Rural credit markets and their impact on vulnerability to poverty: Empirical evidence from Northeast Thailand

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Abstract

Living conditions in developing countries are often difficult. Since a large proportion of the population is engaged in farming activities, their income is not only low but also very volatile. As a result most people live in poverty or are threatened to fall into poverty. One important requirement to improve their situation is financial development. At the country level, functioning institutions and a broad range of products promote overall economic growth. At the household level, financial development enables people to bridge income gaps, save parts of their income and to undertake investments to improve production processes.

This research focuses on these so-called vulnerable people and examines how specifically rural credit affects their economic situation and contributes to reducing poverty in Thailand.

Chapter 2 examines a policy-induced microfinance programme which has been set up in Thailand in 2001. The data suggests that this programme successfully targets poor people and helps to improve their economic situation for a short period of time. However, it is questionable whether the subsidized loans have sustainable impacts since they do not substitute more expensive credit sources and do not affect lending behaviour of households.

Chapter 3 focuses on the segmentation of rural credit markets in which relatively expensive informal lenders still play an important role. By showing that poor as well as rich households demand informal loans but use them for different purposes, this chapter provides an explanation for market segmentation.

Chapter 4 examines loan terms and in particular collateral issues more closely. As a standard ingredient of loan contracts, collateral is often demanded but this demand cannot always be met by the poor. Collateral requirements depend on the riskiness of a borrower. Chapter 4 explains how different types of lenders (formal and informal) gain information on borrowers' risk and therefore are able to lower collateral requirements.

Keywords: Thailand, rural credit markets, microfinance, informal loans, collateral

Zusammenfassung

Menschen in Entwicklungsländern sind oft schwierigen Lebensbedingungen ausgesetzt. Viele von ihnen verdienen ihren Lebensunterhalt mit landwirtschaftlicher Tätigkeit, was häufig zu niedrigen und gleichzeitig schwankenden Einkommen führt. Folglich leben viele dieser Menschen in Armut, oder sind davon bedroht, in Armut zu fallen. Eine der Grundvoraussetzungen für die Verbesserung ihrer ökonomischen Situation ist ein entwickeltes Finanzsystem. Auf Länderebene kann dieses Wirtschaftswachstum fördern. Für Haushalte bedeutet ein entwickeltes Finanzsystem eine Möglichkeit, Einkommensengpässe zu überbrücken, sichere Sparmöglichkeiten zu nutzen und durch Investitionen den (landwirtschaftlichen) Produktionsprozess zu verbessern.

Diese Arbeit widmet sich den Menschen in Entwicklungsländern, die Gefahr laufen, in Armut zu fallen oder bereits in Armut leben. Dabei steht der ländliche Kreditmarkt in Thailand im Fokus und die Möglichkeiten, die dieser bietet, Armut zu reduzieren.

Kapitel 2 untersucht ein Mikrofinanzprogramm, das 2001 in Thailand eingeführt wurde. Aufgrund der ausgewerteten Datenlage lässt sich sagen, dass dieses Programm die Zielgruppe der besonders armen Haushalte erreicht und deren Situation kurzfristig verbessert. Allerdings ist es fraglich, ob diese subventionierten Kredite einen nachhaltigen Effekt haben, da sie weder teurere Kredite substituieren, noch Kreditentscheidungen von Haushalten anderweitig beeinflussen.

Kapitel 3 befasst sich mit dem stark segmentierten Kreditmarkt auf dem relativ teure informelle Kredite immer noch einen hohen Anteil haben. Es wird gezeigt, dass sowohl reiche, als auch arme Haushalte informelle Kredite nachfragen und dass sie diese Kredite für unterschiedliche Zwecke nutzen.

Kapitel 4 untersucht Kreditbedingungen und im Speziellen Kreditbesicherung. Kreditsicherheiten sind ein gängiger Bestandteil von Kreditverträgen, jedoch können viele arme Menschen keine solchen Kreditsicherheiten stellen. Je riskanter ein Kreditnehmer auf den Kreditgeber wirkt, desto wahrscheinlicher muss er Sicherheiten

stellen. Kapitel 4 zeigt, wie Kreditgeber durch mehr Informationen das Risiko besser einschätzen können und daher weniger Kreditsicherheiten verlangen.

Schlagworte: Thailand, ländliche Kreditmärkte, Mikrofinanzierung, informelle Kredite, Kreditsicherheiten

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List of abbreviations

BAAC	Bank for Agriculture and Agricultural Cooperatives
BP	Business Partners (trader and supplier)
CB	Commercial Banks
CRED	Credit and Savings Cooperatives organised at Village Level
DFG	Deutsche Forschungsgemeinschaft (German Research Foundation)
FAM	Families and Friends
FIAM	Foundation of Integrated Agricultural Management
FRI	Friends
GDP	Gross Domestic Product
ML	Moneylenders
POLICY	Special Loans from Political Entities
RELA	Relatives and Friends
RFA	Rural Friends Association
ROSCA	Rotating Savings and Credit Association
VF	Village Funds

1. Introduction

In developing countries people often face difficult living conditions. Especially households in the rural areas are often engaged in farming activities so that their income is very volatile and strongly dependent on weather conditions or world market prices of their products. Hence, households often live in poverty or are threatened to fall into poverty.

Financial development is a crucial issue, not only for promoting overall economic growth for the whole country but also for improving the economic situation of every household. Financial institutions and their products enable people to buy inputs for the next harvesting season, they help to bridge income shortcomings in lean times, offer possibilities for (agricultural) investments to improve the production process and provide safe savings opportunities.

One important precondition for financial decision making is that people have access to finance. Indeed, access to credit, potential savings and insurances have been identified to be a crucial issue for people in developing countries. Many attempts have been made to enhance access to finance. Microfinance institutions all over the world attest to the efforts of governments and non-governmental organisations in this respect. However, programmes often follow their own agenda and have different aims apart from helping the poor as recent discussions about commercialization of microfinance show. Therefore any microfinance programme should be evaluated carefully.

Although microfinance has been put into place, many households in developing countries still opt to borrow from informal credit sources which are often more expensive than banks or microcredit institutions. Furthermore, even if finance is available, people may be excluded from financial sources because lenders require collateral poor people are not able to pledge. Or, if they can bring up collateral, loans

are still risky and a loss of collateral could mean further deterioration of their economic situation.

This dissertation examines how financial institutions influence the well-being of people by analysing several aspects of rural credit markets in developing countries. In particular, the following questions are addressed: How efficient are policy-induced microfinance programmes and what are their effects? Why and when do people choose to borrow from informal sources and how do informal loans effect their economic situation? When do households have to pledge collateral, and how can a reduction in asymmetric information ease collateral requirements?

In order to answer these questions appropriate data is needed. This research relies on data emanating the DFG-funded project "Impact of shocks on the vulnerability to poverty: consequences for development of emerging Southeast Asian economies" (Research Group FOR 756). Within this project a cross-sectional survey first took place between April and June 2007 in Thailand. This initial survey has been expanded for the years 2008 and 2010 so that a panel data set of three waves is available. The three provinces are Buri Ram, Nakhon Phanom and Ubon Ratchathani, which are located in the North-eastern part of Thailand, the poorest region of the country with low income and high agricultural activity. Household identification follows a three-stage stratified sampling procedure: within each province sub-districts were chosen with probability according to their size and two villages in each sub-district were randomly identified. Finally, 10 households of each village were randomly selected to be interviewed. The overall sample which is used in this research consists of 2,105 households that have been interviewed in all three waves. It is the large sample and the broad information basis that makes the data set very useful for the following research. In particular, there is information on household characteristics, their economic situation and finance-related activities, such as borrowing, saving, default history, credit rationing and lending. Furthermore a broad range of different lending institutions is operating in Thailand so that the data contributes to a better understanding of rural credit markets and households' borrowing decisions.

The dissertation is structured as follows: C*hapter 2* examines a policy-induced microfinance programme, the so-called village funds (VF) programme, which has been set up in all Thai villages in 2001. Former studies find that this programme targets people with lower economic status and improves access to finance. Furthermore it seems to increase income, asset endowment and household's expenditures. But given the high costs of this programme it is questionable whether the costs of approximately 1.5% of the GDP in 2001, or US$ 1.8 billion, can be justified. The results in *Chapter 2* show that households who borrow from VF are more likely business owners, larger households with less land holding and unlikely to be farming. As a consequence they are limited in their income generation, especially regarding food production and have less land or other assets. With respect to the effect of VF loans, the results show that they seem to stabilise the economic situation of permanent VF borrowers in that income and overall asset endowment do not fluctuate much over time. The loss of a VF loan, however, leads to a downturn of economic variables. Concerning borrowing purposes, VF loans do not have great impact on borrowing behaviour on household level. Indeed, they seem to be a one-time event and do not substitute more expensive informal loans. Due to their limited maturity they cannot be used for long-term investments either.

Despite some efforts to enhance access to finance, poor as well as rich households in Thailand still borrow from relatively expensive informal sources which account for 19% of all credit contracts. Related literature finds that the decision to borrow from a specific lender depends on borrowing purposes. The common view is that formal loans are used for production or investment purposes whereas informal loans are used for consumption purposes. *Chapter 3* contributes to existing literature by looking at the effects of these loans across income groups of households: poor households increase their asset endowment and in particular farming assets after informal loans have been received. Rich households demand informal loans especially if they are hit by a shock or credit rationed in the formal sector. They use informal loans to increase their (food) consumption, especially if they are less likely farmers, hit by a shock and/or credit rationed in the formal sector.

Chapter 4 examines loan terms and in particular collateral issues more closely. Collateral is a standard ingredient of loan contracts but the rural poor are often not able to meet collateral requirements which is why they are excluded from formal credit more often than others. Furthermore, the loss of pledged collateral may worsen their economic situation. Whether or not collateral is required depends on the riskiness of a borrower: the higher the observable risk the more likely collateral is required. This is known as the ex ante theory of collateral and is thoroughly examined in literature. In line with this theory there are some predictions regarding collateral for different types of lenders. One can broadly distinguish between formal lenders and informal lenders; informal lenders live nearby or among the rural poor and therefore have better information on their riskiness. As a consequence, given the same riskiness of a borrower, informal lenders would demand less collateral. *Chapter 4* uses two measures to capture asymmetric information between lender and borrower: relationship duration in years and geographical distance between lender and borrower. The results show that an increase in information has different effects among lender groups. Relationship duration lowers collateral requirements for formal lenders because they can make use of additional information, whereas it does not lower collateral demanded by informal lenders. Short distances reduce collateral requirements only for informal lenders who can exploit their informational advantage via their proximity to borrowers.

According to the results the following implications can be drawn: firstly, microfinance institutions are no panacea since they do not always have long-lasting impacts on households. Setting up expensive programmes should be considered carefully.

Secondly, informal loans are in general an expensive source of credit but they serve specific purposes which are not limited to serving the very poor. Any programme that aims at reducing the reliance on informal lenders should take this into account.

Thirdly, informal lenders behave differently in setting collateral requirements since they have more information on borrowers' risks. Measures to develop the

financial system should particularly strengthen formal lenders by providing informational networks and enhance transparency.

2. The Village Fund Loan: Who Gets It, Keeps It and Loses It?[*]

Abstract

The Village Funds programme in Thailand is one of the biggest microfinance programmes in the world aiming at improving access to finance and income in rural areas. Earlier studies indicate that the programme is successful in realising its ambitions to some degree. We extend this work by analysing a second wave of a household survey and find that village fund borrowers are consistently characterised by a lower economic status; accordingly village fund loans are an important lifeline to those households. However, we cannot identify any significant substitution between village fund loans and other loans, raising doubts about the long-run impact of the Village Fund programme.

2.1 Introduction

The Village Fund (VF) programme in Thailand is one of the largest microfinance programmes in the world. It aims at improving access to finance and income in rural areas. These are worthwhile objectives for policy as finance is often limited in rural areas and incomes are low. In this sense the introduction of a programme that sets up an additional fund of one million Baht, roughly US$ 28,000, per village leading to a significant increase of loanable funds is welcome. Indeed, the rural population seems to be highly sympathetic to the 2001 government's decision to start the VF programme, as election results continuously show.

However, at the same time there are several concerns with a programme such as this one. First, it is a matter of record that many large state-sponsored lending programmes have failed in the past as documented for example in Krahnen and Schmidt (1994). All of them were started with high ambitions, but in the end the money was too often lost and diverted into dubious purposes. Second, and related to the first concern, political economy models suggest that governments may use gifts of this type to win political support in upcoming elections. Third, there are simple practical concerns about how such a huge programme could be successfully implemented given that no experienced bankers would be relied on.

As this programme has been operational for some time now, there are a few analyses available studying the outcomes of the VF programme. Two studies indicate that, as intended, it increases income (Boonperm et al., 2013, Kaboski and Townsend, 2012). Moreover, a study shows that VFs helped to improve access to finance (Menkhoff and Rungruxsirivorn, 2011). However, considering the size and relevance of the VF programme, the available evidence is surprisingly thin. It would be most interesting for policy-making in Thailand and possibly for decision makers in other countries as well, to learn more about the functioning of VFs in order to make informed policy decisions.

We contribute to the issue of access to finance by extending the cross-sectional evidence in Menkhoff and Rungruxsirivorn (2011) by incorporating a time dimension. In effect, we rely on two waves of a large household survey conducted in three provinces of north-eastern Thailand in the years 2007 and 2008. It is this time dimension – even though consisting of only two consecutive years – that helps us understand how changes in the provision of VF credit may be related to household characteristics: which kinds of households get a VF loan, which ones keep it, and which ones lose it?

We find that VF borrowers are indeed somewhat different from other households and that these differences are consistent across the two periods. VF borrowers are

characterised by a lower economic status and the loss of a VF loan seems to worsen their economic situation. Also, VF borrowers are more often business owners. Finally, we cannot identify any significant substitution between VF loans and other loans, indicating that the VF loans are rarely used for longer-lasting credit-financed projects thus that they have only a slight impact on permanent behaviour at household level.

We proceed in this study as follows. Section 2.2 briefly reports the findings of earlier studies in order to motivate our own research. The data basis is described in Section 2.3, characterising borrowing households and the rural credit market. In Section 2.4 we analyse borrowers of the VFs regarding the four types of households who get it, keep it, lose it and do not use it. Section 2.5 concludes.

2.2 Expectations on the Thai Village Fund programme

Expectations and motivations about the VF programme are shaped by debates about microfinance in general and in Thailand. We briefly refer to these discussions before we discuss the specific research on the Thai VF programme.

In the last decades a lot of research has been conducted on the functionality of microfinance concepts and programmes. An early overview of different lending institutions in rural credit markets is given by Bell (1990). For an empirical impact study of microfinance on poverty reduction, see Khandker (2005). Separating lenders within rural credit markets into informal, formal and semiformal lenders, Pham and Lensink (2007) focus on different lending practices of those types of institutions. Policy induced microfinance programmes especially were subjected to closer scrutiny as they are expensive programmes whose impacts are not easy to assess. Most researchers agree that microfinance institutions can enhance the living conditions of poor people in developing countries. In particular, these institutions can contribute to reducing poverty; they allow farmers to borrow, especially when harvests are bad, and so give them the opportunity to smooth their consumption even if current production possibilities are scarce. In addition they allow entrepreneurs to set up businesses and permit a

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diversification of income generation and the establishment of a more sustainable sector based on non- agricultural business and innovation (World Bank, 2008). So the overall assessment of many microfinance programmes tends to be positive.

With respect to Thailand, an early benchmark study by Siamwalla et al. (1990) analyses the Thai rural credit market. Although the interventions of the Thai government into the rural credit market date back to the beginning of the 20th century, the establishment of the state-owned Bank for Agriculture and Agricultural Cooperatives (BAAC) in 1966 was the major intervention in recent decades. Aiming at an improved access to finance for rural farmers, the BAAC has customers that are mainly people in the rural areas. Another intervention, in the 1970s, was the requirement that commercial banks had to spread their business into the rural areas of the country. These measures were undertaken to ease the dependency of rural households on informal lenders.

The introduction of the VFs in each of the Thai villages is another step to improve access to finance in rural Thailand. But despite the effort to establish formal and semi-formal institutions in the rural areas informal lenders still play an important role. The segmented rural credit market, its institutions and their impact on the poor are therefore an interesting target for researchers (for a general discussion, see Hermes and Lensink (2007).

Coleman (1999) examines the impact of group lending in Thailand using a panel data- set with two waves. In a quasi-experimental setting he studies the effect of group lending on the welfare of borrowers. He finds that group lending procedures of so-called village banks (another microfinance concept introduced prior to the VF in Thailand) which are based on the idea of the Grameen Bank, are limited in their ability to enhance the living conditions of borrowers. Focusing on the rural small-scale entrepreneurs and especially on women, the author does not find any significant impact on physical assets, enhanced spending or even education. But the data Coleman is using reveals many interdependencies and substitution effects among the different sources of credit. It

seems that some households borrow to pay back other loans, and some even borrow to lend the money out at higher interest rates. Therefore it will be interesting to know which category the current VF loans can be assigned to.

In a later study, Coleman (2006) evaluates the impact of two microfinance institutions, namely the Rural Friends Association (RFA) and the Foundation for Integrated Agricultural Management (FIAM) which are operating in Northeast Thailand. According to Coleman the impact evaluation of policy-induced programmes suffers from two biases: first, self-selection of members and non-members and second, programme placement in certain villages based on unobserved characteristics of the villages chosen. Only households which are better able to use credit funds and therefore realise higher returns will self-select into the programmes; these might be placed in villages that are more appropriate for funding due to unobservable characteristics like high entrepreneurial skills and good organisation. Both biases lead to an overestimation of programme impacts. Fortunately, in the case of VFs, the second bias does not occur because the fund is established in all Thai villages making placement selection impossible. Coleman finds that the wealthier households are more likely to borrow from those programmes and by controlling for the selection biases he discovers larger positive effects of finance on the welfare of programme committee members than on the welfare of "rank-and-file" members.

Schaaf (2010) examines the effect of community groups with microfinance components on the well-being of poor village people. Using data from a single village in north-eastern Thailand her focus lies on the assessment of improvements in living conditions through microfinance institutions. Extending a model of Chen (1997) she uses a multi-dimensional framework to measure people's well-being with the following dimensions: material, cognitive, perceptual and relational. She finds that the VFs, together with community banks, have the highest number of members compared to other microfinance institutions, though women are not specially targeted. But compared to other community groups such as product groups, the VFs concentrate on finance and

they are therefore restricted to improving primarily the material dimension of people's well-being.

Kaboski and Townsend (2005) evaluate microfinance programmes also using data from Thailand (before the VF programme was implemented) and find that microfinance promotes asset growth, helps to smooth consumption, eases occupational mobility and is able to decrease money lender reliance.

In a later study, Kaboski and Townsend (2012) analyse the impact of VF credits on rural households. They use a panel data-set which captures data on 960 households in 64 villages over a seven-year time period. Their most striking findings are that the introduction of VFs enhances consumption, short-term credit, investment in agriculture, income growth and wages in the labour market and for businesses. Asset endowment of households, however, decreased. The authors rely on two theories to explain these patterns. The buffer stock model suggests that formerly credit-constrained households increase their consumption if the credit constraints have eased due to the availability of VF credits. The second model relies on the assumption that more available credit will lead to more business start-ups. As a consequence higher wages in the labour market can be expected; indeed, the study finds higher wages but no more new businesses.

Furthermore this study finds that the overall credit amount increases if VF loans are available. The authors take this as evidence that VFs do not crowd out other sources of credit. This assumption is amplified by the observation of no lower interest rates, indicating still some scarcity of capital in the rural markets. The injection of capital via VFs does not reveal an additional effect, as one unit of injected capital does not lead to more than a single unit of further credit. Our study confirms this finding by and large, however, by choosing another perspective; we focus on household characteristics distinguishing between households who receive such loans successively and those who receive a VF loan only once.

Boonperm et al. (2013) address in their analysis the effect of VF loans on income, expenditure and the endowment with assets. Using the Thailand Socioeconomic

Surveys of 2002 and 2004, with an overall sample of 35,000 households in each survey, they assess the extent of VF impact. By applying a propensity score-matching method they compare borrowing households with households which have similar characteristics but do not borrow from VFs. They find an effect for VF borrowers of 1.9% more income, 3.3% more expenditures and 5% higher endowment with durable assets compared to the control group. In combination with loans from the BAAC the effect on income is even higher. Furthermore the effects seem to be larger for households with lower expenditures indicating a good targeting of poor households. But VF loans are not used by everyone; about 24% of the households in the sample did not want to borrow from VFs because they had no need for credit, and another 25% did not want to go into debt. A majority of VF borrowers, according to their own statements, profited from the access to finance but most of them are not satisfied with the current form of the programme. For example they want the loans to be larger and the duration of the loans to be longer. This has to be expected due to the favourable terms of VF loans and is consistent with our own interview experiences in the field.

Menkhoff and Rungruxsirivorn (2011) examine whether VFs are indeed improving access to finance and whether they are working in the intended way, that is targeting the relatively poor more than already existing institutions. Using a multinomial logit model to describe what determines borrowing from a certain institution, the authors find that the VFs serve especially those households which are in an intermediate state regarding income and wealth and are more prone to borrow from informal lending institutions. Although it remains unclear whether the VF programme is more efficient than other lending institutions, VF loans are reaching their aim in targeting the poor and reducing credit constraints, and therefore improve access to finance. We extend this work by stretching the analysis over two waves of the household survey.

Thus there are some encouraging findings on the impact of the VF programme. At the same time, however, some scepticism seems to be appropriate, as Morduch (1999: 1571) warns about new microfinance institutions in general: "Most of those funds are

being mobilised and channelled to new, untested institutions, and existing resources are being reallocated from traditional poverty alleviation programmes to microfinance. With donor funding pouring in, practitioners have limited incentives to step back and question exactly how and where monies will be best spent".

2.3 Our data

In this section we briefly describe our data, from general to specific. The data is part of a larger household survey study from which we consider here only those households which get a loan. We characterise (a) the survey, (b) the borrowing households, (c) the lending institutions in general and (d) the VF in more detail.

(a) The data emanates from a research project funded by the German Research Foundation analysing vulnerability to poverty of rural households. For this project, representative household surveys were conducted from April to June in 2007 and in 2008 respectively, in three provinces in north-eastern Thailand (namely Buri Ram, Nakhon Phanom and Ubon Ratchathani). Households were chosen in a three-stage random sampling procedure being representative for the rural population in the three provinces (see Menkhoff and Rungruxsirivorn, 2011).

(b) From the total of almost 2,200 households we consider a subset which fulfils three requirements: First, households must be covered by both waves of the survey; second, households must take at least one new loan during one period; and, third, we do not consider outliers defined as values beyond the median plus or minus eight times the standard deviation. Due to these requirements we get a sample of 1,575 households. This sample, covering about 74% of the representative survey sample, is characterised as can be seen in Table 1.

Household heads are usually male and on average 54 years old. Their education reflects their age, that is schooling happened decades ago and according to the

compulsory schooling years at that time it was only 4 to 5 years long. Almost two thirds work as farmers, and their own land is as small as two hectares. Household size is about

Table 1: Borrower characteristics

Household characteristics	2007			2008		
	mean	std. deviation	observations	mean	std. deviation	observations
Age of household head	53.9	(12.932)	1,570	54.7	(13.043)	1,569
Proportion of female- headed household	25.1%	(0.434)	1,570	25.2%	(0.434)	1,569
Number of adults per household	2.7	(1.179)	1,570	2.7	(1.216)	1,569
Number of children per household	1.3	(1.090)	1,570	1.4	(1.083)	1,569
Household occupation (%)			1,570			1,569
Farm household	64.1%	(0.478)	1,570	62.5%	(0.484)	1,569
Informal worker	9.7%	(0.297)	1,570	11.7%	(0.322)	1,569
Formal worker	7.2%	(0.259)	1,570	7.0%	(0.256)	1,569
Business owner	7.8%	(0.269)	1,570	7.6%	(0.266)	1,569
Inactive	11.1%	(0.315)	1,570	10.8%	(0.311)	1,569
Years of education	4.6	(2.684)	1,396	4.6	(2.810)	1,402
Income (1,000 THB)	112	(134)	1,546	122	(155)	1,568
Assets (1,000 THB)	219	(317)	1,570	202	(395)	1,569
Area of owned land (hectare)	2.1	(3.184)	1,570	1.9	(3.022)	1,568

4 persons. Household assets are worth above 200,000 Baht which is roughly US$ 5,600, and their annual income is above 110,000 Baht, which is US$ 3,100. Changes between 2007 and 2008 are largely negligible for our purposes. Overall, most of these household members live in modest living conditions, as one might expect for the relatively poor north-eastern region of Thailand.

(c)   Finally, we briefly characterise the lending institutions operating in rural Thailand. The rural credit market in Thailand is somewhat segmented, with many players granting loans. Whereas some authors follow the classification of formal vs. informal lending institutions our approach divides all lending institutions into seven groups. In order of tentatively decreasing formality these are (1) commercial banks (CB), (2) the Bank for Agriculture and Agricultural Cooperatives (BAAC), (3) village funds (VF), (4) credit and savings groups and cooperatives (CRED), (5) policy funds (POLICY), (6) private moneylender (ML) and (7) relatives and friends (RELA). This

approach is also used by Menkhoff and Rungruxsirivorn (2011) and is applied here too to make the results of this research compatible with their results.

CBs are normal commercial banks, including some government institutions such as the Government Savings Bank. The BAAC is a state-owned bank that was founded in the 1960s to support the rural population and, especially, to provide financial access to farmers. The VF are policy-induced funds that are organised at the village level; they exist in every one of the 77,000 Thai villages, and have operated since 2001. CREDSs are mainly community based, and include a variety of slightly different institutions, for example rice banks. POLICYs include all policy loans that have been given for the purpose of alleviating poverty and supporting the poor. MLs are private moneylenders and pawnshops who are often the only source of credit and therefore usually charge a high interest rate. The most informal source of credit are RELAs who lend money very informally and often at short notice, without charging interest in many cases.

Table 2 provides an overview of the importance of these seven lending "institutions" with respect to volume and number of loans in 2007 and 2008. Please note that we do not cover all outstanding loans but only *newly granted loans* which are outstanding.

In this respect, the BAAC is the largest institution regarding volume of loans, while the VF is the largest regarding the number of loans. More than 44% of all new loans granted in our sample stem from the VF, but due to their smaller size – about 16,000 Baht each – they add up to a volume of market share of only about 24%. Still, this makes the VF the second largest lending institution behind the BAAC, following this criterion (share of new loans by volume).

Any changes between 2007 and 2008 are small with two notable exceptions, that is the decreasing number of loans granted by CBs and MLs. As we observe only two periods and the absolute numbers are small, we are not sure whether these decreases reflect systematic changes. If so, the origins of these changes are unclear; possibly, they

are a consequence of the financial crisis, in that more market-oriented institutions (in contrast to state-run institutions) react to the crisis by a more rigid lending policy.

Table 2: Share of different lending institutions on overall volume and credit contracts

	CB	BAAC	VF	CRED	POLICY	ML	RELA
2007							
average loan size (1,000 THB)	92	51	16	39	14	44	30
volume of credit (1,000 THB)	3,900	25,900	15,800	10,800	1,500	5,900	4,200
average volume per hh (1,000 THB)	98	57	18	45	14	48	34
share on volume	5.7%	38.1%	23.2%	15.9%	2.2%	8.7%	6.2%
number of loan contracts	42	512	974	275	107	134	140
share on loan contracts	1.9%	23.4%	44.6%	12.6%	4.9%	6.1%	6.5%
number of borrowing households	40	457	879	240	106	122	124
2008							
average loan size (1,000 THB)	71	50	16	42	9	58	27
volume of credit (1,000 THB)	1,600	26,700	15,600	12,000	900	3,500	4,100
average volume per hh (1,000 THB)	76	57	18	47	10	64	33
share on volume	2.5%	41.4%	24.2%	18.6%	1.4%	5.5%	6.4%
number of loan contracts	23	536	964	285	100	60	149
share on loan contracts	1.1%	25.3%	45.5%	13.5%	4.7%	2.8%	7.0%
number of borrowing households	21	471	862	253	95	55	124

(d)   Based on the idea of microfinance institutions – as established all over the world – the Thai government started the VF programme in 2001. Within a very short time, self-governed vehicles – the so-called VFs – were introduced in every one of the 77,000 Thai villages. Each fund was equipped with 1 million Baht of initial capital. The overall costs of 77 billion Baht, or US$ 1.8 billion, which is 1.5% of the Thai GDP in the same year, makes the VF programme one of the largest in the world (Kaboski and Townsend, 2012).

