



Network based social capital and individual loan repayment performance

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This study analyses the effects of social capital on the repayment behaviour of borrowers in Thailand. In the context of agricultural economics, an innovative data collection approach is used that originates from the field of sociology. A personal network survey is carried out to measure the individual social capital of borrowers. Social capital variables are defined according to: tie strength (bonding/bridging) and social distance (linking) between the respondent and his/her network member. Bonding social capital has a significant and positive influence on repayment performance. However, we find no significant evidence for an effect of bridging and linking social capital.

I Introduction

Social capital can facilitate access to credit, but also affect repayment behaviour of borrowers (van Bastelaer, 2003).ⁱ Many studies link repayment performance to social capital (for example Cassar *et al.*, 2007), or to social ties (for example Ahlin and Townsend, 2007). However, these authors use credit groups as the unit of analysis. Little research exists on repayment performance of individual borrowers and social capital or social ties.ⁱⁱ Studies focus predominantly on social ties crossing power differentials where powerful individuals exploit the credit program. In addition, they are often anecdotal (Vaessen, 2001). Research in agricultural economics has only recently begun to pay heed to social relations or ties. Often, measurement of these ties has been rather crude, focussing on role relationships like friends, relatives, or neighbours. Our approach to measuring social ties is more elaborate. We use a survey tool from the field of sociology that has so far rarely been used in the field of agricultural economics.ⁱⁱⁱ This technique involves the use of instruments referred to as 'name generator' and 'position generator' to measure the personal network of the

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3 respondent's personal network. These network data are then used to create measures
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5 of the individual social capital of borrowers.
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9 The empirical part of this work focuses on the rural credit market in Thailand and on
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11 the repayment behaviour of individual borrowers in particular. A number of papers
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13 have been published on the rural credit market in Thailand, including Coleman (2006)
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15 or Siamwalla *et al.* (1990). Ahlin and Townsend (2007) have applied the concept of
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17 social capital to the rural credit market in Thailand, but using a different definition
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19 and a different unit of analysis, namely joint liability credit groups. No research so far
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21 has applied the concept of social capital specifically to individual loans in Thailand.
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25 To better understand the relevance of social capital to the functioning of rural credit
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27 intermediation, the Thai rural financial market is briefly outlined here. The
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29 government provides various credit lines to support rural households. Most of these
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31 credit lines are administered by the Bank for Agriculture and Agricultural
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33 Cooperatives (BAAC). Furthermore, the government manages different lending
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35 schemes such as the One Million Baht Village Fund and the Poverty Eradication
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37 Fund. About 80 per cent of all villages in Thailand have access to the One Million
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39 Baht Village Fund (NSO, 2003). Almost all players in the rural credit market provide,
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41 or have in the past provided, group loans. However, such group loans are negligible in
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43 number. For instance, they constitute less than 10 per cent of current BAAC loans in
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45 northern Thailand (BAAC, 2008). Formal and semiformal lenders have enormous
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47 outreach. Survey results reveal that more than 50 per cent of households have an
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49 effective credit demand. This enormous outreach has a trade-off: (1) many of the
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51 borrowers are not creditworthy if conventional measures of creditworthiness are
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53 applied; (2) rescheduling of loans is not uncommon, ultimately adding to the total
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55 amount of nonperforming loans.^{iv}
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3 This study focuses on the loan performance of individual rural borrowers of formal or
4 semiformal lenders, taking into account their social capital and its influence on loan
5 performance.^v In general, the smaller an individual's network is, the lower the level of
6 social capital s/he has. But this view is too simplistic. Social capital is not a
7 homogeneous entity (Woolcock and Narayan, 2000). We base our measurements of
8 social capital on three different forms: bonding, bridging, and linking.^{vi} Furthermore,
9 we investigate the relationship between the number of people an individual knows
10 who have poor repayment performance and the individual's own repayment
11 performance.
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25 The paper is organised as follows. Section II gives a brief review of the theory of
26 social capital and sets out how various forms of social capital and social ties may
27 influence repayment performance. Section III describes the sample, the measurement
28 of different forms of social capital, the data collection, and reference group creation.
29 Section IV then introduces the econometric model and discusses the results. The
30 paper concludes with a brief summary and policy recommendations.
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43 **II Different forms of social capital and loan performance**

