2006-2007. For households reporting more than one shock in 2006-2007, we use only the worst shock in that year.

Shocks can have major impacts on households' well-being. [Table 2.3](#) reports the severity of shocks, the estimated loss due to shocks, the consequences of shocks to households' consumption, and the number of years needed to recover from shocks. More than 95% of the households reported high severity of shocks. The estimated loss as percentage of annual household income is, on average, 26% for Thai households and 34% for Vietnamese households. The duration of impact tends to be longer in Vietnam than in Thailand as nearly 85% of the Vietnamese households still have to lower consumption expenditures as a consequence of shocks whereas only 50% of the Thai households report so. Also there seems to be variation in terms of the share of households who are able to recover from shocks by the time of the interview. Close to 50% of the households reporting shocks are able to recover from the shocks within one year whereas 40% of the households have not yet recovered.

The incidence of the different types of shocks faced by households in the period 2006-2007 is reported in [Table 2.4](#). The most common types of shocks are agricultural-related shocks: weather shocks and pest infestations, which affect 46% and 62% of the households in Thailand and Vietnam respectively. Shocks to household demographics, such as illness or death of household members, are the next most frequent shock events

reported by 28% and 30% of the households in Thailand and Vietnam respectively. Other shocks such as macroeconomic shocks and higher household expenditures affect only a few households but are relatively more important in Thailand than Vietnam.

Faced with shocks, households in Thailand and Vietnam rely on various measures as their main coping strategy. Table 2.5 reports the percentage of households that use different measures in response to shocks. Interestingly, about 28% of the Thai households and 17% of the Vietnamese households report taking no measure in response to shocks. There are two interpretations for this. The first interpretation is that resource poor households with limited access to credit markets have no available measures to cope with shocks and thus have to accept a shortfall in consumption. The second interpretation is that the impact of a particular shock on a household might not be too severe. Therefore they remain inactive after a shock. Besides taking no measure, the primary coping strategy used by households in both countries is borrowing, with informal borrowing playing more important role than formal borrowing. Other important responses are assets depletion and increasing labor supply. Interestingly, receiving public assistance is quite important in Thailand. Most households who report receiving public assistance are the households who have been affected by severe weather shocks. Nevertheless these findings suggest that self-help and informal coping mechanisms such as informal borrowing and dissaving are the primary coping strategies, with little evidence of government or formal assistance.

2.3 Theoretical considerations

The empirical analysis of decision making below will be modeled as a two-level decision making process. The first level models the household decision whether to smooth shocks to income through means of self-insurance through asset depletion, borrowing, increases in labor supply or to remain inactive. While we are predominantly interested in financial decision making, completeness of the analysis requires that we do account for other smoothing mechanisms, such as the increase in labor supply, commonly used. Economic theory suggests a number of ways in which households try to compensate fluctuations in income.

2.3.1 Credit constraints and the use of borrowing as smoothing mechanisms

There are many reasons why poor households in developing countries have deprived access to financial services: remoteness, discrimination, financial illiteracy and, particularly, information asymmetries, enforcement problems and transaction costs, the last three of which economic research has predominantly focused on. Information asymmetries, enforcement problems and transaction costs in credit markets might induce financial institutions to offer a zero-supply of financial services to poor households. Transaction costs of small loans can render lending unprofitable. Even though borrowers might be judged creditworthy by financial institutions, they remain unbanked due to the proportionally high cost of small loan transactions (Johnston and Morduch, 2008). Financial institutions have helped overcome these obstacles through innovative lending technologies such as group lending and dynamic incentives individual loans. It is fair to say that the depth and outreach of financial services have improved over the last years, but financial exclusion of both households and enterprises still exists to a high degree (Beck and Demirgüç-Kunt, 2008).

According to Conning and Udry (2005) there are two types of rural credit markets in developing countries. Those of which that are characterized by fragmented or absent credit markets. And those of which that are characterized by government interventions. Thailand and Vietnam belong to the latter. In both countries government-led credit institutions loans are offered on group-based or individual lending schemes to households (e.g. the Village (Taksin) Fund, the Vietnam Bank for Agriculture and Rural Development, the Vietnam Bank for Social Policy etc.).

In addition to formal credit, the informal credit sector in both countries is still flourishing (although the share of informal credit has decreased over the last years). Loans from family and friends are particularly attractive, as they usually come at very low or zero interest. Moneylenders still serve the informal credit sector. They typically do so at interest rates higher than that from other informal and formal sources.

Availability of credit from different formal and informal sources does not necessarily eliminate the problem of credit rationing. Typically, theoretical models analyzing the use of smoothing mechanisms do employ the premise of credit rationed households (see section 2.2). However, whether the credit constraint truly binds depends

on a number of factors. A number of studies relating to the permanent income hypothesis do not employ the assumption of a binding liquidity constraint (see, among others, Paxson, 1992). Policy-oriented credit institutions might supply households with formal credit. Furthermore, informal credit still takes up an important role in rural credit markets. Udry (1994) shows that informal state-contingent loans are mutually used to compensate fluctuations in income.

In the empirical section we will test if credit rationing actually influences the decision to use one smoothing mechanism or another.

2.3.2 Other smoothing mechanisms

Given liquidity constraints and risk aversion Deaton (1991) shows under varying assumptions, that economic agents accumulate assets to compensate fluctuations in future income in infinite horizon models. However, he does not differentiate between productive and non-productive assets. Other studies focus on particular assets households might use to compensate income fluctuations. Credit-constrained households might buy livestock in good years and sell it in bad years (see, among many others, Rosenzweig and Wolpin, 1993).

Platteau (1997) discusses informal risk-sharing arrangements in traditional rural communities as a mechanism against income fluctuations. He argues that traditional agrarian societies have developed sustainable forms of mutual insurance despite problems such as the perception of mutual insurance as balanced reciprocity (they expect a return from any contribution or payment they make) rather than by a true logic of mutual insurance.

Another coping mechanism discussed in the literature is the increase of household labor supply. Kochar (1995) argues that labor supply is elastic to shocks. Labor is used as insurance. This is because of the informality of employment opportunities such as agriculture and non-agriculture rural self-employment allowing for a rather flexible household working schedule.

In both countries we observe a fairly high number of households that do not use any smoothing mechanism after the occurrence of a shock. There are two explanations for this. Zimmerman and Carter (2003) argue that resource poor households with a

subsistence constraint and no access to credit markets accept a shortfall in consumption in order to maintain a level of (productive) assets they need for subsistence. But there is also another explanation. The impact of a particular shock on a household might not be too severe. Therefore they remain inactive after a shock.

2.3.3 Hypotheses and sets of variables

We test the explanatory power of these models in shock-related financial decision making in Thailand and Vietnam. The decision process is modeled in a two-stage design. Let H_{hk} denote the h^{th} hypothesis on level k with $h = 1, 2$ and $k = 1, 2$:

H_{11} : Credit rationing causes the use of any smoothing mechanism other than borrowing

H_{12} : The household decision to stay inactive after a shock is to protect a minimum asset level below which household subsistence is rendered impossible (asset smoothing). However, if this cannot be observed it is quite plausible that the impact of the shock on inactive households was simply not so severe.

H_{21} : The use of monetary savings versus livestock selling depends on livestock possessions and the access to financial services such as bank accounts.

H_{22} : The use of credit as smoothing mechanism is simplified by the possessions of collaterals (land, livestock).

We will test these hypotheses in our decision tree through relating the following sets of proxy variables to the two levels of decision making.

We measure credit rationing through the rationing gap. This is the difference between the total credit amount household's applied for and the credit amount actually received. Further, we include dummies on the credit history indicating whether households ever paid late or defaulted on a loan.

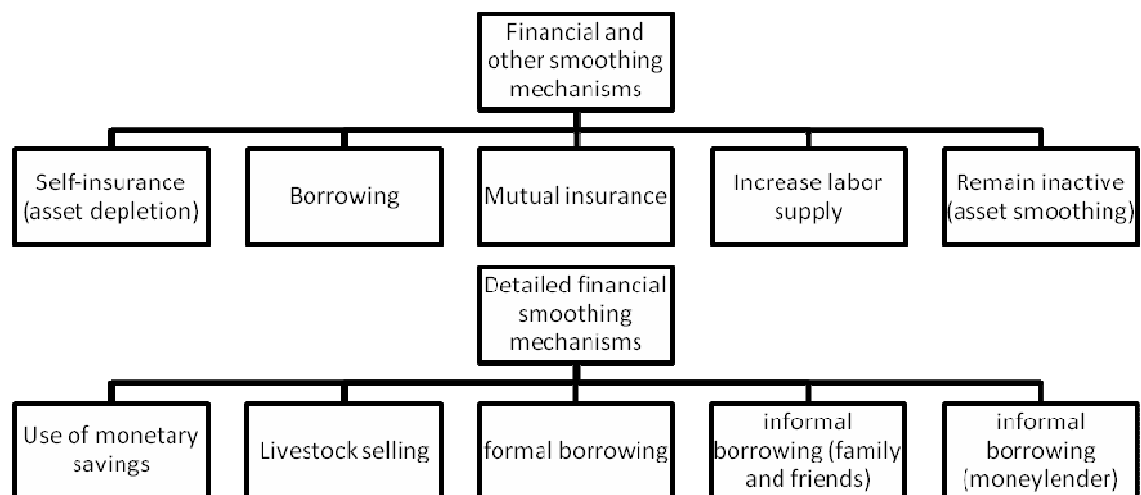
We account for income variance by including the self-estimated income loss related to the occurrence of a shock. Trying to capture the effect of shock characteristics

we employ a dummy for covariate shocks. Further, we attempt to measure the effect of non-human Wealth through the variables land, livestock and monetary savings. We try to proxy human wealth by education and household demographic structure. For the latter we count the number of household members by age group and by type of income generating activity. We also include a dummy variable for membership in a socio-political organization trying to capture network effects.

2.4 Estimation procedure and results

The empirical section tests the explanatory power of the theoretical and empirical models described above in the Thai and Vietnamese context. For this purpose we draw on the first wave of the “Vulnerability in South-East Asia Database”. As opposed to the partial analysis models above we do not have to maintain the a priori assumption that the decision of which smoothing mechanism to choose is independent of other smoothing mechanisms. It is quite plausible to argue that households form expectations over a variety of models and prefer the smoothing mechanism minimizing their utility loss. With respect to the rationale above the two-level household decision tree looks as follows:

Figure 2.1: Household decision trees of post-shock smoothing-mechanism



The choice probabilities of the decision trees above will be sequentially maximum-likelihood estimated by a multinomial logit model (Greene, 2002).

2.4.1 Sample division

As we want to determine the factors affecting the choice of smoothing mechanisms we focus on the households that were affected by a shock during the survey period. Accordingly we split the random sample Z_{total} with $I*N$ households into two subsamples $Z_{noshock}$ and Z_{shock} with respectively $I*K$ and $I*(N-K)$ households. Let $s = 0$ denote the absence $s > 0$ denote the occurrence of a shock for a particular household, then we split the sample according to the following selection rule: Let household $i = 1, \dots, N$ be a member of subsample $Z_{noshock}$ if $s = 0$ and household $j = 1, \dots, N$ be a member Z_{shock} if $s > 0$ for $i \neq j$. Under the assumption that the selection rule is an exogenous variation in the data the subsamples remain their randomness property.

2.4.2 Estimation procedure

In this section we want to detail the procedure for the estimation of two unordered choice sets. The first of which analyses the use of financial smoothing mechanisms (self-insurance and borrowing) against the use of common non-financial smoothing mechanisms (mutual insurance, increased labor supply, doing nothing). Given the prevalence of the financial smoothing mechanism we also analyze decision making within the household's financial nexus. That is, dissaving on monetary savings, livestock selling, formal borrowing and informal borrowing (family and friends or moneylender).

We relate these unordered choice sets to sets of variables the literature suggests to affect the household's choice for a particular smoothing mechanism. We estimate the log-odds ratios for these variables in a sequential multinomial logit approach. Accordingly the probability to make decision j on level k is expressed as follows:

$$P(Y_{ik} = j) = \frac{e^{\beta'_{jk}x_{ik}}}{\sum_l e^{\beta'_{lk}x_{ik}}} \quad (2.1)$$

where the smoothing mechanism chosen is denoted by $J = 1, \dots, 5$, the decision level by $k = 1, 2$ and the household by $i = 1, \dots, N$. However, in this form no unique solution exists to identify the parameters in the model. Therefore we (arbitrarily) restrict one of the $\beta_{j,k}$ to

equal zero, that is $\beta_{j=r,k} = 0$. We normalize all other decisions with respect to decision $J = j$. Consequently,

$$P(Y_{ik} = j) = \frac{e^{\beta'_{jk}x_{ik}}}{1 + \sum_{l=1}^{j-1} e^{\beta'_{lk}x_{ik}}} \quad (2.2)$$

That is, we measure the change of the non-restricted $\beta_{j,k}$ relative to the restricted $\beta_{j=r,k}$. From (2.2) we can compute the log-odd ratios as

$$\ln \left[\frac{P(Y_{ik}=j)}{P(Y_{ik}=r)} \right] = x_{ik}(\beta_{j,k} - \beta_{j=r,k}) = x_{ik}\beta_{j,k} \quad (2.3)$$

The log-odds are sequentially maximum-likelihood estimated from a multinomial logit for $k = 1, 2$. The estimation provides sets of probabilities for $j = 1, \dots, 5$ and $k = 1, 2$ choices. Results are presented in the next section.

2.4.3 Results

The first-level decision making process differentiates between the following smoothing mechanisms: self-insurance, borrowing, mutual insurance, increased labor supply and doing nothing. We normalize with respect to borrowing (see [Table 2.6](#) and [Table 2.7](#) for the results in Thailand and Vietnam).

According to our estimated results, the credit constraint does not have a strong effect on the respective decisions on the first level. We measure the credit constraint as the difference between the amount of credit applied for and the amount of credit actually received during the reference period. We call this variable rationing gap. In Thailand, this rationing gap has no impact at all on the chosen smoothing mechanism. However, in Vietnam we find a relationship between the rationing gap and the decision to self-insure. Namely, the higher the difference between credit amounts applied for a credit actually received, the higher the log-odds ratio for households to self-insure as a smoothing mechanism after the occurrence of a shock. We do not find a significant impact of shock-related losses on the decision to stay inactive in both countries. In combination with the

high significance of the log-odds of expenditures we conclude that rather rich households opt to remain inactive after a shock. We do not find evidence of a binding subsistence constraint causing households to engage in asset smoothing behavior. It seems plausible to argue that the impact of these shocks was comparatively low.

It is often argued in the literature that idiosyncratic shocks, particularly illness of a breadwinner, impair the use of labor supply as smoothing mechanism. Controlling for the type of shock by a binary variable that equals 0 for idiosyncratic and 1 for covariate shocks we find that the log-odds of this binary variable has a strong positive impact on the decision to smooth fluctuations in income through elastic labor supply.

On the second level of decision making we differentiate between the following smoothing mechanisms: Monetary savings, livestock selling, formal borrowing, informal borrowing (family and friends) and informal borrowing (moneylender). We normalize with respect to formal borrowing.

The amount of monetary savings and livestock holdings have a strong log-odds ratio effect on the use of monetary savings and livestock selling as smoothing mechanism. The results for Vietnam are particularly clear. Households with high monetary savings and low livestock holdings prefer monetary dissaving over livestock selling and vice versa.

The household's credit history seems to have little impact on informal borrowing decisions. However, households that have defaulted on loans in the past have a significantly higher log-odds ratio for borrowing from moneylender in Vietnam. In addition, these households also have significantly less schooling. We do not find this pattern for Thailand.

2.4.4 Further work to be done

The preceding analysis assumes that the independence of other alternatives holds not only within but also between the decision levels. Consequently we must assume that error terms are independent and homoskedastic not only within but also between the decisions on each level. To provide the empirical results presented with a more robust foundation, the existing estimation procedure can be supplemented by an estimation strategy that treats the probabilities in the second decision level as conditional on the

probabilities in the first decision level. By employing such an estimation strategy, the independence of irrelevant alternatives must only hold within the nests formed on each level and not between levels.

2.5 Interpreting the results in their country-specific setting

Finally the results will be discussed within the country-specific context of Thailand and Vietnam. This also helps us to clarify to what extent differences in shock-coping strategies differ according to the level of development and to the specific institutional setting.

Regarding the Thai case, [Table 2.6](#) does not provide much structure in the first-level decision, i.e. the broad decision how to react on a shock. It seems as if the five alternatives would be of similar relevance with respect to the variables considered. There is one exception, i.e. the decision to do nothing. [Table 2.5](#) showed already that this is Thai households' preferred "reaction" to a shock. An obvious explanation is that the overall socio-economic level allows for this behavior (in relation to the severity of shocks). This reaction is, according to [Table 2.6](#), even more preferred if the households' expenditures are high and if the shock-induced loss is small. All this seems sensible and may be supported by the variables working as wage-employee and off-farm self-employed, two occupations which come along with a better socio-economic status. The only significant variable that does not fit into this pattern is that households do nothing if the shock has a covariate nature. This may indicate that such a shock is more difficult to address by households' measures. However, there is one measure that households take in case of a covariate shock, i.e. that they increase labor supply, a quite fundamental measure. [Table 2.6](#) indicates that this will be practiced less if there are small children in the household, obviously reducing flexibility of adults.

Interestingly, the Vietnamese case as represented by [Table 2.7](#) shows a much more diversified picture in the first-level decision. Already [Table 2.5](#) indicates that Vietnamese households choose a broader range of coping strategies than Thai households. This may be considered as typical for a poorer country with less specialized income sources where households have to rely on a multitude of feasible shock-coping strategies, including mutual insurance practices (among farmers with older children),

increase in labor supply (where wage employment exists and where no remittances from absentees are available) and self-insurance (where expenditures are high). With increasing shock-induced losses, however, the attractiveness of other alternatives compared to borrowing decreases. As in the Thai case covariate shocks are dealt with by doing nothing, but also by an increase in labor supply.

Table 2.6 reveals even less structure in Thai case regarding the second-level decision, i.e. how to react with forms of asset depletion versus borrowing. More livestock holdings reduce the importance of using monetary savings and informal borrowing (from family and friends) relative to formal borrowing, possibly because livestock holdings easier allow for formal borrowing. More land holdings increase the importance of livestock selling possibly because these households are quite wealthy and can afford to use some livestock as buffer. Overall, however, we are cautious in putting too much weight into these results and explanations as the number of cases under observation is small, i.e. often just 10 to 30 (see Table 2.5). In summary, the main insight from Table 2.7 seems to be that wealth effects dominate decision making with respect to shocks. Those who are richer either do nothing or use their wealth to get (formal) credit or avoid it by using their livestock.

Again, the picture for the Vietnam case in Table 2.7 is much more diversified also regarding the second-level decision. Households with monetary savings and livestock holding make use of them for shock-coping relative to borrowing when they need it. Livestock selling is an indicator for a not so developed formal credit market. Household loan defaulting is negatively correlated with livestock selling. The explanation is simple: livestock-rich households very rarely default on loans.

Loan late payment lead to restrictions in formal borrowing and make asset depletion and informal borrowing as alternative coping mechanisms more attractive. The highly significant and negative influence of land holdings on the relative attractiveness of informal borrowing underlines the importance of land as collateral for formal loans in Vietnam. We study this relationship in more detail in a companion paper (Kemper and Klump 2009). Finally, we have a significant negative effect of the educational level on the relative attractiveness of informal borrowing. Given that the standards of education differ significantly between ethnic groups in Vietnam, one can draw the conclusion here

that the relative availability of formal credit for shock-coping is much less for ethnic minorities than for member of the Kinh majority. This result confirms earlier findings for Vietnam's Central Highlands (Ha and Shively 2008).