VFs are run by the village members themselves, who have to form a VF committee and have to open a bank account at the BAAC or another state bank or savings cooperation via which the money transfer is provided. The borrowers have to open an account at the same credit institution to receive the loan. Only members of the

VF can apply for a loan and to solve moral hazard and adverse selection problems they have to provide personal guarantors from among other members of the fund.

2.4 Borrowers of the village fund

Our research is focused on the borrowers of the VF and whether and how they change over time. We analyse these issues in three sections: in Section 2.4.1 we differentiate all borrowers into four groups, depending on whether they borrowed from the VF in either 2007 or 2008, or in both years or never. This describes the outreach of the VF. Section 2.4.2 examines characteristics of these groups, allowing comparisons across groups and tentatively over time. Section 2.4.3 describes in detail all new loans granted in 2007 and 2008 for the four groups of interest, which allows a first impression on which direction the loss or gain regarding a VF loan may have influenced the household behaviour. This also indicates possible substitution effects between the VF and alternative sources of credit.

2.4.1 Characteristics of four groups of borrowers

We divided our sample into four categories of households according to their borrowing from the VF. We distinguish borrowing from the VF in two periods, that is the 12 months up to the respective survey waves in 2007 and 2008: (1) The first group of borrowing households borrowed from VFs only in the first year but not in the second year. (2) The second group borrowed from the VF only in the second year, (3) the third group borrowed from the VF in both years, and (4) the fourth group never borrowed from the VF at all.

Table 3 briefly gives some characteristics of these four groups. Interestingly the largest group by far is Group 3, that is those households who received a loan from the VF in 2007 and 2008. Of the total of 1,575 households in our sample, the "permanent" VF borrowers make up about 40%. The second largest group is Group 4, that is

households which never borrowed from the VF. Interesting for our purposes are also those households which either lost a VF loan or got one for the first time, that is Groups 1 and 2 respectively.

Analysing the descriptive statistics documented in Table 3, Group 4 seems to be better off in economic terms compared to the other three groups in both survey waves, as these households have slightly longer education, higher income, more assets and more land at their disposal. This is consistent with the finding in Menkhoff and Rungruxsirivorn (2011), covering the 2007 wave only, that the VF reaches households with slightly lower socio-economic status. It also indicates that the VF works differently from the microfinance institutions analysed by Coleman (2006).

Regarding changes between the two waves, it seems interesting that despite a certain increase in income, other wealth indicators – such as assets and the area of owned land – drop. In this latter respect, it is Group 1 in particular which has to face a problematic situation, as the loss of the VF loan in 2008 coincides with the worst economic status of the four groups and the most significant losses in assets and land; it is a topic for speculation that the somewhat higher income in 2008 could have been caused by sales of assets. For Group 2, income increases in the second wave where the VF loans have been received, but the loans seem to stabilise the economic conditions rather than leading to an overall improvement of the economic conditions. Group 3 relies on VF loans in both waves; obviously, those households are economically better off than one-time recipients and worse off than Group 4 households. Furthermore, the economic situation of the Groups 3 households can be described as fluctuating less over time than the households of all other groups. There are at least two explanations for this: first, these households do not really want to improve their economic situation, or, second, they are simply unable to change it. On closer inspection, we see that their situation gets worse in 2008, so the second explanation may be more satisfactory. According to this interpretation, VF loans help stabilise the situation at a medium level, but households are unable to improve their situation further.

Table 3: Borrower characteristics for lending groups and the weighted average over all

Household characteristics	Group 1	Group 2	Group 3	Group 4	Average
2007					
Age of household head	54.30	56.02	52.58	54.72	53.94
	(13.050)	(13.475)	(12.733)	(12.742)	(12.932)
Proportion of female- headed household	29.3%	29.3%	23.9%	23.2%	25.1%
	(0.456)	(0.456)	(0.427)	(0.422)	(0.434)
Household size	4.20	4.06	4.09	4.02	4.08
	(1.769)	(1.859)	(1.684)	(1.620)	(1.698)
Household occupation (%)					
Farm household	58.6%	62.0%	65.6%	65.2%	64.1%
	(0.494)	(0.487)	(0.475)	(0.477)	(0.480)
Informal worker	11.3%	9.3%	8.2%	11.3%	9.4%
	(0.317)	(0.291)	(0.2749)	(0.317)	(0.297)
Formal worker	5.9%	8.8%	6.2%	8.4%	7.2%
	(0.235)	(0.284)	(0.242)	(0.278)	(0.259)
Business owner	12.2%	5.9%	10.0%	4.0%	7.8%
	(0.3276)	(0.235)	(0.300)	(0.198)	(0.269)
Years of education	4.48	4.41	4.61	4.61	4.57
	(2.892)	(2.841)	(2.487)	(2.783)	(2.684)
Income (1000 THB)	100	109	115	115	112
	(118)	(108)	(152)	(126)	(134)
Assets (1000 THB)	204	208	216	236	219
	(293)	(300)	(283)	(374)	(317)
Area of owned land (hectare)	1.74	1.92	2.10	2.25	2.07
	(2.653)	(2.791)	(2.913)	(3.844)	(3.184)
2008					
Age of household head	55.04	56.84	53.44	55.32	54.71
	(12.89)	(13.283)	(12.780)	(13.188)	(13.043)
Proportion of female- headed household	29.3%	28.3%	24.5%	22.9%	25.2%
	(0.456)	(0.452)	(0.430)	(0.420)	(0.434)
Household size	4.05	4.15	4.15	4.02	4.1
	(1.762)	(1.829)	(1.742)	(1.649)	(1.730)
Household occupation (%)					
Farm household	55.0%	58.0%	64.5%	64.7%	62.3%
	(0.499)	(0.495)	(0.479)	(0.478)	(0.484)
Informal worker	14.4%	14.1%	9.3%	12.7%	11.7%
	(0.352)	(0.349)	(0.290)	(0.333)	(0.322)
Formal worker	6.3%	8.8%	6.2%	7.6%	7.0%
	(0.244)	(0.284)	(0.242)	(0.265)	(0.255)
Business owner	12.2%	5.4%	8.5%	5.7%	7.6%
	(0.328)	(0.226)	(0.279)	(0.232)	(0.266)
Years of education	4.71	4.43	4.54	4.59	4.56
	(3.310)	(3.080)	(2.537)	(2.820)	(2.811)
Income (1000 THB)	112	130	116	130	122
	(128)	(181)	(136)	(176)	(155)
Assets (1000 THB)	161	200	193	233	202
	(227)	(389)	(342)	(506)	(395)
Area of owned land (hectare)	1.45	1.70	1.93	1.96	1.85
	(2.379)	(2.794)	(2.662)	(3.725)	(3.022)

Standard errors in parentheses

Note: Group 1 are households who received VF loans only in the first wave; Group 2 are households who received VF loans only in the second wave; Group 3 received VF loans in both waves, and Group 4 never borrowed from VF, but did borrow from other institutions.

2.4.2 Characteristics of village fund borrowers

Table 4 shows what kinds of households in general do receive VF loans, using a multivariate panel probit model. Indeed, VF borrowers and non-VF borrowers are systematically different. Starting with the household-related characteristics, VF borrowers are likely to be large households (in terms of both number of adults and number of children) with a young household head who is less educated. Another interesting finding is the occupation of VF borrowers. We know from Table 3 that VF borrowers are frequently "business owners", which does not necessarily imply a comfortable economic situation; having any of the occupations listed in Table 4 leads to a lower probability of having a VF loan. This has to be interpreted in relation to the omitted base category, which is business owner. Being a business owner therefore increases the probability of receiving a VF loan.

Turning to the economic status variables, these do not give a clear pattern. Whereas income is negatively related to VF loans, asset endowment and the area of owned land is not. Thus none of these variables is significant, which makes any conclusions at this point problematic.

Another interesting finding is the size of the villages the borrowers come from. Every VF received the same amount of initial capital – one million Baht – regardless of village size. As a result loan applicants from small villages are more likely to be successful with their application. This pattern is confirmed by Table 4 showing that an increasing village size leads to a lower probability of receiving a VF loan.

In order to hone our analysis more finely, we compare the characteristics of VF borrowers (belonging to Groups 1 to 3) to Group 4 households (which never borrowed from the VF). We choose a multinomial logit as our estimation approach because we do not want to impose any structure on Groups 1 to 3. This analysis is conducted by taking the average of the observed values of both waves for each variable and for each household. This approach allows the time dimension problem of the data structure to be solved; however, we lose information about changes over time. To control for

individual effects, we use cluster robust standard errors at household level. Results can be seen in Table 5 where relative-risk ratios are presented.

A relative-risk ratio of 0.579 for the dummy variable 'farmer' for Group 1 households shows the relative probability of belonging to Group 1 relative to the reference category (Group 4) if the dummy changes from 0 to 1. In other words, the probability that a household will fall into Group 1 is about 58% if the probability of belonging to the reference category is 100%.

The household size measured as number of adults is still important, even if it is significant for Group 3 only. Having a young household head increases the probability of being in Group 3 but not Group 2. Group 2 and Group 3 households are more likely to be less well educated, but this is not true for Group 1. Higher-income households are less likely to be assigned to Groups 1, 2 and 3, although this effect is only significant for Group 1 households. For all groups, being a farmer decreases the probability of being a VF borrower, but this is statistically significant only for Group 1. Living in a small village increases the probability of being a VF borrower, which is consistent with Table 4.

VF borrowers of Group 1 or 2 either are occasional borrowers by choice or are able to receive VF loans only once in a while. To address this issue, we take a closer look at the differences between the groups. Table 3 suggests that Group 1 has lower income than Group 3, but Group 2, after receiving the VF loan, has higher income than Group 3. In terms of education, income and assets, Group 3 seems to be in a central category, between Groups 1 and 2. The better educated Group 1 may receive VF loans only because of their relatively high education compared to Group 2 households, which indicates lower risk (Beck and Demirgüç-Kunt, 2008). Group 2, which is richer in terms of assets, can pledge more collateral and can be considered as more creditworthy than Group 1 households. Even though the VFs usually do not require tangible collateral, it may still be an indicator for lower risk. Either way, the loss or the receipt of a VF loan generates changes in the economic situation of both groups, as can be seen in Table 3:

Table 4: Panel probit model predicting VF loans

Dependent variable	VF loan
Household characteristics	
Number of children	0.0867*
	(0.0497)
Number of adults	0.101**
	(0.044)
Dummy if household head is female	-0.0712
	(0.131)
Age of household head (in years)	-0.0237***
	(0.00517)
Income per household (in Baht)	-2.71e-07
	(2.16e-07)
Education of household head (in years)	-0.0389*
	(0.0202)
Asset endowment (in Baht)	5.37e-08
	(8.79e-08)
Area of landholding (in hectare)	0.00816
	(0.0167)
Occupation dummies	
Household head is farmer	-0.325*
	(0.173)
Household head is informal worker	-0.483**
	(0.207)
Household head is formal worker	-0.476*
	(0.253)
Household head is economically inactive	-0.244
	(0.2237)
Village size	-0.00253***
	(0.0006)
Constant	1.309***
	(0.370)
Observations	3,767
Number of households	1,953

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.

Table 5: Multinomial logit model predicting being in different groups

Dependent variable	Group 1	Group 2	Group 3
Household characteristics			
Number of children	1.023	0.919	0.986
	(0.0863)	(0.0845)	(0.0628)
Number of adults	1.125	1.145	1.133*
	(0.0994)	(0.111)	(0.0757)
Dummy if household head is female	1.292	1.227	1.196
	(0.267)	(0.272)	(0.195)
Age of household head (in years)	0.995	1.004	0.982***
	(0.00794)	(0.00874)	(0.00594)
Income per household (in Baht)	0.741**	0.970	0.853
	(0.0972)	(0.121)	(0.0826)
Education of household head (in years)	1.004	0.984	0.980
	(0.0371)	(0.0401)	(0.0247)
Asset endowment (in Baht)	1.104	1.060	1.105
	(0.118)	(0.115)	(0.0894)
Area of landholding (in hectare)	0.949	0.945	0.987
	(0.0387)	(0.0415)	(0.0207)
Dummy variables			
Household head is farmer	0.579**	0.779	0.823
	(0.125)	(0.181)	(0.134)
Household lives in a small village	1.672***	1.552	1.480***
	(0.308)	(0.295)	(0.207)
Constant	5.003	0.211	5.322
	(7.315)	(0.315)	(5.882)
Observations	1,389	1,389	1,389

Clustered standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The table shows relative-risk ratios, for income and assets logarithmic values are used.

<u>Note</u>: Group 1 are households who received VF loans only in the first wave; Group 2 are housheolds who received VF loans only in the second wave, and Group 3 received VF loans in both waves.

The regression is run on average values of the first and second wave.

Losing a VF loan downgrades the economic situation (see Group 1), and receiving a VF loan improves the economic situation (see Group 2). For those households who permanently rely on VF loans, namely Group 3, the loans seem to have no observable impact on income and assets over the two-year period considered.

2.4.3 Changes in new loans

As a last step in our analysis, we document the number and volume of new loans in both periods. From this, we can see whether the loss or gain of a VF loan in Groups 1 and 2 respectively leads to noticeably different behaviour.

Interestingly, Group 1 indicates that households losing a VF loan, that is after a VF loan in 2007 with a one-year duration and no new VF loan in 2008, do not seem to apply for (or receive) new loans from other lenders (see Table 6). In fact, neither the number nor the volume of loans from the six other sources increases much in 2008 compared to 2007. Consequently, the VF loan is a limited event for these households – it is available for a certain limited period only. This is consistent with the hypothesis that the purpose for borrowing, too, is limited, and is fulfilled on termination of the loan. Another interpretation may be that VF loans are seen as windfall profits which come and go but do not affect behaviour much.

The surprisingly unrelated role of VF loans can also be seen for Group 2. Even though the newly gained VF loans are important for these households, they do not change their behaviour much regarding other lenders: the number of loans from lenders other than the VF, and the volume that households receive from these loans, are hardly affected by the many newly received VF loans. This is a different finding compared to Coleman (1999) who observes much substitution between loans.

The overall stability in households' borrowing behaviour is also shown by the results for Groups 3 and 4 in Table 6, where number and volume of loans remain quite stable across the two periods. Thus it appears that the VF loans do not crowd out other

Table 6: New loans per household (in 1,000 Baht) and shares on overall loan volume

Household category	2007			2008		
	number of borrowing households	volume per household	share on overall loan volume	number of borrowing households	volume per household	share on overall loan volume
Group 1						
CB	6	148	9.2%	2	20	0.9%
BAAC	58	55	33.3%	56	62	76.2%
VF	222	17	40.0%			
CRED	28	41	11.9%	17	31	11.8%
POLICY	17	5	0.9%	10	5	1.1%
ML	11	24	2.7%	8	35	6.2%
RELA	15	12	1.9%	11	16	3.8%
Total	357	43.1	100.0%	104	28.2	100.0%
Group 2						
CB	5	88	8.8%	6	77	5.6%
BAAC	36	78	55.8%	51	55	34.0%
VF				205	17	41.1%
CRED	23	25	11.5%	30	30	11.0%
POLICY	7	18	2.5%	9	5	0.6%
ML	14	55	15.4%	8	38	3.6%
RELA	8	38	6.0%	11	30	4.0%
Total	93	50.3	100.0%	320	36.0	100.0%
Group 3						
CB	10	80	2.3%	5	39	0.6%
BAAC	199	54	31.6%	194	57	34.9%
VF	657	18	35.1%	657	19	38.7%
CRED	120	41	14.5%	130	32	13.0%
POLICY	48	18	2.6%	45	7	1.0%
ML	41	65	7.9%	13	143	5.8%
RELA	43	46	5.9%	45	43	6.0%
Total	1118	46.0	100.0%	1,089	48.6	100.0%
Group 4						
CB	19	92	8.9%	8	118	4.7%
BAAC	164	56	47.3%	170	55	46.8%
VF						
CRED	69	60	21.4%	76	85	32.3%
POLICY	34	12	2.0%	31	17	2.6%
ML	56	40	11.4%	26	39	5.1%
RELA	58	30	8.8%	57	29	8.4%
Total	400	48.3	100.0%	368	57.2	100.0%

Note: Group 1 are households who received VF loans only in the first wave; Group 2 are households who received VF loans only in the second wave; Group 3 received VF loans in both waves, and Group 4 never borrowed from V but did borrow from other institutions.

lending programmes but are rather seen as a supplementary lending source, presumably due their attractive conditions.

2.5 Conclusions

This article examines the role of VFs in the rural credit market of Thailand. In order to better understand the role of VFs, we form four groups of borrowers, namely (1) borrowers who lose their VF loan in the second period, (2) borrowers who get a new VF loan in the second period, (3) those who have a VF loan in both periods and (4) those who have never had a VF loan.

Based on the two-wave panel on the borrowing of north-eastern households, we contribute three findings to the literature on VFs in Thailand: first, despite the wide-spread use of VF loans there is some structure across households as VF borrowers seem to have a worse economic status than non-borrowers which is underlined by the fact that households losing a VF loan report lower wealth than other households. Second, the regression approach indicates that VF borrowers are characterised not only by a lower economic status but also by having more adults in their household and more often being business owners. In combination with their lower economic status – less often owning land and less often being a farmer – this tentatively indicates underemployment of the workforce. Third, the examination of new loans across the two periods indicates that VF loans do not seem to have a permanent impact on borrowing behaviour at household level. Otherwise, one would expect either that VF loans partially substitutes other loans or that they are partially substituted by other loans – but we cannot observe any such behaviour.

Obviously, this raises new questions regarding the targeting of lending and the behaviour of borrowers. In subsequent work, we plan to analyse households in more detail in order to find out which circumstances may lead to a deterioration of the economic situation after losing the VF loan. Furthermore, we would like to learn about a possible impact of VF loans on small-scale businesses. Finally, we plan to extend the

loans considered in order to come close to a full loan portfolio which may provide new insights into loan substitution. In any case, the VF deserves more thorough investigation.

3. Why are informal loans still a big deal? Evidence from Northeast Thailand[**]

Abstract

Using a difference-in-differences estimation approach this paper finds that borrowing purposes differ across income levels of rural households in Northeast Thailand. As a consequence different household groups profit from informal loans in different ways. Poor households increase their asset endowment and in particular farming assets whereas rich households' (food) consumption rises, especially if households borrow due to a shock. By showing that informal loans serve different households for different purposes this paper provides an explanation why informal loans still play an important role.

3.1 Introduction

Rural credit markets in developing countries are often very diverse. Households can choose from various sources of credit, ranging from conventional formal lenders to a variety of informal lenders. Since informal loans in general are more expensive than formal loans, many attempts have been made to enhance the access to finance for the poor and to alleviate reliance on informal sources. Yet, there are still households who opt to borrow from informal sources so that these enjoy great popularity in developing countries. This is even more striking since people are poor or threatened to fall into poverty more often than in more developed areas. They suffer from volatile income due

to farming activities and small changes in their sensitive environment may cause severe income losses. Finance at reasonable prices is a crucial issue for them to bridge income deficits and to finance inputs for the next harvesting season.

This paper examines in which way the use of informal loans differs across income groups of households and it provides insights into the effects informal loans have on wealth indicators of household groups. Therefore this paper contributes to the literature in that it explains why informal loans still play such an important role for household finance in rural areas of developing countries.

A broad literature examines the *existence* of informal loans which is driven by imperfections on rural credit markets. These imperfections comprise screening, incentive and enforcement problems circumvented by informal lenders who have more information on borrowers than formal lenders (Hoff and Stiglitz, 1990). Following this argument households are credit rationed in the formal sector and therefore have to rely on more informal sources (Guirkinger, 2008). In this sense the informal sector can be considered as a recipient of spillover demand from the formal sector. Another strand of literature addresses the *use* of informal loans. Most studies find that formal loans are used for production whereas informal loans are used for consumption purposes (Barslund and Tarp, 2008; Zeller, 1994; Yadav et al., 1992). As a consequence informal loans are rather small, short-term and usually not to be collateralised (Siamwalla et al., 1990). However, there are other studies who find that the use of informal loans is not limited to consumption purposes (Brandt and Hosios, 2010; Duong and Izumida 2002).

This paper complements the existing literature by distinguishing groups of households according to income and disentangles the use and effect of informal loans found above. This requires specific information on households' characteristics, in particular on their economic status and detailed information on different (informal) lenders operating in the market. The data used here provides this information. This paper is, to the best of my knowledge, the first which is able to distinguish the use and

effect of informal loans for different household groups which are defined according to income.

Using a panel data set consisting of two waves of a household survey that was conducted between April and June 2007 and between April and June 2008 in rural Thailand, I employ a difference-in-differences estimation to calculate the effect of informal loans on different wealth indicators, that is asset endowment and per capita consumption. In a second step the effects for rich and poor households are compared. The results show that poor as well as rich households demand informal loans but use them for different purposes.

For the whole sample, there is a large effect on total asset accumulation and on farming assets as well whereas there is no effect on (food) consumption per capita. To get further insights I split the sample into three groups according to household income. In increasing order of income these are: the vulnerable, the relatively poor and the relatively rich households. Regressions for different types of households reveal that asset endowment increases only for relatively poor households and that there is a positive effect on (food) consumption per capita which is only valid for the richest households.

Informal loans are used by poor as well as by rich households, but obviously it seems as if they serve different purposes. They enhance asset endowment of relatively poor households whereas enable higher (food) consumption for relatively rich households, especially if households are non-farming, credit-rationed in the formal sector and/or negatively affected by a shock.

The remainder of the paper is organised as follows. Section 3.2 distinguishes informal loans from formal loans and gives an overview of the use of informal loans as has been found in former studies. Subsequently an overview of impact assessment methods is given. Section 3.3 describes informal loans and household characteristics in the context of the rural area in Thailand's Northeast. Section 3.4 shows the effect of

informal loans on wealth indicators. Robustness checks are presented in Section 3.5 and Section 3.6 concludes.

3.2 Informal loans and impact assessment in rural markets

This section first gives an overview of loan terms of formal and informal loans and describes the use of loans across different types of lenders. In a next step, impact assessment of loans and in particular microfinance institutions is discussed to derive the method used in this paper.

3.2.1 Loan terms and use of informal loans

Typical informal loans are described to be small, unsecured and short in maturity. Often they are restricted to certain geographical regions or a specific clientele such as "rural areas, agricultural contracts, households, individuals, or small entrepreneurial ventures" (Ayyagari et al., 2010). Barslund and Tarp (2008) find that informal loans are half the size of formal loans, that they are seldom collateralised and much shorter in duration than formal ones. Often, informal loans do not demand interest rates. Using data on informal loans for the Northeast of China Brandt and Hosios (2010) examine the choice of households to apply for positive interest rate loans or zero interest rate loans. Positive interest rate loans require the borrower to pay back principal plus interest whereas zero interest rate loans involve paying back principal only. Instead, borrowers have to fulfil other obligations like providing the lender with land, labour, agricultural goods or productive livestock and even loans in a later point in time so that loan costs may be higher than observed. For informal loans Drèze et al. (1998) find that zero interest rate loans are granted by family members and friends whereas moneylenders usually charge positive interest rates. If interest rates are charged, they often depend on the relationship between borrower and lender. Loans are cheap, if the relationship with the borrowers is close but expensive if the borrower is hardly known and is not be trusted without risk (Bhattacharjee, 2009; Diagne et al., 2000).

Regarding the use of loans, the dominant view is that formal loans are mainly used for production purposes and asset accumulation whereas informal loans are mainly used for consumption smoothening (Barslund and Tarp, 2008 for Vietnam; Mohieldin and Wright, 2000 for Egypt; Zeller, 1994 for Madagascar; Yadav et al., 1992 for Nepal). Duong and Izumida (2002) use data for Vietnam and find that formal loans are used for production purposes and informal loans are used for various purposes and, to some extent, for production as well. Their results indicate that especially poor households are credit rationed in the formal sector and funding beyond what the formal sector provides is often granted by informal sources. Other authors argue that the purpose of borrowing and therefore the use of loans are, though not always, independent of the type of lender. Brandt and Hosios (2010) find that formal and informal loans are used for both, consumption as well as investment purposes. Drèze et al. (1998) find that loans granted by family members and friends are mainly used for consumption purposes whereas loans from professional moneylenders are used for investment purposes.

Other studies identify further features of informal loans: Since informal loans are available rather short-at-hand they are an important strategy to cope with negative shocks (Heltberg and Lund, 2009). Loans from rotating savings and credit associations (ROSCAs), for example, reduce the costs of savings for asset accumulation. As a consequence asset endowment increases if households participate in ROSCAs (Besley and Levenson, 1996). The idea is that ROSCAs collect small amounts of money from each member at given points in time. After each payment round the sum containing of all payments of all members will be given to one selected member of the ROSCA. This concept allows "intertemporal trade" since ROSCA members are able to receive a large amount of money earlier than had they saved on their own (Besley et al., 1993). Using data from the urban poor in Ethiopia, Alvi and Dendir (2009) examine the effect of informal loans and transfers on risk and vulnerability. They show that informal loans are rather used to bridge a financing gap and serve a sudden demand if a household is budget constrained. Especially vulnerable households do not receive more or higher amounts of informal loans than other households. The authors argue that informal loans

do not respond to various measures of vulnerability and therefore do not contribute to reducing risks for the urban poor. For the Philippines, Fafchamps and Lund (2003) find that informal loans indeed facilitate risk-sharing among households and permit consumption smoothening. However, some shocks cannot be insured by informal loans and the positive risk-sharing effect of these loans is restricted to small groups of families and friends.

The literature cited above shows that the stereotypical informal loan does not exist. The design and purpose of informal loans are as manifold as rural credit markets themselves. However, some general patterns can be identified: informal loans are rather small, often they do not charge interest rates and they are more likely used for consumption purposes than for production purposes.

3.2.2 Impact assessment in rural markets

To get further insights into the use and effects of informal loans their impact should be evaluated carefully. A recent discussion regarding the impact evaluation of microfinance programs shows that there are various methods at hand. There are four main concerns which have to be taken into account: First, any real data comprise the problem that program placement might not be exogenous. Second, participation in those programs may not be exogenous and results may be driven by self-selection bias. Third, the effect of the program might be due to unobservable determinants. Fourth, the so-called attrition bias should be taken into account (Tedeschi and Karlan, 2010; Roodman and Murdoch, 2009). I will come to these objections when discussing the methodology in this paper.

Most literature addresses the impact of microfinance. But since the differentiation of microfinance loans and other loans is fuzzy one may as well orientate on evaluation of microfinance programs. There are three dominant methods used in the literature. Pitt and Khandker (1998) suggest using an *instrumental variable approach* if the participation of the program is correlated with the dependent variable. For a cross-

sectional data set from Bangladesh they estimate the impact of a microfinance program by introducing instruments for the eligibility to treatment. They find that indeed consumption increases if microfinance is available and that the effect is stronger for female borrowers than for male borrowers. However, studies show that this is not unproblematic (Roodman and Murdoch, 2009; Pitt and Khandker, 1998).

In another study Khandker (2005) expands the 1998- Pitt and Khandker study by introducing a panel data dimension using a second wave of survey results. He examines the effect of borrowing on consumption using a *fixed effects panel data model*. This model is used to eliminate the bias that might emanate from unobservable household characteristics; in other words: the endogeneity problem. However, it should be taken into account that this approach does not necessarily result in consistent estimates because first, the fixed effects (unmeasured determinants) may vary over time and second, measurement errors will be enforced if only two time periods are used. Khandker finds that indeed microfinance programs have positive impacts on especially poor people and women in the sense that they boost consumption levels and realise spillover effects on non-participants in the same village.

Roodman and Morduch (2009) question the results of all three studies above. They replicate the studies and introduce a *Two-Stage-Least-Square estimation*. They cannot confirm the positive impact of microfinance that has been suggested by the studies above. Yet, they cannot confirm a negative effect of microfinance either. They argue that especially the instrumentation strategy is failing and that results are driven either by omitted variables or reverse causation. Furthermore the relationship between microfinance and consumption differs across subsamples.

The time dimension in our data set (two waves) makes it possible to estimate panel models and to control for individual effects. I do not use an instrumental variable approach since instruments are hard to find and the methods are problematic. A Two-Stage-Least-Square estimation assumes that outcome variables are not known for households who do not get the treatment. However, information on the outcome

variable is available for all households in the sample so that Two-Stage-Least-Squares is not appropriate in this case. Instead a difference-in-differences estimation is used which will be discussed in Section 3.4.1 in more detail.