44 The standard criticism levelled at the social capital concept is that it is usually defined
45 too broadly and is thus analytically useless. We therefore emulate scholars such as Lin
46 (1999a), defining social capital more narrowly and leanly as *interpersonal networks*
47 (*ties*) *plus resources*. It is the resource that turns the social structure into social
48 capital. As mentioned before, three different forms of social capital are applied.
49 Bonding and bridging social capital are distinguished by tie strength, while linking
50 social capital is distinguished by social distance between the respondent and the
51 personal network member. Bonding social capital relates to 'strong ties', bridging
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3 social capital to 'weak ties' (Woolcock and Narayan, 2000). Weak ties are
4 characteristic of the infrequent interactions and peripheral relationships among more
5 or less dissimilar individuals and strong ties of the intimate social circle of individuals
6 with rather similar characteristics, for example relatives (Lin, 1982). Linking social
7 capital refers to a person's ties to people in positions of authority, such as
8 representatives of public (for example police) and private (for example banks)
9 institutions. It can be connected either to bridging social capital, when the link is
10 connected by way of a weak tie, or to bonding social capital, when the link is
11 connected via a strong tie. Consequently, we have four different measures of social
12 capital: 1. bonding, 2. bridging, 3. bonding_{link}, and 4. bridging_{link}.

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28 **Indirect effects:** Social capital can affect repayment positively via income. Sanders
29 and Nee (1996) outline three mechanisms of social capital that positively affect
30 economic success. In general social capital can offer 1. instrumental support (for
31 example free labour or informal loans), 2. productive information, and 3.
32 psychological aid. Bonding capital provides an individual with information that helps
33 preserve his/her interest even when the individual has not actively searched for this
34 information (Lai and Wong, 2002). Wellman and Wortley (1990) state, moreover, that
35 people obtain most of their social support and psychological aid through a small
36 number of strong ties. It may also help households to surmount difficult times and in
37 this way it may reduce the probability of malperforming loans. However, it is
38 assumed that information or resources accessed through strong ties are redundant; in
39 other words, everybody in the core network of strong ties often has similar resources
40 available. Thus, the strength of bridging social capital lies in facilitating access to
41 additional resources that are outside the core network (Lin, 1982). Hence, households
42 with a large amount of bridging social capital may do better as entrepreneurs, and
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3 may thus have better loan repayment performance. The strength of linking social
4 capital, meanwhile, lies in providing access to positions that are vertically higher in
5 the social hierarchy. The higher the rank of the person with whom a link is formed,
6 the more useful it is. An individual is likely to be able to draw on more resources if
7 connected to a rich and influential person than to a person far removed from the seats
8 of power (Lin, 1999b). Whereby bonding_{link} is supposedly superior to bridging_{link} as
9 the strong tie raises the probability that the resource will be actually passed on in case
10 of demand. Thus, all four measures of social capital can have positive indirect effects
11 via income on loan repayment.
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25 Social capital may also work indirectly via income through exploitative links.
26 Particularly vertical relationships may result in a patron-client relationship that can
27 often be exploitive in character (Szreter and Woolcock, 2004). Linking relationships,
28 when connected via a weak tie (bridging_{link}), are prone to producing patron-client
29 relationships.^{vii} But bonding social capital, too, may have negative effects, for
30 example through excessive claims from personal network members connected via
31 strong ties (Portes and Landolt, 2000). Finally, general overinvestment in any form of
32 social capital could create indirect negative effects via income. When the costs of
33 creating or maintaining social relations are higher than the associated profit,
34 household income can be reduced and thus negatively affect loan repayment.
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49 **Direct effects:** The effects of peer pressure and social punishment in credit groups are
50 well known. Similar effects may work in the case of individual credit relations too,
51 albeit at a much lower level. The stronger the relationship, the stronger the peer
52 pressure. Thus, at first sight bonding and bonding_{link} social capital might well be
53 expected to have a positive influence on repayment rate. On second thoughts,
54 however, with stronger ties the probability of social sanctions being exerted and
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collusion taking place goes up. Social capital can thus have direct negative effects on loan repayment. Moral hazard and collusion in tightly knit credit groups are well-known problems, and some microfinance institutes do not allow family members to be part of a credit group as sanctioning may become impossible (Ahlin and Townsend 2007). Another common problem is nepotism and political patronage. Relatives of employees of microfinance institutes often receive better conditions than regular borrowers. Ties to powerful individuals may negatively affect loan repayment through political patronage of the borrower in case of default. Hence, when linking social capital is connected by way of a strong tie (bonding_{link}), it may prove counterproductive in terms of loan repayment.

Shame probably has a greater effect on repayment of individual loans than peer pressure. Being exposed as unable to repay a loan could create shame towards co-villagers. Hence, we might assume that bridging social capital would have a strong effect. Gine and Karlan (2006), however, point out that borrowers with weaker social networks may have less to lose from the shame of being seen to be a defaulter, and hence may default more readily. This would point instead in the direction of bonding social capital. In light of these potential ambiguities, empirical evidence is required to sort out the theory.