Beyond our analysis presented here we want to raise some other points: Firstly, in the Thai case it seems interesting to consider the category "help from the government" (Table 2.5) which is more important than in Vietnam and which may be important in the case of covariate shocks (possibly explaining that households react less because of government support). The problem with this category is its inherent unsystematic nature so that it can be hardly integrated within a framework of household behavior. Secondly, we find in a different approach that informal (versus formal) borrowing is used as a shock-absorbing mechanism in Thailand (Menkhoff and Rungkruxsirivorn, 2009). This does not appear here but may indicate that despite the relative usefulness of (formal) borrowing there may be room for further improvement. In the Vietnamese case our results are almost completely in line with Barslund and Tarp (2008), who find in their study on four rural provinces that a "one size fits all" approach to credit policy would be inappropriate given the very diverse and diversified determinants of formal borrowing in the case of shocks.

Table 2.1: Summary Statistics of Key Variables of Sample Households

Variables	<i>Thailand</i>		<i>Vietnam</i>		
	Mean or fraction	Std. dev.	Mean or fraction	Std. dev.	
Demographics					
Female head of household ⁽¹⁾	0.27	0.01	0.16	0.01	
Age of head	54.65	0.35	48.28	0.35	
Years of education	4.96	0.06	7.38	0.10	
Household size	3.98	0.04	4.30	0.05	
Number of adult males	1.26	0.02	1.22	0.02	
Number of adult females	1.42	0.02	1.35	0.02	
Number of children (<18 years old)	1.30	0.03	1.73	0.04	
Occupation ⁽¹⁾					
Farmer	0.62	0.02	0.68	0.02	
Informal worker	0.09	0.01	0.06	0.01	
Formal worker	0.03	0.00	0.05	0.01	
Government official	0.04	0.00	0.04	0.00	
Business owner	0.08	0.01	0.07	0.01	
Economically inactive	0.15	0.01	0.10	0.01	
Wealth ⁽²⁾					
Area of owned land (hectare)	2.01	0.09	0.73	0.05	
Income	5,185.74	333.86	3,913.77	196.57	
Consumption expenditures	4,581.58	144.90	4,400.25	126.12	
	Food	1,674.80	50.79	2,319.62	58.31
	Non-food	2,906.78	109.48	2,080.62	81.13
Total assets	61,800.00	2,696.77	29,583.33	1,775.71	
	Savings	1,168.72	106.09	881.64	291.31
	Livestock and stored crops	1,880.55	90.90	1,232.80	69.67
	Household durable goods	14,579.23	632.85	5,738.46	415.81
	Land and buildings	44,079.99	2,320.16	21,739.64	1,346.81
Credit Access					
Dummy for credit rationing ⁽¹⁾	0.10	0.01	0.17	0.01	
Dummy for loan default ⁽¹⁾	0.03	0.00	0.01	0.00	
Dummy for late repayment on loan ⁽¹⁾	0.11	0.01	0.07	0.01	
Value of loan defaults to total loans	0.02	0.00	0.01	0.00	
Value of late payments to total loans	0.06	0.00	0.05	0.00	

Note:

(1) Number is expressed as fraction of total sample.

(2) All variables in currency value are measured at purchasing power parity (PPP) adjusted prices to make comparisons in real terms between the two countries possible. The unit of these variables are \$US PPP adjusted

Table 2.2: Number of Households Reporting Shock Events in 2002-2007

<i>Year of shock</i>	<i>No. households</i>	<i>%⁽¹⁾</i>	<i>No. shocks per household⁽²⁾</i>	<i>% of Single shock⁽³⁾</i>
<i>Thailand</i>				
Overall (2002-2007)	1,383	63.27%	1.45	67.25%
2002	136	6.22%	1.04	96.32%
2003	177	8.10%	1.02	97.74%
2004	346	15.83%	1.08	92.20%
2005	407	18.62%	1.08	92.87%
2006	627	28.68%	1.19	85.65%
2007 (Jan-April)	124	5.67%	1.03	96.77%
<i>Total households</i>	2,186			
<i>Vietnam</i>				
Overall (2002-2007)	1,847	84.15%	1.93	38.60%
2002	307	13.99%	1.09	91.20%
2003	295	13.44%	1.05	95.25%
2004	436	19.86%	1.1	89.91%
2005	563	25.65%	1.12	90.23%
2006	1088	49.57%	1.23	78.40%
2007 (Jan-April)	434	19.77%	1.1	90.50%
<i>Total households</i>	2,195			

Note:

(1) Number is expressed as percentage of total sample households.

(2) Number is the mean value of the number of shocks per household in each year that shock occurs.

(3) The number of households being hit by single shock in each year as percentage of households reporting shocks that year.

Table 2.3: Severity of the Shock Events in 2006-2007

	<i>Thailand</i>		<i>Vietnam</i>	
	No. households	%	No. households	%
Impact of shock event				
No impact	2	0.28%	3	0.23%
Low impact	34	4.80%	39	2.96%
Medium impact	219	30.93%	317	24.09%
High impact	453	63.98%	957	72.72%
Still have to lower consumption?	372	52.54%	1,096	83.28%
Years taken to recover from shock				
Less than 1 year	278	39.27%	305	23.18%
1 year	136	19.21%	272	20.67%
More than 1 year	50	7.06%	156	11.85%
Not yet recovered	235	33.19%	559	42.48%
	Mean	Std. dev	Mean	Std. dev
Estimated loss due to shock (\$US PPP Adjusted)	1,800.99	2,755.7 9	1,572.92	3,204.89
Estimated loss as % of household income	170.88	1,390.7 7	163.80	1,097.93
Total	708		1,316	

Table 2.4: Incidence of Different Types of Shocks in 2006-2007

Type of shock	<i>Thailand</i>		<i>Vietnam</i>	
	no. households	%	no. households	%
shock to household demographics ⁽¹⁾	200	28.25%	407	30.93%
social shock ⁽²⁾	45	6.36%	31	2.36%
agro-climatic shock and pests ⁽³⁾	330	46.61%	810	61.55%
higher household expenditures ⁽⁴⁾	28	3.95%	20	1.52%
cannot pay back loan	53	7.49%	4	0.30%
macroeconomic shock ⁽⁵⁾	50	7.06%	33	2.51%
others	2	0.28%	11	0.84%
Total	708		1,316	

Note:

(1) Shocks to household demographics include illness and death of household member, marriage into the household.

(2) Social shocks include theft, criminal offense, disputes and conflict with neighbors.

(3) Agricultural shocks include floods, drought, pests and livestock diseases.

(4) "Higher household expenditures" includes higher educational expense, higher ceremonial expense.

(5) Macroeconomic shocks include job loss, mass lay-offs, business closure, higher input prices and lower output prices.

Table 2.5: Main Coping Strategies Used by Households in 2006-2007

Coping strategy	<i>Thailand</i>		<i>Vietnam</i>	
	no. households	%	no. households	%
do nothing	199	28.11%	228	17.33%
demographics	3	0.42%	2	0.15%
increase labor supply	72	10.17%	212	16.11%
change production	9	1.27%	88	6.69%
assets depletion				
selling livestock and rice	29	4.10%	85	6.46%
selling land and other assets	10	1.41%	6	0.46%
use savings	95	13.42%	132	10.03%
borrowing				
formal	37	5.23%	114	8.66%
informal (village organizations)	31	4.38%	12	0.91%
informal (relatives, friends)	77	10.88%	235	17.86%
informal (moneylender)	26	3.67%	117	8.89%
receive help or transfer				
help from government	72	10.17%	45	3.42%
help from relatives, friends	48	6.78%	36	2.74%
others	0	0.00%	3	0.23%
Total	708		1,316	

Note:

(1) Demographics include taking children out of school, migration to look for job.

(2) Changing production includes substituting crops, diversifying agricultural portfolio, reducing production inputs.

Table 2.6: Estimation Results for Thailand

Variables	<i>First-level decision making</i>				
	Self-insurance	Borrowing	Mutual insurance	Increase labor supply	Did nothing
	Mean (std.dev.)	Mean (std.dev.)	Mean (std.dev.)	Mean (std.dev.)	Mean (std.dev.)
Rationing gap	-1.5e-05 (1.46e-05)		-3.81e-05 (3.65e-05)	-1.06e-05 (3.02e-06)	-2.85e-06 (3.08e-06)
Number of household members...					
... between 0-5 years of age	.3038 (.2193)		.0853 (.2809)	-.5582* (.3247)	-.1354 (.2209)
... between 6-11 years of age	.07075 (.2157)		.0796 (.2982)	-.0146 (.2837)	-.0865 (.1946)
... between 12 -17 years of age	-.0526 (.1851)		-.1570 (.2212)	.1465 (.2136)	-.1055 (.1924)
...of more than 65 years of age	.0569 (.1924)		.2607 (.2210)	.0778 (.2176)	-.2667 (.1896)
...working as wage employees	-.0141 (.0162)		.0026 (.0136)	.0003 (.0131)	-.0252* (.0145)
...working as off-farm self-employed	-.0081 (.0064)		-.0003 (.0071)	-.0089 (.0062)	-.0088* (.0054)
...working as on-farm self employed	.0165 (.0918)		-.1114 (.1463)	-.2176 (.1669)	-.1044 (.1046)
Remittances from absentees	-3.18e-05 (8.85e-05)		4.94e-05 (9.78e-05)	-5.1e-05 (.0001)	-.0001 (8.7e-05)
Expenditures	.0000 (.0000)		1.6e-05 (3.0e-06)	1.64e-05 (3.36e-06)	5.81e-05** (2.96e-05)
Covariate shock dummy	-.0882 (.3348)		-.3441 (.4660)	2.1667*** (.3584)	1.9393** (.2840)
Shock-induced loss	-3.37e-05 (4.18e-05)		-9.25e-06 (.0000)	2.46e-05 (5.51e-05)	-.0002** (.0001)
Constant	-.3363 (.3214)		-.9475** (.4084)	-1.1298** (.4490)	.2233 (.3286)

Normalizing smoothing mechanism

Table 2.6: Estimation Results for Thailand (continued)

Variables	<i>Second-level decision making</i>				
	Monetary Savings	Livestock selling	Formal borrowing	Informal borrowing	Informal borrowing
	Mean (std.dev.)	Mean (std.dev.)	Mean (std.dev.)	Mean (std.dev.)	Mean (std.dev.)
Monetary savings	.0003 (.0002)	.0002 (.0003)		.0003 (.0002)	-.0002 (.0004)
Livestock holdings	-.0002** (.0001)	.0001 (.0001)		-.0003** (.0001)	-.0001 (.0001)
Land holdings	.0768 (.0983)	.2040** (.1014)		.0824 (.0987)	-.0035 (.1337)
Loan default	.7502 (1.114)	.0070 (1.2300)		.5242 (1.2214)	.3878 (1.4420)
Loan late payment	-.5965 (.4689)	-.5384 (.6296)		-.7736 (.5018)	-.5329 (.6354)
Education	.1374 (.1118)	-.0262 (.1325)		.1514 (.1203)	.2032 (.1278)
Member of socio-political organization	.5045 (.7541)	.0341 (.7132)		-.5721 (.6707)	.4947 (.9422)
Constant	-.4309 (1.6710)	-.8159 (1.6257)		1.3385 (1.5497)	-1.8982 (2.0565)

Normalizing smoothing mechanism

Note: The estimation includes 596 observations on the first and 264 observations on the second level. The Wald Chi-square test statistic is respectively 147.04 and 37.42. Therefore both models are jointly significant at the 1 percent level. The Pseudo R-square statistic is 0.1020 and 0.0569 and the log pseudolikelihood -767.7546 and -366.8136.

Table 2.7: Estimation Results for Vietnam

Variables	<i>First-level decision making</i>				
	Self-insurance	Borrowing	Mutual insurance	Increase labor supply	Did nothing
	Mean (std.dev.)	Mean (std.dev.)	Mean (std.dev.)	Mean (std.dev.)	Mean (std.dev.)
Rationing gap	2.16e-05* (1.16e-05)		-7.07e-06 (2.1e-05)	-3.70e-06 (2.03e-05)	-6.30e-06 (.0000)
Number of household members...					
... between 0-5 years of age	-.3849* (.1666)		-.8876* (.3634)	-.0300 (.1551)	-.0374 (.1556)
... between 6-11 years of age	-.2359* (.1228)		-.6641* (.2787)	.0659 (.1153)	.0886 (.1103)
... between 12 -17 years of age	-.1481 (.1017)		-1.2849*** (.3860)	.0547 (.1046)	.1265 (.1033)
...of more than 65 years of age	.1255 (.1596)		.1120 (.3127)	-.0991 (.1703)	.2444 (.1576)
...working as wage employees	-.0812 (.0942)		-.3543 (.3283)	.2482*** (.0938)	-.1583* (.0975)
...working as off-farm self-employed	.2049 (.1387)		-.1774 (.4467)	-.0287 (.1549)	-.0303 (.1482)
...working as on-farm self employed	-.1705* (.0907)		-.9163*** (.2493)	-.1328* (.0800)	-.1230* (.07563)
Remittances from absentees	-.0003 (.0002)		.0001 (.0003)	-.0008*** (.0003)	.0002* (.0001)
Expenditures	.0001*** (.0000)		.0001** (.0000)	-.0000 (.0000)	.0000 (.0000)
Covariate shock dummy	-.2027 (.2166)		.1173 (.4545)	.8847*** (.1941)	.5807*** (.1963)
Shock-induced loss	-1.89e-05 (3.1e-05)		-.0003** (.0001)	-.0002** (.0001)	-2.41e-05 (6.57e-05)
Constant	-.3232 (.2662)		-.0686 (.7491)	-.9604*** (.2919)	-.9862*** (.2907)

Normalizing smoothing mechanism

Table 2.7: Estimation Results for Vietnam (continued)

Variables	<i>Second-level decision making</i>				
	Monetary Savings	Livestock selling	Formal borrowing	Informal borrowing	Informal borrowing
	Mean (std.dev.)	Mean (std.dev.)	Mean (std.dev.)	Mean (std.dev.)	Mean (std.dev.)
Monetary savings	.0004* (.0002)	-.0003 (.0003)		3.93e-06 (.0004)	-.0001 (.0004)
Livestock holdings	-.0002* (.0001)	.0001* (.0001)		.0001* (.0001)	-.0002 (.0001)
Land holdings	-.0795 (.1439)	-.1189 (.1738)		-.6581*** (.1985)	.0443 (.0905)
Loan default	.6986 (1.3017)	-33.6343*** (1.0715)		.7811 (1.1783)	1.4212 (1.1740)
Loan late payment	.1612 (.5999)	1.0038* (.5559)		.4100 (.5317)	1.0909** (.5273)
Education	.0913* (.0488)	-.0621 (.0504)		.0195 (.0424)	-.1538*** (.0506)
Member of socio-political organization	.4432 (.3065)	-.1469 (.3420)		.1692 (.2766)	.4324 (.3087)
Constant	-1.1883* (.6594)	.2480 (.6111)		.6312 (.5508)	.5498 (.6101)

Normalizing smoothing mechanism

Note: The estimation includes 1078 observations on the first and 682 observations on the second level. The Wald Chi-square test statistic is respectively 178.62 and 12376.45. Therefore both models are jointly significant at the 1 percent level. The Pseudo R-square statistic is 0.0660 and 0.0690 and the log pseudolikelihood -1388.4497 and -981.6.

Chapter 3

3. Impact of Local Financial Development on Vulnerability, Investment and Consumption: Evidence from Thai Households¹⁸

3.1 Introduction

Starting with the seminal paper of King and Levine (1993) the impact of financial development on welfare measures has been of great interest for several years. Their cross-country evidence for positive effects of finance on growth was just the beginning of many other macro studies on financial development. More recently micro evidence in evaluation studies of microfinance programs contributed to a better understanding of the micro-impact of financial development, e.g. Amin et al. (2003), Burgess et al. (2005). So far the role of finance for household development is rarely addressed. We shed light into this strand of literature.

We contribute to the existing literature in three ways. First, we measure the impact of financial development on three measures of household welfare: vulnerability, which has been of great interest (Murdoch, 1994), consumption and investment. Second, by separating the effect of credit on production and consumption we achieve a more thorough understanding of the impact channels of credit. Third, the methods we use to retrieve indicators for vulnerability and financial development do a good job in our framework, so we can support their usefulness.

In order to conduct these analyses we use a unique comprehensive data set. We estimate the impact of financial development on about 2200 Thai households. We have detailed information about household and village characteristics. Our data set is particularly rich for financial data, like lending, borrowing, credit, denials of credit etc. Relying on the method of Guiso et al. (2004) we use our information about credit denials to calculate the effects of region dummies on credit restriction. This indicator of “local” financial development appears to be very reliable in the disintegrated financial market of

¹⁸ This chapter is based on the article “Impact of Financial Development on Vulnerability, Consumption, and Investment: Microevidence from Thai Households” written by Ornsiri Rungruxsirivorn and Oliver Gloede.

Thailand. We then use this indicator to analyse the effect of financial on household welfare. In particular, we examine the effect on vulnerability to poverty, investment and consumption. The first is calculated using the method of Chadhuri et al. (2002) where the latter both are taken directly taken from the data set.

We find that financial development matters for households' welfare. First, the household is less vulnerable, the higher the financial development in the district she is living in. Second, households can invest to a larger extend when living in a financially developed district. Third, households better smooth their consumption when there is easy access to the financial market. Our results are robust to various alternations in the estimation method, the proxy for financial development and the regressands.

The paper is structured as follows: Section 3.2 surveys the data set and shows some descriptive statistics. We succeed by presenting our indicator of financial development in Section 3.3. This is followed by the explanation of the indicator of vulnerability, investment and consumption we use in Section 3.4. Results of our estimations are presented in Section 3.5. Section 3.6 gives concluding remarks.

3.2 Data and descriptive statistics

3.2.1 Data collection

The data used in this study are from the project "Impact of shocks on the vulnerability to poverty: consequences for development of emerging Southeast Asian economies" (DFGFOR756), funded by the German Research Foundation (DFG). An initial cross sectional survey was carried out in the Northeast region of Thailand between April and June 2007. The Northeast region is deliberately chosen as this region is considered the poorest region. Three provinces were then selected, namely Buri Ram, Ubon Ratchatani and Nakhon Phanom.

Households were selected following a three-stage stratified sampling procedure where provinces are constituted strata and the primary sampling units (PSU) are sub-districts. Within each of the three provinces, sub-districts were first randomly selected with probability proportional to size by a systematic sample from a list ordered by population density. This ensures proportional coverage of densely (peri-urban) and less densely populated (rural) areas. Within each sub-district, two villages were chosen at

random. Finally, within each village, 10 households are randomly selected. Thus there are in total 2,186 households from 220 villages in 110 sub-districts (45 districts) of the three provinces. Details on sample selection of the survey are contained in Hardeweg et al. (2007).

The survey contains information on household demographics, occupation, health status, education, agricultural activities, off-farm employment activities, household businesses, income, expenditures, assets, borrowing, lending, savings, remittances and public transfers in the one year period of May 2006-April 2007. Detailed information on borrowing activities including loan denials and loan defaults are also covered.

Secondary data on number of financial institutions and demographic variables at district and sub-district level were extracted from Department of Provincial Administration's *District Statistics* and Provincial Cooperative Offices' *Cooperative Statistics*.

3.2.2 Descriptive statistics

Table 3.1 summarizes statistics of key variables for the sample households. The average family size is 3.98 persons or 2.83 in adult equivalent units.¹⁹ The majority of households are male headed but female-headed households are not uncommon. Nearly 25 percent of the Thai households is female-headed. Educational level of these households is low. The average year of schooling for the head of household is only 5 years. We also find that individuals over 15 years of age with only primary education (6th grade) make up 85 percent of the sample population.