To estimate the impact of informal loans appropriate indicators are needed. The choice of an indicator depends on the research question and the time dimension of the data since changes in the variables of interest may take some time. I use asset endowment and (food) consumption per capita to indicate the relatively prompt effect of informal loans. An effect on working capital or assets should be observable within 6–12 months after treatment. Rural households in developing countries often use informal loans to build up their asset stock. In case of lean times assets can be sold immediately and the money can be used for consumption purposes. Higher endowment with assets may also lead to higher creditworthiness of the households (Kaboski and Townsend, 2011). Furthermore more assets help to diversify the asset portfolio of a household which leads to less covariant risks (Zaman, 1999). Armendáriz de Aghion and Morduch (2010) use consumption levels as indicators as well. However, the effect on consumption depends crucially on the loan purpose. If a loan is taken for consumption purposes, then the effect of treatment should be observable immediately. But, if loans are for investment purposes, then the effect on consumption takes longer because it takes time until the investments yield profits which then in turn can be used for consumption.

Relying on the microfinance literature Karlan and Goldberg (2007) suggest several other indicators to measure the impact of microfinance, such as income, business revenues, education levels or school enrolment and housing stock. The first observable change after loans have been received is, of course, the debt level. Another indicator which can be used to make the impact of informal loans observable, is income of a household. But the effect on income is observable only in the long run and difficult to measure for people who are engaged in informal activities and therefore lack formal income. One last effect of any program or single loans can be described as spillover effects on households who are not in the treatment group. Positive spillovers can be

more economic activity in the area or village and negative spillovers could be more competition or deterred market relations.[1] In this paper I do not control for this kind of spillover effects.

3.3 Data

This section contains information on the data which has been used in this paper: Section 3.3.1 describes the underlying survey and how households have been chosen; Section 3.3.2 gives more detailed information on household characteristics and Section 3.3.3 describes informal loans and compares them to more formal loans.

3.3.1 Underlying survey

The data emanates the project "Impact of shocks on the vulnerability to poverty: consequences for development of emerging Southeast Asian economies" which is funded by the German Research Foundation (DFG). I use the first and second wave of a household survey that has been conducted between April and June in 2007 and between April and June in 2008, respectively. The reference period for each wave is a 12 months period starting in April so that the data is on a yearly basis. The interviewed households were chosen according to their location. First, three provinces were chosen, namely Buri Ram, Ubon Ratchathani and Nakhon Phanom which are located in the north-eastern part of the country which is known to be the poorest region in Thailand. Further household identification follows a three-stage-stratified sampling procedure, where provinces are considered as strata and the first sampling units are sub-districts. Sub-districts were chosen randomly with probability according to their size. Then two villages of each sub-district were chosen at random and 10 households out of each village were randomly identified (Hardeweg et al., 2012). The same households were interviewed in

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[1] Further indicators can be taken from Microfinance Information Exchange, available via: http://www.mixmarket.org/data-center. Those indicators are for example debt/equity ratio and capital/asset ratio.

the second wave and the attrition rate is less than 5%. Eventually, the overall sample consists of 2,136 households who all have been interviewed twice.

For these households we have information on: demographics, occupation, employment, health status, education, agricultural activities, income, consumption, expenditures, and assets. Furthermore detailed information regarding the financial situation, such as borrowing activities and the amount of savings is available.

There are other studies which rely on the same survey[2]. Menkhoff and Rungruxsirivorn (2011) examine whether a policy-induced microfinance program, the so-called village funds, improve access to finance for the rural poor. They find that village funds target the poorest households and ease credit constraints but given the high costs of implementation their efficiency can be questioned. In another study, Menkhoff et al. (2012) identify relationship lending and personal guarantees as alternatives to tangible collateral if households lack assets to guarantee for their loans.

Following the procedure in these studies, lending institutions are split into different categories which are in decreasing order of formality: the *formal group*, the *semiformal group* and the *informal group*. Each group consists of subgroups. *Formal lenders* include commercial banks and the state-owned Bank for Agriculture and Agricultural Cooperatives which is one of the biggest lenders in the rural area. *Semiformal institutions* include all kinds of locally organised credit cooperatives and savings groups which operate according to their own regulation framework. In principle they apply the same requirements to every borrower but sometimes participation is restricted to being a member of these groups. Loans given by the Thai revolving fund (the so-called Village Fund programme, see Menkhoff and Rungruxsirivorn, 2011; Boonperm et al., 2013) are considered as semiformal loans as well. Furthermore policy loans are assigned to this group because their lending procedure is more comparable to semiformal institutions than to formal or informal lenders. Policy loans include loans

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[2] These studies use the first wave of the household survey, whereas in this study the first two waves of this survey are used.

which are given in line with the poverty eradication project or student loans. *Informal lenders* are very heterogeneous since they comprise of a large variety of lenders. These are (1) Professional moneylenders whose main business consists of giving loans to other households; (2) Business partners who are mainly traders and suppliers so that loan terms might be interlinked with other businesses; (3) Family members and (4) Friends.

3.3.2 Description of data

Altogether 2,136 households have been interviewed in both waves. 69% of the households borrowed any loans during the first wave and 64% borrowed loans in the second wave. 435 households never borrowed and some households (550) borrowed in only one of the waves. For the analysis only households are considered who borrowed in both waves. This reduces the sample to 1,151 households.

For the analysis I split the households into three different groups according to their income. Vulnerable households are households whose income is below the local poverty line[3] in 2007. Relatively poor households have an income of no more than twice the poverty line and relatively rich households have an income which is higher than two-times the local poverty line. This classification splits the sample into almost equally sized household groups whose characteristics and differences are described in Table 7.

With respect to household *demographics*, household heads of vulnerable households are older than relatively rich household heads and younger than relatively poor household heads. However, their education level is below that of the other household groups, whereas relatively rich households have the highest education level. Vulnerable households tend to be the largest households and they are less often female-headed than relatively rich households. Furthermore their household heads are married most often.

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[3] The local poverty lines per capita per month are in Buri Ram 1,252 Baht, in Ubon Ratchathani 1,245 Baht and in Nakhon Phanom 1,274 Baht.

Table 7: Household characteristics for different types of households

household characteristics	*1st wave*			*2nd wave*		
	vulnerable	*relatively poor*	*relatively rich*	*vulnerable*	*relatively poor*	*relatively rich*
Demographics						
Age of household head	53.62	53.86	52.67	54.39	54.54	53.49
	(13.39)	(13.25)	(11.83)	(13.23)	(12.93)	(11.73)
Years of education of hh head (in years)	4.73	5.02	5.82	4.86	5.08	5.83
	(2.05)	(2.49)	(3.34)	(2.21)	(2.49)	(3.38)
Household size (adult equivalence scale)	3.08	2.99	2.59	3.08	3.00	2.69
	(1.02)	(0.99)	(0.97)	(1.08)	(0.97)	(1.02)
Female headed household (in %)	23.9%	24.6%	26.7%	24.9%	23.2%	26.9%
	(0.43)	(0.43)	(0.44)	(0.43)	(0.42)	(0.44)
Married household head (in %)	80.8%	79.4%	78.7%	81.8%	80.2%	80.5%
	(0.39)	(0.41)	(0.41)	(0.39)	(0.40)	(0.40)
Health status						
Sick (in %)	14.9%	13.8%	11.5%	16.1%	16.1%	14.7%
	(0.36)	(0.35)	(0.32)	(0.37)	(0.37)	(0.35)
Suffering from disease (in %)	24.9%	25.1%	18.9%	26.8%	26.6%	25.3%
	(0.43)	(0.43)	(0.39)	(0.44)	(0.44)	(0.44)
Occupation						
Farmer as reported by household (in %)	72.0%	63.0%	56.3%	66.8%	64.1%	58.1%
	(0.45)	(0.48)	(0.50)	(0.47)	(0.48)	(0.49)
Farmer according to share of farm income (in %)	50.0%	39.8%	28.5%	53.3%	49.2%	41.1%
	(0.50)	(0.49)	(0.45)	(0.50)	(0.50)	(0.49)
Economic status						
Total annual income (in 1,000 Baht)	30	89	238	101	106	213
	(47)	(38)	(217)	(256)	(115)	(404)
Total per capita consumption (in 1,000 Baht)	23	25	41	25	25	40
	(18)	(12)	(21)	(30)	(18)	(36)
Food consumption per capita (in 1,000 Baht)	9	11	14	10	11	15
	(5)	(6)	(8)	(9)	(6)	(11)
Asset endowment (in 1,000 Baht)	131	112	209	153	129	263
	(285)	(168)	(323)	(290)	(241)	(834)
Production assets (in 1,000 Baht)	65	52	88	67	35	109
	(179)	(111)	(167)	(206)	(170)	(753)
Farming assets (in 1,000 Baht)	18	18	12	29	21	18
	(63)	(65)	(75)	(108)	(71)	(57)
Savings (in 1,000 Baht)	11	10	32	8	10	23
	(49)	(27)	(105)	(27)	(26)	(56)
Borrowing activities						
Borrowed because of shock (in %)	9.0%	10.5%	7.7%	10.4%	8.5%	5.3%
	(0.29)	(0.31)	(0.27)	(0.31)	(0.28)	(0.22)
Credit rationed houshold (in %)	7.6%	7.6%	3.7%	4.5%	3.7%	2.7%
	(0.27)	(0.27)	(0.19)	(0.21)	(0.19)	(0.16)
Number of households	422	354	375	422	354	375

Standard errors in parentheses; consumption values are inflation adjusted

Health status variables indicate that vulnerable households have the lowest health status, followed by relatively poor and relatively rich households.

There are two possibilities to categorise a household to be a farm household. In the survey households are asked about their *occupation*. The first definition uses this information. Since many households consider themselves to be farmers but actually their income from farming is just a small fraction of their total income a second definition is used in the regressions. According to this, a household is defined to be a farmer if the share of farm income to total income is at least 20%[4]. Independent of the definition, vulnerable households are most often farming households followed by relatively poor and relatively rich households which indicates their dependence on farming conditions such as flood, draught and crop pests.

Variables indicating the *economic status* of households give an expected pattern: Vulnerable households have by far the lowest income level, the lowest (food) consumption level and, in 2008, the lowest amount of savings. The value of all asset and production assets, however, is lowest for relatively poor households. Farming asset endowment is lowest for relatively rich households since those households are not so often engaged in farming activities.

Borrowing activities differ as well across household groups: Unsurprisingly relatively rich households do not borrow often because they were hit by a shock. Shock-borrowing is most frequent for relatively poor households in 2007 (10.5%) and most frequent for vulnerable households in 2008 (10.4%). Vulnerable households are credit-rationed to the highest degree followed by relatively poor and relatively rich households.

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[4] According to the self-assessment definition 62% of all households are farmers but according to the share of farm income only 40% of all households are farmers.

3.3.3 Informal loans

<u>Table 8</u> shows loan characteristics of all loans for the years 2007 and 2008 according to different types of lenders. <u>Panel A</u> categorises loans into formal, semiformal and informal loans, <u>Panel B</u> itemises informal loans further into moneylenders (ML), business partners (BP), family members (FAM) and friends (FRI). Whereas most studies find that informal loans are expensive in terms of charged interest rates, short in duration, less likely collateralised and rather small (Barslund and Tarp, 2008; Bose, 1998) our data confirms only some of these findings. Regarding *loan characteristics* informal loans are larger than semiformal or formal loans and their duration is only slightly shorter than the duration of formal loans. Like in most other studies informal loans are the most expensive source of credit. There are some differences in *collateral requirements*. Almost 36% of all informal loans require collateral. However, the overall share of informal loans which do not require any collateral is high (48%) and only 16% require personal guarantees. The different types of loans also differ in terms of *borrowing purposes*. Whereas formal and semiformal loans are mainly used for agricultural production, 58% of all informal loans are used for consumption purposes and only 17% are used for agricultural production purposes.

Informal loans are very heterogeneous and can be split further into different types of informal institutions. <u>Panel B</u> shows the same information as before but this time for different informal lenders. Indeed, *loan characteristics* for different informal lenders differ a lot from each other. BP loans are very large and have a long duration of almost three years whereas loans from friends are quite small with durations of less than a year. Most of the BP loans are taken to buy by instalments. In this case the "business partner" is a retailer who sells durables (motorbikes, machines, cars…) to the household. The household pays back small amounts of the purchase price at given points in time until the price has been paid completely. Often the purchased items are used as collateral at the same time. I address this issue in the robustness checks in Section 3.5. With respect to the reliance on *collateral* two groups can be distinguished: the first comprises of ML and BP. They demand collateral relatively often (almost one half of the loans is

Table 8: Loan characteristics for different types of lending institutions

Panel A

Characteristic	formal	semiformal	informal
Average loan size (in 1,000 Baht)	67	22	86
	(121)	(55)	(237)
Duration (in months)	30.7	14.8	24.9
	(40.71)	(16.56)	(28.34)
Annual interest rate (in %)	9.6%	8.1%	23.1%
	(14.82)	(16.34)	(43.46)
Collateral			
Collateralized loans (in %)	37.8%	5.1%	35.5%
Rate of collateralization	4.2	4.9	2.3
Personal guarantee (in %)	58.8%	89.1%	16.1%
No collateral required (in %)	3.2%	5.7%	47.8%
Purpose			
Agricultural production (in %)	47.8%	44.4%	17.1%
Non- agricultural production (in %)	18.9%	14.1%	11.7%
Consumption (in %)	18.3%	27.5%	57.7%
Pay back other loans (in %)	13.7%	13.8%	10.5%
Other purpose (in %)	1.0%	0.2%	2.3%
Number of loans	1,456	3,520	1,138

Panel B

Characteristic	ML	BP	FAM	FRI
Average loan size (in 1,000 Baht)	54	143	37	19
	(97)	(336)	(85)	(38)
Duration (in months)	18.8	33.0	17.4	11.6
	(23.50)	(33.23)	(18.08)	(10.41)
Annual interest rate (in %)	45.3%	17.4%	10.5%	35.8%
	(63.39)	(33.40)	(22.15)	(54.27)
Collateral				
Collateralized loans (in %)	41.3%	53.3%	9.6%	9.2%
Rate of collateralization	4.2	1.3	4.5	5.3
Personal guarantee (in %)	12.2%	24.8%	6.9%	8.3%
No collateral required (in %)	46.1%	20.7%	83.5%	82.6%
Purpose				
Agricultural production (in %)	27.4%	7.1%	25.4%	20.2%
Non- agricultural production (in %)	13.5%	8.1%	18.2%	7.3%
Consumption (in %)	31.7%	82.5%	36.4%	54.1%
Pay back other loans (in %)	20.9%	1.0%	16.8%	16.5%
Other purpose (in %)	6.1%	0.2%	3.1%	1.8%
Number of loans	230	508	291	109

collateralised) and personal guarantees are a frequent feature of their loan contracts. The second group comprises of FAM and FRI. They demand tangible collateral in only 10% of all cases and more than 82% of all loans require no collateral at all. *Borrowing purposes* differ a lot across different informal lenders. ML loans are mainly used for consumption, but also agricultural production and pay back other loans are frequent borrowing purposes. Most loans of BP are used for consumption. The same is true for FAM and FRI but unlike BP loans, loans from FAM and FRI are also used for agricultural production and to pay back other loans.

In the data informal loans are very heterogeneous but they can be clearly distinguished from semiformal and formal loans. To address the issue why informal loans are still important it is crucial to know who demands informal loans and whether they target a certain type of household.

Table 9 shows how loans from different institutions are distributed over household groups. It becomes evident that, independently of household groups, semiformal lenders are by far the most frequently used group of lenders since more than 50% of all loans are granted by semiformal institutions. Formal loans are the second important source of credit with an overall share of 24.2%. Informal loans are least frequently used and account for 16.6%. In general poor households tend to borrow more often from informal and semiformal institutions whereas rich households borrow more likely from formal institutions. Still, relatively rich households borrow from informal sources in 14.3% of all cases.

Table 9: Borrowing activities for different groups of households

	vulnerable	*relatively poor*	*relatively rich*	*weighted av.*
formal	21.0%	25.8%	26.6%	24.2%
semiformal	60.1%	58.8%	59.1%	59.3%
informal	18.9%	15.4%	14.3%	16.6%
∑	100.0%	100.0%	100.0%	100.0%

Note: Data is on loan level, overall sample contains 1,151 households and 5,134 loans.

3.4 Results

3.4.1 Methodology

To estimate the effect of informal loans on asset accumulation and consumption a difference-in-differences estimator is used. Therefore a panel data set at household level has been generated for the two waves of our survey (2007 and 2008) and a fixed effects model is employed to account for individual-specific effects and possible unobserved heterogeneity. There are four general problems that have to be taken into account when assessing the impact of any newly introduced program. First, program placement should be exogenous (f.e. in an experimental setting) and second, participation in programs should be exogenous in order to avoid biased results due to self-selection into the program. In this study, the availability of informal loans is not an exogenously placed program and of course the decision to demand informal loans is made on households level and therefore not exogenous. However, the aim of this study is to examine the impact of informal loans on wealth indicators rather than to evaluate a new credit program. Third, unobservable determinants may drive the effects. To account for that a fixed effects model is used and all necessary control variables are included in the regressions. Of course, household fixed effects may vary over time but the time span is only one year so that fixed effects should not vary much. Fourth, there might be an attrition bias since some households drop out of the survey in the second wave. However, this figure amounts to less than 2.3% and affects 50 households only.

The sample has been split into a treatment group and a control group in which the receipt of an informal loan in 2008 is considered as treatment independently of a receipt of informal loans in 2007. All regressions control for the total sum of formal, semiformal and informal loans at household level in both waves. This is to make sure that the amount of loans is taken into account and that loans granted in 2007 are considered as well. The treatment effect in this approach is given by changes in per capita consumption and asset endowment in 2008. I am aware of the problem that the treatment and its effects occur within the same year. But since the effect of informal

loans on assets and consumption is calculated by using data aggregated on a yearly basis, it is likely that effects on assets and consumption are observable within the same year the informal loan has been received. Since wealth indicators may also depend on other macroeconomic and individual household characteristics an extended classical approach (Huebler, 2001) is used. The model can be explained by the following equation:

$$y_{it} = \mu_i + x'_{it}\beta + z_t + D'_{it}\alpha + u_{it} \qquad (1)$$

where y_{it} is the dependent variable which is one of the wealth indicators of interest so that y_{it} represents either asset endowment or per capita consumption. μ_i is an individual-specific effect for each household, X'_{it} is a vector of household characteristics and z_t is a macroeconomic indicator consisting of the GDP in Baht in the respective wave. D'_{it} is a dummy variable that indicates whether a household is treated or not. D'_{it} equals one if a household received informal loans in the year 2008 and zero otherwise. U_{it} is the error term with $E[u_{it}]=0$.

Table 10 gives an overview of treated and non-treated households for the groups of vulnerable, relatively poor and relatively rich households. In the whole sample about 20% of all households received treatment in the second wave. Vulnerable households are most likely treated (24%) followed by relatively poor households (19%) and relatively rich households (17%).

Table 10: Sample overview

	vulnerable	*rel. poor*	*rel. rich*	*sum/ (percentage)*
non-treated	322	287	311	920
(in percentage)	(76.3%)	(81.1%)	(82.9%)	(79.9%)
treated	100	67	64	231
(in percentage)	(23.7%)	(18.9%)	(17.1%)	(20.1%)
sum	422	354	375	1,151
(in percentage)	(36.7%)	(30.8%)	(32.6%)	(100.0%)

As stated above, it can be argued that the treatment in this study is not exogenous since it is each household's decision to borrow from informal sources themselves. Hence, it is important to know in which way treated and non-treated households differ. Table 11 compares household characteristics of treated and non-treated households for each group in 2007 (prior to treatment).

Regarding *household demographics*, household heads of treated households are younger than non-treated. Treated households are less educated except for relatively rich households. In general, treated households have larger household sizes and the share of female-headed households is larger indicating an exclusion of females in the formal credit market.

With respect to the *health status*, treated households are not sick more often nor do they suffer from any disease more often than their non-treated counterparts.

According to self-reported *occupation*, vulnerable treated households are more likely farmers than non-treated whereas this cannot be found for the other groups. If the share of farm income to total income is taken to define farmers there is not much difference between treated and non-treated households for vulnerable and relatively poor households. Relatively rich households are less likely farmers when treated.

With respect to *economic status* treated vulnerable households have lower income than non-treated households, but for relatively poor and relatively rich households income is higher for treated households. Consumption values do not differ much between non-treated and treated households. However, if consumption on household level is considered (not reported in Table 11) consumption values are higher for relatively poor and relatively rich households when treated. Asset endowment is higher for treated households except for relatively poor households who have comparatively low assets endowment when treated. Savings are always lower if households are treated in 2008.

Table 11: Household characteristics for treated and non-treated households in 2007

household characteristics	vulnerable		relatively poor		relatively rich	
	non-treated	treated	non-treated	treated	non-treated	treated
Demographics						
Age of household head	54.71	50.10	54.07	52.97	52.85	51.81
	(13.85)	(11.13)	(13.00)	(14.33)	(11.74)	(12.32)
Years of education of hh head (in years)	4.74	4.70	5.04	4.97	5.67	6.56
	(2.13)	(1.77)	(2.54)	(2.30)	(3.16)	(4.07)
Household size (adult equivalence scale)	3.06	3.14	2.96	3.14	2.57	2.69
	(1.01)	(1.04)	(0.94)	(1.17)	(0.96)	(0.98)
Female headed household (in %)	23.9%	24.0%	23.7%	28.4%	25.4%	32.8%
	(0.43)	(0.43)	(0.43)	(0.45)	(0.44)	(0.47)
Married household head (in %)	79.8%	84.0%	79.8%	77.6%	78.8%	78.1%
	(0.40)	(0.37)	(0.40)	(0.42)	(0.41)	(0.42)
Health status						
Sick (in %)	15.5%	13.0%	14.3%	12.0%	11.6%	10.9%
	(0.36)	(0.34)	(0.35)	(0.33)	(0.32)	(0.31)
Suffering from disease (in %)	25.8%	22.0%	25.8%	22.4%	19.3%	17.2%
	(0.44)	(0.42)	(0.44)	(0.42)	(0.40)	(0.38)
Occupation						
Farmer as reported by household (in %)	71.4%	74.0%	64.5%	56.7%	57.2%	51.6%
	(0.45)	(0.44)	(0.48)	(0.50)	(0.50)	(0.50)
Farmer according to shareof farm income (in %)	50.3%	49.0%	39.4%	41.8%	29.3%	25.0%
	(0.50)	(0.50)	(0.49)	(0.50)	(0.46)	(0.44)
Economic status						
Total annual income (in 1,000 Baht)	32	25	88	96	234	262
	(48)	(45)	(35)	(47)	(199)	(288)
Total per capita consumption (in 1,000 Baht)	23	23	25	25	41	42
	(17)	(21)	(12)	(11)	(21)	(21)
Food consumption per capita (in 1,000 Baht)	9	9	10	11	14	13
	(5)	(5)	(6)	(6)	(8)	(7)
Asset endowment (in 1,000 Baht)	124	154	116	92	192	289
	(259)	(355)	(177)	(121)	(299)	(416)
Production assets (in 1,000 Baht)	58	87	55	40	79	130
	(138)	(274)	(118)	(76)	(157)	(206)
Farming assets (in 1,000 Baht)	18	19	20	11	13	9
	(58)	(78)	(68)	(51)	(80)	(36)
Savings (in 1,000 Baht)	12	7	10	7	35	17
	(55)	(22)	(29)	(19)	(111)	(65)
Borrowing activities						
Borrowed because of shock (in %)	7.5%	15.0%	10.8%	10.4%	7.4%	7.8%
	(0.26)	(0.36)	(0.31)	(0.31)	(0.26)	(0.27)
Credit rationed houshold (in %)	6.0%	13.0%	5.9%	14.9%	3.2%	6.3%
	(0.24)	(0.34)	(0.24)	(0.36)	(0.18)	(0.24)
Number of households	322	100	287	67	311	64

Standard errors in parentheses; consumption values are inflation adjusted

Interestingly, *borrowing because of a shock* and *credit rationing* of a household occurs more often for households that will receive treatment in the next year.

Taken together, households who are treated (and therefore received informal loans in 2008) are larger, more likely female-headed and less educated. Regarding the economical status, there are important differences across household groups. Only vulnerable treated households have lower income, per capita consumption and savings but higher asset endowment than non-treated households. Relatively poor households have higher income, per capita consumption and savings if treated, but asset endowment is quite low. They may use informal loans to enhance their asset endowment. Relatively rich households have high income, per capita consumption, savings and asset endowment when they receive informal loans in 2008. There is no sign of any good reason to borrow from informal sources, except credit rationing and shock-related borrowing.

3.4.2 The role of informal loans for asset accumulation and consumption of rural households

This section shows treatment effects on asset endowment and on per capita consumption.[5] To get further insights assets are split into total assets, farming assets and production assets. Farming assets are assets for which the household specified to use them mainly for farming purposes whereas production assets are used mainly for production purposes. One economic good can either be farming or production asset but there are assets which cannot be assigned to any of these categories. As a consequence farming and production assets do not sum up to total assets. To calculate the current value of assets I only consider assets bought within the last five years and reduce the purchase price by depreciation values. Total per capita consumption comprises the value

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[5] If appropriate, logarithmic values are taken. This applies to income, consumption, food consumption, total assets, farming assets, production assets, savings, loan volume and GDP.

of all consumed items like food, clothing, education, transportation, health etc. Food consumption per capita is therefore a fraction of total consumption.

Specification (1) in Table 12 shows the treatment effects on total asset endowment and specification (2) shows the effects on farming assets. Informal loans lead to a 40% higher total asset endowment for households who received informal loans in 2008 compared to those households who do not receive informal loans in 2008. Farming assets are 55% higher for households who receive informal loans in 2008 compared to their counterparts who do not receive informal loans. The effect on total per capita consumption (specification (3)) and on food consumption per capita (specification (4)) is not significant. To see which group of households is responsible for the effects I rerun the regressions with different subsamples consisting of different groups of households.

3.4.3 The impact of informal loans on asset accumulation and on consumption for different household groups

Table 13 shows the results for the treatment effect on different asset categories across household groups. Specification (1), (2), and (3) show the effect of informal loans on the value of total asset endowment. Specification (4), (5), and (6) give the effects on farming assets, a very important assets group since many households are full-time or at least part-time farmers. The effect on both asset categories is significant and positive only for relatively poor households (specification (2) and (5)). If they have received informal loans in the second wave their assets have a value which is 78% higher than the value of relatively poor households who did not receive informal loans. The figure even rises if farming assets are considered: relatively poor households who received informal loans have a farming asset endowment which is 105% higher than that of their non-borrowing counterparts.