Household occupations are classified into six groups according to the main occupation of the head of household. These groups are farm households, wage earners in the informal sector, wage earners in the formal sector, government official, business owners and the "economically inactive" group. The most common occupation is farming, followed by the "economically inactive" group – a large proportion of which is found to be the elderly.

¹⁹ We use the OECD adult equivalence scale which assigns the weight of 1.0 for the first adult member, 0.7 to each additional adult, and 0.5 to each child.

Average annual income of household is nearly 90,000 Baht (2,500 US Dollars at the present exchange rate) during the period covered by the survey. As households of different size and composition have different needs, we use equivalence scale to adjust household income. Household income per equivalence adult is about 33,000 Baht (920 US Dollars). We note that household income is composed of income from four sources: net income from farming, net income from household business, wage labor income and other non-labor income such as land rent but excludes remittances and transfers. We exclude the latter two because we want income before any coping strategy is taken. For the average household, farming is the most important source of household income (60 percent).

The annual consumption expenditure for the average household is 79,000 Baht (2,200 US Dollars). Food is the largest proportion of household expenditures, accounting for 40 percent of all consumption expenditures.

The value of assets holding owned by the average Thai household is 250,000 Baht (7,000 US Dollars) and 95,000 Baht per equivalence adult (2,500 US Dollars). As to the type of assets, land and housing constitute the main assets of rural households, accounting for about 70 percent of household assets. Next in importance to land are household durable assets which include among other durable goods, furniture, telephones, motor vehicles, machines and equipment used in agricultural production and households' businesses. Interestingly savings and agricultural assets including livestock and stored crops account for very small shares of total assets.

Turning to the incidence of credit rationing, 209 households, or about 10 percent of the households, report credit rationing. When we consider only the households that demand credit, the incidence of credit rationing is equal to 12 percent. Among these households, 55 percent reports being totally credit rationed and 45 percent is partially credit rationed.. The default rate is very low in Thailand as only 3 percent of the households reports that they have ever defaulted on loans. The value of loan defaults as ratio of total outstanding loans is only 2 percent for the average borrower but this ratio reaches 60 percent for defaulters. The incidence of late repayment is relatively higher; about 10 percent of the households reports ever repaid late on loan. Again, the ratio of

late repayment loans to total loans is only 6 percent for the average borrower but is as high as 60 percent for late payers.

Thailand is geographically divided into six regions and 76 provinces. Each province is divided into districts which, in turn, are divided into sub-districts and then villages. Each province has one capital district which is the most developed area in the province. [Table 3.2](#) presents the basic characteristics of the sample districts. Clearly these districts are heterogeneous, made up of both small and large communities, with densely and less densely population. Some large districts have up to 220,000 inhabitants while some smaller districts have only 15,000 inhabitants. This is also the case for the number of lending institutions across districts. For example, while one district has no cooperative, the other district has as high as 33 cooperatives. Similarly for the density of lending institutions, the number of cooperatives per 1,000 households ranges from 0 in one district to 0.8 in another.

3.3 Indicator of financial development

Starting from financial market data of the household and village data, we estimate an indicator for financial development. We rely closely on the method of Guiso et al. (2004). They calculate an index of *local* financial development of regional entities in Italy. To derive a financial indicator they propose that holding household and village characteristics constant a province is financially badly developed if the fraction of credit denials is large. Employing a linear probability estimator they regress credit constraint (y) on dummy variables for each of the regional entities (Z) as well as on household and village characteristics (X).

$$y_i = \mathbf{x}_i' \boldsymbol{\beta} + \mathbf{z}_i' \boldsymbol{\gamma} + \varepsilon \quad (3.1)$$

For our regression analysis later on we will use a normalization of the dummy coefficient γ_k of region k . The normalized indicator is:

$$FINDEVN_k = 1 - \gamma_k [\max(\boldsymbol{\gamma}')]^{-1} \quad (3.2)$$

Differing from their Italian study we claim that the Thai financial market is yet not fully integrated so that there is no concern about the usefulness of an indicator of *local* financial development. Even for better developed financial markets several studies find that distance to banking institutions matters (e.g. Lerner, 1995; Petersen and Rajan, 2002; Haselmann et al., 2009). These studies find that regionalism matters especially for small firms (who are not able to borrow at different branches) and public banks. Since we analyze small rural households whose major lending institutions are formal (BAAC²⁰) or semi-formal (the village funds²¹), it is probable that the financial market in Thailand is local indeed.

Accepting that credit markets are local, the question rises what regional entity is feasible to be a separate market. We set the 45 districts in our 3 provinces as separate financial markets. We believe this to be closest approximation to the real financial markets which provide credit to borrowing households because of three reasons. First, the major lending institutions are BAAC and the village funds. BAAC has one branch per district, in most of the cases in the district capital. The village fund is set up in every village but the fund is available for only residents of a given village and not for residents living in other villages. Our definition of local market is also consistent with BAAC's policy to expand and decentralize its banking operations from the provincial to the district level (BAAC, 2004). Second, we ask households how long they have to travel to get to the next banking institution. Their average answers correspond to the time close to the time to travel inside a district. Third, next larger and smaller regional entities are provinces and sub-districts. Since our sample spans solely on three provinces and on more than 100 sub-districts, it is obvious that taking these entities as the local market would not be feasible. We refrain from clustering districts, since proceeding can just happen on the basis of arbitrary decisions which districts to cluster. Whether this is the right set up or not, is ultimately a matter of empirical results. If this procedure is a good

²⁰ The Bank of Agriculture and Agricultural Cooperatives (BAAC) is the state-owned bank established in 1966 and remains one of the main suppliers of household loans in Thailand. Among all banks – public and private banks, BAAC has the largest number of branches.

²¹ In 2001, the Thai government introduced the microfinance program called “the village funds.” Following in the spirit of other microfinance programs, the main objective of the village funds is to improve access to credit for the poor.

approximation the dummy variables in our regression would be significant and substantially explain credit denial.

Our goal is to estimate the likelihood a household is credit constrained controlling for household characteristics and district dummies. Households are classified as credit constrained if they demand credit but have been fully or partially denied credit. To approximate the set of households demanding credit, we use a sub-sample of households who have loans from the credit market outstanding or have experienced credit denials. This marks the local demand side of credit. As control variables in equation (3.1), we use age, years of education, occupation and gender of household head, earned income per equivalence scale, assets (squared) per equivalence scale, equivalence scale, number of children, dummy for being married, the number of households and number of self employed in the village. If there are households who are known to be late payers or defaulters less credit denial would not mean a better developed credit market. Therefore we include as dummy variables for late payers and defaulters. [Table 3.3](#) exhibits the regression coefficients and normalized coefficients for the 45 districts in our sample. The normalized indicator ranges from 0 to 0.936. The result gets close to what was expected. Districts which are financially better developed have more bank branches per households, have better public infrastructure and are economically stronger. 65% of our district dummy variables are individually significant. The joint hypothesis of zero influence is rejected on the 1% significance level. Qualitatively these results match those of Guiso et al. (2004) so after all we conclude that the applied methods seem appropriate for the Thailand credit market.

3.4 Indicators for household development

We want to measure the impact of financial development on the economic situation of the household and how the household is able to influence its development. To realize the effects we focus on three measures. First, we address vulnerability, i.e. the exposure of households to poverty and which is in the focus of policy programs. Second, the impact of financial development on investments shows the possibilities of households to change their welfare ex ante. Third, by analyzing consumption we want to see whether financial development helps households to smooth consumption and cope with shocks.

This focuses on the ex post transmission channel of financial development on household welfare.

3.4.1 Household's vulnerability measure

Poverty analysis has been improved. Targets for policy programs moved from a backward looking poverty reduction strategy to an ex ante prevention strategy. This means reducing the number of vulnerable households, which are either likely to fall below poverty line or remain in poverty (Murdoch, 1994). The variety of approaches which address vulnerability empirically is manifold, e.g. Glewwe and Hall (1998), Jalan and Ravallion (1999), Ligon and Schlechter (2003), Amin et al. (2003), Calvo and Dercon (2008), Dercon and Krishnan (2000). As vulnerability follows the household's consumption path over time a comprehensive analysis should preferably rely on panel data. Such data requirements are often not fulfilled in developing countries as it is in our case. For the numerous cases where only one wave of data is available Chaudhuri et al. (2002) suggest a vulnerability measure which is based on the instruments of poverty analysis. Since this is to the best of our knowledge currently the least restrictive way to estimate a vulnerability indicator with cross-sectional data, we follow their procedure.

We want to estimate the vulnerability v_{ht} , which is the probability of household h to fall in time $t+1$ below the poverty line z :

$$V_{ht} = \Pr(c_{h,t+1} \leq z) \quad (3.3)$$

Hence the task is to find an estimate for the mean and variance for c_{ht+1} . Chaudhuri et al. (2002) use a three-step feasible generalized least squares (FGLS) procedure (Amemiya, 1977) to estimate:

$$\ln c_h = X_h \beta + \varepsilon_h \quad (3.4)$$

Since we cannot follow the households over time it is not possible to say whether β is stable. We therefore have to assume that shocks are identically and independently

distributed over time. But do not claim that shocks are distributed identically across households. This means we allow to have different variances for households:

$$\Sigma_{e,h}^2 = X_h \theta \quad (3.4)$$

We correct for this by using the FGLS procedure. Assuming consumption to be log-normally distributed the estimated vulnerability level is then:

$$v_h = \Pr(\ln c_h < \ln z \mid X_h) = \Phi[(\ln z - X_h \beta) / (\sqrt{X_h \theta})] \quad (3.5)$$

with Φ as the cumulative density function of the standard normal distribution.

For the estimation of equation (3.4) we use as covariates: household size (squared), number of children, dummies for marital status, age (squared), years of education, occupation and gender of household head as well as dummies for the provinces. The poverty line is the official poverty line of the Northeastern region of Thailand where all our provinces located. We compare the poverty line per capita with the household consumption, which is deflated by the OECD equivalence scale. The mean of our vulnerability index is about 0.1 with a standard deviation of approximately 0.07.

3.4.2 Investment

Financial development can directly lower poverty and vulnerability of households through two main channels. First, by improving the access of the poor to financial services, particularly to savings and credit markets, financial development allows the poor to take advantage of profitable investment opportunities. These investments tend to be lumpy and may be difficult to finance out of current household income but could provide for a higher income in the future. Thus access to financial services enables the poor to invest in productive assets which in turn enhance their productivity and reduce their vulnerability. Second, borrowing and savings also provide the poor more opportunities to manage risks and smooth consumption in the face of negative shocks.

Thus access to financial services can reduce households' vulnerability to shocks and minimize the adverse impacts of shocks that can sometimes have a long-run impact.

We first look at the investments made by households. Investments are defined as the expenditures incurred in acquiring productive assets net of depreciation²². We define productive assets as those capital goods including equipment, tools, machinery and vehicles, used in agricultural production or households' businesses. As some of these assets may be purchased long time ago and may not be affected by the current financial market conditions, we also look at the value of assets that were purchased during the past 10 years. The data show that amounts invested in productive assets are, on average, 93,000 Baht and most of these investments are made in the past 10 years.

Another way to examine whether the improved access to financial services brought by financial development increases households' investment opportunities is to look at the amount of input supplies used by households. Households may not invest in capital goods but rather buy more input supplies such as fertilizers and pesticides. We look at households' expenditures on crop production as agriculture is the most important source of income for our sample households; nearly 85 percent of the households has crop production.²³ Most of these expenditures are in the forms of fertilizers, pesticides and seedlings. As more investments can lead to higher productivity, we further look at the impact of financial development on several indicators of farm productivity including revenue from crop production, profit, revenue per unit area from crop production, and profit per unit area.

3.4.3 Consumption

By analyzing consumption we want to see whether financial development helps households to smooth consumption and cope with shocks. This focuses on the ex post transmission channel of financial development on household welfare.

The information on consumption expenditures obtained from our household survey is detailed enough so that we can have a reliable and accurate measure of

²² The value of each durable asset is calculated as the value of the asset at time of purchase net of depreciation.

²³ Although 62 percent of the households has farming as the main occupations, almost 85 percent of the households has some crop production.

household consumption. Household consumption is further decomposed into two sources: food and non-food consumption. For rural households, considering the fact that large shares of the population live in subsistence level, it is often more relevant to rely on food consumption as a measure of household's well-being.

3.5 Results

We estimate the influence of financial development on household vulnerability, investment and consumption by ordinary least square. We account for the sampling design and adjust by stratum, sampling weights and population size of our sample. In our baseline regression we use the local financial development indicator which was introduced above. Alternatively we also use number of financial institutions on the whole, disaggregated by formal status and banking type as well as time to reach the next branch as approximations to financial development. We are aware that these measures are crude due to their one-dimensionality, measurement errors and sectorality but present this as robustness checks to confirm the validity of our findings. We will report the results in the intuitive order vulnerability, investment, and consumption.

In all regressions, we control for household characteristics which include household income (measured per number of adult equivalence), area of landholdings, the age of the household head, age squared, years of education of the household head, household number (measured in terms of equivalence scale), number of children, marital status, gender, occupation, ratio of loan defaults and late repayment. We also add an interaction between the indicator of financial development and dummy for credit demand as the effects of financial development on investment decisions may differ between the two groups. Those that do not demand credit neither for investments nor consumption are less likely to be affected by financial development. Thus financial development is likely to have greater impact on households demanding credit.

3.5.1 Vulnerability

We regress financial development on vulnerability by using ordinary least square. Since the vulnerability indicator right-skewed and takes only positive values we

alternatively use a Tobit to check our results. Since the results are completely the same, we do not discuss them separately. Results for OLS estimations are reported in [Table 3.4](#).

Our main interest is in the coefficient of the financial development indicator. The effect is significantly negative on the 5 % level. As our indicator is standardized from 0 to 0.94, meaning that increasing the index by one unity the likelihood of falling below poverty line is decreased by 1.3 %. Since the interaction effect with the dummy for credit demand is not significant, this effect is independent whether the household asks for credit or not. As our indicator aims on the formal sector indirect effects over the informal sector might be the driving force.

The control variables show the signs which were expected and match the results of former studies (see references).

Income increases vulnerability significantly on the 5 % level. Since the coefficient is only marginally negative we do not want to put too much economic meaning in it. Nevertheless it is reasonable that higher incomes may come along with higher swings which are the case for our data sample. This finding matches the example of (see references).

The effect of household's age is negative with diminishing effect. In the relevant range from 20 to 70 years the coefficient varies between -0.159 and -0.357. The absolute maximum of the coefficient is at age 60.5 with an decreased vulnerability of about 37 %. Older people have usually a larger social network to cope with vulnerability and personal assets which they can use to cope with shocks. But the older people get the more likely is it that they suffer from health shocks and they lose their regular income. This fits to the absolute minimum of the common retirement age of 60.5.

The larger the household (measured in equivalence scales) and the number of children, the higher the vulnerability level. This is an ample finding in the literature (see reference). The negative effect of more mouths to feed is larger than the effect of more heads to cope with a shock.

Marriage significantly gives security to the household and decreases vulnerability. A reliable partner is also for the rural households a good coping mechanism.

We find two job groups, which either increase or decrease vulnerability. If the main occupation of the household head is formal worker, government official and

business owners vulnerability is decreased compared to the reference case of an unemployed household head. In contrast informal jobs like and farming activities increase vulnerability levels substantially (by 11 and 4 %). This is due to their seasonal and occasional frequency of income gains.

We test the effect of financial development on vulnerability for robustness reasons with a couple of other financial indicators. [Table 3.5](#) reports only the estimates on these alternative measures of financial development and does not show the estimates on the other control variables. First, we regress vulnerability on the number of financial institutions per capita in the district (*Column (2)*). Just increasing the number of financial institutions to borrow from might not enhance the financial market per se. But it gives another view on financial development, and here it supports our finding. Financial development decreases vulnerability. Second, we analyze further which institutions might be the driving force for the beneficial effect. We find out that it is primarily semi-formal institutions which lead to lower vulnerability (*Column (3)*). Third, we go deeper into the analysis and find out that we can just find a significant effect of village funds on vulnerability (*Column (4)*). This is a comparatively newly designed microfinance program from the government, which appears to work good on the vulnerable. Fourth, we cannot confirm the effect for financial development approximated by the time it takes to get to the next bank branch (*Column (5)*). As seen before the reason might be that banks do not play the major role for the effect of financial development on vulnerability.

3.5.2 Investment

[Table 3.6](#) presents the list of explanatory variables and the regression results for seven specifications of the dependent variables. *Column (1)* reports the effects of financial development on investments in productive assets; *Column (2)* investments in productive assets made in the past 10 years; *Column (3)* expenditures on crop production; *Column (4)* revenue from crop production; *Column (5)* profit from crop production; *Column (6)* revenue from crop production per unit area; finally *Column (7)* profit from crop production per unit area.

Most importantly, the results show that our financial development indicator significantly increases the amount of household investments in productive assets and

input supplies for those households demanding credit. In particular, moving from the least financially developed district to the most financially developed, the average amount of productive investment increases by 5,000 Baht or by about 1.2 of a standard deviation. The results also show that financial development is positively and significantly associated with higher farm productivity as proxied by revenue and profit from crop production.

Regarding other explanatory variables, we find that investments in productive assets are positively related to household's landholdings, the education of the household head, household size and the age of the household head but at a lower rate for older households. The amounts of investments are lower for those households with higher loan defaults or late repayments. This also reflects the significance of having access to credit on investments; households with bad credit history are less likely to get access to funds and thus are constrained in their investment decisions.

As robustness tests, we apply alternative indicators for local financial development. [Table 3.7](#) reports the effects of financial development on investment in productive assets during the past 10 years using various indicators of local financial development. [Table 3.8](#) reports the effects on expenditures on crop production while [Table 3.9](#) presents the results on revenue from crop production. *Column (1)* of each table reports the estimates using our financial development indicators. *Column (2)* uses the number of lending institutions per 1,000 households in district as indicator of financial development. *Column (3)* separates the lending institutions into formal and semi-formal lenders. *Column (4)* separates the lending institutions into commercial banks, BAAC, cooperatives and the village funds. Finally *Column (5)* uses time taken to reach the nearest bank branch as indicator of financial development. Including in the regressions these alternative financial development indicators leave our conclusions unchanged. Our results also suggest that semi-formal lending institutions especially the village funds appear to have positive and most important roles to play regarding household investments. Nevertheless we note that these alternative indicators are crude measures of financial development and our local financial development indicator is a better measure in the sense that it captures the ease with which households can access financial markets.

3.5.3 Consumption

Table 3.10 presents the regression results for consumption regressions. The columns show different dependent variables. *Column (1)* reports estimates of the effects of financial development on household's consumption expenditures; *Column (2)* reports the effects on food consumption; finally *Column (3)* reports the effects on non-food consumption.

We find that financial development positively improves household consumption and food consumption in particular, suggesting that the improved access to financial services brought by financial development to some extent helps households in smoothing their consumption and improving their welfare.

Our results also show that household consumption is positively related to household income, landholdings and education of the household head. Households with more adult male equivalences have higher consumption but the number of children reduces consumption. This may reflect that the consumption needs of children are lower than that of adults. Consumption expenditures are lower for farm households and informal workers but higher for business owners.

Robustness tests using alternative indicators of financial development are reported in Table 3.11. Using these other indicators does not change our main conclusions. Again we find that semi-formal lending institutions especially the village funds have positive and more significant impacts on household consumption than the formal lenders.

3.6 Conclusions

This study examines the role of financial development in reducing household vulnerability to poverty. In recent years, many studies have examined the effect of financial development on economic growth, but the question of whether financial development helps reduce vulnerability has not been the subject of much empirical work. We contribute to the literature by providing a new indicator of local financial development based on Guiso et al. (2004), estimating household vulnerability, and assessing the channels through which financial development helps reduce household vulnerability.

Using a new micro-household survey for Thailand, our results confirm that financial development does contribute to vulnerability reduction. Our results also suggest that the main impacts of financial development on vulnerability come not only through increasing household consumption but also through increasing household investment and productivity.

Given the current emphasis on financial development and poverty reduction on policy agendas of many developing countries, our results serve to provide evidence of positive effects of financial development on vulnerability reduction. Such evidence provides a firm basis to undertake more detailed investigations of which specific financial development measures can be set up as effective instruments for achieving vulnerability reduction.

Table 3.1: Summary Statistics of Key Variables of Sample Households

<i>Variables</i>	<i>Mean</i> <i>(n = 2186)</i>	<i>Std. dev.</i>	
Demographics			
Dummy for female headed household	0.27	0.01	
Dummy for marital status, married	0.78	0.01	
Age of household head	54.65	0.35	
Years of education of household head	4.96	0.06	
Household size	3.98	0.04	
Equivalence scale	2.83	0.02	
Number of children (<18 years old)	1.30	0.03	
Occupation			
Farmer	0.62	0.02	
Informal worker	0.09	0.01	
Formal worker	0.03	0.00	
Government official	0.04	0.00	
Business owner	0.08	0.01	
Economically inactive	0.15	0.01	
Wealth			
Area of owned land (hectare)	2.01	0.09	
Income	89,179.94	5,716.69	
Income per equivalence scale	33,340.78	2,155.15	
Consumption expenditures	78,641.09	2,485.73	
	Food	28,769.00	872.05
	Non-food	12,741.54	380.23
Total assets	1,014,292	45,071.96	
	Savings	20,723.24	1,957.30
	Livestock and stored crops	32,311.89	1,561.91
	Household durable goods	202,646.30	8,917.13
	Land and buildings	758,610.30	39,810.58
Investment			
Productive assets	92,778.82	4,371.36	
Productive assets purchased in past 10 years	82,545.10	4,087.42	
Crop production			
Expenditures on crop production	18,613.98	1,044.08	
Revenue from crop production	48,766.30	3,245.00	
Profit from crop production	30,152.33	2,365.20	
Revenue from crop production per unit area	27,330.34	4,552.43	
Profit from crop production per unit area	18,492.58	4,444.71	
Credit Access			
Dummy for credit rationing	0.10	0.01	
Dummy for loan default	0.03	0.00	
Dummy for late repayment on loan	0.11	0.01	
Ratio of loan defaults to total loans	0.02	0.00	
Ratio of late repayments to total loans	0.06	0.00	

Table 3.2: Summary Statistics of Key Variables of Sample Districts

	<i>Mean</i> (<i>n = 45</i>)	<i>Std. dev.</i>
Demographics		
No. of households	18,617.60	11,586.24
No. of villages	117.38	59.37
District area (km. ²)	588.52	362.48
Local financial development indicators		
No. of commercial banks	2.02	2.43
No. of BAAC	0.89	0.32
No. of cooperatives	5.91	6.40
No. of village funds	117.38	59.37
No. of commercial banks per 1,000 households	0.08	0.08
No. of BAAC per 1,000 households	0.06	0.04
No. of cooperatives per 1,000 households	0.31	0.19
No. of village funds per 1,000 households	6.74	1.07
Time to reach nearest bank	22.30	10.04

Table 3.3: The Indicator of Local Financial Development

<i>District ID</i>	<i>Coefficient on district dummy</i>	<i>Normalized measure of financial development</i>	<i>District ID</i>	<i>Coefficient on district dummy</i>	<i>Normalized measure of financial development</i>
1	0.076	0.756	23	0.157	0.495
2	0.020	0.936	24	0.194	0.376
3	0.107	0.657	25	0.207	0.336
4	0.109	0.650	26	0.049	0.844
5	0.083	0.735	27	0.163	0.478
6	0.102	0.672	28	0.121	0.613
7	0.032	0.896	29	0.164	0.473
8	0.069	0.777	30	0.086	0.725
9	0.150	0.517	31	0.253	0.188
10	0.169	0.457	32	0.110	0.648
11	0.085	0.728	33	0.063	0.799
12	0.166	0.467	34	0.139	0.553
13	0.125	0.599	35	0.281	0.097
14	0.032	0.897	36	0.192	0.383
15	0.079	0.745	37	0.220	0.294
16	0.120	0.615	38	0.128	0.588
17	0.251	0.195	39	0.085	0.726
18	0.122	0.607	40	0.199	0.361
19	0.060	0.808	41	0.199	0.361
20	0.144	0.537	42	0.311	0.000
21	0.150	0.517	43	0.182	0.417
22	0.276	0.113	44	0.073	0.767
			45	0.235	0.246
F test for district dummies = 0					
	F(45, 63)	4.21			
	Prob > F	0			

Table 3.4: Effect of Local Financial Development on Household Vulnerability

<i>Household vulnerability</i>	<i>OLS</i>
Income per equivalence scale	4.40e-08** (3.55)
Area of owned land	0.0002 (0.77)
Age of household head	-0.0080** (-19.78)
Age of household head squared	0.0001** (22.27)
Years of education of household head	-0.0085** (-17.67)
Equivalence scale	0.0579** (10.09)
Equivalence scale squared	-0.0784** (-4.97)
Number of children	0.0244** (14.30)
Marital status, married	-0.0185** (-6.89)
Female headed household	0.0066** (3.52)
Occupation, farmer	0.0246** (12.13)
Occupation, informal worker	0.0769** (25.33)
Occupation, formal worker	-0.0282** (-6.73)
Occupation, government official	-0.0200** (-3.04)
Occupation, business owner	-0.0421** (-11.89)
Ratio of loan defaults to total loans	-0.0029 (-0.64)
Ratio of late payments to total loans	0.0061** (2.05)
Findevn	-0.0110** (-2.80)
Findevn*dummy for credit demand	0.0044** (2.06)
Constant	0.2821** (15.28)
R-squared	0.867
p-value	0.000
No. Obs	2186

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

Table 3.5: Robustness Test - Effect of Alternative Measures of Local Financial Development on Household Vulnerability

<i>Household vulnerability</i>	(1)	(2)	(3)	(4)	(5)
Findevn	-0.0110**				
	(-2.80)				
Findevn*Dcred	0.0044**				
	(2.06)				
No. financial insti		-0.0013**			
		(-2.59)			
No. financial insti* Dcred		0.0004**			
		(2.12)			
No. formal insti			-0.0027		
			(-0.20)		
No. semi-formal insti			-0.0013**		
			(-2.23)		
No. formal insti* Dcred			0.0071		
			(0.43)		
No. semi-formal insti* Dcred			0.0002		
			(0.54)		
No. commercial banks				-0.0084	
				(-0.58)	
No. BAAC				0.0717	
				(1.56)	
No. cooperatives				0.0070	
				(1.15)	
No. village funds				-0.0021**	
				(-3.38)	
No. commercial bank* Dcred				0.0083	
				(0.50)	
No. BAAC* Dcred				-0.0258	
				(-0.52)	
No. cooperatives* Dcred				-0.0042	
				(-0.61)	
No. village funds* Dcred				0.0006	
				(1.07)	
Time to nearest bank					-0.0001*
					(-1.90)
Time to nearest bank* Dcred					0.0001*
					(1.76)
R-squared	0.867	0.867	0.867	0.868	0.867
p-value	0.000	0.000	0.000	0.000	0.000
No. Obs	2186	2186	2186	2186	2186

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

Number of lending institutions is expressed as the number of lending institutions per 1,000 district households. Dcred is dummy for credit demand.

Table 3.6: Effect of Local Financial Development on Household Investment

	<i>Investment in assets</i>	<i>Investment in assets in 10 years</i>	<i>Crop production expenses</i>	<i>Crop production revenue</i>
Income per equivalence scale	0.07 (0.30)	0.07 (0.29)	0.11* (1.77)	0.61* (1.87)
Area of owned land	13412.4** (5.10)	11675.2** (4.94)	1519.5** (2.72)	3708.2** (2.17)
Age of household head	4080.7** (2.13)	3280.8* (1.81)	-17.8 (-0.04)	184.2 (0.21)
Age of household head squared	-34.43** (-2.10)	-28.87* (-1.86)	-0.48 (-0.12)	-4.06 (-0.55)
Years of education of head	11700.6** (4.22)	9801.4** (3.60)	-410.2 (-0.77)	-2362.3 (-1.20)
Equivalence scale	51993.4** (2.76)	47032.6** (2.39)	4295.8 (1.51)	6367.6 (0.88)
Equivalence scale squared	-55813.9 (-1.24)	-48369.3 (-1.02)	-3963.4 (-0.53)	11442.2 (0.59)
Number of children	-8016.6 (-1.31)	-6054.7 (-0.99)	-1635.6* (-1.68)	-5251.8** (-1.98)
Marital status, married	17928.5* (1.91)	14343.8 (1.57)	557.7 (0.31)	6595.3 (1.43)
Female headed household	-6719.4 (-0.79)	-6211.1 (-0.77)	-2368.9 (-1.32)	-6757.8 (-1.40)
Occupation, farmer	-15098.5 (-1.42)	-16166.7 (-1.55)	-893.7 (-0.37)	232.4 (0.06)
Occupation, informal worker	-13640.3 (-1.08)	-16553.1 (-1.36)	-7899.8** (-2.47)	-20705.0** (-3.58)
Occupation, formal worker	-18319.6 (-0.84)	-17684.8 (-0.82)	-6975.1 (-1.61)	-18046.0* (-1.93)
Occupation, government official	40654.3 (1.37)	42004.0 (1.42)	-7547.8 (-1.51)	-17900.7 (-1.10)
Occupation, business owner	91803.2** (3.12)	89811.4** (3.10)	-14447.0** (-3.45)	-49775.0** (-3.36)
Ratio of loan defaults to all loans	-80604.1** (-2.72)	-74811.9** (-2.56)	18271.9 (1.11)	77369.7 (0.91)
Ratio of late payments to all loans	-39291.5** (-2.38)	-40400.5** (-2.46)	-174.3 (-0.07)	1896.9 (0.15)
Findevn	-30716.1 (-1.35)	-23869.9 (-1.13)	7098.4 (1.35)	15757.8 (0.85)
Findevn*dummy for credit demand	36235.4** (2.77)	24121.8** (2.11)	13900.2** (4.86)	36473.0** (4.43)
Constant	-141560** (-2.11)	-110329.0* (-1.69)	5440.8 (0.32)	-24936.4 (-0.63)
R-squared	0.163	0.144	0.127	0.220
p-value	0.000	0.000	0.000	0.000

Table 3.6: Effect of Local Financial Development on Household Investment (continued)

	<i>Crop production profit</i>	<i>Crop revenue per area</i>	<i>Crop profit per area</i>
Income per equivalence scale	0.50* (1.88)	0.12** (2.02)	0.11** (2.14)
Area of owned land	2188.7* (1.79)	-1109.7 (-1.60)	-798.6 (-1.28)
Age of household head	202.0 (0.32)	5759.6** (2.06)	5751.5** (2.02)
Age of household head squared	-3.59 (-0.66)	-51.36** (-2.04)	-51.41** (-2.01)
Years of education of head	-1952.2 (-1.25)	-1152.0** (-2.00)	-482.3 (-0.78)
Equivalence scale	2071.8 (0.39)	53022.0 (1.30)	48249.7 (1.17)
Equivalence scale squared	15405.6 (1.03)	-205234.3 (-1.49)	-189152.8 (-1.37)
Number of children	-3616.2* (-1.76)	23977.2* (1.77)	23285.0* (1.73)
Marital status, married	6037.6* (1.70)	6376.2 (0.60)	5318.3 (0.51)
Female headed household	-4388.8 (-1.14)	2364.6 (0.34)	2051.4 (0.30)
Occupation, farmer	1126.2 (0.33)	-79111.3* (-1.75)	-78874.3* (-1.74)
Occupation, informal worker	-12805.2** (-3.00)	-47495.9 (-0.92)	-67585.7 (-1.33)
Occupation, formal worker	-11070.94 (-1.40)	-53937.71 (-1.09)	-77046.62 (-1.54)
Occupation, government official	-10352.9 (-0.79)	-71034.9 (-1.50)	-74252.6 (-1.57)
Occupation, business owner	-35328.0** (-3.05)	-77341.9 (-1.62)	-76746.2 (-1.61)
Ratio of loan defaults to all loans	59097.9 (0.85)	4415.9 (0.37)	2473.9 (0.24)
Ratio of late payments to all loans	2071.3 (0.19)	-7525.9 (-0.84)	-3965.8 (-0.44)
Findevn	8659.5 (0.62)	3096.6 (0.15)	-1129.52 (-0.06)
Findevn*dummy for credit demand	22572.8** (3.59)	28814.7** (2.01)	22960.2 (1.64)
Constant	-30377.2 (-1.01)	148042.0 (1.07)	126296.1 (0.89)
R-squared	0.217	0.038	0.032
p-value	0.000	0.000	0.000

Table 3.7: Robustness Test - Effect of Alternative Measures of Local Financial Development on Household Investment in Productive Assets in Past 10 Years

<i>Investment in past 10 years</i>	(1)	(2)	(3)	(4)	(5)
Findevn	-23869.9 (-1.13)				
Findevn*Dcred	24121.8** (2.11)				
No. financial insti		-1938.6 (-0.59)			
No. financial insti* Dcred		2234.3** (2.32)			
No. formal insti			-27373.9 (-0.41)		
No. semi-formal insti			-1509.8 (-0.47)		
No. formal insti* Dcred			11169.8 (0.12)		
No. semi-formal insti* Dcred			1993.3 (0.82)		
No. commercial banks				-26023.1 (-0.38)	
No. BAAC				-165764.1 (-0.68)	
No. cooperatives				3905.26 (0.17)	
No. village funds				258.30 (0.07)	
No. commercial bank* Dcred				-2665.5 (-0.03)	
No. BAAC* Dcred				104463.1 (0.37)	
No. cooperatives* Dcred				38694.3 (1.11)	
No. village funds* Dcred				-153.9 (-0.05)	
Time to nearest bank					-603.6** (-2.17)
Time to nearest bank* Dcred					571.9** (2.19)
R-squared	0.144	0.144	0.144	0.146	0.144
p-value	0.000	0.000	0.000	0.000	0.000
No. Obs	2186	2186	2186	2186	2186

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

Number of lending institutions is expressed as the number of lending institutions per 1,000 district households. Dcred is dummy for credit demand.

Table 3.8: Robustness Test - Effect of Alternative Measures of Local Financial Development on Expenditures on Crop Production

<i>Crop expenditures</i>	(1)	(2)	(3)	(4)	(5)
Findevn	7098.4				
	(1.35)				
Findevn*Dcred	13900.2**				
	(4.86)				
No. financial insti		-326.4			
		(-0.48)			
No. financial insti* Dcred		1228.3**			
		(4.70)			
No. formal insti			9689.7		
			(0.46)		
No. semi-formal insti			-463.5		
			(-0.53)		
No. formal insti* Dcred			4456.6		
			(0.16)		
No. semi-formal insti* Dcred			1173.8*		
			(1.68)		
No. commercial banks				13463.3	
				(0.59)	
No. BAAC				3110.2	
				(0.05)	
No. cooperatives				-5400.4	
				(-0.88)	
No. village funds				-238.9	
				(-0.22)	
No. commercial bank* Dcred				4442.2	
				(0.15)	
No. BAAC* Dcred				-13579.3	
				(-0.23)	
No. cooperatives* Dcred				1647.2	
				(0.26)	
No. village funds* Dcred				1282.7	
				(1.51)	
Time to nearest bank					-171.4**
					(-2.33)
Time to nearest bank* Dcred					275.3**
					(4.43)
R-squared	0.127	0.112	0.113	0.115	0.109
p-value	0.000	0.000	0.000	0.000	0.000
No. Obs	2186	2186	2186	2186	2186

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

Number of lending institutions is expressed as the number of lending institutions per 1,000 district households. Dcred is dummy for credit demand.

Table 3.9: Robustness Test - Effect of Alternative Measures of Local Financial Development on Revenue from Crop Production

<i>Crop revenue</i>	(1)	(2)	(3)	(4)	(5)
Findevn	15757.8				
	(0.85)				
Findevn*Dcred	36473**				
	(4.43)				
No. financial insti		-1556.2			
		(-0.79)			
No. financial insti* Dcred		3295.4**			
		(3.82)			
No. formal insti			80271.6		
			(0.82)		
No. semi-formal insti			-3422.2		
			(-1.00)		
No. formal insti* Dcred			-97109.8		
			(-0.90)		
No. semi-formal insti* Dcred			5650.21*		
			(1.84)		
No. commercial banks				90704.3	
				(0.84)	
No. BAAC				481496.7	
				(1.54)	
No. cooperatives				-24355.4	
				(-0.97)	
No. village funds				-6668.3	
				(-1.44)	
No. commercial bank* Dcred				-106250.4	
				(-0.88)	
No. BAAC* Dcred				-422116.5	
				(-1.36)	
No. cooperatives* Dcred				6320.4	
				(0.25)	
No. village funds* Dcred				8153.9*	
				(1.96)	
Time to nearest bank					-484.1**
					(-2.35)
Time to nearest bank* Dcred					716.9**
					(4.81)
R-squared	0.220	0.212	0.212	0.216	0.209
p-value	0.000	0.000	0.000	0.000	0.000
No. Obs	2186	2186	2186	2186	2186

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

Number of lending institutions is expressed as the number of lending institutions per 1,000 district households. Dcred is dummy for credit demand.

Table 3.10: Effect of Local Financial Development on Household Consumption

	<i>Consumption expenditures</i>	<i>Food consumption</i>	<i>Non-food consumption</i>
Income per equivalence scale	0.20** (6.25)	0.05** (4.21)	0.03** (3.67)
Area of owned land	2086.98** (3.18)	-106.08 (-0.58)	290.84** (2.82)
Age of household head	800.41 (0.79)	-155.41 (-0.60)	326.08** (2.58)
Age of household head squared	-10.75 (-1.33)	-0.04 (-0.02)	-3.19** (-2.97)
Years of education of household head	3611.97** (4.56)	747.14** (2.64)	674.57** (3.89)
Equivalence scale	4837.37 (0.69)	423.96 (0.17)	2325.56 (1.33)
Equivalence scale squared	31261.56* (1.70)	15535.42** (2.34)	1242.17 (0.27)
Number of children	-4759.36* (-1.70)	-2119.08** (-2.26)	-375.23 (-0.83)
Marital status, married	2764.82 (0.62)	727.43 (0.46)	820.19 (1.02)
Female headed household	2310.86 (0.59)	1060.23 (0.78)	1427.19** (2.08)
Occupation, farmer	-10565.54** (-2.45)	-4496.72** (-2.75)	-2128.52** (-2.77)
Occupation, informal worker	-14715.98** (-2.65)	-2230.71 (-0.97)	-2488.76** (-2.78)
Occupation, formal worker	-510.81 (-0.07)	3644.24 (1.24)	165.13 (0.11)
Occupation, government official	14930.18 (1.46)	961.05 (0.26)	4422.03 (1.63)
Occupation, business owner	26676.14** (3.18)	6548.99** (2.62)	5798.97** (4.25)
Ratio of loan defaults to total loans	4506.96 (0.49)	4270.24 (0.99)	354.27 (0.21)
Ratio of late repayments to total loans	13494.44 (1.42)	10479.76 (1.55)	1523.64 (1.21)
Findevn	-9336.62 (-0.90)	-8324.58 (-1.56)	-1461.42 (-0.81)
Findevn*dummy for credit demand	20794.84** (4.18)	5867.02** (3.56)	884.98 (0.85)
Constant	-30881.73 (-0.86)	6167.83 (0.56)	-8277.24 (-1.45)
R-squared	0.126	0.114	0.184
p-value	0.000	0.000	0.000
No. Obs	2186	2186	2186

Table 3.11: Robustness Test - Effect of Alternative Measures of Local Financial Development on Household Consumption

<i>Consumption expenditures</i>	(1)	(2)	(3)	(4)	(5)
Findevn	-9336.6 (-0.90)				
Findevn*Dcred	20794.8** (4.18)				
No. financial insti		-2617.3 (-1.49)			
No. financial insti* Dcred		1787.0** (4.29)			
No. formal insti			42640.0* (1.72)		
No. semi-formal insti			-3336.4* (-1.79)		
No. formal insti* Dcred			-7835.1 (-0.21)		
No. semi-formal insti* Dcred			2076.9** (2.43)		
No. commercial banks				36083.6 (1.36)	
No. BAAC				-101439.2 (-1.47)	
No. cooperatives				14977.5 (1.08)	
No. village funds				-1874.0 (-0.89)	
No. commercial bank* Dcred				5117.3 (0.13)	
No. BAAC* Dcred				-23857.6 (-0.28)	
No. cooperatives* Dcred				2712.6 (0.19)	
No. village funds* Dcred				2084.5* (1.92)	
Time to nearest bank					-548.6** (-2.81)
Time to nearest bank* Dcred					420.8** (3.92)
R-squared	0.126	0.125	0.127	0.131	0.126
p-value	0.000	0.000	0.000	0.000	0.000
No. Obs	2186	2186	2186	2186	2186

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

Number of lending institutions is expressed as the number of lending institutions per 1,000 district households. Dcred is dummy for credit demand.