Table 12: Treatment effect on assets and consumption for the whole sample

Dependent variables	(1) total asset endowment	(2) farming assets	(3) total consumption	(4) food consumption
Treatment effect	0.396***	0.551*	0.0218	-0.00588
	(0.119)	(0.298)	(0.0545)	(0.0652)
Age of household head	-0.00932	0.0368	-0.0137***	-0.000593
	(0.00945)	(0.0236)	(0.00427)	(0.00510)
Household size (adult equivalence scale)	0.224***	0.0662	-0.255***	-0.222***
	(0.0645)	(0.162)	(0.0285)	(0.0341)
Dummy if household head is married	-0.0317	-0.218	-0.0581	-0.0468
	(0.187)	(0.468)	(0.0852)	(0.102)
Female headed household head	0.0203	-0.190	0.158	0.101
	(0.277)	(0.694)	(0.126)	(0.151)
Dummy if household head is sick	0.0475	0.146	0.0846	-0.00420
	(0.118)	(0.295)	(0.0535)	(0.0640)
Dummy if household head suffers disease	0.0645	-0.0305	0.0202	0.0846
	(0.0972)	(0.243)	(0.0442)	(0.0528)
Dummy if household is farming	-0.00533	0.0673	-0.00765	-0.00428
	(0.0720)	(0.180)	(0.0327)	(0.0392)
Income per household (in Baht)	-0.0250*	0.0344	0.0102*	0.00653
	(0.0131)	(0.0328)	(0.00596)	(0.00713)
Total consumption per capita (in Baht)	0.221**	0.0884		
	(0.0929)	(0.234)		
Total food consumption per capita (in Baht)	-0.0138	0.0899		
	(0.0779)	(0.195)		
Asset endowment of household (in Baht)			0.0433***	0.0349**
			(0.0135)	(0.0161)
Production asset endowment (in Baht)		0.316***		
		(0.0260)		
Savings (in Baht)	-0.000277	-0.0199	0.00691	0.00975*
	(0.0101)	(0.0253)	(0.00459)	(0.00549)
Total loan volume from formal lenders (in Baht)	0.00238	-0.0459**	-0.00115	0.00263
	(0.00902)	(0.0226)	(0.00410)	(0.00490)
Total loan volume from semiformal lenders (in Baht)	-0.00486	0.0288	-0.000173	-0.00246
	(0.0111)	(0.0278)	(0.00507)	(0.00606)
Total loan volume from informal lenders (in Baht)	0.00601	-0.0119	-0.00957**	-0.00575
	(0.00846)	(0.0212)	(0.00384)	(0.00459)
Borrowed from formal lenders due to shock	-0.241	-0.0577	0.174*	0.175
	(0.213)	(0.533)	(0.0968)	(0.116)
Borrowed from semiformal lenders due to shock	0.0614	-0.181	-0.0178	-0.0248
	(0.154)	(0.385)	(0.0700)	(0.0837)
Borrowed from informal lenders due to shock	-0.505***	-0.327	0.0436	-0.00430
	(0.174)	(0.435)	(0.0795)	(0.0951)
GDP	4.270***	29.98***	-2.051***	1.579*
	(1.544)	(4.011)	(0.692)	(0.827)
Constant	-28.72**	-265.5***	29.15***	-4.672
	(13.71)	(35.62)	(6.102)	(7.294)
Observations	2302	2302	2302	2302
Number of hhid	1151	1151	1151	1151
R-squared	0.059	0.159	0.106	0.058

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 13: Treatment effect on asset endowment for different household groups

Dependent variable	(1) vulnerable	(2) relatively poor	(3) relatively rich	(4) vulnerable	(5) relatively poor	(6) relatively rich
	asset endowment			farming assets		
Treatment effect	0.137	0.780***	0.203	0.269	1.048**	0.352
	(0.139)	(0.255)	(0.249)	(0.448)	(0.493)	(0.649)
Age of household head	-0.00545	-0.0133	0.00359	0.0504	0.0401	0.0387
	(0.0137)	(0.0149)	(0.0320)	(0.0442)	(0.0289)	(0.0836)
Household size (adult equivalence scale)	0.0745	0.428***	0.212*	0.0799	-0.429	0.337
	(0.0787)	(0.143)	(0.128)	(0.256)	(0.279)	(0.332)
Dummy if household head is married	0.222	-0.474	0.162	-1.639**	-0.0404	0.597
	(0.257)	(0.362)	(0.369)	(0.828)	(0.699)	(0.959)
Female headed household head	0.544	-0.434	0.173	-1.208	-1.142	1.091
	(0.337)	(0.549)	(0.725)	(1.090)	(1.062)	(1.893)
Dummy if household head is sick	0.166	-0.106	-0.0961	-0.0496	-0.302	1.037
	(0.139)	(0.248)	(0.246)	(0.447)	(0.479)	(0.639)
Dummy if household head suffers disease	-0.0713	0.177	0.131	0.230	-0.304	-0.233
	(0.119)	(0.202)	(0.197)	(0.385)	(0.395)	(0.512)
Dummy if household is farming	-0.0890	0.0478	-0.000632	-0.0561	-0.0768	0.302
	(0.0819)	(0.155)	(0.156)	(0.266)	(0.300)	(0.406)
Income per household (in Baht)	-0.0178	-0.0457	-0.0996**	0.0544	0.0230	-0.0158
	(0.0119)	(0.0453)	(0.0465)	(0.0384)	(0.0876)	(0.121)
Total consumption per capita (in Baht)	0.200*	0.452**	0.0513	1.149***	-0.451	-0.485
	(0.119)	(0.215)	(0.178)	(0.384)	(0.420)	(0.463)
Total food consumption per capita (in Baht)	-0.0186	-0.0118	0.0792	-0.723**	0.0327	0.447
	(0.107)	(0.175)	(0.136)	(0.345)	(0.338)	(0.353)
Production asset endowment (in Baht)				0.365***	0.306***	0.299***
				(0.0456)	(0.0434)	(0.0484)
Savings (in Baht)	0.0135	-0.0357	0.0209	0.000951	-0.00961	-0.0408
	(0.0130)	(0.0235)	(0.0180)	(0.0419)	(0.0454)	(0.0468)
Total loan volume formal lenders (in Baht)	-0.00567	0.00201	0.00620	-0.0487	-0.0330	-0.0768*
	(0.0109)	(0.0210)	(0.0168)	(0.0351)	(0.0406)	(0.0441)
Total loan volume semiformal lenders (in Baht	-0.00804	-0.0215	0.00232	0.00885	0.0667	-0.0275
	(0.0137)	(0.0237)	(0.0219)	(0.0444)	(0.0458)	(0.0570)
Total loan volume informal lenders (in Baht)	0.0137	0.00169	0.00731	0.0139	-0.0318	-0.0439
	(0.00983)	(0.0191)	(0.0168)	(0.0317)	(0.0372)	(0.0436)
Borrowed from formal lenders due to shock	-0.284	-0.179	-0.123	-0.755	-0.880	1.623
	(0.264)	(0.434)	(0.448)	(0.850)	(0.838)	(1.167)
Borrowed from semiformal lenders due to sho	-0.401**	0.550*	0.0543	-0.307	0.643	-1.260
	(0.182)	(0.302)	(0.346)	(0.588)	(0.584)	(0.901)
Borrowed from informal lenders due to shock	-0.273	-0.963***	-0.375	-0.696	-0.397	1.341
	(0.196)	(0.371)	(0.413)	(0.632)	(0.728)	(1.077)
GDP	5.777***	3.091	1.447	36.57***	21.31***	24.55***
	(1.980)	(3.210)	(3.184)	(6.668)	(6.381)	(8.677)
Constant	-42.15**	-20.05	-2.645	-327.0***	-181.2***	-215.4***
	(17.44)	(28.73)	(28.36)	(58.79)	(57.06)	(77.21)
Observations	844	708	750	844	708	750
Number of hhid	422	354	375	422	354	375
R-squared	0.104	0.127	0.046	0.227	0.186	0.160

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 14 gives the effect of informal loans on total per capita consumption (specifications (1), (2) and (3)) and on food consumption per capita (specifications (4), (5) and (6)) for all groups of households. The treatment effect is only significant and positive for relatively rich households whereas it is negative but insignificant for all other groups of households. Informal loans lead to higher consumption values per capita, but only for the richest households in the sample. Their total per capita consumption is 15% higher than that of non-treated relatively rich households and their food consumption per capita even rises by almost 20%.

3.4.4 Use of informal loans and reasons to borrow from informal sources

To sum up informal loans increase asset endowment for relatively poor households and consumption of relatively rich households. This section provides further insights into the results and examines the reasons why certain households borrow from informal sources.

Relatively poor households may increase their asset endowment due to two reasons. First, they may build up a "buffer stock" (Kaboski and Townsend, 2011) which they can sell promptly if they need money at short notice. These "buffers" consist of all kinds of assets and if not sold households simply put them to use. Second, they may try to improve their standing at more formal institutions by accumulating assets which can be used as collateral. The lack of collateral is one important reason why households are credit rationed or completely excluded from the formal credit sector (Boucher and Guirkinger, 2007; Yadav et al., 1992). Indeed there is some evidence for credit rationing of relatively poor households. Panel A in Table 15 shows the percentage of credit rationed households across waves. When looking at relatively poor treated households it becomes evident that almost 15% of them are credit rationed in 2007 but in 2008, after receiving an informal loan, only 7.5% of them remain credit rationed. Obviously, informal loans ease the problem of being excluded from the more formal sector.

Table 14: Treatment effect on consumption

Dependent variable	(1) vulnerable	(2) relatively poor	(3) relatively rich	(4) vulnerable	(5) relatively poor	(6) relatively rich
	total consumption (per capita)			food consumption (per capita)		
Treatment effect	-0.0746	-0.0402	0.188**	-0.0831	-0.117	0.236**
	(0.100)	(0.0903)	(0.0881)	(0.112)	(0.112)	(0.115)
Age of household head	-0.0154	-0.00717	-0.0245**	-0.00518	0.00900	-0.0117
	(0.00983)	(0.00514)	(0.0113)	(0.0110)	(0.00635)	(0.0148)
Household size (adult equivalence scale)	-0.116**	-0.303***	-0.327***	-0.0689	-0.337***	-0.279***
	(0.0565)	(0.0478)	(0.0421)	(0.0632)	(0.0592)	(0.0551)
Dummy if household head is married	-0.328*	0.0985	0.0808	-0.366*	0.0971	0.0843
	(0.185)	(0.127)	(0.131)	(0.206)	(0.157)	(0.172)
Female headed household head	0.0688	-0.205	0.575**	-0.226	-0.195	0.776**
	(0.243)	(0.192)	(0.256)	(0.272)	(0.238)	(0.335)
Dummy if household head is sick	-0.0123	0.0690	0.240***	-0.0649	-0.0444	0.144
	(0.100)	(0.0864)	(0.0865)	(0.112)	(0.107)	(0.113)
Dummy if household head suffers disease	0.178**	-0.0305	-0.112	0.242**	-0.0625	0.0297
	(0.0855)	(0.0708)	(0.0696)	(0.0956)	(0.0876)	(0.0912)
Dummy if household is farming	-0.0292	0.0289	-0.0324	-0.0387	0.0351	-0.00415
	(0.0592)	(0.0543)	(0.0555)	(0.0662)	(0.0671)	(0.0727)
Income per household (in Baht)	-0.000306	0.0259	0.0298*	-0.000879	0.0440**	0.0336
	(0.00862)	(0.0157)	(0.0166)	(0.00964)	(0.0195)	(0.0217)
Asset endowment (in Baht)	0.0955***	0.0542***	0.0137	0.0831**	0.0454*	0.0219
	(0.0356)	(0.0189)	(0.0188)	(0.0398)	(0.0234)	(0.0247)
Savings (in Baht)	0.00719	0.00842	0.00485	0.0104	0.0170*	-0.00214
	(0.00935)	(0.00822)	(0.00641)	(0.0105)	(0.0102)	(0.00839)
Total loan volume formal lenders (in Baht)	-0.00138	-0.00188	-0.00493	0.00184	0.00428	-0.00175
	(0.00786)	(0.00734)	(0.00597)	(0.00879)	(0.00908)	(0.00782)
Total loan volume semiformal lenders (in Baht)	0.00357	0.00898	-0.0149*	-0.00409	0.00898	-0.0123
	(0.00990)	(0.00829)	(0.00775)	(0.0111)	(0.0103)	(0.0101)
Total loan volume informal lenders (in Baht)	-0.00464	-0.00824	-0.0200***	-0.000505	-0.00476	-0.0209***
	(0.00710)	(0.00667)	(0.00586)	(0.00794)	(0.00825)	(0.00768)
Borrowed from formal lenders due to shock	0.0622	0.0945	0.320**	-0.0557	0.0889	0.424**
	(0.190)	(0.152)	(0.158)	(0.213)	(0.188)	(0.207)
Borrowed from semiformal lenders due to shock	0.0295	-0.0298	-0.140	0.0890	-0.0844	-0.139
	(0.132)	(0.106)	(0.123)	(0.148)	(0.131)	(0.161)
Borrowed from informal lenders due to shock	0.0633	0.0959	0.140	-0.0208	0.151	0.110
	(0.142)	(0.131)	(0.147)	(0.158)	(0.162)	(0.193)
GDP	0.717	-1.905*	-4.127***	2.747*	0.698	2.022
	(1.434)	(1.111)	(1.085)	(1.604)	(1.374)	(1.422)
Constant	3.802	27.16***	48.64***	-15.50	2.266	-7.981
	(12.59)	(9.863)	(9.533)	(14.08)	(12.20)	(12.49)
Observations	844	708	750	844	708	750
Number of hhid	422	354	375	422	354	375
R-squared	0.063	0.163	0.277	0.055	0.125	0.146

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Relatively rich households increase (food) consumption if informal loans have been received. This is a somewhat unexpected finding and needs closer investigation. I address four issues in this respect:

1) Some relatively rich households may be credit rationed in the formal sector and therefore have to rely on informal loans.

Table 15: Credit rationing, farming and shock-related borrowing over time

Panel A: Percentage of credit rationed households

	all households		treated households	
	2007	**2008**	**2007**	**2008**
vulnerable	7.6%	4.5%	13.0%	3.0%
relatively poor	7.6%	3.7%	14.9%	7.5%
relatively rich	3.7%	2.7%	6.3%	9.4%

Panel B: Percentage of farming households

	all households		treated households	
	2007	**2008**	**2007**	**2008**
vulnerable	50.0%	53.3%	49.0%	48.0%
relatively poor	39.8%	49.2%	41.8%	35.8%
relatively rich	28.5%	41.1%	25.0%	31.3%

Panel C: Percentage of households who borrowed due to shock

	all households		treated households	
	2007	**2008**	**2007**	**2008**
vulnerable	8.1%	10.4%	14.0%	26.0%
relatively poor	10.2%	8.5%	11.9%	20.9%
relatively rich	7.7%	5.3%	7.8%	17.2%

Note: "All households" include households who borrowed in both waves (n=1,151); "treated househo[...] are households who received at least one informal loan in 2008 (n=231). A household is considered to[...] credit rationed if it has not been granted any loan or not the full amount applied for; farming househo[...] are households whose income from farming is at least 20% of the total income.

2) It is especially food consumption that rises. In general relatively rich households might be less likely farmers and therefore do not produce food on their own. They may borrow from informal sources to buy food because they cannot consume own food production.

3) Using informal loans to buy food might still be an unusual event and could be explained by shocks relatively rich households are affected by. As a consequence of these shocks they borrow short-at-hand informal loans.

4) If households need money on short notice it is still striking why households demand expensive informal loans instead of using savings or cheaper formal loans. To address this issue savings and loan costs (interest rates) should be examined more closely. In this context it would also be interesting to learn which informal lenders give loans to those households.

If relatively rich households are excluded from more formal credit sources we would find a high share of credit rationed households. Panel A of Table 15 shows that almost 9.4% of the relatively rich households who received informal loans in 2008 are credit rationed. This is a higher share compared to the year 2007 in which it was only 6.3%. For all other groups, informal loans ease credit constraints over time except for the relatively rich. They remain credit rationed even if informal loans are available.

Regarding the second issue relatively rich households would have need for food consumption if they are non-farming. Panel B in Table 15 shows that indeed relatively rich households are less likely farmers compared to the other groups of households.

Still, the fact that relatively rich households borrow from informal sources has to be explained. Informal loans are known to be available on short notice. The choice of households to borrow from informal sources might be driven by the fact that they need short-term finance. Information on shock-related borrowing can be found in Panel C of Table 15. The share of treated relatively rich households who borrow because of a shock in 2008 is more than three times higher compared to all households in the sample (treated and non-treated). Furthermore the share of shock-related borrowing for relatively rich households increases from 7.8% in 2007 to 17.2% in 2008.

So far, relatively rich households seem to be credit rationed to a large degree so that even informal loans cannot ease their situation. Furthermore they are more likely non-farmers and as a consequence do not consume own food production. This makes them especially vulnerable if they are hit by a shock since they cannot smooth food consumption by consuming self-produced goods. Data shows that indeed they borrow due to shocks. If all these findings are true it is still striking that relatively rich

households borrow from informal sources instead of using savings or, if they have access, cheaper formal loans.[6]

Table 16 gives the savings of treated and non-treated households over time and lists interest rates for informal loans. Savings of treated households do not change much from 2007 to 2008 and even increase if households borrow due to shock. Savings of non-treated households decrease over time. Obviously, treated households do not deplete their savings whereas households who do not receive informal loans in 2008 deplete their savings. As for the interest rates, treated households who borrow due to a shock in 2008 have to pay very low interest rates of 6.1%. 64% of their loans come from family members (FAM).

Table 16: Savings, interest rate and informal lenders for relatively rich households over time

	2007				2008			
	non-treated		treated		non-treated		treated	
	non-shock	*shock*	*non-shock*	*shock*	*non-shock*	*shock*	*non-shock*	*shock*
Variable								
Savings (in 1,000 Baht)	30	32	24	1	22	18	22	3
	(99)	(67)	(79)	(1)	(56)	(15)	(52)	(5)
Interest rate	8.85%	12.42%	14.37%	12.17%	9.12%	7.09%	13.47%	6.08%
	(13.88)	(21.06)	(53.73)	(14.62)	(17.53)	(2.72)	(33.99)	(11.77)
informal lenders								
ML	2%	2%	6%	17%	0%	0%	8%	14%
BP	7%	2%	12%	0%	0%	0%	22%	0%
FAM	2%	5%	10%	33%	0%	0%	16%	64%
FRI	1%	0%	1%	0%	0%	0%	5%	0%
no. of households	305	24	63	5	302	9	61	11
no. of loans	761	43	164	6	488	19	144	14

Note: Number of loans is a bit lower than in Table 3.3 since there are some loans for which information on shock-related borrowing is missing.

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[6] Guirkinger (2008) argues that informal loans may be cheaper and less risky for households because loan application is easier and faster and renegotiation of loan terms is possible.

To sum up, we know that relatively poor households use informal loans to increase their assets. According to the buffer stock model, informal loans help to reduce risk since the household is able to bridge income gaps by selling assets. Furthermore they enhance creditworthiness by providing tangible collateral and therefore facilitate formal borrowing. Finally, they ease credit constraints if households are denied formal loans. Relatively rich households increase consumption and especially food consumption. They are credit rationed to a high degree and often non-farming. Hence, they do not produce food on their own and have to spend more money for (food) consumption if they are hit by a shock. They prefer to borrow informal loans rather than using their savings since interest rates are low. Whereas informal lenders seem to be a helpful credit source and often the "regular" credit source for relatively poor households, informal loans serve as "emergency" loans for richer households.

3.5 Robustness

One could argue that assets and loan size may be dependent from each other. In other words, there might be an endogeneity problem due to reverse causality: loans affect asset endowment but at the same time higher asset endowment may lead to higher loan volumes.[7] A household with high asset endowment is able to pledge more collateral or might be considered as less risky in general. To explore this issue further I include the value of collateral that households have to pledge for informal loans to check whether the treatment effect changes. Results are presented in Appendix 1. As before, the effect is positive for relatively rich households and even stronger than in the regression without the value of collateral. Informal loans lead to 82% higher asset endowment and doubles farming assets for relatively poor households compared to non-treated households. The value of collateral (here logarithmic values are taken) is slightly

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[7] I directly test whether the amount of informal loans is endogenous using the Durbin-Wu-Hausman test. Therefore I instrumented informal loan volume by total expenditures and money that has been spent for celebrations and funerals. A test on overidentification reveals that the instruments are appropriate. The F-statistic for the test of endogeneity is 4.09 and the p-value is 0.0433. The hypothesis of endogeneity can be rejected at the 5% level but not at the 1% level.

significant only for total asset endowment of relatively rich households. As expected the value of collateral is positive related to asset endowment.

As mentioned in Section 3.3.3 some informal loans may indicate instalment purchases. In this case an observed loan does not represent a real loan decision but the purchase of a good that will be paid off in many small amounts and asset endowment would be affected directly. Therefore it is crucial for the results to eliminate instalment loans and see whether the effects are still valid. Appendix 2a shows that the effect for relatively rich households on total asset endowment is still visible and even slightly stronger than before. However, the effect on farming assets is not significant anymore. The results suggest that instalment loans are rather used to buy farming assets than other kind of assets.

Appendix 2b shows the effect on per capita consumption. Former results have shown that informal loans increase total per capita consumption and food consumption per capita for relatively rich households. If instalment loans are excluded the effect on total consumption remains but the effect on food consumption is not significant anymore. Though, after all, the effect is still positive for relatively rich households whereas it is negative for all other households.

So far household groups are defined according to income. Since income is a very difficult measure in emerging countries another variable should be used to make sure that the effects remain evident. In Appendix 3 household groups are defined according to total expenditures in 2007. Poor households have total expenditures of less than the mean value, which is 52,700 Baht, rich households have total expenditures of more than 52,700 Baht. Specifications (1) to (4) show the effect on assets. Total asset endowment and farming assets increase for poor households as shown before. Specifications (5) to (8) show no significant effects on total consumption or on food consumption. This might be due to the definition of income which is not only defined by incoming salaries but also include rents from housing, assets and savings. Households who are defined to be rich according to income may not necessarily have high inflows of wages and if hit

by a shock they have to borrow from informal sources more likely. Households who are rich according to expenditures may have higher regular incomes so that shocks will not get them into financial trouble so easily. As a consequence we do not see a significant effect on (food) consumption.

3.6 Conclusions

Understanding borrowing needs and use of credit in developing countries help to explain why informal loans still play such an important role for household finance. The terms "informal lenders" or "informal loans" should be used cautiously since this category can comprise of very different types of lenders which are very different from each other. This paper defines the following groups of lenders to be informal: professional moneylenders, business partners, family members and friends.

Using a panel data set of Thai rural households I find that informal lenders are still an important source of credit, independent of income levels of borrowing households. Their loans are large, have relatively long maturities and are collateralised to a high degree. Thus, in some ways these loans are different from the described findings in former studies. However, a lot of characteristics depend on the type of informal lender. Whereas moneylender loans are very expensive, loans within the family are not.

A difference-in-differences estimation approach shows that asset endowment for relatively poor households increases if households receive informal loans. There are good reasons for this. First, they build up buffer stocks which can be sold if they need money; second, they improve their credit worthiness by accumulating assets which can serve as collateral if applying for formal loans and third, if they are excluded from the formal sector informal loans are their 'regular' sources of finance if investments have to be undertaken. For relatively rich households no statistically significant effect on assets can be observed. Instead their food consumption increases when they receive informal

loans. This effect is in turn not observable for relatively poor households. Relatively rich households are less likely to be farming households and if hit by a shock they cannot produce food on their own. They have to rather rely on informal loans to get short-term finance.

There have been several attempts to reduce the reliance on informal loans for rural households in developing countries. Microfinance institutions all over the world attest to the efforts of governments and non-governmental organizations in this respect. This paper gives some insights into why informal loans are still needed in developing countries. They serve different purposes and satisfy specific needs, which depend on the economic standing of borrowing households. Informal lenders provide credit access for poor people who are excluded from the formal sector but they also provide loans at short notice for rich people. Any credit program that aims to minimise reliance on informal credit sources should take this into account.

4. The use of collateral in formal and informal lending[***]

Abstract

We offer a new test of the ex ante theory of collateral. Theory states that lenders rely less on collateral if they have better information about borrowers. We test this by contrasting the use of collateral between formal and – better informed – informal lenders in a developing financial market. Indeed, formal lenders rely about 40% more often on collateral than informal lenders, controlling for conventional determinants of collateral. Moreover, having better information about borrowers has implications within lender groups: formal lenders rely less on collateral with longer borrower-relationship and informal lenders rely less on collateral with shorter distance to the borrower.

4.1 Introduction

Collateral is a common element of loan contracts which is used to overcome information and incentive problems. Empirical studies have shown that collateral is indeed used in most loan contracts and that theoretically expected determinants are relevant (Steijvers and Voordeckers, 2009). However, do we find the same use of collateral among diverse lenders which differ, in particular, in their degree of private information about borrowers? We examine this issue based on a sample of loans from a developing country. Developing markets are characterized by more opaque information as well as more severe problems in monitoring and enforcing of loan contracts. Due to this difference, specific financial institutions have emerged, in particular informal

lending. Informal lenders address information and incentive problems in lending by their proximity to the borrower. Proximity, indicated by relationship and near distance, may contribute to generating private information, thus reducing the need for collateral. Despite the prominence of informal lenders in developing countries (e.g., Kan, 2000; Banerjee and Duflo, 2007; Barslund and Tarp, 2008), their use of collateral has rarely been examined and a comparison with formal lenders in this respect is missing. We contribute to filling this gap by making use of a novel data set.

The use of collateral is an important issue in developing countries because widespread poverty limits the availability of collateral. Lack of collateral contributes to restricted access to finance which is a major concern in developing financial markets (Beck and Demirgüc-Kunt, 2008). From this perspective, an information advantage of informal lenders may contribute to better access to finance. It may also complement formal finance by contributing to the growth of small firms (Degryse et al., 2013) and by providing capital despite difficult loan contract enforcement (Giné, 2011). Moreover, a deeper understanding of the information environment in general may generate insights into how to improve lending technologies in order to make (semi-) formal financial institutions more inclusive.

However, the differences in the informational setting between formal and informal lending are not just interesting for the analysis of developing financial markets. They also allow for more general insights into the use of collateral. Our examination is guided by the two dominating theories on the use of collateral in lending, the ex post and the ex ante theory (Berger et al., 2011a, 2011b). According to the *ex post theory of collateral*, borrowers have to provide collateral as a buffer against default risk. The testable implication of this theory is that loans with higher observable risk will have to pledge more collateral. As this is quite a general statement, the empirical relation is expected to hold across various types of lenders, in particular at formal and informal ones. This ex post theory has often been tested and has been confirmed in most cases, although there is a gap regarding informal lenders.

By comparison, empirical evidence on the validity of the *ex ante theory of collateral* is rather rare. This theory starts with the assumption that lenders cannot (fully) observe the riskiness of borrowers. The resulting asymmetric information may be reduced by borrowers: less risky borrowers have an incentive to signal their superiority by pledging more collateral. Despite its theoretical appeal, this ex ante theory of collateral has hardly been tested because of the lack of available knowledge of borrowers' riskiness which is *not* observable to lenders. Thus the researcher needs a degree of information which lenders do not have – this is rare and motivates the search for alternative approaches.

Such approaches exploit an implication of the ex ante theory: The signalling incentive of less risky borrowers is weaker and thus their provision of collateral is lower if lenders have better information about borrowers. Therefore, if there are two cases which differ only in the information asymmetry between lender and borrower, the ex ante theory predicts that less collateral is used in case of better information. This has been analyzed in an event study approach where the information asymmetry changes due to new regulatory requirements (Berger et al., 2011a). We propose another approach which exploits the different degree of information asymmetry across lending institutions.

Essentially, regular banks mainly use observable information about the riskiness of borrowers but informal lenders are able to use a richer set of information, including more private information, due to their intimate knowledge of borrowers. This difference in the degree of information between formal and informal lenders has testable implications regarding the role of collateral in their lending operations.

Overall, by empirically examining four theoretically expected relations we get the following results: (1) As a baseline relation derived from the ex post theory, and thus independent from the degree of lender information about the borrower, we expect and find that more risky loans have more restrictive terms to a significant degree, including higher collateral requirements. (2) According to the ex ante theory of collateral, regular

banks require more collateral than informal lenders as they have less information about borrowers' riskiness. On average, formal lenders require collateral about 40% more often compared to informal lenders. (3) As a further implication of the ex ante theory of collateral, we find that regular banks – but not informal lenders – improve their risk assessment over time: at the mean, about 7.5 years longer relationship with borrowers will reduce the probability of collateral by about 8%. (4) Another implication of the ex ante theory derives from the physical distance between lender and borrower: larger distance hampers information gathering, for informal lenders only. The effect at the mean is about 10% higher collateral probability with 17 minutes longer travel time. If borrower and informal lender are located in the same village, collateral probability decreases by even a third.

This research program requires appropriate data. In this paper, we use a comprehensive household survey, conducted among more than 2,000 households in the rural areas of north-eastern Thailand. This data set is particularly useful for our purpose as these households make frequent use of the various financial institutions offering loans. Overall, about 65% of households have a loan at a certain point in time and on average these households take loans from 2.3 different institutions. Moreover, we observe the operations of a broad range of formal, semiformal and informal financial institutions which is important in identifying differing degrees of information asymmetry between lender and borrower. These financial market characteristics under review are necessary to implement our research strategy and distinguish our study from others in the literature, as we argue later in more detail (see Section 4.2).

The paper is structured as follows: Section 4.2 links our research to the literature and carves out our contribution. Section 4.3 describes data, Section 4.4 presents and discusses results of the empirical examinations, Section 4.5 contains robustness checks and Section 4.6 concludes.