Chapter 4

4. Assessing the Impacts of Village Funds on Access to Finance in Rural Thailand²⁴

4.1 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?

²⁴ This chapter is based on the article “Village Funds and Access to Finance in Rural Thailand” written by Lukas Menkhoff and Ornsiri Rungruxsirivorn.

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.²⁵ Insights converge

²⁵ 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

towards the following findings with respect to the characteristics of borrowers, their purpose of borrowing and credit contracts:

- 1 Informal *borrowers* have lower income, lower assets, tend to be less educated and realized more frequently earlier default.
- 2 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.
- 3 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 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

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.

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.²⁶ 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 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 4.2 informs about Thailand's rural credit market, Section 4.3 introduces the data used in our research. Descriptive statistics about the village funds (in relation to other financial institutions) are provided in Section 4.4, whereas regression approaches analyzing the contribution of the village funds are discussed in Section 4.5. Section 4.6 discusses resulting policy considerations and Section 4.7 concludes.

²⁶ 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, 2005).

4.2 Thailand's rural credit market

4.2.1 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?

4.2.2 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.²⁷ 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 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

²⁷ 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.

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.

4.3 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.

4.4 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 4.4.1). We also describe characteristics of borrowing households, borrowing purposes as stated by households and characteristics of loan contracts (Section 4.4.2).

4.4.1 Aggregate statistics about the village funds and other lenders

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).²⁸ 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).²⁹ A sixth lending institution is various kinds of moneylenders (ML) and finally, relatives and friends (RELA) form another source of borrowing for rural households.³⁰

Table 4.1 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

²⁸ 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).

²⁹ 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.

³⁰ 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.

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.

4.4.2 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 4.2](#) 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.³¹

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

³¹ 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.

an intermediate position between formal (CB, BAAC) and informal institutions (CRED, POLICY, ML, RELA). This intermediate position applies – in the order of Table 4.2 – 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. 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 wide-spread; 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.

4.5 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 4.5.1). Second, we assess the aimed impact of VF which is to mitigate the credit constraints of rural households (Section 4.5.2). Finally, Section 4.3 provides some robustness analyses.

4.5.1 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 4.5.3).

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

$$\text{Prob}(y_{ij} = k) = \frac{\exp(\alpha_k X_i + \beta_k Z_j + \gamma_k D_p)}{\sum_{m=1}^7 \exp(\alpha_m X_i + \beta_m Z_j + \gamma_m D_p)} \quad (4.1)$$

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 4.3](#). 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 4.4](#).

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 4.2](#) 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. 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 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.

4.5.2 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 4.1](#) 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.³² 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.

³² 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.

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:

$$\text{Prob}(\text{apply}_i = 1) = \frac{\exp(\delta X1_i + \phi D_p)}{1 + \exp(\delta X1_i + \phi D_p)} \quad (4.2)$$

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. 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:

$$\text{Prob}(\text{ration}_i = 1) = \frac{\exp(\alpha_1 X2_i + \beta_1 w_j + \gamma_1 D_p)}{1 + \exp(\alpha_1 X2_i + \beta_1 w_j + \gamma_1 D_p)} \quad \text{if } \text{apply}_i = 1 \quad (4.3)$$

$$w_i = \alpha_2 X2_i + \beta_2 Z_i + \gamma_2 D_p + \varepsilon_i \quad (4.4)$$

where $ration_i$ is a binary variable taking a value of one if a household is fully or partially credit rationed.³³ $X2_i$ 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 4.5](#). *Column (1)* of the table shows the estimated coefficients for the selection equation. *Column (2)* presents the estimated coefficients from the first stage regression where the endogenous variable – the amount of VF credit – is regressed on all exogenous variables including the instruments. *Column (3)* shows the estimated coefficients from the second stage regression where the probability of credit constraint is estimated.

Results from the first stage regression (*Column 2*) 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.

³³ 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.

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. Results in *Column (1)* suggest 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.

4.5.3 Robustness tests

This section tackles several possible concerns with the baseline results. First, we check the robustness of our results in Section 4.5.1 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 [Table 4.6](#)).

Second, we evaluate the robustness of the main findings in Section 4.5.2 to the use of an alternative measure for credit constraint. In Section 4.5.2 we measure credit constraint by a binary variable, 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.³⁴ We find that, at 10 percent significance level, the degree of credit constraint is reduced by a larger amount of VF credit (Table 4.7). 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 4.5.2 with regard to the use of an alternative measure for VF impact. Recall that in Section 4.5.2, 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 (Table 4.8).

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.

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 analyses in Sections 4.5.1 and 4.5.2 separately for male and female

³⁴ Degree of credit constraint = 1 - (amount of credit actually received/ amount of credit applied).

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 ([Table 4.9a](#), [Table 4.9b](#)). We also find that VF has significant impact in reducing credit constraint for male headed households but not so for female headed households ([Table 4.10a](#), [Table 4.10b](#)). 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.

4.6 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.

4.7 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.

Table 4.1: Number of Loans, Number of Borrowing Households and Volume of Credit by Lending Institution

	<i>CB</i>	<i>BAAC</i>	<i>VF</i>	<i>CRED</i>	<i>POLICY</i>	<i>ML</i>	<i>RELA</i>	<i>Total</i>
Total sample								
Number of outstanding loan contracts	134	1,030	1,629	605	275	368	301	4,342
Number of borrowing households ⁽¹⁾	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
Loans received in 2006-2007								
Number of outstanding loan contracts	64	757	1,427	442	165	228	225	3,308
Number of borrowing households ⁽²⁾	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:

(1) 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.

(2) 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 4.2: Descriptive Statistics on Borrower and Loan Characteristics by Lending Institution

	<i>CB</i>	<i>BAAC</i>	<i>VF</i>	<i>CRED</i>	<i>POLICY</i>	<i>ML</i>	<i>RELA</i>	<i>Ave.</i>
Panel A: Characteristics of borrower								
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 of household head	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 (hectare)	2.7	2.5	2.5	1.9	1.7	1.5	1.9	2.1
Value of loan defaults to total loans	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
Panel B: Purpose of borrowing								
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%
Panel C: Characteristics of loan contract								
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 interest free loans	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%
guarantee	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 4.3: Results of the Hausman test and the Small-Hsiao test for IIA

	<i>Hausman test</i>			<i>Small-Hsiao test</i>		
	test statistic	p-value	evidence	test statistic	p-value	evidence
CB	-0.838	- ^(a)	-	93.413	0.382	for IIA
BAAC	-27.01	- ^(a)	-	93.282	0.385	for IIA
VF	-30.427	- ^(a)	-	90.918	0.453	for IIA
CRED	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	- ⁽¹⁾	-	93.633	0.376	for IIA

Note:

(1) 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 4.4: Multinomial Logit Predicting the Choice of Lender by Borrowing Households

	<i>CB</i>	<i>BAAC</i>	<i>CRED</i>	<i>POLICY</i>	<i>ML</i>	<i>RELA</i>
Household characteristics						
Age of 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 head	-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	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	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 loan defaults	0.0543 (0.07)	-1.1591** (-3.46)	-0.4332 (-1.43)	-0.5763 (-1.22)	-0.0314 (-0.08)	0.1844 (0.53)

Table 4.4: Multinomial Logit Predicting the Choice of Lender by Borrowing Households (continued)

	<i>CB</i>	<i>BAAC</i>	<i>CRED</i>	<i>POLICY</i>	<i>ML</i>	<i>RELA</i>
Loan characteristics						
Agricultural production	-1.3117**	-0.0555	0.0114	0.1424	-0.5351**	-0.8458**
	(-3.28)	(-0.39)	(0.06)	(0.45)	(-2.24)	(-3.42)
Consumption loan	-0.7464**	-0.4552**	0.3328*	0.6033*	0.3908*	0.0157
	(-2.39)	(-3.09)	(1.79)	(1.93)	(1.79)	(0.07)
Shock related borrowing	0.4689	0.2458	-0.0004	0.0050	0.8104**	1.4341**
	(0.94)	(1.32)	(-0.00)	(0.01)	(3.44)	(6.34)
Province dummies						
Buri Ram	0.1844	0.2779*	-0.0001	-0.0227	0.6669**	0.0143
	(0.40)	(1.75)	(-0.00)	(-0.09)	(2.71)	(0.06)
Ubon	-0.2354	0.1427	-0.0514	-0.1833	-0.6690**	-0.1535
	(-0.57)	(0.93)	(-0.28)	(-0.76)	(-2.49)	(-0.65)
Constant	-1.7871*	-1.3554**	-1.8469**	-1.8038**	-2.2833**	-1.0698
	(-1.84)	(-3.79)	(-4.28)	(-2.84)	(-3.86)	(-1.55)
Pseudo R2	0.052					
No. Obs	61	745	429	165	226	217

Note: 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 4.5: Impact of Village Fund Credit on Probability of Credit Constraint

<i>Probability of credit constraint</i>	(1)	(2)	(3)
Household characteristics			
Age of head	-0.0141** (-5.08)	-0.0153 (-1.39)	0.0071 (0.94)
Female head	-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	-0.0022 (-1.37)	-0.0060 (-1.54)	-0.0014 (-0.51)
Assets	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 loan defaults	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)

Table 4.5: Impact of Village Fund Credit on Probability of Credit Constraint (continued)

<i>Probability of credit constraint</i>	(1)	(2)	(3)
Instruments			
Number of village households		-0.0111** (-2.78)	
Interest rate on VF credit		-0.0768 (-1.55)	
Amount of VF credit (in 10,000 Baht, predicted)			-0.1552** (-2.29)
No. Obs	2,141	1,742	1,742

Note: 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.

Table 4.6: Robustness Test - Multinomial Probit Predicting the Choice of Lender by Borrowing Households

	<i>CB</i>	<i>BAAC</i>	<i>CRED</i>	<i>POLICY</i>	<i>ML</i>	<i>RELA</i>
Household characteristics						
Age of 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 head	-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	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	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 loan defaults	-0.1231 (-0.32)	-0.7895** (-3.48)	-0.3294 (-1.59)	-0.3982 (-1.50)	-0.0721 (-0.30)	0.0557 (0.25)

Table 4.6: Robustness Test - Multinomial Probit Predicting the Choice of Lender by Borrowing Households (continued)

	<i>CB</i>	<i>BAAC</i>	<i>CRED</i>	<i>POLICY</i>	<i>ML</i>	<i>RELA</i>
Loan characteristics						
Agricultural production	-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)
Province dummies						
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

Note: 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 4.7: Robustness Test - Impact of Village Fund Credit on Degree of Credit Constraint

<i>Degree of credit constraint</i>	(1)	(2)	(3)
Instruments			
Number of village households		-0.0111** (-2.78)	
Interest rate on VF credit		-0.0768 (-1.55)	
Amount of VF credit (in 10,000 Baht, predicted)			-0.0787* (-1.93)
No. Obs	2,141	1,742	1,742

Note: 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.
Coefficients on other variables are not shown in the table.

Table 4.8: Robustness Test - Impact of Village Fund Participation on Probability of Credit Constraint

<i>Probability of credit constraint</i>	(1)	(2)	(3)
Instruments			
Number of village households		-0.0025** (-2.58)	
Interest rate on VF credit		-0.0290 (-1.41)	
VF participation (predicted)			-0.9416** (-2.79)
No. Obs	2141	1742	1742

Note: 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.
Coefficients on other variables are not shown in the table.

Table 4.9a: Robustness Test - Multinomial Logit Model of Lender Choice for Male Headed Households

<i>Male</i>	<i>CB</i>	<i>BAAC</i>	<i>CRED</i>	<i>POLICY</i>	<i>ML</i>	<i>RELA</i>
Household characteristics						
Age of 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	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	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 loan defaults	0.1954 (0.22)	-1.4641** (-3.84)	-0.4747 (-1.28)	-0.3607 (-0.68)	0.1520 (0.35)	0.0147 (0.04)

Table 4.9a: Robustness Test - Multinomial Logit Model of Lender Choice for Male Headed Households (continued)

<i>Male</i>	<i>CB</i>	<i>BAAC</i>	<i>CRED</i>	<i>POLICY</i>	<i>ML</i>	<i>RELA</i>
Loan characteristics						
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)
Province dummies						
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

Note: 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 4.9b: Robustness Test - Multinomial Logit Model of Lender Choice for Female Headed Households

<i>Female</i>	<i>CB</i>	<i>BAAC</i>	<i>CRED</i>	<i>POLICY</i>	<i>ML</i>	<i>RELA</i>
Household characteristics						
Age of 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	-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	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 loan defaults	-0.8664 (-0.41)	-0.2895 (-0.47)	-0.3058 (-0.58)	-1.0993 (-1.02)	-0.8799 (-0.98)	0.5284 (0.85)

Table 4.9b: Robustness Test - Multinomial Logit Model of Lender Choice for Female Headed Households (continued)

<i>Female</i>	<i>CB</i>	<i>BAAC</i>	<i>CRED</i>	<i>POLICY</i>	<i>ML</i>	<i>RELA</i>
Loan characteristics						
Agricultural production loan	-2.6701**	-0.2855	0.1641	0.2014	-2.0056**	-0.3252
	(-1.97)	(-0.92)	(0.48)	(0.37)	(-3.85)	(-0.66)
Consumption loan	-1.5579**	-0.4232	0.4522	0.1978	0.2484	0.3183
	(-1.98)	(-1.35)	(1.34)	(0.35)	(0.66)	(0.71)
Shock related borrowing	1.6529*	0.2488	0.0030	0.5402	0.8038*	1.2251**
	(1.77)	(0.66)	(0.01)	(1.13)	(1.73)	(2.68)
Province dummies						
Buri Ram	0.0231	0.0540	-0.3320	-0.1706	0.0883	0.4346
	(0.02)	(0.17)	(-0.99)	(-0.35)	(0.18)	(0.93)
Ubon	-0.9622	-0.1141	-0.2937	-0.0727	-0.6637	-0.1108
	(-1.15)	(-0.36)	(-0.94)	(-0.15)	(-1.47)	(-0.23)
Constant	-1.7868	-1.2223	-2.3222**	-1.4211	-1.9846**	-1.5157
	(-0.89)	(-1.54)	(-3.20)	(-1.32)	(-2.14)	(-0.91)
Pseudo R2	0.081					
No. Obs	14	149	122	43	65	57

Note: 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 4.10a: Robustness Test - Impact of Village Fund Credit on Probability of Credit Constraint for Male Headed Households

<i>Probability of credit constraint</i>	(1)	(2)	(3)
Instruments			
Number of village households		-0.0115** (-2.83)	
Interest rate on VF credit		-0.0737 (-1.36)	
Amount of VF credit (in 10,000 Baht, predicted)			-0.2395** (-3.62)
No. Obs	1578	1302	1302

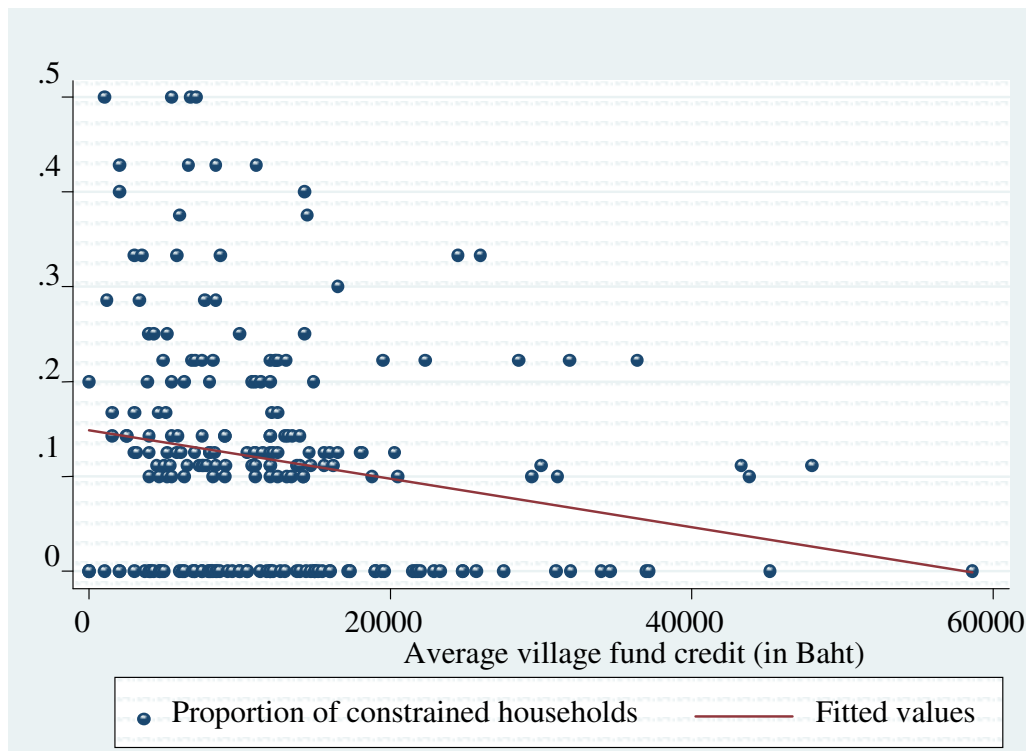
Note: t-statistics in parentheses, * p<0.10, ** p<0.05.
Income and assets are divided by 10,000 to rescale estimates into convenient numbers.
Coefficients on other variables are not shown in the table.

Table 4.10b: Robustness Test - Impact of Village Fund Credit on Probability of Credit Constraint for Female Headed Households

<i>Probability of credit constraint</i>	(1)	(2)	(3)
Instruments			
Number of village households		-0.0093** (-2.17)	
Interest rate on VF credit		-0.0882 (-1.05)	
Amount of VF credit (in 10,000 Baht, predicted)			0.1082 (0.61)
No. Obs	563	440	440

Note: t-statistics in parentheses, * p<0.10, ** p<0.05.
Income and assets are divided by 10,000 to rescale estimates into convenient numbers.
Coefficients on other variables are not shown in the table.
Fwork is dropped as it is collinear with other variables.