4.2 Literature and hypotheses

4.2.1 Theoretical literature

Economic theory explains collateral as an instrument to reduce adverse selection and moral hazard arising from ex ante and ex post information asymmetries between borrowers and lenders. This helps to reduce credit rationing (for reviews see Berger et al., 2011a, 2011b). According to the *ex post theory of collateral*, borrowers have to provide collateral as a buffer against default risk, which arises from moral hazard, difficulties in enforcing contracts, or costly monitoring. These ex post theories of collateral predict that the incidence of collateral is higher for observably riskier borrowers (Berger et al., 2011b) and that collateral provides incentives to monitor these borrowers (Longhofer and Santos, 2000). Observable risk depends on characteristics of the borrower and the loan contract. Ex post frictions such as moral hazard may not only be reduced by collateral, but also by shorter loan duration and lower loan volume. Therefore, the use of collateral is expected to increase with loan duration and loan size (Ortiz-Molina and Penas, 2008; Steijvers and Voordeckers, 2009).

Ex ante, collateral may be used as a sorting or signalling device by inducing observationally equivalent loan applicants to reveal their default risk. From a menu of contracts offered, applicants with projects of higher quality choose secured debt with lower loan rates, while those with projects of lower quality self-select into unsecured debt with higher loan rates (e.g. Boot et al., 1991). According to these ex ante theories of collateral, the incidence of collateral is expected to increase with the ex ante information gap between borrower and lender (Berger et al., 2011a). A special aspect of this information asymmetry has been addressed by the lender-based theory of collateral, which states that the type of lender matters for information asymmetries and collateral requirements. A model of competition between a local lender with an information advantage and distant transaction lenders predicts that the incidence of collateral increases, if the information advantage of local lenders is reduced, e.g., by technological innovations in credit scoring (Inderst and Mueller, 2007).

Theories of relationship lending predict that ex ante and ex post information asymmetries between borrower and lender depend on the strength (length, breadth or intensity) of the lending relationship, because the proximity between lender and borrower facilitates ex ante screening and ex post monitoring (for an overview see Boot, 2000). In a model of repeated lending, Boot and Thakor (1994) show that a bank initially requires high collateral from a firm, but reduces these requirements after having observed timely repayment of the loan. The strength of the bank-borrower relationship depends on the lending technology, which is categorized as relationship lending or asset-based lending (Berger and Udell, 2006; Egli et al., 2006). Relationship lending relies on soft, private information about the borrower's risk obtained through a close relationship between bank and borrower, while asset-based lending is more transactions oriented and relies on hard, public information (Brick and Palia, 2007). A possible disadvantage of relationship lending for borrowers is that the proprietary information gained by the relationship lender increases his or her ex post bargaining power, so that the borrower is locked in (Sharpe, 1990; Rajan, 1992). This lock-in can be used by the lender to increase collateral requirements. Then, collateral is the result of hold-up, and the incidence of collateral rises with the strength of the lending relationship.

While these theories have been developed for banks in mature economies, relationship lending plays an even larger role in less developed economies with financial systems characterized by low transparency and weak legal enforcement (Egli et al., 2006). Especially in the case of small loans in not fully developed markets, the costs of evaluating and utilizing collateral may be excessive, which makes relationship lending especially attractive as a substitute for collateral. We therefore expect a negative influence of the duration of the lending relationship on collateral required by banks in emerging markets. Relationship lending can be seen as a strategy of regular banks and other formal lending institutions to improve their limited information. Beyond serving as strategy for formal lenders, relationship lending has emerged as a specific organizational form, called informal lenders. Informal lenders are closer to their customers than formal lenders and hence have a comparative advantage in reducing ex

ante information gaps about their borrowers. For the case of small loans in developing markets, ex ante theories of collateral are especially relevant, because hard information about the credit risk of rural households is missing or difficult to obtain (e.g. lack of credit registers). Therefore, we expect that collateral is less often used by informal lending institutions than by formal ones that provide loans at arms' length, and that the distance to the customer matters for the use of collateral by informal lenders. The duration of the lending relationship is likely to play a larger role for collateral requirements of formal banks to reduce their larger ex ante information gaps.

Summarizing, we derive the following hypotheses:

H1: The incidence of collateral increases with observable credit risk at all types of lenders.

H2: Regular banks require more collateral than informal lenders.

H3: A longer duration of the lending relationship reduces collateral requirements of formal lenders.

H4: A shorter distance between borrower and lender reduces collateral requirements of informal lenders.

4.2.2 Empirical literature

One way to test the validity of ex ante and ex post theories of collateral is to examine the relationship between borrower risk and collateral. While the ex post theories of collateral predict a positive influence of observable borrower risk on collateral, the ex ante theories predict a negative influence of unobservable risk on collateral due to its signalling role. The majority of studies find that observed risk, measured by borrower and loan characteristics, positively affects collateralization, consistent with H1 (for a review see Steijvers et al., 2010).[8] Collateral and monitoring seem to be complements to reduce the risk of ex post information problems (Cerqueiro et al., 2012). Evidence in

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[8] Studies include Berger and Udell, 1995; Degryse and Van Cayseele, 2000; Lehmann and Neuberger, 2001; Chakraborty and Hu, 2006; Menkhoff et al., 2006, 2012; Voordeckers and Steijvers, 2006; Brick and Palia, 2007.

favour of the ex ante theories of collateral is less clear, because the first studies that found a negative relationship between borrower risk and collateral (Jiménez et al., 2006; Lehmann and Neuberger, 2001) do not isolate effects of private information from ex post incentive problems (Berger et al., 2011a, 2011b). To do so, Berger et al. (2011a) exploit exogenous variation in ex ante lender information related to the adoption of an information-enhancing loan underwriting technology and find a negative effect on the use of collateral, consistent with the ex ante theory of collateral. Berger et al. (2011b) isolate private from public information by using information about borrower risk from a credit registry which is not known to the lender. They find that ex post theories of collateral dominate, and that the ex ante theories seem to hold only for customers with relatively short relations to the lender. Berger et al. (2012) find that the mixed results of the risk-collateral studies may be explained by different economic characteristics of collateral in the different samples.

Another set of empirical studies examines the influence of asymmetric information, measured by the duration of the lending relationship or the number of lenders, respectively exclusivity of the lending relationship, on the incidence of collateral (for reviews see Berger et al., 2011a; Steijvers et al., 2010). The evidence is mixed. Some studies find a negative effect of relationship duration on the incidence of collateral, consistent with H1 (e.g., Berger and Udell, 1995; Lehmann and Neuberger, 2001; Chakraborty and Hu, 2006; Brick and Palia, 2007; Menkhoff et al., 2012), while others find a positive effect (e.g., Machauer and Weber, 1998; Ono and Uesegi, 2009) and again others find mixed signs or insignificant results (e.g., Degryse and Van Cayseele, 2000; Jiménez et al., 2006; Menkhoff et al., 2006; Voordeckers and Steijvers, 2006). Also the effect of the number of lenders on the use of collateral is sometimes positive (Chakraborty and Hu, 2006; Jiménez et al., 2006), sometimes negative (Menkhoff et al., 2006; Voordeckers and Steijvers, 2006) and sometimes insignificant (Menkhoff et al., 2012). These mixed results can be interpreted as being partly consistent with ex ante theories of collateral, ex post theories of collateral and the hold-up hypothesis, and reflect the problem of isolating the ex ante information hypothesis

from the ex post one (Berger et al., 2011a). Ioannidou and Ongena (2010) find that switching to a new bank increases the likelihood of collateralization. This clearly supports the ex ante theories of collateral, because ex ante information asymmetries are higher for outside banks than for relationship lenders as inside banks.

With respect to the role of distance in lending, Degryse and Ongena (2005) find that the geographical distance between borrower and lender is relevant for loan pricing, but they do not examine its influence on collateral. Agarwal and Hauswald (2010) provide evidence that the proximity between bank and borrower is a source of local informational advantage and increases credit availability. Jiménez et al. (2009) show that the organizational distance, measured as the distance between the headquarters of the bank and the location of the borrower, matters for the use of collateral for business loans in Spain. In contrast to our expectations, the use of collateral is higher for loans that are granted by local lenders. This can be explained by the finding that hard data about the credit quality of the borrower (accounting variables) and organizational distance are substitutes in the collateral decision. If distant lenders can offset their informational disadvantage by the availability of hard data, they can grant loans with less collateral than local banks (Jiménez et al., 2009).

The majority of studies focuses on mature markets. As theoretically expected, collateral requirements of banks tend to be larger in less developed markets and decline with financial development (Liberti and Mian, 2010; Nguyen and Qian, 2012). For a cross-section of 31 countries, Godlewski and Weill (2011) show that consistent with the ex ante theories of collateral, the relationship between collateral and risk premiums tends to be negative only in countries with higher levels of asymmetric information, measured among others by the presence of credit registries, accounting standards, creditor rights and the level of financial development. Relatively high rates of collateral have been found for business loans in transition countries (Hainz, 2003) and in the emerging markets of Mexico (La Porta et al., 2003) and Thailand (Menkhoff et al., 2006), while the incidence of collateral is comparatively low in business loans in Bolivia (Ioannidou and Ongena, 2010) and Peru (Guirkinger and Boucher, 2008). The

evidence for China is mixed (Allen et al., 2005; Lin, 2011).[9] Collateral plays a limited role in rural household lending in Thailand (Menkhoff et al., 2012), and in lending to very small enterprises and households by microfinance institutions in developing countries (Conning and Udry, 2007; Hermes and Lensink, 2007). In these markets, collateral tends to be substituted by guarantees and relationships (e.g., Besley and Coate, 1995; Fafchamps and Lund, 2003; Menkhoff et al., 2012). Whether this depends on the formality of the lender is still an open question. In a cross-section of 43 developing countries, loans from non-bank financial institutions were less often collateralized (Nguyen and Qian, 2012), consistent with H2. In commercial microlending in Mozambique, collateral is relevant, but decreases with informational gains from successive loans (Behr et al., 2011). This supports the mechanism underlying H3.

Summarizing, there is a research gap in the empirical literature on the ex ante theories of collateral and the use of collateral by informal lenders which we address in this paper.

4.3 Data

This section contains data information, from general to specific: Section 4.3.1 is about the overall survey underlying our research, Section 4.3.2 describes the specific data of this survey which we use and Section 4.3.3 shows the reliance on collateral in our sample.

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[9] While Allen et al. (2005) show that collateral is important in private sector loans in China, Lin (2011) finds only a limited role of collateral in China due to weakly protected creditor rights.

4.3.1 The underlying survey

The data emanates from the project "Vulnerability to poverty in Southeast Asia" which started in 2006 to compile a long-run panel data set providing household information.[10] The survey covers more than 2,000 rural households in the north-eastern part of Thailand in which most people are engaged in farming activities. Households have been selected according to a three-stage stratified sampling procedure, in which 3 provinces were chosen according to their share of rural population. In a subsequent step sub-districts in these provinces were randomly selected with probability relative to their population density. In each of these sub-districts two villages were chosen and 10 households in each village were randomly identified. The generated sample is representative for the relatively poor rural population in Thailand's Northeast.

So far, three waves have been conducted during April and May in the years 2007, 2008, and 2010. Each wave captures the period of the last 12 months so that there is a 12 months gap for 2009. The range of questions is quite broad, capturing household dynamics, health, education, risks, shocks, economic activities, employment and financial issues. For our research purpose, we use information about borrowing and lending activities, repayment behaviour and savings of a household. It is this broad informational basis, notably the detailed data about households' borrowing activities, which distinguishes our dataset from others.

Due to the setting in Thailand, many lenders operate in rural areas. Roughly, one can differentiate between three diverse types of lenders according to their degree of formality, i.e. formal, semiformal and informal lenders. *Formal lenders* consist of commercial banks (CB) which have, however, only a very limited lending business in the rural Northeast, and a large state owned bank, the "Bank for Agriculture and Agricultural Cooperatives" (BAAC), which was set up to serve the agricultural sector of the economy, i.e. rural areas.

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[10] Part of the data has been used in an earlier study on collateral, with a different research focus, too. Appendix 4 shows comparability of both studies as far as data and issues overlap.

Semiformal lenders consist of three groups: first, there are credit-granting institutions at the village level (CRED), such as village banks, credit cooperative or credit groups; these financial institutions have been analyzed in some detail by Kaboski and Townsend (2005). Second, the Thai government established in 2002/03 the so-called Thai Village Fund Program (VF), i.e. a revolving fund set up in each village (see details in Boonperm et al, 2013). With respect to formality CRED and VF can be located between formal and informal lenders since they are operating according to binding regulations but these regulations are only valid for a specific clientele or linked to membership. Third, another type of loans can also be defined to be semiformal, i.e. loans given by political entities to specific borrowers such as very poor households or students (POL).

Finally, despite Thailand's economic progress over the last decades and despite the set-up of specific (semi-)formal institutions in rural areas, *informal lenders* still play an important role. They comprise professional moneylenders and pawnshops (ML), business partners such as traders and suppliers (BP), family members (FAM) and friends (FRI).

4.3.2 Description of data

This study is about the role of collateral. Thus out of the overall survey sample, we are only interested in those households who were interviewed in each of the three waves and who ever took a loan in the 12 months preceding one of the three interviews: 1,791 households fulfil these conditions and thus form the sample for our empirical study[11]. These households and their borrowing behaviour are described in the following.

Table 17 provides descriptive statistics about four areas of interest, i.e. (1) household demographics, (2) economic status of the household, (3) borrowing

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[11] 314 households (15% of all households) never borrowed. These households distinguish from borrowing households in that they are mainly retired people who have a relatively high but non-increasing income, high amounts of savings but only small land plots, low asset endowments and low consumption levels.

characteristics and (4) relationship variables. We comment on some of the data. Regarding *demographic information*, household heads are about 54 years old and spent slightly above five years in school, as compulsory schooling for the old cohort was 4 years. The household size is more than four persons, which translates into about three when measured as adult equivalence units according to the OECD[12]. About 25% of all households are female headed and 80% of all household heads are married.

Variables indicating the *economic situation* of households show that most households own a small area of land. Most variables become larger over time in nominal terms as the overall economy experienced average real growth rates of about 2.5% annually between 2007 and 2010.[13] This nominal increase applies to income, consumption expenditures and asset endowment. Finally, debt capacity, expressed by the ratio of income over total loan volume, slightly decreases over the years.

Regarding *borrowing* behaviour, we have to ensure comparability over time, i.e. across three waves. Thus we capture only newly granted loans within our reference periods and do not consider loans that have been granted before the survey started in 2006 nor loans that have been granted in the 12 months gap in 2009. The remaining sample consists of 1,791 households and 6,957 loans. 2,529 loans have been granted within the first wave, 2,497 within the second and 1,931 within the third wave.[14] On average, households agree on about 1.6 new loans per year which is, of course, partially driven by the short duration of below 17 months. The percentage of loans with either (tangible) collateral or guarantees is increasing over time though collateral and guarantees exhibit a different development. The share of collateralized loans drops by 2%-points from 18% to 16% in wave 2 and increases again in wave 3 to 21%. Wave 2

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[12] The OECD assigns different weights to household members. The first adult member attributes to the measure with 1.0, all other adult attributes with a weight of 0.7 and each child is assigned a weight of 0.5.

[13] Growth rates were 4.2% (2007), 1.8 (2008), -3.0 (2009) and 7.2% (2010), respectively.

[14] These loans are mostly cash loans but there are also 433 installment loans and 116 in kind loans which are included in the descriptive statistics. However, we do not include them in the regressions due to the following reasons: 1) we want to avoid measurement errors for loan size and therefore do not consider in kind loans and 2) we do not want to mix purchasing decisions and their payment modalities with real loan decisions and hence exclude installment loans.

Table 17: Descriptive statistics of variables

	1st wave		2nd wave		3rd wave	
	Mean/fraction	Std. dev.	Mean/fraction	Std. dev.	Mean/fraction	Std. dev.
Household characteristics						
Demographics						
Age of household head (years)	53.49	12.87	54.48	12.74	55.54	12.20
Years of education of household head	5.15	2.68	5.25	2.79	5.27	2.72
Household size	4.11	1.69	4.13	1.73	4.15	1.74
Number of adult equivalence	2.93	1.03	2.95	1.05	2.98	1.06
Female headed household	0.25	0.43	0.25	0.44	0.25	0.44
Married household head	0.80	0.40	0.81	0.39	0.81	0.39
Economic status						
Area of owned land (rai[a])	2.46	3.21	2.51	3.33	2.73	3.08
Household annual income (in 1,000 Baht)	116	167	135	269	165	239
Annual income per equiv. scale (in 1,000 Baht)	43	66	49	104	58	88
Consumption expenditures (in 1,000 Baht)	90	56	115	92	175	115
Food	39	22	46	30	94	65
Total assets of last 5 years (in 1,000 Baht)	149	270	174	490	209	501
Savings (in 1,000 Baht)	15	61	14	42	19	63
Livestock and stored crops (in 1,000 Baht)	19	181	20	46	19	32
Debt capacity (Annual inc./ total loan vol.)	2.78	9.67	2.52	8.81	2.32	6.29
Borrowing						
Number of loans per household	1.72	1.12	1.68	0.97	1.49	0.77
Volume of loans per household (in 1,000 Baht)	67	134	72	212	77	186
Loan size (in 1,000 Baht)	37.76	89.95	40.67	150.85	49.28	140.53
Duration of loans (in months)	17.87	22.50	17.14	23.51	18.45	23.56
Average interest rate per household (%)	12.97	30.30	11.35	29.3	10.45	23.70
Percentage of late repayment (of total loans per hh)[b]	0.11	0.32	0.08	0.27	0.03	0.18
Percentage of collateralized loans	0.18	0.38	0.16	0.38	0.21	0.41
Percentage of guaranteed loans	0.73	0.44	0.76	0.43	0.74	0.44
Agricultural production purpose (in %)	0.38	0.49	0.42	0.49	0.39	0.49
Non-agricultural production purpose (in %)	0.16	0.37	0.13	0.34	0.18	0.38
Consumption purpose (in %)	0.33	0.47	0.28	0.45	0.28	0.45
Payback or relend to others (in %)	0.12	0.33	0.15	0.36	0.15	0.36
Relationship variables						
Relationship duration	5.40	5.30	6.16	5.28	7.77	6.48
Number of loans from same lender	2.59	1.18	2.58	1.18	2.64	1.21
Number of lenders	2.27	1.01	2.26	1.00	2.30	1.01
Number of households (loans)	1,407	(2,529)	1,410	(2,497)	1,239	(1,931)

Note: Sample contains 1,791 households and 6,957 loans. Only households who have been interviewed in all 3 waves have been considered. Sample contains cash loans (6,408), installment loans (433) and loans in kind (116).

[a] One rai corresponds to 0.16 hectare.

[b] This figure gives the yearly number of loans that have been repaid late in percentage of all loans received in the respective year.

can be considered as a crisis year since the financial crisis of 2007/2008 hit the country in these months what may explain the results. Consequentially the pattern for guaranteed loans is reverse: personal guarantees increase in wave 2 and decrease again in wave 3 suggesting a substitution of collateral and personal guarantees. Also the purpose of loans slightly changes over time. The share of loans used for agricultural production, which is the most important use of loans, increases from 38% (wave 1) to 42% (wave 2) and decreases again to 39% in wave 3. The share of loans used for non-agricultural production decreases from 18% to 13% and increases again to 18%, reflecting the economic crisis during wave 2. Consumption loans decrease from the first to the second wave and remain at the new level of 28%. Loans to pay back other loans or to relend to other households increase from 12% (wave 1) to 15% (wave 2) and also remain at that level in wave 3.

Finally, there are three potential relationship variables: Relation duration between lender and borrowing household is on average more than six years and increasing. On average households have borrowed 2.6 loans from the same lender across waves, indicating close relations, and the average household is engaged with 2.27 different lenders, where less lenders indicate a closer relation.

4.3.3 The reliance on collateral

The sample includes a variety of lending institutions and the different institutions may have different collateral requirements. In particular, lenders with more information on borrowers, should have less need of collateral as the ex ante theory predicts (Berger et al., 2011a). Lenders with less information regarding the borrower should therefore have higher collateral requirements. According to theoretic reasoning (see Section 4.2 above), we expect formal lending institutions having less intimate knowledge about borrowers and thus relying more on collateral than informal lenders.

Table 18 presents information about the use of collateral, relationship variables and loan characteristics for the nine different lending institutions operating in the rural Northeast of Thailand (Panel A) and for the three major groups of lending institutions (Panel B). Panel A shows that on average about 18% of all loans are collateralized. This share is rather low compared to collateralization in other developing countries. In Peru, Guirkinger and Boucher (2008) find collateralization of 24% of all loans. Berger et al. (2012) observe the same share for loans from formal institutions in Bolivia. As expected, in our sample formal institutions, i.e. CB and BAAC, have a high share of collateralized loans, i.e. roughly 40% (Panel B). Semiformal institutions are very diverse. The VF does not rely on collateral at all but on guarantees. Policy loans (POL) also do not use the instrument of collateral. Therefore it does not seem relevant to consider these two lending institutions when examining the role of collateral. Only credit institutions (CRED) use collateral to some extent, i.e. in 19% of cases and thus indeed less than formal lending institutions.

Within the informal institutions we can distinguish between ML/BP and FAM/FRI. Former demand collateral similar to formal lenders and drive the results for the whole group. The motivation for ML and BP to give loans to households is economic reasoning. Furthermore it is likely that loan transactions, in particular from BP, are interlinked with other business transactions between the lender and the borrower which might influence loan terms. FAM and FRI in contrast do not follow economic reasoning in the first place. But it is possible that they want to gain advantages in case of own potential problems in the future by helping their kin. Overall, FAM/FRI use collateral to less than 10% and thus indeed seem to act in accordance with the theoretical expectations, whereas ML/BP use collateral to an unexpectedly high degree. We come back to this fact (in Sections 4.4.2 and 4.4.3).

Turning to the descriptive statistics about relationship variables and loan characteristics, we see some marked differences between lending institutions. As expected, for example, CB lend large loan amounts and ML charge high interest rates. However, we would also emphasize that many variables – such as average loan size and

loan duration – are not very different between formal and informal lenders, indicating some degree of homogeneity in loans across these institutions.

Table 18: Incidence of collateral and relationship variables by lending institution

Panel A	CB	BAAC	VF	CRED	POL	ML	BP	FAM	FRI	total weighted average	sample weighted average[c]
Collateral											
Collateralized loans (in %)	43.6	37.4	2.3	19.1	1.4	40.5	48.5	6.4	9.7	18.0	31.1
Rate of collateralization[a]	2.56	4.43	1.20	4.00	0.00	2.87	1.39	3.47	6.44	2.57	3.79
Guaranteed loans (in %)	54.4	74.3	96.3	75.0	80.9	14.7	42.9	5.6	8.3	74.4	57.4
Neither collat. nor guarantee (in %)	12.1	2.6	2.7	11.6	18.4	49.6	24.4	87.7	83.4	13.6	21.4
Relationship variables											
Relationship duration	3.88	10.00	5.62	7.63	5.30	2.90	2.14	3.50	3.19	6.36	6.99
Number of loans from same lender	2.38	3.07	3.01	3.19	2.65	2.29	2.42	2.66	2.45	2.93	2.88
Number of different lenders per hh	2.99	2.48	2.40	2.71	2.94	2.72	2.91	2.90	2.98	2.57	2.68
Loan characteristics											
Loan size (in 1,000 Baht)	184.10	55.59	17.03	51.84	13.59	49.16	143.38	30.62	20.18	43.65	65.97
Duration (in months)	33.40	24.44	12.40	17.14	21.51	15.05	28.44	12.28	11.18	17.69	21.37
Annual interest rate (in %)	13.8	9.2	7.3	12.0	2.6	49.9	25.3	11.8	42.7	11.9	16.1
Sample size											
Number of households	123	765	1,281	477	218	205	355	245	112		
Number of loans	149	1,605	2,860	868	293	252	443	342	145	∑ 6,957	3,804

Panel B	formal	semiformal[b]	informal	total weighted average	sample weighted average[c]
Collateral					
Collateralized loans (in %)	37.9	5.9	29.9	18.0	31.1
Rate of collateralization[a]	4.24	3.14	2.15	2.57	3.79
Guaranteed loans (in %)	72.6	90.5	21.8	74.4	57.4
Neither collat. nor guarantee (in %)	3.5	5.9	55.8	13.6	21.4
Relationship variables					
Relationship duration	9.48	6.03	2.82	6.36	6.99
Number of loans from same lender	3.01	3.02	2.46	2.93	2.88
Number of different lenders per hh	2.52	2.50	2.87	2.57	2.68
Loan characteristics					
Loan size (in 1,000 Baht)	66.50	24.30	65.86	43.65	65.97
Duration (in months)	25.20	14.09	19.28	17.69	21.37
Annual interest rate (in %)	9.6	8.0	27.3	11.9	16.1
Sample size					
Number of households	848	1,456	745		
Number of loans	1,754	4,021	1,182	∑ 6,957	3,804

[a] gives the average rate of collateralization (value of collateral/ loan size) for collateralized loans only

[b] information is for semiformal loans (weighted average of VF, CRED and POL), sample used in regressions comprises CRED only

[c] VF and POL loans are excluded since they seldom operate with collateral

As a consequence, differences in collateral requirements do not obviously emanate from differing loan characteristics but reflect different lending practices.

Turning to the descriptive statistics about relationship variables and loan characteristics, we see some marked differences between lending institutions. As expected, for example, CB lend large loan amounts and ML charge high interest rates. However, we would also emphasize that many variables – such as average loan size and loan duration – are not very different between formal and informal lenders, indicating some degree of homogeneity in loans across these institutions. As a consequence, differences in collateral requirements do not obviously emanate from differing loan characteristics but reflect different lending practices.

4.4 Results

This section documents results in four steps. In Section 4.4.1 we confirm standard results of the ex post-theory of collateral for our sample. On this basis we show in various forms that better information of lenders about borrowers reduces the use of collateral: this holds across different lenders (Section 4.4.2), it is corroborated by the influence of relationship across lenders (Section 4.4.3) and it is further supported by the role of distance across and within groups of lenders (Section 4.4.4).

4.4.1 The empirical approach in examining the use of collateral

Our empirical approach in examining the use of collateral follows standards in the literature (see Section 4.2). We analyze the determinants of collateral at the loan level. As households typically have several loans at the same time and over time, we take care of this fact by using standard errors being clustered at the household level.

Moreover, we examine the use of collateral by applying a logistic regression in which the use of collateral is approximated by its incidence. If not indicated otherwise

we present the marginal effects at the means of explanatory variables. As a measure of collateral we prefer the "incidence of collateral" over the "degree of collateralization" because the latter is unusually high in our sample with about 200 to 400 percent on average, mainly due to indivisibility of land. Unfortunately, there is little information in rates of collateralization above 100%, so that the measure of degree of collateralization is much less informative than in other studies where loans are typically collateralized to less than 100 percent.

We employ a logistic regression model to explain the incidence of collateral of the following form:

$$P(Inc._{ijt}) = f\ (Loan\ characteristics_{ijt},\ Borrower\ characteristics_{ijt}, \qquad (2)$$

$$Information\ proxy_{ijt},\ \gamma_t,\ \delta_j)$$

where $P(\cdot)$ indicates probability, $Inc._{ijt}$ is a dummy variable which equals one if collateral has been pledged and zero otherwise and γ_t and δ_j represent time and provincial fixed effects, respectively.[15] The sub indices i,j and t correspond to loans, provinces and waves.

Empirically analyzing the use of collateral requires considering various potential determinants as they have been found in the literature.[16] These determinants include four groups: (i) information about *Loan characteristics*, i.e. in particular loan size, loan duration, annual interest rate, loan purpose, and eventually guarantees; (ii) information

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[15] We prefer the logit model over the probit model since most variables are not normally distributed according to the Shapiro-Wilk and Shapiro-Francia test. However, comparing the values of the Akaike and Bayesian information criterion (AIC and BIC) the models do not differ much. Accordingly marginal effects are almost unchanged when using a probit model.

[16] We use a standard set of variables to describe household characteristics (see, e.g., Behr et al. 2011) and we derive loan terms from other papers such as Degryse and van Cayseele (2000), Ioannidou and Ongena (2010) and Berger et al. (2011a,b). Following Berger and Udell (1995) and more recently e.g. Jiménez et al. (2006) or Brick and Palia (2007), we proxy relationship by calculating the duration a household is engaged with the same lender in years.

about *Borrower characteristics*, i.e. income, age, education, household size, gender, total loan volume, earlier repayment behaviour, and (iii) *Information proxies* which capture information asymmetry between lender and borrower (we will mainly use relationship in years and distance between lender and borrower in minutes travel time).

When pooling over all lenders and over three waves we get a standard outcome, because we find several determinants to be statistically significant in our sample and the sign of the marginal effects is in line with theory.[17] Table 19 shows the regression results: specification (1) is the broadest one, where we consider a large set of potential determinants. We find that a larger loan size and longer duration increase the probability that collateral has to be pledged. This is consistent with H1 as we expect the risk for the lender to increase with increasing loan size and longer loan duration. Concerning the use of loans it is the marginal effect of consumption purpose which is significant. The negative sign indicates that loans borrowed for consumption purposes require less collateral than loans used for other purposes; this probably reflects short-term agreements on consumption loans (and possibly also effects from short duration and low volume beyond the average). If a loan is guaranteed for by other persons collateral requirements are less likely. Higher education of the household head lowers collateral requirements since higher education may indicate lower risk. Higher debt capacity of a household is also associated with lower use of collateral. Next, a higher loan volume per household lowers collateral requirements, basically because this represents richer and wealthier households. Finally, longer relationship duration is associated with a higher incidence of collateral: this is consistent with the hold-up hypothesis, however, it may also result from unconsidered heterogeneity among lenders because we know from Table 18 that lenders with more use of collateral, as BAAC, have longer relationship duration than others (we will see in Section 4.4.2, when we implement lender dummies, that the second interpretation is correct).

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[17] The pooling over lenders and waves results from the analysis of loans. An analysis of households might use a panel approach but this would be a different research question than ours.

Table 19: Determinants of collateral

Incidence of collateral	(1) all variables	(2) reduced set	(3) wealth indicator	(4) relationship measure II	(5) relationship measure III
Independent variables					
Loan size (Baht)	0.167***	0.167***	0.168***	0.171***	0.163***
	(0.0153)	(0.0153)	(0.0153)	(0.0160)	(0.0158)
Loan duration (months)	0.00210***	0.00208***	0.00208***	0.00200***	0.00198***
	(0.000429)	(0.000422)	(0.000423)	(0.000410)	(0.000419)
Annual interest rate	-0.000231	-0.000261	-0.000277	-0.000362	-0.000359
	(0.000263)	(0.000265)	(0.000270)	(0.000277)	(0.000274)
Agricultural production loan	0.0295	0.0314	0.0302	0.0322	0.0305
	(0.0276)	(0.0273)	(0.0273)	(0.0272)	(0.0271)
Non-agricultural production loan	0.0406	0.0431	0.0435	0.0372	0.0369
	(0.0342)	(0.0341)	(0.0342)	(0.0339)	(0.0339)
Consumption loan	-0.0506*	-0.0508*	-0.0515*	-0.0606**	-0.0617**
	(0.0285)	(0.0285)	(0.0285)	(0.0277)	(0.0276)
Guaranteed loan	-0.437***	-0.435***	-0.435***	-0.421***	-0.425***
	(0.0228)	(0.0226)	(0.0226)	(0.0219)	(0.0218)
Female headed household	-0.0170				
	(0.0243)				
Household size (adult equivalence)	-0.00864				
	(0.00921)				
Education of household head	-0.00657*	-0.00590	-0.00595	-0.00598	-0.00603
	(0.00387)	(0.00385)	(0.00387)	(0.00382)	(0.00383)
Income per adult equivalence (Baht)	0.00330	0.00389		0.00482	0.00465
	(0.00536)	(0.00532)		(0.00537)	(0.00538)
Asset endowment (in Baht)			0.00229		
			(0.00640)		
Savings (in Baht)	0.00319				
	(0.00334)				
Debt capacity	-0.00732*	-0.00664	-0.00560	-0.00674	-0.00723*
	(0.00436)	(0.00424)	(0.00402)	(0.00424)	(0.00436)
Dummy if repaid late	-0.0147				
	(0.0339)				
Total loan volume per hh (in Baht)	-0.0474***	-0.0457***	-0.0457***	-0.0449***	-0.0337**
	(0.0161)	(0.0156)	(0.0159)	(0.0164)	(0.0170)
Relationship duration	0.0306***	0.0318***	0.0322***		
	(0.00971)	(0.00965)	(0.00968)		
Number of loans from same lender				-7.69e-05	
				(0.00801)	
Number of lenders					-0.0180*
					(0.00984)
Pseudo R-squared	0.314	0.313	0.313	0.314	0.316
Observations	2,963	2,992	2,991	3,051	3,051

Cluster-robust standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$;

Note: All lending institutions included except VF and POL. For relationship duration, loan size, income, savings, asset endowment and total loan volume logarithmic values are taken.

All specifications control for time and province effects via dummies.

Specification (1): Broad set of explanatory variables, relationship measured via relationship duration;

Specification (2) Reduced set of explanatory variables according to established literatur;

Specification (3): Household's wealth is proxied by asset endowment instead of income;

Specification (4): Relationship is proxied by the number of loans a household borrowed from the same lender;

Specification (5): Relationship is proxied by the number of lenders a household is engaged with.

Specification (2) reduces the number of determinants in order to continue our future examinations with more parsimonious specifications. More precisely we drop determinants which remain insignificant in all specifications. This applies to the following variables: female headed household, household size, savings and whether a household ever repaid late on a loan. Again, in specification (2) we find that the riskiness of loans is positively related to the incidence of collateral. This confirms the prediction made by the ex post theory of collateral (H1).

Specification (3) just exchanges income by asset endowment to see whether this makes a difference, which is, however, not the case. Both marginal effects are positive, as theoretically expected, but far from turning significant. Nevertheless, we stick to the income variable because it seems to be crucial in general when explaining riskiness of borrowers and thus the use of collateral.

In specifications (4) and (5), the relationship aspect between lender and borrower is measured in new ways. First, the "number of loans from same lender" indicates a stronger relation, whereas, second, the "number of lenders" the household is engaged with rather indicates a weaker relation between borrowers and each specific lender. These new relationship variables are insignificant in specification (4), but significant with a negative sign in specification (5) which implies that more lenders increase competition and thus reduce collateral requirements. In both specifications the other variables keep signs and significance so that results remain robust and there is no need to exchange the "relationship duration" variable in standard specifications.

4.4.2 The use of collateral: formal vs. informal lenders

In this section we test whether formal lending institutions use collateral to a higher degree than informal ones: in line with the ex ante hypothesis of collateral we expect that informal lenders rely less on the use of collateral because they have better information about the riskiness and behaviour of their borrowers (H2).

Consequently we would expect that CB and BAAC demand more collateral than other lending institutions. To test this hypothesis we rely on the parsimonious specification (2) from Table 19 and add dummies for the seven lenders which we still consider. The resulting specification (1) in Table 20 shows that indeed BAAC loans are collateralized most often followed by BP, CRED, CB, followed with some distance by ML, FRI (the reference category) and FAM. On average, formal institutions require collateral quite frequently, semiformal lenders require less often collateral and informal lenders have the lowest collateral requirement. Within the group of informal lenders, however, there are obvious differences which require attention.

BP loans are collateralized more often than we would have expected from an informal lender. The reason is that BPs often finance the purchase of a product (such as a motorcycle) and simultaneously take this product as collateral. In this sense they follow a somewhat specific business model when granting loans. At the other extreme, FAM and also FRI do not often require collateral. This seems to be in line with earlier literature (Barslund and Tarp, 2008) because in these cases the reason to grant a loan may be influenced by altruistic motivation. This tends to lower collateral standards. In between the extremes of BP and FAM/FRI are ML, a traditional form of informal lenders. Specification (2) shows that formal lenders require collateral 30% more likely than ML, which is the reference category here. Overall, informal lenders use collateral much less than formal lenders, with the specific exception of BP.

Another interesting result occurs while controlling for the type of lender: the influence of relationship duration changes from positive (Table 19) to negative (Table 20). This can be explained by the correlation between relationship duration and type of lender. Formal lenders do not use longer relationships for hold-up, but for reducing their larger information gaps. This will be further examined below (Section 4.4.3).

Specifications (3) to (5) are used to check the robustness of our finding above. In specification (3) we consider the fact that borrowers of formal and informal loans might be different in unobserved characteristics (we cannot control for in our regressions).

Table 20: Use of collateral across lending institutions

Incidence of collateral	(1) all loans	(2) formal banks and ML	(3) formal/inf. institutions	(4) formal/inf. dummies	(5) formal/semif./inf. dummies
Independent variables					
Loan size (Baht)	0.143***	0.238***	0.163***	0.191***	0.155***
	(0.0157)	(0.0344)	(0.0313)	(0.0241)	(0.0159)
Loan duration (months)	0.00148***	0.00274***	0.00245***	0.00269***	0.00165***
	(0.000395)	(0.000678)	(0.000665)	(0.000574)	(0.000432)
Annual interest rate	-0.000245	-0.000377	0.000564	0.000347	0.000217
	(0.000272)	(0.000537)	(0.000605)	(0.000312)	(0.000247)
Agricultural production loan	-0.0180	0.0260	0.0202	-0.00576	-0.00814
	(0.0253)	(0.0495)	(0.0545)	(0.0357)	(0.0261)
Non-agricultural prod. loan	0.0172	0.0877	0.0175	0.0422	0.0146
	(0.0315)	(0.0596)	(0.0643)	(0.0451)	(0.0325)
Consumption loan	-0.0452	-0.00338	0.0123	0.0115	-0.0402
	(0.0287)	(0.0627)	(0.0703)	(0.0429)	(0.0289)
Guaranteed loan	-0.602***	-0.719***	-0.624***	-0.619***	-0.600***
	(0.0267)	(0.0263)	(0.0454)	(0.0306)	(0.0267)
Income per adult equiv. (Baht)	-0.00395	-0.00842	-0.0128*	-0.00465	-0.00325
	(0.00473)	(0.00921)	(0.00724)	(0.00649)	(0.00469)
Debt capacity	-0.00543	0.000272	0.000989	-0.00157	-0.00669*
	(0.00350)	(0.00954)	(0.00823)	(0.00436)	(0.00367)
Total loan vol. per hh (in Baht)	-0.0309*	-0.0187	-0.00593	-0.0319	-0.0420**
	(0.0160)	(0.0326)	(0.0297)	(0.0230)	(0.0166)
Relationship duration	-0.0281***	-0.0319*	-0.0248	-0.0169	-0.0191*
	(0.0106)	(0.0190)	(0.0223)	(0.0142)	(0.0103)
Dummy for CB	0.462***		0.563***		
	(0.110)		(0.143)		
Dummy for BAAC	0.510***		0.520***		
	(0.0574)		(0.0901)		
Dummy for CRED	0.476***		0.441**		
	(0.0787)		(0.176)		
Dummy for ML	0.287***		0.349**		
	(0.0929)		(0.161)		
Dummy for BP	0.500***		0.697***		
	(0.134)		(0.0896)		
Dummy for FAM	-0.146***		-0.183***		
	(0.0322)		(0.0621)		
Dummy for formal		0.301***		0.399***	0.430***
		(0.0391)		(0.0300)	(0.0339)
Dummy for semiformal					0.400***
					(0.0497)
Pseudo R-squared	0.414	0.401	0.443	0.367	0.379
Observations	3,145	1,851	939	2,344	3,145

Cluster-robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1;

Note: All lending institutions included except VF and POL, with respect to lender dummies reference category is FRI. For relationship duration, loan size, income and total loan volume logarithmic values are taken.

All specifications control for time and province effects via dummies.

Specification (1): Base line regression with reduced set of variables, reference category for lender dummies is FRI;

Specification (2): Tests collateral requirment of formal lenders against the reference category (ML);

Specification (3): Sample is reduced to households who borrowed from formal and informal institutions (irrespective of borrowing from semiformal lenders).

Specification (4): Baseline regression with formal and informal loans only, inclusive dummies for informal and formal to show differences in collateral requirements.

Specification (5): Baseline regression with formal, semiformal and informal loans and respective dummies to show differences in collateral requirements.

Therefore we reduce the sample quite radically to those 939 households who have loans from formal and informal institutions at the same time. Again, results are qualitatively unchanged. Even though the relationship variable turns insignificant, this is because variance increases in the small sample whereas the marginal effect almost has the same size.

This pattern is confirmed in the final two specifications which give the regressions for a reduced sample (specification 4) and for the whole sample (specification 5). Dummy variables for formal and informal lenders show that controlled for characteristics of loans and borrowers, indeed formal lenders require about 40% more often collateral than informal lenders (ranging from families to business partners).

4.4.3 The impact of relationship within lending groups

In this section the possible private information influencing the use of collateral is further examined. If different reliance on collateral by formal and informal lenders (see Section 4.4.2 above) is indeed driven by the different degree of information asymmetry between lender and borrower, this asymmetry may decline during enduring relations. The argument runs that longer lending relations provide private information about the economic situation and the behaviour of the borrower which cannot be obtained by inspecting files. This is why we expect that formal lenders profit much more from longer relations (H3), whereas informal lenders have better access to this kind of private information. This hypothesis gets empirical support, as shown in the following.

As a first step we simply split the total sample into three groups with potentially different degree of private information about borrowers, i.e. formal, semiformal and informal lenders. In Table 21, specifications (1) to (3) give the respective results for the three groups of lenders. Indeed, the marginal effect of the variable "relationship duration" varies across the three groups. For formal lenders we get the theoretically expected result consistent with a reduction of information gaps by longer relationship

duration, i.e. the use of collateral (here as probability of collateral) declines with longer durations. The marginal effects of the relation variable for semiformal and informal lenders are insignificant; if at all, the size of the marginal effect for semiformal lenders is smaller than for formal lenders and for informal lenders it even turns positive. Overall, this supports our hypothesis H3.

Table 21: Use of collateral for formal, semiformal and informal lenders

Incidence of collateral	(1) formal	(2) semiformal	(3) informal	(4) ML/ BP	(5) FAM/ FRI
Independent variables					
Loan size (Baht)	0.223***	0.0841***	0.105***	0.194***	0.0273***
	(0.0410)	(0.0138)	(0.0172)	(0.0585)	(0.00840)
Loan duration (months)	0.00302***	-0.000420	0.00131**	0.00259	0.000374
	(0.000684)	(0.000346)	(0.000580)	(0.00182)	(0.000230)
Annual interest rate	-0.00104	-0.000159	0.000183	-0.000251	-4.62e-06
	(0.00130)	(0.000464)	(0.000152)	(0.000540)	(5.67e-05)
Agricultural production loan	0.0477	-0.0196	-0.0557**	-0.155*	-0.0338**
	(0.0564)	(0.0229)	(0.0254)	(0.0932)	(0.0135)
Non-agricultural production loan	0.101	-0.0402*	-0.0206	0.0876	-0.0220***
	(0.0683)	(0.0207)	(0.0344)	(0.130)	(0.00852)
Consumption loan	-0.0149	-0.0935***	-0.00483	-0.0156	-0.0139
	(0.0754)	(0.0231)	(0.0287)	(0.108)	(0.0119)
Guaranteed loan	-0.727***	-0.524***	-0.0300	-0.202**	-0.0144
	(0.0217)	(0.0544)	(0.0306)	(0.0904)	(0.0125)
Income per adult equivalence (Baht)	-0.0180*	-0.000257	0.00608	0.0264*	-0.00205
	(0.00928)	(0.00446)	(0.00462)	(0.0137)	(0.00306)
Debt capacity	0.00403	-0.00664*	-0.00559	-0.00548	-0.00182
	(0.00944)	(0.00351)	(0.00404)	(0.0175)	(0.00144)
Total loan volume per household (Baht)	-0.0221	-0.0406***	-0.0313*	0.0233	-0.0154**
	(0.0376)	(0.0148)	(0.0173)	(0.0529)	(0.00699)
Relationship duration	-0.0342*	-0.0114	0.0164	-0.0114	0.00550
	(0.0206)	(0.0109)	(0.0139)	(0.0478)	(0.00737)
Pseudo R-squared	0.426	0.444	0.224	0.258	0.188
Observations	1,640	801	704	261	443

Cluster-robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1;

<u>Note</u>: All lending institutions included except VF and POL.

For relationship duration, loan size, income and total loan volume logarithmic values are taken.

All specifications control for time and province effects.

Specification (1): Formal loans only; Specification (2): Semiformal loans only; Specification (3): Informal loans only; Specification (4): ML and BP only; Specification (5): FAM and FRI only.

Reassuringly, the marginal effects on other possible determinants of collateral still fit into the literature. Collateral requirement is robustly associated with larger loan size. Regarding further determinants, longer loan duration and the lack of guarantees are also related to collateral, although the significance of these variables may be borderline or partially missing which may be caused by smaller sample size.

Motivated by the somewhat lower R-squared of the regression regarding informal lenders, we split this sample into two groups which may be more homogeneous than the total, i.e. ML and BP vs. FAM and FRI. Specifications (4) and (5) show that explanatory power is partially improved despite smaller samples but the structure of determinants is somewhat different, illustrating the heterogeneity of informal lenders. In particular, guarantees have a significant negative effect on collateral for ML/BP, but not for FAM/FRI, indicating that lending from family members or friends is the most informal form of finance with better ex ante information than ML/BP.

4.4.4 The role of distance between lenders and borrowing households

So far, we have seen that formal lenders require more collateral than informal lenders. An information-based explanation is supported by the fact that only formal lenders profit from increased relationship duration which allows them to operate with less collateral. We now test the significance of another proxy for good information of lenders about borrowers, i.e. their geographical distance to each other. Informal lenders are usually geographically closer to their borrowers, which is an important reason why they may have better information and increase credit availability, as shown by Agarwal and Hauswald (2010). In fact, the role of distance for lending was examined years ago (Petersen and Rajan, 2002; Degryse and Ongena, 2005) but has been linked with the issue of collateral by only one study (Jiménez et al., 2009) so far.

In this section we include a variable that captures the distance between lenders and borrowing households. The survey includes two kinds of information about

distance: first, the travelling time in minutes the household takes to reach its lender, and, second, information about where lenders and borrowers are located (i.e. in the same village, same commune, same district or province, urban or rural area). This information provides a useful proxy for lender's information on borrowers and allows to test whether the effect on collateral requirements varies with distance. Since this information is only available for waves 2 and 3 it reduces the sample which is used in this section to 1,659 households and 4,409 loans.[18]

Table 22 shows regressions for different types of lenders, including the variable "distance to lender". If informal lenders indeed gain their information through their closeness to the borrowers it is reasonable to assume that they have less information with increasing distance and therefore demand more collateral (H4). As first step we just add the distance variable to the other determinants and find that its marginal effect is positive and significant. This is a first indication that distance – as proxy for more information asymmetry – is related to more collateral.

For formal and semiformal institutions (specifications (2) and (3)) distance has no significant effect on collateral requirements. Or, in other words: whether the borrower is located far away from the lender or not, information regarding borrower's risk does not change consistently.[19] This is completely different for informal lenders as presented in specification (4): their lending is significantly more often collateralized if the distance increases, consistent with H4. This contrasts the finding of Jiménez et al. (2009) that distance has a negative influence on the use of collateral for regular banks. A possible explanation is that the lending technology of banks in Thailand is stronger asset-based than relationship-based, so that distance does not matter consistently for them. In contrast to the Spanish banks examined by Jiménez et al. (2009), the Thai banks in our sample do not seem to be able to offset their informational disadvantage by the availability of hard data, and therefore use more often collateral than informal lenders.

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[18] We drop 19 loans for which lenders are located in Europe and in Bangkok, which is still hundreds of kilometers away from our target group.

[19] We note that coefficient signs on the distance variable are positive for formal and informal lenders and that coefficient size is largely comparable to informal lenders; however, standard errors are high.

In order to check this finding, we run the same regression but only exchange the indicator for distance, i.e. we replace the travel time indicator by the simple information whether the lender is located in the same village as the borrower (specification 5). This

Table 22: The role of distance across lending institutions

Table 6: The role of distance across lending institutions

	(1)	(2)	(3)	(4)	(5)
Incidence of collateral	all loans	formal	semiformal	informal	informal
Independent variables					
Distance to lender (in minutes)	0.108***	0.0565	0.0253	0.0332***	
	(0.0168)	(0.0370)	(0.0175)	(0.0112)	
Lender and borrower in the same village					-0.0964***
					(0.0310)
Loan size (Baht)	0.161***	0.195***	0.0813***	0.0865***	0.0834***
	(0.0206)	(0.0462)	(0.0229)	(0.0209)	(0.0212)
Loan duration (months)	0.00169***	0.00268***	-0.000423	0.00135***	0.00129***
	(0.000477)	(0.000842)	(0.000465)	(0.000454)	(0.000451)
Annual interest rate	-6.82e-05	0.00106	-0.000321	0.000375**	0.000323**
	(0.000359)	(0.00117)	(0.000822)	(0.000146)	(0.000141)
Agricultural production loan	-0.0256	-0.0255	-0.00852	-0.0755***	-0.0717***
	(0.0302)	(0.0612)	(0.0348)	(0.0239)	(0.0228)
Non-agricultural production loan	-0.000335	0.0604	-0.0509*	-0.0405*	-0.0343*
	(0.0354)	(0.0737)	(0.0272)	(0.0210)	(0.0208)
Consumption loan	-0.0652**	-0.0175	-0.0820***	-0.0383*	-0.0391*
	(0.0322)	(0.0854)	(0.0309)	(0.0224)	(0.0230)
Guaranteed loan	-0.511***	-0.727***	-0.641***	-0.0397*	-0.0413**
	(0.0274)	(0.0252)	(0.0562)	(0.0211)	(0.0194)
Income per adult equivalence (Baht)	0.00487	-0.0194	0.00609	0.00398	0.00345
	(0.00799)	(0.0132)	(0.0109)	(0.00418)	(0.00387)
Indebt capacity	-0.00684	0.00104	-0.00690	-0.00642	-0.00835*
	(0.00595)	(0.0143)	(0.00741)	(0.00467)	(0.00462)
Total loan volume per household (Baht)	-0.0402**	-0.00457	-0.0218	-0.0464***	-0.0473***
	(0.0198)	(0.0426)	(0.0253)	(0.0153)	(0.0152)
Relationship duration	0.0236**	-0.0354	-0.0161	0.0122	0.0144
	(0.0116)	(0.0238)	(0.0147)	(0.0125)	(0.0123)
Pseudo R-squared	0.352	0.419	0.493	0.351	0.354
Observations	2,038	1,129	502	407	418

Cluster-robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1;

<u>Note</u>: VF and POL are excluded from semiformal institutions.

For loan size, income, relationship duration and distance to lender logarithmic values are taken.

All specifications ccontrol for time and province effects.

Specification (1): All lenders; Specification (2): Formal lenders (CB and BAAC) only; Specification (3): Semiformal lenders (CRED); Specification (4): Informal lenders (ML, BP, FAM and FRI); Specification (5): Formal lenders and dummies whether borrower and lender are located in the same village or not.

rough split provides an indication that proximity within a village may define a critical point up to which distance provides an information advantage. Again, distance has a significant positive influence on collateral only in the case of informal loans.

This can also be seen in <u>Figure 1</u> in which predicted probabilities of pledging collateral are plotted against the distance between informal lenders and borrowers. The figure shows that at distances being larger than about 5 to 10 minutes, the distance effect is clearly at work: the probability of a collateral requirement jumps upwards and increases slightly with distance thereafter.

Figure 1: The probability that informal loans require collateral and distance between lender and borrower
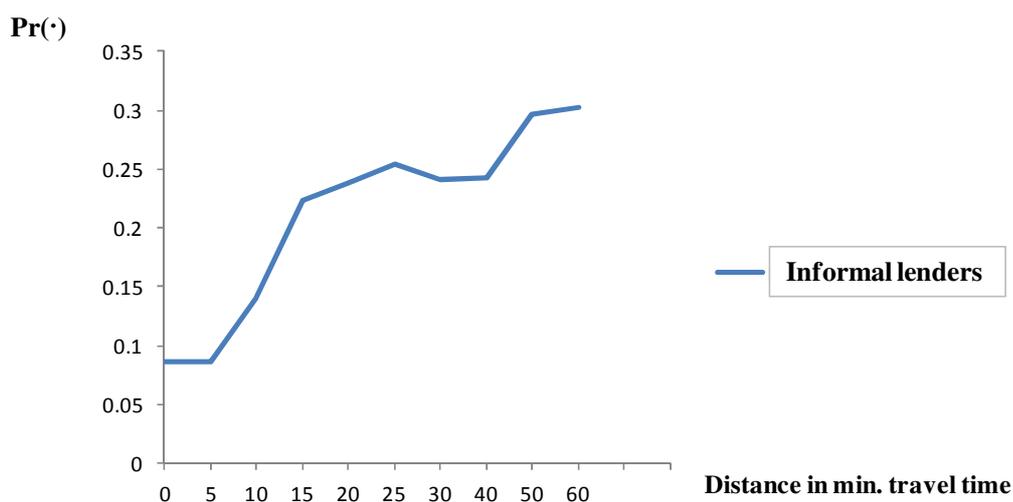
4.5 Robustness checks

This section contains robustness checks going beyond those already presented in the main text above. In detail, we examine six issues: results separated for the three waves (Section 4.5.1), results for the rate of collateralization instead of the incidence of collateral (Section 4.5.2), the role of marketability of collateral (Section 4.5.3), the contribution of social collateral (Section 4.5.4), results for other definitions of income

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(Section 4.5.5) and further insights into a possible influence of competition between financial institutions on the use of collateral (Section 4.5.6).

4.5.1 Results across the three waves

The household survey underlying our analysis has been conducted in the years 2007, 2008 and 2010, so that it may be interesting to see whether results are roughly comparable across these three waves. As a major change over waves, however, we have to consider that the macroeconomic environment worsened before wave 2 and improved again before wave 3.

Detailed results are available in the Appendix in <u>Appendix 5</u>. The three panels A, B and C document results for the three waves each with 1,065, 1,098 and 982 loan cases, respectively. Columns (1) in the three panels show the outcome for all financial institutions at the respective wave and thus follows column (1) in Table 4, however, without presenting marginal effects for dummy variables. Columns (2) to (6) give results for groups of financial institutions and thus follow the five columns in Table 5. Overall, the structure of results is quite stable across all waves, although the number of significant coefficients becomes smaller, if the number of observations is reduced. Consistently significant variables with the theoretically expected signs are loan amount, loan duration and the use of guarantees.

Comparing the three main groups of formal, semi-formal and informal lenders over time we find that the same three variables as for the total sample (loan amount, loan duration and the use of guarantees) keep their sign and are mostly significant. Further findings are specific to the three sub-groups: (1) Examining lending behaviour of the formal financial institutions, they appear to be tentatively more risk-averse during wave 2, because they require more often collateral for consumption loans and honour higher income with less collateral requirement. (2) In contrast, collateral requirements of semi-formal lenders are basically unchanged across waves and thus do not seem to

react to the macroeconomic environment. (3) Finally, regarding informal lenders there are no significant coefficients for loans from family and friends, so that the structure stems from moneylenders and business partners only. These lenders also seem to react more risk averse during the bad times of wave 2 as some risk proxies become more important: the coefficient on "loan amount" doubles and the one on "guarantees" turns significant. However, the role of this group is at the same time also unique: first, they slightly relax collateral requirements during wave 2 (wave dummies not explicitly shown in Table 21, column 3) and they tentatively do so on the three loan purposes given in Appendix 5, i.e. they rather require more collateral for loans to repay other loans. Indeed, we find that this loan purpose becomes slightly more important during wave 2 in which 15.5% of all loans are borrowed to repay other loans compared to 12.5% and 15% in wave 1 and wave 3, respectively. This may indicate that these informal lenders help their borrowers to serve existing loans. Different from moneylenders' and business partners' declining importance over time, the group of family and friends does extend a larger number of loans in difficult times, i.e. during wave 2.

Overall, the separate examination of the three waves mainly confirms the earlier analysis. In addition, we learn from observing behaviour during wave 2 when a severe negative macroeconomic shock hit the economy: first, formal lenders require rather more collateral, second, semi-formal lenders do not react at all, and, third, only informal lenders offer slight tendencies towards supporting their borrowers.

4.5.2 Results for explaining the rate of collateralization

In the following section we test whether main results still hold if we explain the rate of collateralization, i.e. the value of collateral over loan size, rather than the incidence of collateral. In the literature both empirical measures are common and most results do not depend on the preferred definition (Menkhoff et al., 2006; Behr et al., 2011). The reason that we do not prefer the rate of collateralization is its unusually large range, including

not only the "normal" rates from 0 to slightly above 1 but extending far beyond the rate of 1. Our data includes more than 200 loans with a collateralization rate of more than 5 and the largest rates range above 10. Due to these extreme rates, we document results for the original rate and for an upper limit of the rate of collateralizations.