Figure 4.1: 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.

Chapter 5

5. Collateral and Lending in Rural Credit Markets: Evidence from Thailand³⁵

5.1 Introduction

Collateral is a normal ingredient of risky lending. Collateral serves to limit potential losses for lenders and serves as a commitment signal from the viewpoint of borrowers. In any case, it plays an important role in loan markets. According to evidence from mature markets, collateral is part of many if not most loan contracts. Due to opaque information and weak enforcement, the incidence of collateral is even higher in developing markets (Hainz, 2003, Menkhoff et al., 2006). This high importance of collateral results into a problem for poor households in developing countries: collateral requirements are expected to be particularly high for this group but their ability to provide collateral is comparatively low. How do borrowers and lenders get along with this problem?

In principle, there may be two possibilities: first, collateral requirements are unchanged so that poor households who lack adequate assets to pledge as collateral will be credit-rationed; second, conventional collaterals are not necessary and lenders can issue some credit without collateral. In the latter case, the follow-up question is then how can a lender enforce a collateral-free loan? Is it through the collateral substitutes such as third party guarantees and pledged savings, through some relationships or inter-linkages with other markets, or on the basis of interpersonal trust?

In order to answer these questions, first we examine the collateral types used by lending institutions operating in the rural credit markets in order to identify which scenario fits our data. We also summarize the key features of collateral offered and link with household wealth, source of loan, interest rate and other terms of loan contracts. We shall see that the second scenario is more consistent with our data; that is, a large number of loans in the rural areas are issued without any tangible collateral. Then we use

³⁵ This chapter is based on the following article “Collateral and Lending to Rural Households in Thailand” written by Lukas Menkhoff and Ornsiri Rungruxsirivorn.

regression techniques to analyze how lenders enforce collateral-free contracts and what factors affect lenders' decisions to give loans without any collateral

The paper is organized in four more sections. Section 5.2 informs about the data used in this study and the types of financial institutions operating in the rural areas. In Section 5.3, we highlight the key characteristics of collateral used in the rural credit markets. Further hypotheses and regression results on the use of collateral are examined in Section 5.4. Section 5.5 concludes.

5.2 Data and institutions

5.2.1 Data compilation

The data used in this analysis is based on a household survey conducted in 2007 in three provinces in the Northeast region of Thailand. The survey is part of the project "Impact of shocks on the vulnerability to poverty: consequences for development of emerging Southeast Asian economies" (DFGFOR756), funded by the German Research Foundation (DFG). The Northeast region is particularly interesting for our study because it is often considered the poorest region with limited access to formal financial markets and with various types of informal lenders operating in the areas.

A three stage sampling design was used to select the households. Within each of the three provinces, sub-districts were first randomly selected with probability proportional to population density. Then within each sub-district, two villages were chosen at random. Finally, within each village, 10 households are randomly selected. In total, the survey covers 2,186 households from 220 villages in 110 sub-districts of the three provinces. Details on sample selection of the survey are contained in Hardeweg et al. (2007).

The data set contains detailed information on household characteristics and their activities profile for the reference period May 2006 – April 2007. Our data set is particularly rich for financial data, including borrowing, savings, lending, credit denials, loan defaults and related credit contracts.

5.2.2 Household borrowing

Table 5.1 presents the sample means and standard deviations for some of the selected variables for different income groups. Households are classified into three income groups: the low-income, the middle-income and the high-income.³⁶

There seems to be little difference between the income groups with respect to household demographic characteristics. The average family size is 3.98 persons or 2.83 in adult equivalent units.³⁷ The level of educational attainment for these households is low, as the average year of schooling for the head of household is only 5 years. However the proportion of households with more than secondary education is higher in the high-income group. The majority of households are farmers in all income groups. Nevertheless formal employment and non-farm self-employment are more important in the high-income group.

Households with different income levels tend to differ with regard to wealth variables. Whereas differences between the low-income and the middle-income group are in general not much, the high-income group, by contrast, differs significantly in income, consumption and assets. In particular, land ownership, consumption expenditures and assets are almost twice as much for this group as for the other two groups.

Regarding household borrowings, the data reveal that these households exhibit a high degree of borrowing, as more than 70 percent of the households have taken some loans during the reference period. Moreover having multiple loans contracted by one household is not uncommon, as the average number of loans per household is about 1.5 loans. Significant differences also occur between the income groups with respect to household borrowing. Whereas there are no big differences in the number of loans between the three groups, the amount of loans differ significantly. The high-income households borrow about twice as much as the low and middle income households, suggesting that the high-income households can obtain loans with larger size than the low and middle-income households. When we consider loan amount relative to household

³⁶ A household is classified as low-income if household income per adult equivalent unit falls below the Northeast poverty line, which is 1,316 Baht/person/month. A household is classified as middle-income if income is above the poverty line but below twice the poverty line, and as high-income if income is above twice the poverty line.

³⁷ We use the OECD adult equivalence scale which assigns the weight of 1.0 for the first adult member, 0.7 to each additional adult, and 0.5 to each child.

income, we find that the low-income households have the largest loan-income ratio, and that the loan-income ratio tend to decrease with household income. As for the interest rate, the high income households pay a much lower interest rate as compared to the low and middle-income households. The incidence of credit rationing and loan defaults are low for the three types of households and are not statistically different. However poorer households are more likely to face credit denials.

In summary, we find that a large number of rural households have access to the credit markets and that the poor are not statistically different from the rich in terms of credit rationing. Both observations seem to be inconsistent with the first scenario that collateral requirements are unchanged and that the poor who lack adequate assets will be credit rationed. Later, we shall find that the second scenario is more consistent with the data; that is, the large quantity of loans is provided without land or any tangible assets as collateral.

5.2.3 Rural lending institutions

This section gives a brief overview of the financial institutions that operate in the rural areas. The rural credit markets in Thailand are characterized by a diverse set of lenders; some are formal, some are informal and some are considered somewhere in between. These lenders have characteristics that are distinct from one another. Instead of dividing these lenders into two major categories — the formal and informal sectors, we group these different lenders into seven categories. Ranked in descending order of formality, the first is commercial banks and state owned banks (CB). Commercial banks and state owned banks have the largest asset size but play small roles in the rural area. The second is the Bank for Agriculture and Agricultural Cooperatives (BAAC). BAAC was established in 1966 as a government owned agricultural development bank. Most of the loans issued by BAAC are for agricultural production purposes. BAAC normally does not require collateral in the form of land ownership and tangible assets but rather in the form of guarantor and joint liability. Among all banks – public and private banks, BAAC has the largest number of branches. The third is the million village funds (VF). This program was initiated in 2001 following in the spirit of other microfinance programs. It is also promoted as an attempt to improve access to credit for the poor. Under this program,

each fund was established in every village and the government injected 1 million Baht into each fund. Loan application process is done by the village fund committee selected by village members. The fourth is community-based organizations including cooperatives, rice banks, buffalo banks, savings and credit groups (CRED). Typically these cooperatives and credit groups are organized and administered by local community. The fifth is some policy loans with a narrow focus and at subsidized lending conditions, mainly the “Student Loan Fund” and the “Poverty Eradication Scheme” (POLICY)³⁸. The sixth is professional money lenders, including pawnshops and traders (ML). Finally the seventh is relatives and friends (RELA).

Table 5.2 describes the lending business of these lending institutions. It is clear that BAAC and VF are the most important source of credit in rural areas. Based on the survey data, 3,298 loans are made in 2006 - 2007, among which 43 percent are from VF and 23 percent are from BAAC. In terms of credit volume, BAAC dominates the rural credit markets due to its larger loan size while VF accounts for 23 percent of the total credit volume. Next in importance are CRED, ML and RELA. Interestingly, CB and POLICY play relatively smaller roles in the rural areas, both in terms of number of loans and credit volume.

The variation in loan characteristics across lenders is also presented. The formal financial institutions (CB and BAAC) provide larger loans whereas the more informal institutions provide loans with smaller size. Among informal lenders, ML provides relatively larger loans than the others. CB and BAAC tend to provide loans with longer duration than the others. There are great variations in interest rates within lending institutions and between lending institutions. Nevertheless some patterns can be derived. The groups of lending institutions that typically charge low interest rates are POLICY, RELA and VF. We note that while the average interest rate for RELA is higher than VF, nearly 70 percent of these loans are given at zero interest. BAAC and CRED are also

³⁸ The student loan fund and the poverty eradication scheme are treated as separate lending institution 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.

relatively “cheap” but more expensive than VF. Interestingly, the formal and the informal extremes, i.e. CB and ML, charge comparatively high interest rates.

These lending institutions seem to have their own market niche with respect to the purpose of borrowing. The more formal lending institutions lend disproportionately for production whereas the more informal ones lend more for consumption loans. Interestingly, ML and RELA seem to be used for shock related borrowing more than other lending institutions.

5.3 The use of collateral: disaggregated views

The use of collateral may depend on the source of loan, household wealth, borrowing purpose and interest rate. We describe the use of collateral by different lending institutions, income groups, borrowing purposes and terms of credit contracts in order to draw some inferences about their relationships.

5.3.1. Collateral by lending institution

The types of assets that are commonly accepted as collateral in the rural credit markets are land, durable goods, savings, future crop, and gold. We classify the types of collateral into three groups: land, asset substitutes and no collateral. [Table 5.3](#) shows the types of collateral accepted by different lending institutions. We see that all types of lending institutions issue some loans without any tangible assets as collateral. Even for the formal lending institutions such as CB and BAAC, nearly 65 percent of their loans is given without collateral.³⁹ The corresponding figures for the informal lenders are between 60 - 98 percent. Not all loans are collateral-free; in general formal lending institutions rely more on land collateral (about 35 percent of the loans from CB and BAAC) compared with the informal ones. Also, a considerable number of loans from CRED (15 percent) and ML (47 percent) are backed by land or asset substitutes. The exception is RELA which typically requires no collateral.

³⁹ State owned banks engage in two types of lending. The first is the typical lending to persons who are required to provide land collateral or a third party guarantee, usually guarantee from a government official. The second involves special policy loans which are disbursed via the state owned banks. In the latter case, collateral requirements may be waived or substituted by a third party guarantee.

Finally we find that the ratio of the value of collateral to loan size is very high overall. On average, the value of collateral is more than twice the value of loan. The proportion of more than fully collateralized loans is in the range of 50 percent to 100 percent. The high collateral ratio may be resulted from the low marketability of collateral, the difference between the lender and the borrower valuation of collateral, the restrictive collateral requirements by lenders, and the indivisibility in collateral.

5.3.2 Collateral by income of household

Table 5.4 describes the types of collateral for different income groups. Collateral requirements overall show a small variation across income groups, much less than they did across lending institutions. There are no dramatic differences between the income groups with respect to the types of collateral and the collateral to loan ratio. This is partly due to the fact that many households have multiple loans from multiple sources at the same time. In our data, we find that several high-income households borrow from the informal lenders like CRED, ML and RELA. Nevertheless we note that the proportion of loans without any collateral is slightly higher for the low and the middle-income households compared with the high-income households. This is quite consistent with the finding that the poor pay higher interest rates than the rich. In other words, the poor do not have adequate assets to pledge as collateral; having no collateral security, the lender charges high rates on these loans to maximize his interest income.

5.3.3 Collateral by borrowing purpose

We classify borrowing purposes into three categories: agricultural production, non-agricultural production and consumption. Table 5.5 shows the collateral requirements for different borrowing purposes. We first note that an equal number of loans are given for agricultural production and consumption whereas non-agricultural production loans account for 16 percent of total loans. Across all borrowing purposes, we see that a large share of loans is provided without tangible collateral. We also find that production loans are more likely to require land collateral, while consumption loans are less likely to require any collateral. However the collateral to loan amount ratio is, on

average, higher for consumption loans than production loans. Similar patterns are also observed for shock-related borrowings and normal borrowings; shock-related borrowings are less likely to require any collateral. Interestingly we find that the ratio of collateral to loan values is slightly lower for shock-related borrowings. This is quite surprising as one may expect that borrower who urgently needs of loan may be forced to accept restricted collateral arrangements.

5.3.4 Collateral and loan terms

Table 5.6 shows the average term of credit contracts secured by different types of collateral. There seems to be a relationship between the types of collateral and loan terms. We find that conventional collateral is related to larger loan size, longer duration, and lower interest rate. With the exception of collateral-free loans, we find an inverse relationship between the marketability of collateral and interest rates. According to the table, the interest rates are lower on loans secured by land, the most marketable collateral, and higher on loans secured by asset substitutes. We also look at loan requirements, in particular, whether the borrower is a member of the lending institution and whether a third party guarantee is required to get a loan. We find that the proportion of members and third party guarantees are higher for collateral-free loans than loans backed by land or asset substitutes.

5.4 The use of collateral: regressions

In this section, we analyze how lenders enforce collateral-free contracts and what factors affect lenders' decisions to give loans without any tangible collateral. We use the probit model to explain the choice between with and without collateral, and the ordered probit model to explain the choice between land collateral, asset substitutes and no collateral.

In our baseline regression, we exclude VF and POLICY from our analysis because the collateral policies of these institutions are institutionally fixed, i.e. loans are secured by third party guarantees. Alternatively we also exclude two more lending institutions: CB, since the share of CB in rural credit is very small, and RELA, since

relatives may provide loans based on altruism or trust but not based on the typical lending business.

The analysis is performed at the loan level because we observe several households borrowing multiple loans with varying loan terms from different sources. We account for the sampling design and adjust by stratum, sampling weights and population size of our sample.

In all regressions, we control for loan term variables, household characteristics, default risk and borrower-lender relationship. Loan term variables comprise loan size, duration, interest rate, borrowing purpose, and whether a third party guarantee is required to obtain a loan. It is expected that a third party guarantee is a substitute for conventional collateral. Thus lenders would require less collateral for loans with third party guarantees.

Household characteristics include the gender of the household head, the age of the household head, household number (measured in terms of equivalence scale), number of children, years of education of the household head, household income (measured per number of adult equivalence), and the amount of savings in the corresponding lending institution. It has been argued that some financial institutions treat savings as collateral substitute, using the savings to cover missed loan repayments. Some microfinance institutions even require mandatory savings as a condition of obtaining a loan. Our data allow us to trace how much savings a borrower has in a given financial institution.

Default risk is proxied by the value of loan defaults to total outstanding loans, the value of late repayments to total loans and the value of loans to assets. We proxy the borrower-lender relationship by three variables: membership status, whether the borrower has previously borrowed from the lender, and the number of lenders a borrower engages with to capture the exclusivity of the relationship. Finally a set of lender dummies is also included.

Results for the probit and ordered probit estimations are reported in [Table 5.7](#) and [Table 5.8](#) respectively. *Column (1)* of the table displays the results for the whole sample (CB, BAAC, CRED, ML, RELA); *Column (2)* for excluding CB; and *Column (3)* for excluding CB and RELA. Since the results are not completely different, we do not discuss them separately.

Our regressions display interesting results with respect to the terms of credit contracts. Loan size and loan duration are positively related to both the incidence and the degree of collateral. This finding is consistent with previous studies (Harhoff and Körting 1998, Elsas and Krahn 2000). This effect is logical as larger loan amount usually increases the incentive for default; loans with longer duration are also more difficult to monitor. With regard to interest rate, we find that the provision of collateral is negatively related to interest rate, that is conventional collateral is required for a loan with low interest rate. This finding is consistent with the function of collateral in increasing the lender's expected return (Binswanger 1982).⁴⁰ Production loans are more likely to require collateral than consumption loans.

Our main interest is in the coefficient on the third party guarantee. The effect is significantly negative on the 1 percent level, suggesting that a loan guarantee acts as a collateral substitute and allows a lender in the rural credit markets to enforce collateral-free loans.

Another potential form of collateral substitute is pledged savings. However we find no significant effect of savings on the use of collateral. Contrary to our expectation, savings do not act as a collateral substitute.

In general, the borrower-lender relationship appears to be negatively related to the use and the degree of collateral. A very important element seems to be whether a borrower has ever borrowed from a lender. Having previously borrowed from a lender reduces the likelihood of pledging collateral. Both membership status and number of lenders have expected signs but are not significant.

Regarding the effect of default risk, we find no significant effect of borrower's default risk on the use and the degree of collateral. Household wealth and other household characteristics appear to play no role on the provision of collateral. The lack of wealth effect is not completely surprising. One may argue that household wealth should be positively related to the provision of collateral as wealthier households have enough assets to pledge as collateral. However household wealth may indicate lower default risk;

⁴⁰ Collateral has three functions: it increases the expected return to lenders; it reduces borrowers' incentives to default; and it shifts the risk of missed payment from lenders to borrowers. For a given loan size, L , and probability of failure, p , the lender's expected return is $iL(1-p) + (C-L)p$. Thus from the point of view of expected return, interest and collateral are substitute.

thus poorer households may be required to pledge more collateral. The two effects may outweigh each other. Another possible explanation is related to the role of informal lenders. The informal lenders serve to solve this problem for the poor by giving loans without any collateral requirement but using informational advantages, social enforcement and collateral substitute. Thus for the informal lenders, wealth plays no role in the provision of collateral. Given the prevalence of the informal lenders in the Thai rural credit markets, the effect of wealth on the provision of collateral would become less important.

We find considerable differences between lenders with respect to their collateral requirements. As expected, CRED, ML and RELA are more likely to give loans without any collateral than BAAC. This is in line with the hypothesis that the informal lenders have informational advantages over the formal lenders. Testing for equality of coefficients on these dummies, we find that RELA is most likely to offer collateral-free loans, followed by ML, CRED and CB. Surprisingly our results show that CB requires less collateral than BAAC. This result is possibly driven by some special policy loans which are disbursed via the state banks. These policy loans usually require no land or asset substitutes as collateral.

5.5 Conclusions

This paper examines the use of collateral in the rural credit markets. Collateral is an important instrument for formal lending institutions. In general, collateral serves to limit potential losses to the lenders in case of loan defaults and reduce borrowers' incentives to default. Due to opaque information and weak enforcement, the incidence of collateral is expected to be even higher in developing markets. This high importance of collateral results into a problem for poor households in developing countries: collateral requirements are expected to be particularly high for this group but their ability to provide collateral is comparatively low. How do borrowers and lenders deal with this problem?

Our empirical examination yields four results. First we find that the conventional collateral is rarely used in the rural credit markets and that a large quantity of loans is provided without any tangible assets as collateral. Second, we find that lenders in the

rural credit markets can enforce collateral-free loans mainly through third party guarantees and the borrower-lender relationship. In particular, we find that borrowers who are previous customers of the lenders are less likely to pledge any assets as collateral. Third party guarantees significantly reduce the pledging of collateral whereas savings account which is another potential form of collateral substitute appears to play no role. Third, our results show no significant impacts of the borrower's wealth and default risk on the use of collateral. Finally, we find that lenders are more likely to require collateral for loans with larger amounts, longer duration and lower interest rates.