Appendix 6 reproduces Table 20 column (1) in various specifications. Specification (1) uses institution dummies with "friends" as reference category, specification (2) excludes the semi-formal institutions and specifications (3) to (5) use groups of formal, semiformal and informal lenders. In specification (6) the rate of collateralization is limited to 1.5 and in specification (7) all collateralization rates higher than 1.5 are set to 1.5. All specifications show that formal lenders demand higher collateral in relation to loan size than informal lenders while important risk determinants (loan size, guarantees and debt capacity) remain stable.

4.5.3 Results depending on marketability of collateral

Collateral, in particular land, is not marketable easily in Thailand (Menkhoff et al., 2012). Land cannot be sold, if specific land titles are missing and in other cases the weak legal system hinders effective recovery of collateral. As a consequence we test whether main results still hold if we consider only collateral which can be claimed more easily and which should be therefore of particular importance to the lender. We implement this by excluding those collateralized loans where land would be difficult to sell due to a missing respective land title.

Appendix 7 shows our standard set of regressions. Formal lenders still require more often collateral. Also the other variables of interest mainly keep their sign and significance. In particular, relationship duration still has a negative effect on collateral requirements for formal lenders which is even significant to a higher degree than in our standard regression. This indicates that the consideration of land that is hardly marketable may somewhat blur the economic relations we uncover.

4.5.4 Results depending on consideration of social collateral

The proximity between lender and borrower in informal lending reduces the degree of asymmetric information. However, as both sides know each other better they are also tentatively closer to each other regarding social relations. These social relations may work as a kind of social enforcement to properly pay for the loan which can be termed "social collateral" (Karlan et al., 2009; Karaivanov and Kessler, 2013). As we know that the use of collateral depends on the use of alternatives, such as guarantees and loan terms (e.g. Menkhoff et al., 2012), a missing consideration of social collateral may contribute to overestimating the effect of better information on reduced collateral requirements.

However, there are also reasons limiting this potential effect: First, the better information of lenders about borrowers aims for predicting their repayment behaviour. In this sense good information about a borrower includes information about this borrower's social relations which create social collateral; thus proximity creates good information and social collateral at the same time, although not necessarily to the same degree. Second, the institutional environment in rural Thailand is different from much more closed poor communities that often serve as reference case when studying informal lending (e.g. Behr et al., 2011): Households in Thailand potentially have several lenders competing with each other, households are mobile due to public transport, private motorcycles etc., they are potentially informed as most of them use mobile phones and many of them have family networks including migrants. Thus social collateral is expected to play a more limited role.

In the end it may be an empirical question whether social collateral is very important. In order to test this, we include two rough proxies for stronger social relations in our standard regressions for informal lenders in general and for ML/BP and FAM/FRI in particular. We assume that social collateral is strengthened within small and remote villages and that therefore tangible collateral may be used less often in these cases. Thus the first proxy for more social collateral is that borrowers live in a smaller

village, the second proxy is the larger distance of the borrower's village from the next district town. We expect that with increasing village size, and hence lower social collateral, tangible collateral increases. Larger distance to the next district town, however, indicating higher social collateral decreases tangible collateral. Appendix 8 shows the marginal effects for the social collateral proxies which are insignificant in all specifications. We conclude that the effect of social collateral may be of limited importance in our sample or that at least our proxies for social collateral do not indicate great importance.[20] The negative marginal effect of village size may indicate a lock-in of borrowers in small villages.

4.5.5 Results depending on other transformations of income

In our earlier regressions we use a logarithmic transformation of income which is standard in the literature (e.g. Agarwal and Hauswald, 2010; Behr et al., 2011). However, some households have negative incomes at certain points in time, which occurs mainly due to negative shocks from farming business. These negative incomes values are set to one in order to be able to apply a logarithmic transformation.

Alternative approaches also seem to be plausible. First, one may exclude extreme income values from further consideration, such as incomes beyond four standard deviations from the mean. Second, one may simply exclude all observations with negative household income. Third, one may choose a different transformation of the small incomes, such as dividing all incomes by 1,000, setting negative ones to the value of one and those which are exactly one to 1.1. Afterwards the logarithm is taken. However, all of these alternative transformations of income do not have major effects on our variables of interest. Appendix 9 refers to our standard regressions when using

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[20] This is not a contradiction to Karaivanov and Kessler (2013) due to the studies different set-up. They assume the existence of social collateral in the group of FAM/FRI which is not distinguished from better information. They also do not focus on collateral in the regressions, possibly because it is assumed to be ideally zero in FAM/FRI-lending. Finally, their theoretically derived implication that formal loans should have larger loan size is also consistent with our data (if we exclude ML/BP from informal lenders as they do).

the respective alternative income measures, but just gives two coefficients of interest: "relationship duration" has a negative sign at formal lenders, and "distance" has a positive sign for informal lenders – this is what we find in our standard regressions too, indicating that our findings are robust to modified income definitions.

4.5.6 A possible influence from competition among financial institutions

It can plausibly be assumed that the use of collateral also depends on the degree of competition among financial institutions: less competition reduces negotiation power of the borrower and allows the lender to require more collateral (see Hainz, 2003; Hainz et al., 2013). As the competition between lender groups may be weak in rural Thailand, we test whether there are effects within lender groups.

Basically, we complement the standard regressions from Table 22 by adding available travel times to some major financial institutions, i.e. the BAAC (public agricultural bank), the CRED (semiformal credit institutions), the GSB (public savings bank, usually considered as commercial bank), and the CB (commercial bank). Results in Appendix 10 show, that there is indeed evidence being consistent with the expected competition effect among formal financial institutions: they use more often collateral if the distance to the next commercial bank is larger. Moreover, the sign of the marginal effect for the travel time to the next BAAC points into the same direction. As the BAAC has far more offices in the rural areas than all commercial banks taken together, the marginal effect of travel time to the next CB may also be interpreted as a noisy indicator of local centrality. That means collateral has less often to be pledged at more centrally located places which are characterized by more lender competition.

The further evidence is less clear: the marginal effect on credit institutions in specification (3) has the expected sign (which is reasonable since CRED is the granting institution in this specification). At the same time travel time to the next CB would lead to lower collateral required by CRED. Possibly, semiformal lenders behave special in

that they require less collateral at more remote locations (i.e. where travel time to the next CB is longer). Finally, there is no significant effect for informal lenders in specifications (4) and (5) which makes sense as we do not have information about the distance to the next competing informal lender.

Overall, the evidence about the role of competition for the use of collateral is limited but points into the theoretically expected direction.

4.6 Conclusions

This research is at the intersection of banking and development. Both fields are interested in the use of collateral: From a banking perspective, collateral is a regular characteristic of loan contracts whose use is still not fully understood; in particular there is little evidence on the so-called "ex ante theory" of collateral. We provide novel evidence by testing this theory in a new way, i.e. by contrasting the lending behaviour of two financial institutions in the same market which differ in their private information about borrowers: formal lenders know tentatively less than informal lenders. From a development perspective, the need of pledging collateral is often seen as limiting access to finance, which contributes to explaining the existence and role of informal lenders who rely less on collateral in their lending decisions.

Our dataset is based on a largely representative household survey in rural Northeast Thailand, covering more than 2,000 households over three waves during the years 2007 to 2010. This data includes all loans that households have taken from the variety of up to nine different kinds of lenders, ranging from conventional commercial banks over specialized lending institutions to informal lenders. Due to some specialized institutions which secure their loans exclusively via guarantees and not via (tangible) collateral, the average incidence of collateral is just 18%. For the whole sample as well as for groups of lenders we find that collateralization is related to indicators of risk. This

confirms – as did many other studies before – that the ex post-theory of collateral is valid, i.e. collateral serves as buffer against repayment risk.

Based on these relations we examine the ex ante theory, claiming that "a reduction in the ex ante information gaps between borrowers and lenders is associated with a lower incidence of collateral" (Berger et al., 2011a, p.56). In the cross-section, informal lenders should have a smaller information gap than formal lenders, which implies that they rely less on collateral and this is indeed what we find.

We proceed by testing two implications of the ex ante theory: if asymmetric information drives (controlled for other determinants) the reliance on collateral, we hypothesize that a reduction of information asymmetry via relationship duration should be related with less collateral. Finally, the information advantage of informal lenders should work best if their geographical distance to borrowers is short. Again, we find empirical support for both conjectures.

Overall, we provide new kind of evidence supporting the rarely tested ex ante theory of collateral. At the same time, we learn about the operation of formal and informal lenders with respect to collateral. The variety of institutions seems to perform different roles: whereas formal lenders operate to a large extent as they do in more advanced market settings, informal lenders indeed seem to rely on their assumed information advantage. Interestingly, the group of informal lenders in itself is quite heterogeneous and differentiation is necessary to understand their rationale when using collateral. In this sense formal and informal institutions seem to complement each other.

5. Final remarks

This dissertation examines the role of financial development for the rural poor in three provinces in Thailand's Northeast. It is shown that rural credit markets clearly differ from those in more mature markets in several aspects: a policy-induced microfinance programme is in place to improve access to finance, the market is highly segmented with many operating lenders and lenders have different information on borrowers' risk so that setting collateral requirements is different across lenders.

The main findings are evaluated with respect to their contribution to households' well-being. The setup of a microfinance programme shows some effort to improve access to finance which is still denied to many people. The results in *Chapter 2* show that policy-subsidised microcredit reaches the target group and that it contributes to stabilising economic variables. However, it does not substitute more expensive informal loans and has no long-lasting effect on lending behaviour of poor households. With this in mind, one can question the overall efficiency of the programme and ask whether the overall costs of more than 1.5% of the GDP in the year 2001 can be justified.

High segmentation may hinder economic growth and worsen the situation of the rural poor if borrowers are excluded from the formal credit markets and informal lenders are able to exploit them. The results in *Chapter 3* indicate that segmentation accounts for different needs of borrowers. Informal loans are demanded by the poor and the rich people who use them in different ways. Whereas poor households enhance their asset endowment, informal loans enable rich people to maintain or even increase their consumption levels in lean times or after a shock occurred.

Every type of lender has specific advantages which expand into loan terms. Formal lenders do not have intimate knowledge on borrowers so that they will demand relatively high collateral to control for potential default risk. If they can gain more information through long-lasting relationships, they reduce collateral requirements. Informal lenders have informational advantages which enables them to demand less

collateral in the first place. But if distances to borrowers increase they tend to increase collateral requirements.

Overall, in providing targeted products for the poor and in using their specific advantages, lenders in rural credit markets are able to improve people's situation. However, there is still need for improvement. The results in this dissertation allow the following suggestions:

1. Loans from policy-induced microfinance products should be larger and longer in maturity so that they can be used for investments. Only then they would really be an alternative to informal loans.

2. Informal lenders are relatively expensive but they are demanded frequently by all people, rich and poor. They serve different needs throughout the whole population in rural areas. Any programme that aims at reducing reliance on informal loans should take this in mind.

3. Informal lenders demand less collateral because they have better information on borrower's risk. Formal lenders can catch up with information if the relationship with borrowers continues so that they are able to demand less collateral. Development measures should therefore focus on providing more transparency and strengthen the informational basis for lending institutions.

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Appendix

Appendix 1: Treatment effect on asset endowment

Dependent variable	(1) vulnerable	(2) relatively poor	(3) relatively rich	(4) vulnerable	(5) relatively poor	(6) relatively rich
	asset endowment			farming assets		
Treatment effect	0.138	0.820***	0.211	0.268	1.067**	0.197
	(0.139)	(0.256)	(0.254)	(0.448)	(0.496)	(0.657)
Age of household head	-0.00658	-0.0116	0.00367	0.0525	0.0409	0.0358
	(0.0138)	(0.0149)	(0.0321)	(0.0445)	(0.0290)	(0.0835)
Household size (adult equivalence scale)	0.0733	0.438***	0.212*	0.0804	-0.423	0.333
	(0.0788)	(0.143)	(0.128)	(0.256)	(0.280)	(0.332)
Dummy if household head is married	0.219	-0.413	0.159	-1.635**	-0.0114	0.642
	(0.257)	(0.362)	(0.370)	(0.829)	(0.704)	(0.958)
Female headed household head	0.558*	-0.398	0.170	-1.236	-1.124	1.122
	(0.338)	(0.548)	(0.727)	(1.092)	(1.064)	(1.891)
Dummy if household head is sick	0.174	-0.0895	-0.0977	-0.0651	-0.294	1.062*
	(0.139)	(0.247)	(0.246)	(0.449)	(0.480)	(0.639)
Dummy if household head suffers disease	-0.0646	0.161	0.130	0.219	-0.310	-0.224
	(0.120)	(0.202)	(0.197)	(0.386)	(0.396)	(0.511)
Dummy if household is farming	-0.0782	0.0722	-0.00119	-0.0773	-0.0653	0.311
	(0.0829)	(0.155)	(0.156)	(0.270)	(0.302)	(0.405)
Income per household (in Baht)	-0.0172	-0.0395	-0.100**	0.0533	0.0259	-0.00463
	(0.0119)	(0.0453)	(0.0466)	(0.0385)	(0.0880)	(0.121)
Total consumption per capita (in Baht)	0.197*	0.461**	0.0512	1.154***	-0.445	-0.491
	(0.119)	(0.214)	(0.178)	(0.385)	(0.421)	(0.462)
Total food consumption per capita (in Baht)	-0.0150	-0.0274	0.0799	-0.731**	0.0249	0.435
	(0.107)	(0.175)	(0.136)	(0.345)	(0.339)	(0.352)
Production asset endowment (in Baht)				0.367***	0.305***	0.309***
				(0.0459)	(0.0435)	(0.0488)
Savings (in Baht)	0.0135	-0.0379	0.0205	0.000697	-0.0107	-0.0327
	(0.0130)	(0.0235)	(0.0182)	(0.0419)	(0.0455)	(0.0471)
Total loan volume formal lenders (in Baht)	-0.00569	0.000108	0.00631	-0.0487	-0.0340	-0.0802*
	(0.0109)	(0.0210)	(0.0168)	(0.0352)	(0.0407)	(0.0441)
Total loan volume semiformal lenders (in Baht	-0.00818	-0.0257	0.00237	0.00922	0.0647	-0.0290
	(0.0138)	(0.0238)	(0.0219)	(0.0444)	(0.0461)	(0.0569)
Total loan volume informal lenders (in Baht)	0.00856	-0.0198	0.00511	0.0231	-0.0421	-0.00234
	(0.0115)	(0.0229)	(0.0203)	(0.0372)	(0.0445)	(0.0527)
Borrowed from formal lenders due to shock	-0.292	-0.191	-0.126	-0.743	-0.885	1.692
	(0.264)	(0.433)	(0.449)	(0.852)	(0.839)	(1.167)
Borrowed from semiformal lenders due to sho	-0.405**	0.575*	0.0497	-0.301	0.656	-1.159
	(0.182)	(0.302)	(0.347)	(0.588)	(0.586)	(0.902)
Borrowed from informal lenders due to shock	-0.253	-0.938**	-0.375	-0.731	-0.388	1.327
	(0.198)	(0.371)	(0.414)	(0.637)	(0.729)	(1.075)
Value of collateral for informal loans (in Baht)	0.0110	0.0434*	0.00412	-0.0200	0.0210	-0.0784
	(0.0129)	(0.0257)	(0.0214)	(0.0419)	(0.0498)	(0.0561)
GDP	5.697***	3.061	1.417	36.81***	21.27***	25.64***
	(1.983)	(3.201)	(3.192)	(6.694)	(6.390)	(8.700)
Constant	-41.39**	-19.93	-2.381	-329.2***	-180.8***	-225.0***
	(17.47)	(28.65)	(28.43)	(59.03)	(57.14)	(77.42)
Observations	844	708	750	844	708	750
Number of hhid	422	354	375	422	354	375
R-squared	0.106	0.135	0.046	0.227	0.186	0.165

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Appendix 2a: Treatment effect on asset endowment excluding instalment loans

Dependent variable	(1) vulnerable	(2) relatively poor	(3) relatively rich	(4) vulnerable	(5) relatively poor	(6) relatively rich
	asset endowment			farming assets		
Treatment effect	0.0144	0.863***	0.167	-0.151	0.784	0.457
	(0.161)	(0.309)	(0.300)	(0.503)	(0.579)	(0.761)
Age of household head	-0.00918	-0.0128	0.00289	0.0407	0.0439	0.0313
	(0.0152)	(0.0153)	(0.0324)	(0.0476)	(0.0288)	(0.0824)
Household size (adult equivalence scale)	0.0883	0.403***	0.212	0.0423	-0.474	0.0876
	(0.0816)	(0.153)	(0.134)	(0.257)	(0.288)	(0.339)
Dummy if household head is married	0.160	-0.469	0.192	-1.728**	-0.0907	0.661
	(0.265)	(0.369)	(0.374)	(0.830)	(0.694)	(0.949)
Female headed household head	0.598*	-0.424	0.205	-1.069	-1.611	0.898
	(0.358)	(0.594)	(0.734)	(1.121)	(1.115)	(1.869)
Dummy if household head is sick	0.164	-0.149	-0.0774	-0.128	-0.359	1.077*
	(0.142)	(0.257)	(0.253)	(0.444)	(0.482)	(0.642)
Dummy if household head suffers disease	-0.0627	0.200	0.186	0.167	-0.296	-0.203
	(0.122)	(0.212)	(0.206)	(0.381)	(0.401)	(0.521)
Dummy if household is farming	-0.0874	0.0727	-0.00319	0.0871	-0.137	0.168
	(0.0840)	(0.163)	(0.161)	(0.264)	(0.306)	(0.408)
Income per household (in Baht)	-0.0196	-0.0459	-0.116**	0.0490	0.00914	0.0532
	(0.0122)	(0.0468)	(0.0507)	(0.0383)	(0.0882)	(0.129)
Total consumption per capita (in Baht)	0.187	0.450**	0.0166	1.107***	-0.290	-0.686
	(0.121)	(0.223)	(0.184)	(0.380)	(0.424)	(0.468)
Total food consumption per capita (in Baht)	-0.0367	-0.0488	0.110	-0.701**	-0.0795	0.474
	(0.109)	(0.182)	(0.140)	(0.340)	(0.341)	(0.354)
Production asset endowment (in Baht)				0.357***	0.280***	0.323***
				(0.0457)	(0.0438)	(0.0487)
Savings (in Baht)	0.0208	-0.0354	0.0224	-0.000592	-0.00267	-0.0227
	(0.0134)	(0.0242)	(0.0186)	(0.0420)	(0.0454)	(0.0472)
Total loan volume formal lenders (in Baht)	-0.00806	0.00128	0.00175	-0.0422	-0.0339	-0.0320
	(0.0118)	(0.0213)	(0.0178)	(0.0368)	(0.0399)	(0.0455)
Total loan volume semiformal lenders (in Baht	-0.0141	-0.0210	-0.0262	0.0277	0.0763*	-0.0251
	(0.0150)	(0.0246)	(0.0245)	(0.0469)	(0.0461)	(0.0622)
Total loan volume informal lenders (in Baht)	-0.00987	-0.00894	-0.00994	0.0493	-0.00756	-0.0239
	(0.0125)	(0.0278)	(0.0230)	(0.0391)	(0.0526)	(0.0584)
Borrowed from formal lenders due to shock	-0.412	-0.171	-0.171	-0.848	-0.811	1.381
	(0.270)	(0.450)	(0.472)	(0.844)	(0.845)	(1.200)
Borrowed from semiformal lenders due to shock	-0.327*	0.477	0.0241	-0.681	0.391	-1.236
	(0.172)	(0.294)	(0.352)	(0.539)	(0.552)	(0.895)
Borrowed from informal lenders due to shock	-0.0319	-0.909**	-0.153	-0.625	-0.503	1.500
	(0.209)	(0.409)	(0.454)	(0.652)	(0.782)	(1.156)
GDP	5.693***	4.135	0.181	37.14***	23.94***	27.61***
	(1.943)	(3.082)	(3.124)	(6.410)	(6.028)	(8.368)
Constant	-40.83**	-28.89	9.084	-331.2***	-204.7***	-241.0***
	(17.05)	(27.59)	(27.81)	(56.33)	(53.91)	(74.41)
Observations	816	686	720	816	686	720
Number of hhid	408	343	360	408	343	360
R-squared	0.090	0.113	0.048	0.221	0.170	0.176

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Appendix 2b: Treatment effect on consumption excluding instalment loans

Dependent variable	(1) vulnerable	(2) relatively poor	(3) relatively rich	(4) vulnerable	(5) relatively poor	(6) relatively rich
	total consumption (per capita)			food consumption (per capita)		
Treatment effect	-0.0844	-0.0371	0.237**	-0.104	-0.149	0.204
	(0.116)	(0.108)	(0.104)	(0.130)	(0.133)	(0.137)
Age of household head	-0.0180*	-0.00785	-0.0249**	-0.00855	0.00845	-0.0111
	(0.0109)	(0.00519)	(0.0113)	(0.0122)	(0.00642)	(0.0148)
Household size (adult equivalence scale)	-0.0911	-0.316***	-0.358***	-0.0495	-0.353***	-0.321***
	(0.0586)	(0.0501)	(0.0426)	(0.0656)	(0.0619)	(0.0562)
Dummy if household head is married	-0.377**	0.112	0.108	-0.438**	0.0967	0.108
	(0.190)	(0.128)	(0.131)	(0.213)	(0.158)	(0.172)
Female headed household head	0.0994	-0.0879	0.526**	-0.181	-0.0799	0.735**
	(0.258)	(0.205)	(0.255)	(0.289)	(0.254)	(0.336)
Dummy if household head is sick	-0.0169	0.0456	0.249***	-0.0761	-0.0734	0.160
	(0.102)	(0.0885)	(0.0876)	(0.114)	(0.109)	(0.115)
Dummy if household head suffers disease	0.187**	0.00546	-0.116	0.245**	-0.0302	0.0147
	(0.0871)	(0.0732)	(0.0716)	(0.0975)	(0.0905)	(0.0944)
Dummy if household is farming	-0.00505	0.0585	-0.0209	-0.0171	0.0671	-0.00551
	(0.0606)	(0.0562)	(0.0563)	(0.0678)	(0.0695)	(0.0742)
Income per household (in Baht)	-0.00226	0.0255	0.0472***	-0.00223	0.0426**	0.0513**
	(0.00884)	(0.0161)	(0.0177)	(0.00990)	(0.0199)	(0.0233)
Asset endowment (in Baht)	0.0799**	0.0489**	0.0117	0.0650	0.0377	0.0250
	(0.0363)	(0.0190)	(0.0189)	(0.0406)	(0.0235)	(0.0249)
Savings (in Baht)	0.0102	0.00905	0.00460	0.0131	0.0149	8.72e-05
	(0.00966)	(0.00836)	(0.00653)	(0.0108)	(0.0103)	(0.00860)
Total loan volume formal lenders (in Baht)	-0.00151	0.00101	-0.00547	0.00275	0.00636	0.000479
	(0.00849)	(0.00734)	(0.00622)	(0.00950)	(0.00907)	(0.00820)
Total loan volume semiformal lenders (in Baht	0.00855	0.0103	-0.0120	-0.000266	0.0101	-0.00614
	(0.0108)	(0.00848)	(0.00857)	(0.0121)	(0.0105)	(0.0113)
Total loan volume informal lenders (in Baht)	0.00582	-0.00164	-0.0224***	0.00673	-0.000711	-0.0197*
	(0.00899)	(0.00961)	(0.00797)	(0.0101)	(0.0119)	(0.0105)
Borrowed from formal lenders due to shock	-0.0635	0.0103	0.318*	-0.246	-0.0172	0.348
	(0.194)	(0.156)	(0.164)	(0.218)	(0.192)	(0.217)
Borrowed from semiformal lenders due to sho	-0.00713	-0.00752	-0.159	0.0359	0.0176	-0.0892
	(0.125)	(0.102)	(0.123)	(0.140)	(0.126)	(0.162)
Borrowed from informal lenders due to shock	-0.000926	0.0446	0.136	-0.0531	0.140	0.105
	(0.150)	(0.142)	(0.159)	(0.168)	(0.176)	(0.209)
GDP	1.350	-2.051*	-3.559***	3.444**	0.778	3.070**
	(1.403)	(1.050)	(1.040)	(1.570)	(1.298)	(1.371)
Constant	-1.615	28.50***	43.48***	-21.37	1.662	-17.54
	(12.28)	(9.308)	(9.140)	(13.74)	(11.51)	(12.05)
Observations	816	686	720	816	686	720
Number of hhid	408	343	360	408	343	360
R-squared	0.058	0.163	0.300	0.057	0.123	0.151

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Appendix 3: Treatment effect on asset endowment and consumption for different household groups defined according to total expenditures

Dependent variable	(1) poor	(2) rich	(3) poor	(4) rich	(5) poor	(6) rich	(7) poor	(8) rich
	total assets		farming assets		total consumption (p.c.)		food consumption (p.c.)	
Treatment effect	0.427**	0.343*	0.848**	-0.111	0.0381	0.0693	-0.0654	0.148
	(0.180)	(0.192)	(0.381)	(0.577)	(0.0566)	(0.0938)	(0.0769)	(0.121)
Age of household head	-0.00943	-0.0269	0.0408	-0.0395	-0.0128**	-0.0226***	0.00127	-0.0106
	(0.00783)	(0.0189)	(0.0257)	(0.0357)	(0.00537)	(0.00837)	(0.00436)	(0.0156)
Household size (adult equivalence scale)	0.195**	0.276***	-0.171	0.556*	-0.268***	-0.218***	-0.231***	-0.195***
	(0.0806)	(0.0903)	(0.214)	(0.311)	(0.0697)	(0.0496)	(0.0695)	(0.0568)
Dummy if household head is married	-0.129	0.206	-0.685	0.791	-0.0986	-0.0329	-0.0501	-0.0901
	(0.173)	(0.272)	(0.501)	(1.117)	(0.102)	(0.205)	(0.115)	(0.231)
Female headed household head	-0.0776	0.169	-0.627	1.349	0.0758	0.280	-0.0352	0.471
	(0.405)	(0.420)	(0.865)	(1.303)	(0.180)	(0.203)	(0.197)	(0.307)
Dummy if household head is sick	-0.00570	0.150	-0.188	0.915	0.0262	0.234***	-0.0219	0.0456
	(0.116)	(0.163)	(0.351)	(0.584)	(0.0713)	(0.0870)	(0.0794)	(0.110)
Dummy if household head suffers disease	0.112	-0.0763	0.210	-0.554	0.0481	-0.0467	0.0931	0.0429
	(0.119)	(0.130)	(0.308)	(0.450)	(0.0885)	(0.0713)	(0.0900)	(0.0937)
Dummy if household is farming	-0.000119	-0.0145	-0.133	0.554	-0.0419	0.0933*	-0.0308	0.0710
	(0.0757)	(0.132)	(0.213)	(0.338)	(0.0317)	(0.0565)	(0.0430)	(0.0615)
Income per household (in Baht)	-0.0198	-0.0283	0.00299	0.0907	0.00630	0.0239***	0.00365	0.0149
	(0.0138)	(0.0301)	(0.0407)	(0.0577)	(0.00765)	(0.00809)	(0.0101)	(0.0110)
Total consumption per capita (in Baht)	0.163	0.191	0.123	-0.168				
	(0.135)	(0.138)	(0.307)	(0.471)				
Total food consumption per capita (in Baht)	0.0451	-0.103	0.0527	0.157				
	(0.116)	(0.0972)	(0.244)	(0.369)				
Total asset endowment (in Baht)					0.0470***	0.0169	0.0489**	-0.00395
					(0.0179)	(0.0183)	(0.0199)	(0.0192)
Production asset endowment (in Baht)			0.357***	0.218***				
			(0.0377)	(0.0671)				
Savings (in Baht)	0.0133	-0.0273	-0.0414	0.0192	0.00574	0.0137**	0.00980	0.0112
	(0.00977)	(0.0251)	(0.0318)	(0.0447)	(0.00511)	(0.00666)	(0.00692)	(0.00967)
Total loan volume formal lenders (in Baht)	0.00788	-0.00769	-0.0551**	-0.0273	-0.000874	-0.000551	0.00442	-0.00131
	(0.00850)	(0.0124)	(0.0279)	(0.0416)	(0.00442)	(0.00600)	(0.00618)	(0.00815)
Total loan volume semiformal lenders (in Baht	0.00553	-0.0216	0.0477	-0.0184	0.000541	-0.00353	-0.00193	-0.00616
	(0.0103)	(0.0158)	(0.0386)	(0.0553)	(0.00511)	(0.00786)	(0.00697)	(0.00970)
Total loan volume informal lenders (in Baht)	0.0168	-0.0137	-0.00401	-0.0175	-0.0135**	-0.00998*	-0.00521	-0.0107
	(0.0107)	(0.0149)	(0.0249)	(0.0339)	(0.00608)	(0.00509)	(0.00702)	(0.00689)
Borrowed from formal lenders due to shock	-0.342*	-0.0100	-0.271	0.733	0.125	0.283	0.174	0.195
	(0.185)	(0.255)	(0.577)	(1.373)	(0.102)	(0.216)	(0.107)	(0.203)
Borrowed from semiformal lenders due to sho	-0.100	0.803	-0.196	-0.0381	-0.0540	0.170	-0.0508	0.0945
	(0.154)	(0.860)	(0.446)	(0.926)	(0.0731)	(0.154)	(0.0918)	(0.113)
Borrowed from informal lenders due to shock	-0.424	-0.884***	-0.819*	0.438	0.134*	-0.138	0.0523	-0.130
	(0.341)	(0.275)	(0.469)	(0.813)	(0.0804)	(0.115)	(0.108)	(0.126)
GDP	5.216***	2.691	29.55***	28.66***	-0.319	-7.157***	2.642***	-1.503
	(1.544)	(2.935)	(4.505)	(8.343)	(0.705)	(1.225)	(0.879)	(1.512)
Constant	-37.42***	-11.90	-260.7***	-250.5***	13.67**	75.28***	-14.34*	23.67*
	(13.66)	(26.56)	(39.86)	(74.97)	(6.184)	(10.76)	(7.766)	(13.21)
Observations	1620	682	1620	682	1620	682	1620	682
Number of hhid	810	341	810	341	810	341	810	341
R-squared	0.082	0.069	0.207	0.129	0.096	0.267	0.063	0.085

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
Groups are defined according to the median value of total expenditures in 2007. Poor households have total expenditures of less than 52,700 Baht.

Appendix 4:

This research is based on a household survey which has been used for other purposes before. In this respect there is a paper which also analyzes the role of collateral, focusing on possible substitutes (Menkhoff et al., 2012). This earlier paper differs from ours in some limited respect: the main difference is that we use three waves of the survey, whereas the other research is based on the first wave only. However, the other paper examines all loans that a household held in 2007, whereas we only consider all new loans at each point in time.

In few cases we also use slightly different definitions of variables. This applies to asset endowment, where we consider only assets bought within the last 5 years due to depreciation calculations. In addition the area of owned land is denominated in rai (the common surface measure in Thailand) in our paper. We undertake some changes in the lender definitions. Menkhoff et al. (2012) distinguish between CB, BAAC, CRED, ML and RELA. "ML" comprises loans from professional moneylenders, business partners and family and friends if the interest rate is positive. RELA comprises all loans from professional moneylenders, business partners and family and friends if the interest rate is zero. We use a more precise definition which is based more on the institutions than on the interest rate. To show that our estimations are still comparable to the other paper we use data of our first wave and rerun the regressions shown in Menkhoff et al. (2012) as far as our own sample allows generating the same variables. The sample still differs from the one used in the other paper in that we use newly granted loans only.

Appendix 4a shows that the sign and most often size of marginal effects are quite similar despite different samples and definitions used. However, there are three differences regarding the statistical significance in that the other paper has more significant coefficients, which may be supported by more observations: (1) Whether or not a loan is used for agricultural production is significant only in one of our specifications. In the other paper it is always significant except for one small subsample. (2) Education is not significant in our regressions but it is in the paper of Menkhoff et

al. (2012). (3) The other paper finds a significant impact for "number of lenders a household is engaged with" for a small subsample. In our subsample the marginal effect has the same sign but is not significant.

Appendix 4a: Comparison to Menkhoff et al. (2012)

Specification (sample)	(1)	(2)	(3)	(4)
Independent variables				
Loan size (Baht)	0.101***	0.101***	0.133***	0.181***
	(0.0153)	(0.0153)	(0.0222)	(0.0487)
Loan duration (months)	0.00163***	0.00160***	0.00210**	0.00337**
	(0.000593)	(0.000618)	(0.000823)	(0.00150)
Annual interest rate	-0.000869*	-0.000801*	-0.000978*	-0.00196
	(0.000492)	(0.000450)	(0.000572)	(0.00163)
Agricultural prod. loan	0.0527	0.0518	0.0981**	-0.168
	(0.0379)	(0.0382)	(0.0498)	(0.142)
Non-agricultural prod. loan	0.130**	0.143**	0.237***	0.176
	(0.0633)	(0.0659)	(0.0867)	(0.178)
Guaranteed loan	-0.584***	-0.591***	-0.706***	-0.380***
	(0.0588)	(0.0603)	(0.0555)	(0.105)
Female headed household	0.0254	0.0427	0.0330	0.0902
	(0.0431)	(0.0446)	(0.0554)	(0.148)
Age of household head	-0.00132	-0.00115	-0.00213	-0.00552
	(0.00140)	(0.00141)	(0.00184)	(0.00466)
Household size (adult equiv.)	-0.00724	-0.00868	-0.0106	-0.0170
	(0.0154)	(0.0158)	(0.0210)	(0.0701)
Education of household head (years)	-0.00290	-0.00107	-0.00325	-0.0220
	(0.00556)	(0.00568)	(0.00764)	(0.0171)
Income per adult equ.	0.000636	0.000969	0.000319	0.0265
	(0.00609)	(0.00620)	(0.00822)	(0.0200)
Amount of savings	-0.00437	-0.00389	-0.00184	0.0186
	(0.00470)	(0.00474)	(0.00617)	(0.0198)
Dummy if ever defaulted	0.126	0.126	0.137	0.0308
	(0.113)	(0.113)	(0.134)	(0.302)
Dummy if repaid late	0.0829	0.0904	0.0506	0.188
	(0.102)	(0.104)	(0.114)	(0.208)
Number of lenders hh is engaged	0.00595	0.000405	0.00299	0.0700
	(0.0133)	(0.0138)	(0.0177)	(0.0431)
Dummy for CB	-0.146***			-0.363*
	(0.0254)			(0.199)
Dummy for CRED	-0.144***	-0.149***	-0.192***	
	(0.0315)	(0.0330)	(0.0439)	
Dummy for ML	-0.139***	-0.141***	-0.182***	-0.187
	(0.0289)	(0.0295)	(0.0398)	(0.276)
Dummy for BP	-0.0546	-0.0604	-0.0648	
	(0.114)	(0.107)	(0.158)	
Dummy for FAM	-0.242***	-0.247***		
	(0.0256)	(0.0264)		
Dummy for FRI	-0.154***	-0.155***		
	(0.0249)	(0.0256)		
(Pseudo) R-squared	0.465	0.459	0.463	0.407
Observations	886	847	723	128

Cluser- robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Specification (1) includes loans from CB, BAAC (base category); CRED, ML, BP, FAM and FRI;

Specification (2) includes BAAC, CRED, ML, BP FAM and FRI; Specification (3) includes BAAC,

CRED, ML and BP; Specification (4) includes CB, ML and BP. Province dummies are considered.

Only loans that have been granted within the 12 month period of the first wave are considered.

Appendix 5: Incidence of collateral across waves

Panel A: 1st wave

Incidence of collateral	(1) all loans	(2) formal	(3) semiformal	(4) informal	(5) ML/BP	(6) FAM/FRI
Loan size (Baht)	0.128***	0.316***	0.0529***	0.0815***	0.173**	0.000115
	(0.0195)	(0.0695)	(0.0189)	(0.0286)	(0.0731)	(0.000226)
Loan duration (months)	0.00231***	0.00311***	-0.000806	0.000901	0.00323	1.35e-06
	(0.000603)	(0.00113)	(0.000576)	(0.00187)	(0.00328)	(3.60e-06)
Annual interest rate	-0.000475	-0.00456**	0.000314	5.77e-05	-0.00171	-2.04e-09
	(0.000305)	(0.00201)	(0.000446)	(0.000210)	(0.00131)	(6.96e-07)
Agricultural production	0.116**	0.307***	-0.0355	0.0309	-0.0952	
	(0.0467)	(0.114)	(0.0263)	(0.0746)	(0.168)	
Non-agricultural production	0.120*	0.308**	-0.0147	0.0752	0.216	-7.73e-05
	(0.0662)	(0.152)	(0.0256)	(0.111)	(0.229)	(0.000207)
Consumption loan	-0.0222	0.1000	-0.0656**	0.0618	-0.0442	0.000311
	(0.0474)	(0.158)	(0.0300)	(0.0776)	(0.187)	(0.000696)
Guaranteed loan	-0.384***	-0.767***	-0.477***	-0.0179	-0.190	
	(0.0344)	(0.0384)	(0.0902)	(0.0817)	(0.183)	
Income per adult equivalence (Baht)	0.00178	-0.0163	-0.00333	0.0131	0.0296*	0.000244
	(0.00578)	(0.0131)	(0.00273)	(0.00889)	(0.0176)	(0.000537)
Debt capacity	-0.00700	0.0108	-0.00665**	-0.00153	0.00740	-6.66e-05
	(0.00470)	(0.00700)	(0.00282)	(0.00380)	(0.0221)	(0.000116)
Total loan volume/household (Baht)	-0.0407**	-0.0556	-0.0404***	0.00498	0.0345	-0.000105
	(0.0196)	(0.0568)	(0.0150)	(0.0298)	(0.0690)	(0.000202)
Relationship duration	0.0182	-0.0432	-0.00277	0.0223	0.00154	-5.67e-05
	(0.0142)	(0.0363)	(0.0126)	(0.0262)	(0.0783)	(0.000162)
Pseudo R-squared	0.310	0.484	0.434	0.183	0.247	0.227
Observations	1,065	507	284	274	117	120

Panel B: 2nd wave

Incidence of collateral	(1) all lenders	(2) formal	(3) semiformal	(4) informal	(5) ML/BP	(6) FAM/FRI
Loan size (Baht)	0.152***	0.188***	0.0565***	0.0794***	0.301***	0.0171
	(0.0194)	(0.0679)	(0.0167)	(0.0266)	(0.0885)	(0.0169)
Loan duration (months)	0.00114**	0.00279***	-0.000486	0.000582	0.00321	-0.000126
	(0.000527)	(0.00107)	(0.000362)	(0.000416)	(0.00284)	(0.000221)
Annual interest rate	-0.000899	-0.00207	-0.000448	0.000122	0.000345	-2.17e-05
	(0.000701)	(0.00199)	(0.000501)	(0.000108)	(0.000514)	(5.72e-05)
Agricultural production	-0.0138	0.0627	-0.0288	-0.0464**	-0.312***	-0.00922
	(0.0330)	(0.0817)	(0.0211)	(0.0193)	(0.104)	(0.0118)
Non-agricultural production	0.0337	0.174	-0.0251	-0.0160	-0.0484	-0.00471
	(0.0447)	(0.113)	(0.0178)	(0.0153)	(0.0880)	(0.00510)
Consumption loan	-0.0301	0.285**	-0.0600***	-0.0284	-0.0924	-0.0139
	(0.0391)	(0.126)	(0.0222)	(0.0202)	(0.106)	(0.0168)
Guaranteed loan	-0.422***	-0.752***	-0.524***	-0.0322**	-0.232**	
	(0.0365)	(0.0389)	(0.0979)	(0.0159)	(0.105)	
Income per adult equivalence (Baht)	-0.00650	-0.0411**	0.00292	-0.00178	-0.0319*	-0.000949
	(0.00739)	(0.0182)	(0.00540)	(0.00304)	(0.0175)	(0.00152)
Debt capacity	0.000575	0.0160	-0.00673	0.000458*	0.0299	3.58e-05
	(0.00152)	(0.0148)	(0.00717)	(0.000264)	(0.0285)	(7.88e-05)
Total loan volume per household (Baht)	-0.0299	0.0329	-0.0305**	-0.0385**	-0.0132	-0.0126
	(0.0195)	(0.0587)	(0.0127)	(0.0169)	(0.0826)	(0.0111)
Relationship duration	0.0441***	-0.0375	0.00322	0.000990	-0.0963	0.00217
	(0.0142)	(0.0378)	(0.0118)	(0.00938)	(0.0595)	(0.00514)
Pseudo R-squared	0.337	0.440	0.512	0.438	0.538	0.445
Observations	1,098	551	305	242	79	153

Appendix 5: Incidence of collateral across waves, continued

Panel C: 3rd wave

Incidence of collateral	(1) all loans	(2) formal	(3) semiformal	(4) informal	(5) ML/BP	(6) FAM/FRI
Loan size (Baht)	0.228***	0.229***	0.135*	0.0817***	0.154	0.00189
	(0.0379)	(0.0658)	(0.0694)	(0.0300)	(0.151)	(0.00264)
Loan duration (months)	0.00198**	0.00285**	2.82e-05	0.00182*	0.00370	9.23e-05
	(0.000785)	(0.00115)	(0.000949)	(0.000965)	(0.00412)	(0.000142)
Annual interest rate	0.000610	0.00559**	7.07e-05	0.000618**	0.00107	1.81e-07
	(0.000531)	(0.00268)	(0.00165)	(0.000305)	(0.00112)	(2.91e-05)
Agricultural production	0.00754	-0.0646	0.0994	-0.0552	0.0472	-0.00800
	(0.0536)	(0.0878)	(0.101)	(0.0452)	(0.229)	(0.0152)
Non-agricultural production	-0.0268	-0.00521	-0.103	-0.0484	0.153	
	(0.0579)	(0.0995)	(0.0662)	(0.0500)	(0.304)	
Consumption loan	-0.119**	-0.223**	-0.152*	-0.00779	0.159	-0.00378
	(0.0532)	(0.101)	(0.0803)	(0.0481)	(0.240)	(0.0102)
Guaranteed loan	-0.525***	-0.737***	-0.738***	-0.0119	-0.189	0.00519
	(0.0351)	(0.0311)	(0.0678)	(0.0461)	(0.207)	(0.0134)
Income per adult equivalence (Baht)	0.0258**	0.00680	0.0229	0.00777	0.0444	-0.000316
	(0.0115)	(0.0153)	(0.0324)	(0.00639)	(0.0364)	(0.00123)
Debt capacity	-0.0234**	-0.0305	-0.00939	-0.0235**	-0.101*	-0.00359
	(0.0111)	(0.0221)	(0.0201)	(0.00925)	(0.0608)	(0.00342)
Total loan volume/household (Baht)	-0.0867**	-0.0688	-0.0172	-0.0472	-0.0162	-0.00146
	(0.0389)	(0.0640)	(0.0806)	(0.0292)	(0.152)	(0.00334)
Relationship duration	0.0265	-0.0447	-0.0255	0.0204	0.00915	0.00254
	(0.0175)	(0.0306)	(0.0326)	(0.0224)	(0.100)	(0.00353)
Pseudo R-squared	0.315	0.434	0.464	0.248	0.240	0.296
Observations	982	582	212	188	65	102

Cluster- robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; all specifications control for provincial effects.

Appendix 6: Determinants of collateralization rate

Rate of collateralization	(1) all loans	(2) formal/informal dummy	(3) formal	(4) semiformal	(5) informal	(6) trunc at 1.5	(7) high values set to 1.5
Independent variables							
Loan size (Baht)	2.513***	2.756***	0.862	3.554***	3.643***	0.374***	0.564***
	(0.480)	(0.479)	(0.662)	(0.841)	(1.133)	(0.0824)	(0.0653)
Loan duration (months)	0.00992	0.0118	0.0171**	-0.0318	0.0506**	0.00408***	0.00382***
	(0.00783)	(0.00827)	(0.00836)	(0.0280)	(0.0228)	(0.00149)	(0.00128)
Annual interest rate	-0.00290	0.00623	-0.0143	0.0236	0.00904	-0.000459	0.00101
	(0.00725)	(0.00669)	(0.0198)	(0.0295)	(0.00658)	(0.00210)	(0.00112)
Agricultural production loan	-0.0469	0.273	1.872**	-2.918	-2.387	0.0818	0.0230
	(0.751)	(0.747)	(0.888)	(1.958)	(1.555)	(0.152)	(0.107)
Non-agric. production loan	0.149	0.139	1.885*	-4.299*	0.797	0.365**	0.0661
	(0.846)	(0.848)	(1.038)	(2.435)	(1.834)	(0.163)	(0.122)
Consumption loan	-1.131	-0.935	0.772	-8.934***	0.205	0.261	-0.105
	(0.838)	(0.825)	(1.038)	(3.318)	(1.390)	(0.179)	(0.123)
Guaranteed loan	-11.60***	-11.23***	-11.57***	-14.50***	-2.135	-1.769***	-1.812***
	(1.203)	(1.187)	(1.348)	(3.566)	(1.579)	(0.103)	(0.0833)
Income per adult equiv. (Baht)	-0.0140	0.000810	-0.141	0.234	0.229	-0.0136	-0.00807
	(0.129)	(0.124)	(0.171)	(0.265)	(0.202)	(0.0255)	(0.0194)
Debt capacity	-0.184*	-0.224**	0.00740	-0.235	-0.531	0.0376**	-0.0229
	(0.103)	(0.106)	(0.154)	(0.153)	(0.343)	(0.0186)	(0.0149)
Total loan vol./hh (in Baht)	-0.765	-0.992*	-0.460	-0.792	-0.981	0.0528	-0.129*
	(0.531)	(0.535)	(0.676)	(1.154)	(1.071)	(0.0923)	(0.0682)
Relationship duration	-0.374	-0.153	-0.260	0.000242	0.564	-0.0345	-0.0538
	(0.298)	(0.282)	(0.323)	(0.682)	(0.996)	(0.0551)	(0.0389)
Dummy for CB	4.948**						
	(2.508)						
Dummy for BAAC	10.71***						
	(2.381)						
Dummy for CRED	7.359***						
	(2.273)						
Dummy for ML	4.698**						
	(2.199)						
Dummy for BP	7.541***						
	(2.607)						
Dummy for FAM	-5.072**						
	(2.494)						
Dummy for formal		2.878***				0.379***	0.420***
		(0.732)				(0.145)	(0.103)
Dummy for informal		-5.878***				0.410*	-0.926***
		(1.106)				(0.216)	(0.143)
Constant	-25.07***	-19.13***	-0.913	-25.64**	-38.20***	-4.631***	-4.218***
	(4.526)	(3.995)	(5.778)	(12.91)	(7.371)	(0.952)	(0.579)
Pseudo R-squared	0.116	0.105	0.091	0.177	0.094	0.310	0.218
Observations	3,142	3,142	1,639	801	702	1,942	3,145

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; all specifications control for time and provincial effects.

Specification (1): All loans; Specification (2): Includes all loans plus dummes for formal and informal lenders; Specification (3): Formal loans only, Specification (4): Semiformal loans only; Specification (5): Informal loans only; Specification (6): Rate of collateralization is truncated at the value 1.5; Specification (7): Values for the rate of collateralization of higher than 1.5 are set to 1.5.

Appendix 7: Use of collateral excluding non-marketable land

Incidence of collateral	(1) all loans	(2) formal	(3) semiformal	(4) informal	(5) ML/BP	(6) FAM/FRI
Independent variables						
Loan size (Baht)	0.139***	0.214***	0.0756***	0.0934***	0.187***	0.0178**
	(0.0141)	(0.0404)	(0.0133)	(0.0160)	(0.0578)	(0.00702)
Loan duration (months)	0.00121***	0.00228***	-0.000286	0.00110*	0.00169	0.000297*
	(0.000336)	(0.000599)	(0.000324)	(0.000578)	(0.00227)	(0.000176)
Annual interest rate	0.000227	-0.000678	-8.14e-05	0.000175	-0.000275	4.95e-06
	(0.000226)	(0.00125)	(0.000431)	(0.000137)	(0.000546)	(3.84e-05)
Agric. production loan	0.00335	0.0668	-0.0147	-0.0442*	-0.128	-0.0228**
	(0.0236)	(0.0533)	(0.0218)	(0.0236)	(0.0945)	(0.0112)
Non-agric. production loan	0.0205	0.102	-0.0343*	-0.00759	0.124	-0.0151**
	(0.0305)	(0.0685)	(0.0197)	(0.0337)	(0.131)	(0.00673)
Consumption loan	-0.0346	0.00526	-0.0835***	-0.0105	0.00182	-0.0162
	(0.0262)	(0.0731)	(0.0221)	(0.0262)	(0.112)	(0.00983)
Guaranteed loan	-0.579***	-0.737***	-0.519***	-0.0295	-0.206**	-0.00609
	(0.0282)	(0.0241)	(0.0557)	(0.0269)	(0.0883)	(0.0102)
Inc.per adult equiv. (Baht)	-0.000766	-0.0103	-0.000986	0.00609	0.0271*	-0.00117
	(0.00438)	(0.00825)	(0.00416)	(0.00435)	(0.0142)	(0.00234)
Debt capacity	-0.00670*	0.00328	-0.00780**	-0.00470	-0.00314	-0.00153
	(0.00363)	(0.00938)	(0.00385)	(0.00367)	(0.0175)	(0.00116)
Tot. loan vol./ hh (in Baht)	-0.0381**	-0.0240	-0.0366**	-0.0279*	0.0308	-0.0117**
	(0.0150)	(0.0367)	(0.0142)	(0.0162)	(0.0537)	(0.00524)
Relationship duration	-0.0230**	-0.0412**	-0.0124	0.0112	-0.0347	0.00699
	(0.00939)	(0.0195)	(0.0104)	(0.0131)	(0.0495)	(0.00551)
Dummy for formal	0.0918***					
	(0.0249)					
Dummy for informal	-0.214***					
	(0.0197)					
Pseudo R-squared	0.381	0.426	0.457	0.231	0.265	0.216
Observations	3,021	1,542	791	688	253	435

Cluster-robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; all specifications contain dummies for waves and provinces. <u>Note</u>: In specifications (1) - (4) land as collateral is excluded if households do not have proper title deeds for the land.

Appendix 8: Marginal effects of proxies for social collateral on collateral requirements

		1st, 2nd and 3rd wave			2nd and 3rd wave (distance)		
	Proxy for social collateral	*informal*	*ML/BP*	*FAM/FRI*	*informal*	*ML/BP*	*FAM/FRI*
I	village size (log)	-0.0285	-0.0162	-0.0109	-0.0213	-0.0254	-0.0065
		(0.0227)	(0.0675)	(0.0130)	(0.0179)	(0.0088)	(0.0065)
II	small village (< 157 households)	0.0288	0.0076	0.0102	0.0177	-0.0173	0.0092
		(0.0245)	(0.0853)	(0.0104)	(0.0206)	(0.1226)	(0.0067)
	large village (> 157 households)			omitted category			
III	distance to district town (log)	-0.0294	0.0016	-0.0084	-0.0237	-0.0036	-0.0026
		(0.0193)	(0.0627)	(0.0079)	(0.0153)	(0.0807)	(0.0046)
IV	far town (> 20 min. travel time)	-0.0269	-0.0109	-0.0071	-0.0193	0.0607	-0.0037
		(0.0231)	(0.0850)	(0.0104)	(0.0201)	(0.1108)	(0.0074)
	near town (<= 20 min. travel time)			omitted category			

<u>Note</u>: Small villages and far towns are defined according to the mean values of village size (157 households) and travel time from households to lender (20 min.)

Appendix 9: Marginal effects of relationship and distance for different definitions of income

	relationship duration			distance		
	formal	*semiformal*	*informal*	*formal*	*semiformal*	*informal*
4 times standard deviation [a]	-0.0379*	-0.0118	0.0169	0.0445	0.0247	0.0331***
	(0.0205)	(0.0110)	(0.0140)	(0.0365)	(0.0178)	(0.0112)
exclude incomes <0 [b]	-0.0342	-0.0125	0.0102	0.0658*	0.0230	0.0335***
	(0.0209)	(0.0106)	(0.0149)	(0.0372)	(0.0177)	(0.0110)
transformation [c]	-0.0349*	-0.0111	0.0155	0.0555	0.0256	0.0329***
	(0.0206)	(0.0108)	(0.0140)	(0.0372)	(0.0179)	(0.0108)

[a] Incomes of more or less than 4 times the standard deviation from the mean are excluded.

[b] Negative incomes are exluded.

[c] Incomes are divided by 1,000 to adjust the large range. Negative incomes are set to 1 and finally logarithmic values of all incomes are taken.

Appendix 10: The role of distance across lending institutions (including competition among lenders)

	(1)	(2)	(3)	(4)	(5)
Incidence of collateral	*all loans*	*formal*	*semiformal*	*informal*	*informal*
Independent variables					
Distance to lender (in minutes)	0.130***	0.0204	0.0282	0.0300***	
	(0.0204)	(0.0481)	(0.0207)	(0.0113)	
Lender and borrower in the same village					-0.0870***
					(0.0317)
Loan size (Baht)	0.157***	0.199***	0.0893***	0.0813***	0.0803***
	(0.0219)	(0.0500)	(0.0270)	(0.0225)	(0.0221)
Loan duration (months)	0.00165***	0.00270***	-0.000643	0.00115***	0.00116***
	(0.000487)	(0.000857)	(0.000568)	(0.000429)	(0.000430)
Annual interest rate	-0.000116	0.00102	-0.000449	0.000322**	0.000306**
	(0.000362)	(0.00114)	(0.00105)	(0.000134)	(0.000133)
Agricultural production loan	-0.0257	-0.0336	-0.00764	-0.0671***	-0.0675***
	(0.0319)	(0.0658)	(0.0376)	(0.0238)	(0.0232)
Non-agricultural production loan	0.00249	0.0558	-0.0499	-0.0366*	-0.0313
	(0.0375)	(0.0770)	(0.0305)	(0.0203)	(0.0206)
Consumption loan	-0.0560	0.00518	-0.0782**	-0.0300	-0.0342
	(0.0349)	(0.0914)	(0.0347)	(0.0214)	(0.0226)
Guaranteed loan	-0.518***	-0.732***	-0.656***	-0.0349*	-0.0361*
	(0.0284)	(0.0257)	(0.0566)	(0.0208)	(0.0200)
Income per adult equivalence (Baht)	0.00551	-0.0177	0.00381	0.00546	0.00519
	(0.00838)	(0.0129)	(0.00918)	(0.00391)	(0.00392)
Indebt capacity	-0.00793	0.00266	-0.00651	-0.00802*	-0.00932**
	(0.00655)	(0.0143)	(0.00764)	(0.00479)	(0.00471)
Total loan volume per household (Baht)	-0.0416**	-0.00803	-0.0282	-0.0467***	-0.0473***
	(0.0203)	(0.0448)	(0.0267)	(0.0149)	(0.0152)
Relationship duration	0.0253**	-0.0327	-0.0131	0.0118	0.0135
	(0.0121)	(0.0259)	(0.0157)	(0.0117)	(0.0120)
Travel time to next BAAC	-0.00166	0.00513	-0.00183	-0.000811	-0.000441
	(0.00240)	(0.00480)	(0.00189)	(0.00160)	(0.00144)
Travel time to next CRED	-0.00122	-0.00386	0.00401**	0.000464	0.000631
	(0.00242)	(0.00459)	(0.00179)	(0.00167)	(0.00157)
Travel time to next GSB	-0.00156*	-0.00300	0.000737	-0.000299	-1.69e-05
	(0.000942)	(0.00210)	(0.000784)	(0.000706)	(0.000756)
Travel time to next CB	0.00198*	0.00480*	-0.00349***	-0.000284	-0.000394
	(0.00117)	(0.00246)	(0.00125)	(0.00106)	(0.00101)
	(0.0437)	(0.0791)	(0.0762)	(0.0330)	(0.0330)
Pseudo R-squared	0.348	0.420	0.500	0.344	0.354
Observations	1,940	1,068	476	396	406

Cluster- robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Note: VF and POL are excluded from semiformal institutions. For loan size, income, relationship duration and distance to lender logarithmic values are taken. All specifications control for time and province effects. Specification (1): All lenders; Specification (2): Formal lenders (CB and BAAC) only; Specification (3): Semiformal lenders (CRED); Specification (4): Informal lenders (ML, BP, FAM and FRI); Specification (5): Informal lenders and dummy whether borrower and lender are located in the same village or not.