Table 5.1: Summary Statistics of Key Variables of Sample Households

	<i>Low income</i> (<i>n = 936</i>)		<i>Middle income</i> (<i>n = 587</i>)		<i>High income</i> (<i>n = 663</i>)	
	Mean	Std.	Mean	Std.	Mean	Std.
Demographics						
Female headed household	0.28	0.01	0.28	0.02	0.23	0.02
Marital status, married	0.77	0.01	0.77	0.02	0.80	0.02
Age of household head	55.43	0.47	55.30	0.67	52.95	0.51
Years of education of head	4.58	0.06	4.67	0.08	5.77	0.14
Equivalence scale	2.81	0.03	2.97	0.05	2.73	0.04
Household size	3.98	0.06	4.21	0.07	3.77	0.07
Number of children	1.43	0.04	1.38	0.05	1.05	0.04
Occupation						
Farmer	0.66	0.02	0.62	0.02	0.55	0.02
Informal worker	0.08	0.01	0.10	0.01	0.08	0.01
Formal worker	0.02	0.00	0.03	0.01	0.06	0.01
Government official	0.01	0.00	0.03	0.01	0.09	0.01
Business owner	0.05	0.01	0.06	0.01	0.13	0.01
Economically inactive	0.18	0.01	0.17	0.02	0.09	0.01
Wealth						
Area of owned land (hectare)	1.61	0.09	2.11	0.13	2.47	0.19
Income	8,184	1,862	67,198	1,198	222,742	14,847
Income per equivalence scale	2,761	691	22,603	188	85,924	5,645
Consumption expenditures	64,930	2,393	68,709	2,281	106,742	5,460
Total assets	666,307	31,473	893,108	66,895	1,611,767	107,132
Savings	9,836	1,394	12,209	1,221	43,592	5,534
Livestock and stored crops	23,988	1,192	29,846	1,687	46,221	4,063
Household durable goods	160,117	13,124	158,755	8,146	301,382	18,458
Land and buildings	472,366	21,513	692,297	66,165	1,220,573	95,454
Borrowing						
Dummy for borrowing	0.75	0.02	0.72	0.02	0.70	0.02
Number of loans	1.61	0.07	1.44	0.07	1.44	0.07
Volume of loans	43,811	3,032	39,231	3,493	71,458	6,353
Interest rate	17.26	5.33	11.89	1.28	10.70	1.50
Weighted average interest rate	9.97	2.45	8.26	1.10	7.24	1.49
Credit Access						
Dummy for credit rationing	0.11	0.01	0.09	0.01	0.08	0.01
Full rationing	0.07	0.01	0.05	0.01	0.04	0.01
Partial rationing	0.05	0.01	0.04	0.01	0.04	0.01
Dummy for loan default	0.03	0.01	0.03	0.01	0.03	0.01
Dummy for late repayment	0.12	0.01	0.11	0.01	0.08	0.01
Value of loan defaults: all loans	0.02	0.00	0.02	0.00	0.02	0.00
Value of late payment: all loans	0.07	0.01	0.06	0.01	0.04	0.01

Note: All other currency variables are in Thai Baht.

Table 5.2: Loan Characteristics by Lending Institution

	<i>CB</i>	<i>BAAC</i>	<i>VF</i>	<i>CRED</i>	<i>POLICY</i>	<i>ML</i>	<i>RELA</i>
No. borrowing households	57	569	1,076	336	147	194	192
% of all borrowing households	3.6%	35.8%	67.8%	21.2%	9.3%	12.2%	12.1%
No. loan items	61	757	1,427	436	165	227	225
% of total loans items	1.8%	23.0%	43.3%	13.2%	5.0%	6.9%	6.8%
Total credit value (mil Baht)	6.4	38.6	23.3	16.6	1.8	9.3	6.6
% of total credit volume	6.2%	37.6%	22.7%	16.2%	1.7%	9.1%	6.4%
Loan size (Baht)							
Mean	104,705	51,043	16,345	38,114	10,823	41,135	29,303
Std. dev	136,776.7	58,356.0	9,366.6	91,127.6	32,849.6	75,704.7	58,063.7
Loan duration (years)							
Mean	3.8	2.1	1.0	1.4	2.2	1.3	1.2
Std. dev	5.4	2.8	0.4	1.4	3.2	1.4	1.6
Interest rate (%)							
Mean	22.9%	9.5%	6.3%	11.1%	3.1%	55.0%	10.6%
Std. dev	27.03%	12.45%	7.49%	14.56%	6.62%	75.16%	29.80%
Weighted ave interest rate (%)							
Mean	21.4%	9.6%	6.1%	11.3%	3.9%	48.2%	9.0%
Std. dev	23.7%	11.2%	6.8%	11.4%	6.2%	66.0%	26.8%
Percentage of interest-free loans							
% of loan items	0.0%	1.1%	0.4%	6.2%	53.3%	2.6%	67.6%
% of credit volume	0.0%	0.7%	0.2%	1.1%	41.2%	1.5%	54.4%
Borrowing purpose (%)							
Farm production	21.3%	51.9%	44.9%	38.3%	37.6%	24.7%	24.4%
Non-farm production	37.7%	18.4%	15.5%	13.1%	10.9%	15.0%	20.0%
Consumption	39.3%	28.5%	38.5%	47.2%	50.9%	59.0%	55.1%
Shock related borrowing (%)							
	9.8%	6.9%	6.5%	7.1%	6.7%	14.1%	23.6%

Table 5.3: Collateral by Lending Institution

	<i>CB</i>	<i>BAAC</i>	<i>VF</i>	<i>CRED</i>	<i>POLICY</i>	<i>ML</i>	<i>RELA</i>
Percentage of loans							
Land	27.9%	36.7%	0.4%	12.8%	0.6%	27.7%	5.8%
Other assets	6.6%	1.1%	1.0%	3.4%	0.6%	9.4%	1.3%
None	65.6%	62.3%	98.6%	83.7%	98.8%	62.9%	92.8%
Mean value of collateral to loan size							
Land	2.89	4.32	2.01	5.57	1.12	4.56	5.32
Other assets	27.19	1.03	1.02	1.06	6.58	2.09	1.00
None	0	0	0	0	0	0	0
Median value of collateral to loan size							
Land	1.75	2.65	1.94	3.17	1.12	3.00	4.90
Other assets	3.50	1.07	0.05	0.50	6.58	1.18	1.00
None	0	0	0	0	0	0	0
Percentage of more than fully collateralized loans							
Land	76.5%	84.8%	66.7%	96.4%	100.0%	85.5%	92.3%
Other assets	100.0%	50.0%	21.4%	26.7%	100.0%	57.1%	0.0%
None	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Table 5.4: Collateral by Income Group

	<i>Low income</i>	<i>Middle income</i>	<i>High income</i>
Percentage of loans			
Land	12.6%	11.8%	15.0%
Other assets	1.9%	1.9%	2.3%
None	85.4%	86.3%	82.7%
Mean value of collateral to loan size			
Land	4.22	4.94	4.42
Other assets	1.35	8.19	3.85
None	0	0	0
Median value of collateral to loan size			
Land	2.50	3.00	3.07
Other assets	0.70	1.58	1.00
None	0	0	0
Percentage of more than fully collateralized loans			
Land	83.7%	83.8%	90.8%
Other assets	34.5%	62.5%	40.9%
None	0.0%	0.0%	0.0%

Table 5.5: Collateral by Borrowing Purpose

	<i>Borrowing purpose</i>			<i>Shock-related borrowing</i>	
	Agricultural production	Non-agricultural production	Consumption	No	Yes
	Percentage of loans				
Land	14.7%	19.8%	8.2%	13.0%	13.7%
Other assets	0.7%	4.9%	2.2%	1.9%	3.2%
None	84.6%	75.4%	89.6%	85.0%	83.1%
	Mean value of collateral to loan size				
Land	4.58	3.91	4.96	4.52	3.71
Other assets	0.87	1.75	6.68	4.09	1.95
None	0	0	0	0	0
	Median value of collateral to loan size				
Land	3.00	2.50	3.08	2.86	2.63
Other assets	0.97	1.08	1.00	1.00	1.50
None	0	0	0	0	0
	Percentage of more than fully collateralized loans				
Land	88.2%	85.8%	81.7%	86.8%	78.9%
Other assets	30.0%	50.0%	43.3%	37.9%	77.8%
None	0.0%	0.0%	0.0%	0.0%	0.0%

Table 5.6: Loan Terms by Type of Collateral

	<i>Land</i>	<i>Other assets</i>	<i>None</i>
Loan size	77,563	44,522	23,604
Loan duration	2.98	1.71	1.21
Interest rate	13.08	24.3	10.78
% Consumption loan	25.29%	44.78%	42.83%
% Membership	70.30%	43.28%	80.32%
% Third party guarantee	54.76%	25.37%	85.37%
% Ever borrowed	65.89%	55.22%	80.57%

Table 5.7: Determinants of the Use of Collateral – Probit Model

	(1)	(2)	(3)
Loan terms			
Loan size	2.74e-06** (4.29)	2.63e-06** (3.76)	2.94e-06** (3.52)
Loan duration	0.1183** (6.24)	0.1239** (5.99)	0.1369** (5.83)
Interest rate	-0.0039** (-2.19)	-0.0037** (-2.15)	-0.0046** (-2.35)
Agricultural production loan	0.1966* (1.90)	0.1703 (1.60)	0.2085* (1.89)
Non-agricultural production loan	0.4573** (3.67)	0.4429** (3.57)	0.5132** (3.81)
Third party guarantee requirement	-1.5629** (-9.24)	-1.6000** (-9.08)	-1.5997** (-9.00)
Household characteristics			
Female headed household	0.0543 (0.49)	0.0779 (0.71)	0.0213 (0.17)
Age of household head	-0.0013 (-0.32)	-0.0017 (-0.42)	-0.0020 (-0.47)
Equivalence scale	-0.0276 (-0.43)	-0.0194 (-0.30)	-0.0307 (-0.44)
Number of children	-0.0140 (-0.27)	-0.0149 (-0.28)	-0.0003 (-0.01)
Years of education of household head	-0.0415** (-2.18)	-0.0390* (-1.88)	-0.0558** (-2.50)
Income per equivalence scale	4.42e-07 (0.45)	4.79e-07 (0.44)	1.33e-07 (0.12)
Amount of savings in lending institution	-2.33e-06 (-0.55)	-9.76e-07 (-0.22)	-1.04e-06 (-0.23)
Default risk			
Ratio of loan default to total loans	0.0292 (0.06)	0.0564 (0.12)	-0.7706 (-1.57)
Ratio of late repayments to total loans	0.3212 (1.27)	0.2464 (0.90)	0.2485 (0.83)
Ratio of loans to assets	0.0662 (0.41)	-0.1213 (-0.51)	-0.0720 (-0.27)
Borrower-Lender relationship			
Membership	-0.2251 (-1.31)	-0.1731 (-1.00)	-0.1809 (-1.04)
Ever borrowed	-0.2926** (-2.50)	-0.2758** (-2.29)	-0.3298** (-2.66)
Number of lenders	0.0662 (1.35)	0.0683 (1.36)	0.0517 (0.91)

Table 5.7: Determinants of the Use of Collateral – Probit Model (continued)

	(1)	(2)	(3)
Other controls			
Lender dummy, CB	-0.9016** (-3.53)		
Lender dummy, CRED	-0.9725** (-8.93)	-0.9673** (-8.87)	-0.9556** (-8.79)
Lender dummy, ML	-1.3151** (-5.99)	-1.2898** (-5.80)	-1.2555** (-5.59)
Lender dummy, RELA	-2.7284** (-10.78)	-2.6901** (-10.71)	
Province dummy, Buriram	0.1601 (1.22)	0.1884 (1.36)	0.1299 (0.85)
Province dummy, Ubon	-0.2118* (-1.76)	-0.1754 (-1.39)	-0.2026 (-1.42)
Constant	1.2461** (3.99)	1.2008** (3.68)	1.3973** (4.05)
Pseudo R-squared	0.283	0.277	0.279
No. Obs	1671	1610	1400

Note: t-statistics in parentheses, * $p < 0.10$, ** $p < 0.05$.

Column (1) includes loans from CB, BAAC, CRED, ML, RELA; Column (2) excludes loans from CB; Column (3) excludes loans from CB and VF.

Table 5.8: Determinants of the Use of Collateral – Ordered Probit Model

	(1)	(2)	(3)
Loan terms			
Loan size	2.63e-06** (4.18)	2.45e-06** (3.63)	2.69e-06** (3.40)
Loan duration	0.1212** (6.47)	0.1351** (6.51)	0.1500** (6.44)
Interest rate	-0.0044** (-2.48)	-0.0042** (-2.35)	-0.0053** (-2.75)
Agricultural production loan	0.2221** (2.14)	0.1938* (1.82)	0.2380** (2.17)
Non-agricultural production loan	0.4006** (3.44)	0.3925** (3.37)	0.4645** (3.73)
Third party guarantee requirement	-1.4449** (-9.48)	-1.4939** (-9.37)	-1.4910** (-9.24)
Household characteristics			
Female headed household	0.0323 (0.30)	0.0598 (0.54)	0.0067 (0.06)
Age of household head	-0.0015 (-0.38)	-0.0023 (-0.58)	-0.0026 (-0.61)
Equivalence scale	-0.0234 (-0.37)	-0.0112 (-0.17)	-0.0220 (-0.32)
Number of children	-0.0206 (-0.40)	-0.0262 (-0.49)	-0.0110 (-0.19)
Years of education of household head	-0.0388** (-2.05)	-0.0360* (-1.71)	-0.0524** (-2.30)
Income per equivalence scale	5.17e-07 (0.53)	5.66e-07 (0.53)	2.44e-07 (0.22)
Amount of savings in lending institution	-2.52e-06 (-0.59)	-1.36e-06 (-0.29)	-1.44e-06 (-0.31)
Default risk			
Ratio of loan default to total loans	0.0065 (0.02)	0.0512 (0.12)	-0.6521 (-1.35)
Ratio of late repayments to total loans	0.2468 (1.10)	0.2086 (0.77)	0.2088 (0.71)
Ratio of loans to assets	0.1318 (0.84)	-0.0898 (-0.39)	-0.0417 (-0.16)
Borrower-Lender relationship			
Membership	-0.2360 (-1.45)	-0.1850 (-1.13)	-0.1921 (-1.17)
Ever borrowed	-0.2802** (-2.45)	-0.2572** (-2.21)	-0.3050** (-2.55)
Number of lenders	0.0535 (1.16)	0.0621 (1.26)	0.0433 (0.77)

Table 5.8: Determinants of the Use of Collateral – Ordered Probit Model (continued)

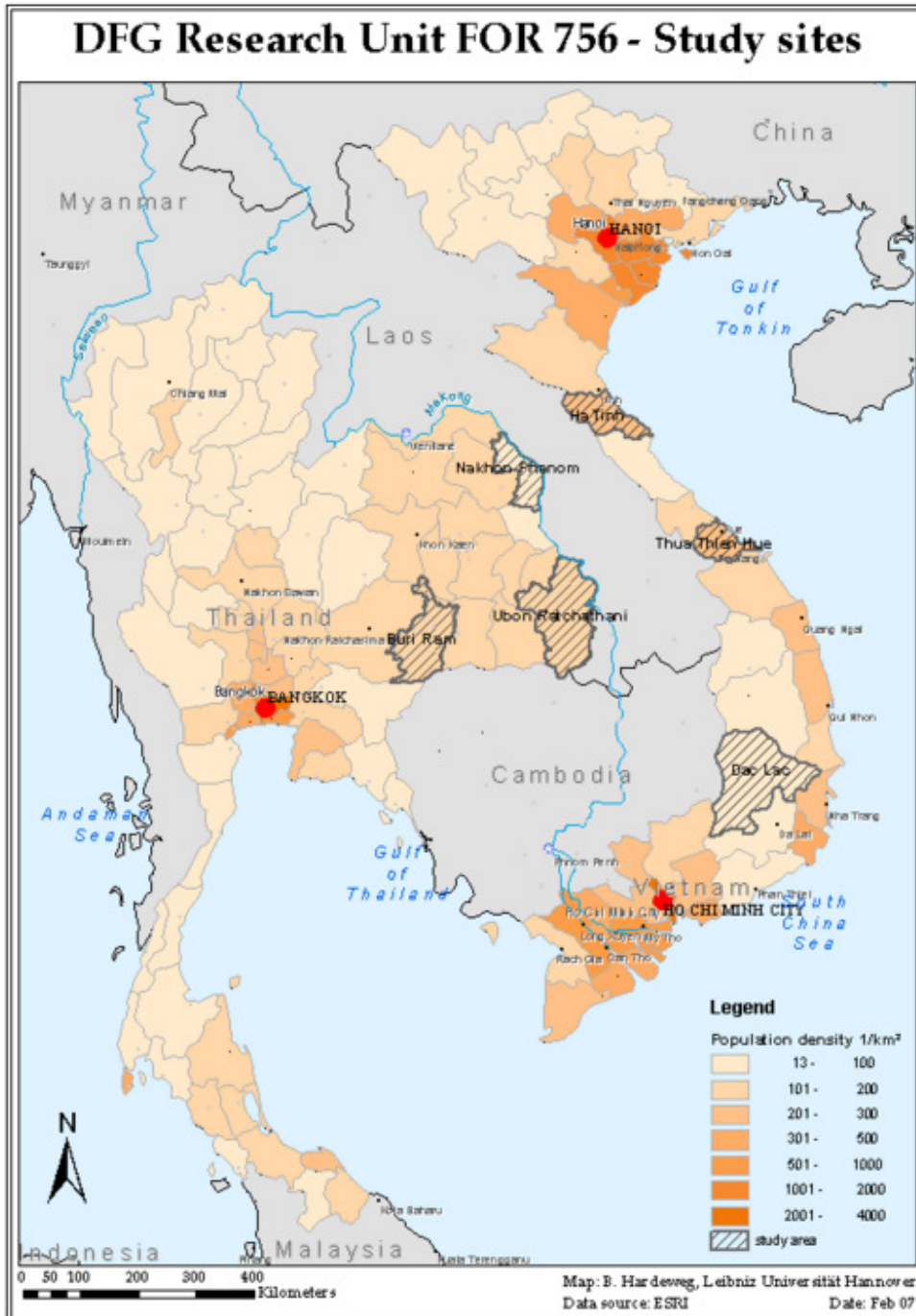
	(1)	(2)	(3)
Other controls			
Lender dummy, CB	-1.0123** (-4.04)		
Lender dummy, CRED	-0.9840** (-9.30)	-0.9794** (-9.22)	-0.9644** (-9.12)
Lender dummy, ML	-1.3064** (-6.49)	-1.2883** (-6.31)	-1.2463** (-6.11)
Lender dummy, RELA	-2.6351** (-10.83)	-2.6059** (-10.93)	
Province dummy, Buriram	0.2832** (2.05)	0.3239** (2.25)	0.2813* (1.76)
Province dummy, Ubon	-0.1141 (-0.92)	-0.0704 (-0.54)	-0.0845 (-0.57)
Constant 1	-1.0872** (-3.54)	-1.0309** (-3.25)	-1.2018** (-3.60)
Constant 2	-0.9578** (-3.10)	-0.9072** (-2.85)	-1.0751** (-3.19)
Pseudo R-squared	0.243	0.242	0.241
No. Obs	1671	1610	1400

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

Column (1) includes loans from CB, BAAC, CRED, ML, RELA; Column (2) excludes loans from CB; Column (3) excludes loans from CB and VF.

Appendix

Appendix 1: Map of Selected Provinces in Thailand and Vietnam, DFGFOR756



Appendix 2: Questionnaire on Informal Assistance, MOF Survey

Informal assistance between relatives in the same villages

“In the past 12 months, have you or anyone in your household shared rice with relatives in the same village?”

“In the past 12 months, have you or anyone in your household helped relatives in the same village with free labor?”

“In the past 12 months, have you or anyone in your household helped relatives in the same village with money?”

Informal assistance between non-relatives in the same villages

“In the past 12 months, have you or anyone in your household shared rice with non-relatives in the same village?”

“In the past 12 months, have you or anyone in your household helped non-relatives in the same village with free labor?”

“In the past 12 months, have you or anyone in your household helped non-relatives in the same village with money?”

Appendix 3: Occupational Group, MOF Survey

- | | |
|---|--|
| 1. inactive or unemployed | 2. rice farmer |
| 3. corn farmer | 4. shrimp farmer |
| 5. fish farmer | 6. fruit farmer |
| 7. farmer growing other crops | 8. raise livestock: chicken, poultry |
| 9. raise livestock: pig, cow or buffalo | 10. construction work in village |
| 11. construction work out of village but in the same province | 12. construction work in other province but not in Bangkok |
| 13. construction work in Bangkok | 14. rice miller |
| 15. store owner | 16. factory worker |
| 17. mechanic | 18. clerical worker |
| 19. administrative work | 20. government jobs |
| 21. accountant | 22. electrician |
| 23. janitor | 24. seller, vendor |
| 25. others | |

References

- Alesina, Alberto and Eliana La Ferrara (2000), Participation in Heterogeneous Communities, *Quarterly Journal of Economics*, 115:3, 847– 904.
- Allen, Franklin, Jun Qian and Meijun Qian (2005), Law, Finance, and Economic Growth in China, *Journal of Financial Economics*, 77, 57-116.
- Amemiya, Takeshi (1977), The Maximum Likelihood Estimator and The Non-Linear Three Stage Least Squares Estimator in The General Nonlinear Simultaneous Equation Model, *Econometrica*, 45, 955-968.
- Amin, Sajeda, Ashok S. Rai and Giorgio Topa (2003), Does Micro Credit Reach the Poor and Vulnerable? Evidence from Northern Bangladesh, *Journal of Development Economics*, 70, 59–82.
- Ayyagari, Meghana, Asli Demirgüç-Kunt and Vojislav Maksimovic (2008), Formal versus Informal Finance: Evidence from China, World Bank Policy Research Working Paper 4465.
- BAAC (2004), How Can Public Bank Contribute to Outreach in Rural Areas?, Paper Presented by Mr. Supachai Sathakarn, BAAC Senior Vice-President at Regional Symposium of The 48th Asia-Pacific Rural and Agricultural Credit Association(APRACA) Ex-Com Meeting, 10 October 2004, Tehran, Iran.
- Bank of Thailand (2005), Financial Sector Master Plan, mimeo.
- Barslund, Mikkel and Finn Tarp (2008), Formal and Informal Rural Credit in Four Provinces in Vietnam, *Journal of Development Studies*, 44:4, 485-503.
- Beck, Thorsten and Asli Demirgüç-Kunt (2008), Access to Finance: An Unfinished Agenda, *World Bank Economic Review*, 22:3, 383-396.
- Bell, Clive (1990), Interactions between Institutional and Informal Credit Agencies in Rural India, *World Bank Economic Review*, 4:3, 297-327.
- Besley, Timothy J. (1995), Nonmarket Institutions for Credit and Risk Sharing in Low-Income Countries, *Journal of Economic Perspectives*, 9:3, 115-127.
- Besley, Timothy J. and Stephen Coate (1995), Group Lending, Repayment Incentives and Social Collateral, *Journal of Development Economics*, 46, 1-18.

- Besley, Timothy J., Stephen Coate and Glenn C. Loury (1993), The Economics of Rotating Savings and Credit Associations, *American Economic Review*, 83:4, 792-810.
- Biddle, Gary, Robert Bowen and James Wallace (1997), Does EVA Beat Earnings? Evidence on Associations with Stock Returns and Firm Values, *Journal of Accounting and Economics*, 24:3, 301-336.
- Binswanger, Hans P. (1982), Risk Aversion, Collateral Requirements and the Markets for Credit and Insurance in Rural Areas, in: Peter Hazell, Carlos Pomarecla and Alberto Valdes (eds.), *Crop Insurance for Agricultural Development: Issues and Experiences*, Baltimore, MD: Johns Hopkins University Press [1986].
- Boonperm, Jirawan, Jonathan Haughton and Shahidur R. Khandker (2007), Does the Village Fund Matter in Thailand?, Working Paper.
- Breman, Jan (2001), The Impact of the Asian Economic Crisis on Work and Welfare in Village Java, *Journal of Agrarian Change*, 1:2, 242-282.
- Burgess, Robin, Rohini Pande, and Grace Wong (2005), Banking for the Poor: Evidence from India, *Journal of the European Economic Association*, 3, 268-278.
- Calvo, Cesar and Stefan Dercon (2008), Measuring Individual Vulnerability, Economics Series Working Papers 229, University of Oxford, Department of Economics.
- Carter, Michael R. and John A. Maluccio (2003), Social Capital and Coping with Economic Shock: An Analysis of Stunting of South African Children, *World Development*, 31, 1147-1163.
- Chaudhuri, Shubham (2003), Assessing Vulnerability to Poverty: Concepts, Empirical Methods and Illustrative Examples, mimeo. New York: Columbia University.
- Chaudhuri, Shubham, Jyotsna Jalan, and Asep Suryahadi (2002), Assessing Household Vulnerability to Poverty: A Methodology and Estimates for Indonesia, Columbia University Department of Economics Discussion Paper No. 0102-52. New York: Columbia University.
- Coate, Stephen and Martin Ravallion (1993), Reciprocity without Commitment: Characterization and Performance of Informal Insurance Arrangements, *Journal of Development Economics*, 40, 1-24.

- Cole, Shawn (2009), Fixing Market Failures or Fixing Elections? Agricultural Credit in India, *American Economic Journal: Applied Economics*, 1:1, 219-250.
- Coleman, James S. (1988), Social Capital in the Creation of Human Capital, *American Journal of Sociology*, 94, 95-121.
- Conning, Jonathan and Christopher Udry (2005), Rural Financial Markets in Developing Countries, in: Robert E. Evenson and Prabhu Pingali (eds.), *The Handbook of Agricultural Economics*, 3, 2857-2910.
- Costa, Dora and Matthew Kahn (2003), Civic Engagement and Community Heterogeneity: an Economist's Perspective, *Perspectives on Politics*, 1:1, 103-111.
- Deaton, Angus (1991), Savings and Liquidity Constraints, *Econometrica*, 59, 1221-1248.
- Deaton, Angus (1997), *The Analysis of Household Surveys: A Microeconomic Approach*. Baltimore: Johns Hopkins University Press.
- Dercon, Stefan (2001), Income Risk, Coping Strategies and Safety Nets, *World Bank Research Observer*, 17:2, 141-166.
- Dercon, Stefan and Pramila Krishnan (2000), In Sickness and in Health: Risk-Sharing within Households in Rural Ethiopia, *Journal of Political Economy*, 108:4, 688-727.
- Dercon, Stefan, and Pramila Krishnan (2000), Vulnerability, Seasonality, and Poverty in Ethiopia, *Journal of Development Studies*, 36:6, 25-50.
- Elsas, Ralf and Jan P. Krahnert (2000), Collateral Default Risk and Relationship Lending: an Empirical Study on Financial Contracting, CEPR Discussion Paper, No. 2540.
- Eswaran, Mukesh and Ashok Kotwal (1989), Credit as Insurance in Agrarian Economies, *Journal of Development Economics*, 37, 37-53.
- Fafchamps, Marcel (2006), Development and Social Capital, *Journal of Development Studies*, 42:7, 1180-1198.
- Fafchamps, Marcel and Flore Gubert (2007), The Formation of Risk Sharing Networks, *Journal of Development Studies*, 83, 326-350.
- Fafchamps, Marcel and Susan Lund (2003), Risk-Sharing Networks in Rural Philippines, *Journal of Development Economics*, 71, 261-287.

- Gertler, Paul, David Levine, and Enrico Moretti (2006), Is Social Capital the Capital of the Poor? The Role of Family and Community in Helping Insure Living Standards Against Health Shocks, *CESifo Economic Studies*, 52:3, 455-499.
- Ghate, Prabhu B. (1992), Interaction between the Formal and Informal Financial Sectors: The Asian Experience, *World Development*, 20:6, 859-872.
- Glewwe, Paul and Gillette Hall (1998), Are Some Groups More Vulnerable to Macroeconomic Shocks than Others? Hypothesis Tests Based on Panel Data from Peru, *Journal of Development Economics*, 56: 1, 181-206.
- Granovetter, Mark (1995), *Getting a Job: A Study of Contacts and Careers*, 2nd Edition, Chicago: University of Chicago Press.
- Greene, William H. (2002), *Econometric Analysis*, 5th Edition, Prentice Hall.
- Grimard, Franque (1997), Household Consumption Smoothing through Ethnicities: Evidence from Côte d'Ivoire, *Journal of Development Economics*, 53, 391-422.
- Guirkinger, Catherine (2008), Understanding the Coexistence of Fomal and Informal Credit Markets in Piura, Peru, *World Development*, 36:8, 1436-1452.
- Guiso, Luigi, Paola Sapienza, and Luigi Zingales (2004), Does Local Financial Development Matter, *Quarterly Journal of Economics*, 119, 929-969.
- Ha, Dang T. and Gerald Shively (2008), Coffee Boom, Coffee Bust and Small Holder Response in Vietnam's Central Highlands, *Review of Development Economics*, 12:2, 312-326.
- Hainz, Christa (2003), Bank Competition and Credit Markets in Transition Economies, *Journal of Comparative Economics*, 31, 223-245.
- Hardeweg, Bernd, Suwanna Praneetvatakulb, Tung Phung Duc and Hermann Waibel (2007), Sampling for Vulnerability to Poverty: Cost Effectiveness versus Precision, Conference on International Agricultural Research for Development.
- Harhoff, Dietmar and Timm Körting (1998), Lending Relationships in Germany: Empirical Results from Survey Data, *Journal of Banking and Finance*, 22, 1317-1353.
- Haselmann, Rainer, Katharina Marsch, and Beatrice Weder Di Mauro (2009), State versus Private Banks and Firms' Innovation Ability, mimeo.

- Hausman, Jerry A. and Daniel McFadden (1984), Specification Tests for the Multinomial Logit Model, *Econometrica*, 52:5, 1219-1240.
- Healy, Andrew J. and Somchai Jitsuchon (2007), Finding the Poor in Thailand, *Journal of Asian Economics*, 18:5, 739-759.
- Hermes, Niels and Robert Lensink (2007), The Empirics of Microfinance: What Do We Know?, *Economic Journal*, 117, F1-F10.
- Hoff, Karla and Joseph E. Stiglitz (1990), Imperfect Information and Rural Credit Markets – Puzzles and Policy Perspectives, *World Bank Economic Review*, 4:3, 235-250.
- Jacob, Jeffry (2005), The Role of Social Capital in Consumption Smoothing and Self-Insurance: Evidence from Indonesia, Southern Methodist University, Job Market Paper.
- Jain, Sanjay (1999), Symbiosis vs. Crowding-out: The Interaction of Formal and Informal Credit Markets in Developing Countries, *Journal of Development Economics*, 59, 419-444.
- Jalan, Jyotsna and Martin Ravallion (1999), Are the Poor Less Well Insured? Evidence on Vulnerability to Income Risk in Rural China, *Journal of Development Economics*, 58:1, 61-81.
- Jarvis, Darryl S.L. (2002), Problems and Prospects in Thaksin's Thailand: An Interim Assessment, *Asian Survey*, 42:2, 297-319.
- Johnston, Don and Jonathan Morduch (2008), The Unbanked: Evidence from Indonesia, *World Bank Economic Review*, 22:3, 517-537.
- Kaboski, Joseph P. and Robert M. Townsend (2005), Policies and Impact: An Analysis of Village-Level Microfinance Institutions, *Journal of the European Economic Association*, 3:1, 1-50.
- Kaboski, Joseph P. and Robert M. Townsend (2006), The Impacts of Credit on Village Economies, Working Paper, University of Chicago.
- Kaboski, Joseph P. and Robert M. Townsend (2007), Testing a Structural Model of Credit Constraints Using a Large-Scale Quasi-Experimental Microfinance Initiative, Working Paper, University of Chicago.

- Kemper, Niels (2009), Credit, Svings and Transitory Income Smoothing in Rural Vietnam, Verein für Socialpolitik (Entwicklungsländerausschuß), Frankfurt, Germany, June 26-27.
- Kemper, Niels and Rainer Klump (2009), Analyzing the Impact of Land Reform and Land Ownership on Household Credit in Rural Vietnam, Draft, Frankfurt (extended abstract accepted for presentation at the next PEGNet Conference, Den Haag, September 2009).
- Kim, Soyoung, Sunghyun Kim, and Yunjong Wang (2006), Financial Integration and Consumption Risk Sharing in East Asia, Japan and the World Economy, Working Paper, East Asian Bureau of Economics Research.
- King, Robert G. and Ross Levine (1993), Finance and Growth: Schumpeter Might be Right, *Quarterly Journal of Economics*, 103, 717-738.
- Kochar, Anjini (1995), Explaining Household Vulnerability to Idiosyncratic Income Shocks, *AEA Papers and Proceedings*, 85:2, 159-164.
- Kochar, Anjini (1997), An Empirical Investigation of Rationing Constraints in Rural Credit Markets in India, *Journal of Development Economics*, 53, 339-371.
- Kochar, Anjini (1999), Smoothing Consumption by Smoothing Income: Hours-of-Work Responses to Idiosyncratic Agricultural Shocks in Rural India, *Review of Economics and Statistics*, 81:1, 50-61.
- Lerner, Josh (1995), Venture Capitalists and the Oversight of Private Firms, *Journal of Finance*, 50, 301-318.
- Ligon, Ethan (1998), Risk-sharing and Information in Village Economies, *Review of Economic Studies*, 65:4, 847-864.
- Ligon, Ethan and Laura Schechter (2003), Measuring Vulnerability, *Economic Journal*, 113, 95-102.
- Menkhoff, Lukas, Doris Neuberger and Chodechai Suwanaporn (2006), Collateral-based Lending in Emerging Markets: Evidence from Thailand, *Journal of Banking and Finance*, 30, 1-21.
- Menkhoff, Lukas and Ornsiri Rungruxsirivorn (2009), Village Funds and Access to Finance in Rural Thailand, Discussion Paper No.417, Hannover.

- Miguel, Edward, Paul Gertler, and David Levine (2005), Does Social Capital Promote Industrialization? Evidence from a Rapid Industrializer, *Review of Economics and Statistics*, 87:4, 754-762.
- Miguel, Edward and Mary K. Gugerty (2005), Ethnic Diversity, Social Sanctions, and Public Goods in Kenya, *Journal of Public Economics*, 89, 2325–2368.
- Mohieldin, Mahmoud S. and Peter W. Wright (2000), Formal and Informal Credit Markets in Egypt, *Economic Development and Cultural Change*, 48:3, 657-670.
- Morduch, Jonathan (1994), Poverty and Vulnerability, *American Economic Review*, 84:2, 221-225.
- Morduch, Jonathan (1999), The Microfinance Promise, *Journal of Economic Literature*, 37:4, 1569-1614.
- Morduch, Jonathan (2001), Consumption Smoothing Across Space: Tests for Village-Level Responses to Risk, in: Dercon Stefan (eds.), Insurance against Poverty, Manuscript prepared for UNU-WIDER Studies in Development Economics. Oxford: Oxford University Press.
- Pal, Sarmistha (2002), Household Sectoral Choice and Effective Demand for Rural Credit in India, *Applied Economics*, 34:14, 1743-1755.
- Paxson, Christina (1992), Using Weather Variability to Estimate the Response of Savings to Transitory Income in Thailand, *American Economic Review*, 82:1, 15-33.
- Paxson, Christina and Shubham Chaudhuri (1994), Consumption Smoothing and Income Seasonality in Rural India, Princeton, Woodrow Wilson School - Development Studies, Paper 173.
- Petersen, Mitchell, Raghuram Rajan (2002), Does Distance Still Matter: The Information Revolution in Small Business Lending, *Journal of Finance*, 57, 2533-2570.
- Petrick, Martin (2005), Empirical Measurement of Credit Rationing in Agriculture: A Methodological Survey, *Agricultural Economics*, 33, 191-203.
- Phillips, Julie A. and Douglas Massey (2000), Engines of Immigration: Stocks of Human and Social Capital in Mexico, *Social Science Quarterly*, 81:1, 33-48.
- Platteau, Jean.-Philippe (1997), Mutual Insurance as an Elusive Concept in Traditional Rural Communities, *Journal of Development Studies*, 33: 6, 764 – 796.

- Puhani, Patrick (2000), The Heckman Correction for Sample Selection and Its Critique – A Short Survey, *Journal of Economic Surveys*, 14, 53-68.
- Rauch, James and Alessandra Casella (2003), Overcoming Informational Barriers to International Resource Allocation: Prices and Ties, *Economic Journal*, 113, 21-42.
- Ravallion, Martin and Shubham Chaudhuri (1997), Risk and Insurance in Village India: Comment, *Econometrica*, 65, 171-184.
- Ravi, Shamika (2006), Access to Credit as Insurance, Working Paper, Indian School of Business.
- Rosenzweig, Mark (1988), Risk, Implicit Contracts and the Family in Rural Areas of Low Income Countries, *Economic Journal*, 98:393, 1148-1170.
- Rosenzweig, Mark R. and Kenneth I. Wolpin (1993), Credit Market Constraints, Consumption Smoothing, and the Accumulation of Durable Production Assets in Low-Income Countries: Investment in Bullocks in India, *Journal of Political Economy*, 101:2, 223-244.
- Siamwalla, Ammar, Chirmsak Pinthong, Nipon Poapongsakorn, Ploenpit Satsanguan, Prayong Nettayarak, Wanrak Mingmaneeakin and Yuavares Tubpun (1990), The Thai Rural Credit System: Public Subsidies, Private Information, and Segmented Markets, *World Bank Economic Review*, 4:3, 271-295.
- Swaminathan, Madhura (1991), Segmentation, Collateral Undervaluation, and The Rate of Interest in Agrarian Credit Markets: Some Evidence from Two Villages in South India, *Cambridge Journal of Economics*, 15, 161-178.
- Stiglitz, Joseph E. and Andrew Weiss (1981), Credit Rationing in Markets with Imperfect Information, *American Economic Review*, 71:3, 393-410.
- Townsend, Robert (1994), Risk and Insurance in Village India, *Econometrica*, 62, 539-591.
- Townsend, Robert (1995), Consumption Insurance: An Evaluation of Risk-Bearing Systems in Low-Income Economies, *Journal of Economic Perspectives*, 9, 83-102.
- Townsend, Robert (1995), Financial Systems in Northern Thai Villages, *Quarterly Journal of Economics*, 110, 1011-1046.

- Trà, Pham Thi Thu and Robert Lensink (2008), Household Borrowing in Vietnam: A Comparative Study of Default Risks of Informal, Formal and Semi-Formal Credit, *Journal of Emerging Market Finance*, 7:3, 237-261.
- Udry, Christopher (1991), Credit Markets in Northern Nigeria: Credit as Insurance in a Rural Economy, *World Bank Economic Review*, 4, 251-271.
- Udry, Christopher R. (1994), Risk and Insurance in a Rural Credit Market: An Empirical Investigation in Northern Nigeria, *Review of Economic Studies*, 61, 495-526.
- Wooldridge, Jeffrey (2002), *Econometric Analysis of Cross Section and Panel Data*, Cambridge, MA: MIT Press.
- Wydick, Bruce (1999), Can Social Cohesion Be Harnessed to Repair Market Failures? Evidence from Group Lending in Guatemala, *Economic Journal*, 109, 463-475.
- Zeller, Manfred (1994), Determinants of Credit Rationing: A Study of Informal Lenders and Formal Credit Groups in Madagascar, *World Development*, 22:12, 1895-1907.
- Zimmerman, Frederick and Michael R. Carter (2003), Asset Smoothing, Consumption Smoothing and the Reproduction of Inequality under Risk and Subsistence Constraints, *Journal of Development Economics*, 71:2, 233-260.