What can we expect in the Thai context? Thailand has a long history of promoting the local community in times of crises. Various government programmes have aimed at strengthening the capacity of local communities to assist the poor and develop local self-reliance (Warr, 2004). It is to be assumed, therefore, that social capital in general plays a pivotal role, with bonding and bridging social capital having a positive impact on loan repayment performance. Misuse of loans in rural finance by elites is a well-known and worldwide phenomenon. In Thailand in particular non kin based networks

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3 of men provide access to political patronage (Curran *et al.*, 2005). Coleman (2006)
4 reports on village banks in which committee members abused their positions by
5 borrowing much more money than rank and file members and giving out preferential
6 loans to privileged persons. He does not, however, report bad repayment behaviour by
7 those committee members. Korff *et al.* (2006) describe a case in northern Thailand in
8 a semiformal setting where local leaders paid out loans to favoured individuals by
9 circumventing loan procedures. Thus, we assume that bonding^{link} social capital may
10 decrease loan repayment performance.
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25 **III Methods and data**

26 *Sample and data*

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28 A representative sample of households was drawn in the Chiang Dao district, Chiang
29 Mai province in northern Thailand, using a two stage random sampling procedure. We
30 randomly selected 50 per cent of the villages, resulting in 41 villages out of a total of
31 79 villages in Chiang Dao district. In each of the villages, we drew a random sample
32 of ten households. We restricted our sample to those households having a formal or
33 semiformal individual credit arrangement. Outstanding loans where the original
34 repayment date was older than one year were labelled as not performing and added to
35 the credit history. After excluding households with missing values, the final sample
36 consisted of 346 credits in 214 households.
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53 *Measuring social capital and its different forms*

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55 In contrast to human capital, which is based on individuals, social capital resides in
56 relationships (Coleman, 1988). Thus, relational data in the form of network data
57 would be ideal for measuring social capital (Herrmann-Pillath and Lies, 2001). Our
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3 measurement of social capital was therefore based on personal network ties. A
4 personal network is defined as the sum of all relationships an individual has. Only ties
5 that are connected to resources are measured, thus enabling us to identify the resource
6 network of the respondent.
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13 The data gathered from the personal network of the respondent are used as the basis
14 for our four measures of social capital. After excluding missing values, the sample
15 comprised 3621 persons. We applied two different cluster analyses (*k*-means) for
16 measuring tie strength and social distance to identify our social capital variables. *K*-
17 means clustering is a method of cluster analysis which aims to partition *n*
18 observations into *k* clusters in which each observation belongs to the cluster with the
19 nearest mean.
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30 ***Cluster analysis - tie strength:*** Bonding and bridging social capital are distinguished
31 by the strength of the tie between the respondent and his/her personal network
32 member. To measure tie strength we employed a similar approach to Zhao (2002),
33 who used four different variables to estimate tie strength: role relationship (core
34 family, other family, friend, acquaintance), frequency of contact per month, duration
35 of relationship in years, and closeness (see Table 1).^{viii} In the case of tie strength, two
36 clusters were determined upfront (weak ties, strong ties).
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48 Bonding and bridging capital can also be regarded as positive or negative. However,
49 our personal network survey was set up in such a way as to collect mainly positive
50 relationships. Relationships based on antipathy and similar negative feelings are not
51 measured. One must not confuse these positive or negative ties with the effects they
52 exert. Even positive ties can have positive or negative effects on loan repayment
53 behaviour.
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Table 1: Cluster analysis cluster tie strength

Variable	Mean	Std. Dev.	Min.	Max.
<i>Cluster 1, strong ties</i> N = 1773				
Duration of relationship in years	34.22	11.75	13	78
Frequency of contact per month	24.83	10.60	0.02	30
Role relationship*	1.97	1.15	1	4
Closeness of relationship**	4.12	0.89	1	5
<i>Cluster 2, weak ties</i> N = 1848				
Duration of relationship in years	13.54	9.30	1	37
Frequency of contact per month	7.65	10.89	0.02	30
Role relationship*	1.27	0.66	1	4
Closeness of relationship**	3.07	1.11	1	5

Note: * Core family = 4, extended family = 3, friend = 2, acquaintance = 1

** 5-point Likert scale: 5 = very close to; 1 not close at all.

Cluster analysis – social distance: Linking social capital is distinguished by the social distance between the respondent and his/her personal network member. The indicator for social distance is thus the difference in occupational prestige of the household head and his/her personal network members measured according to the Standard International Occupational Prestige Scale (SIOPS) of Ganzeboom and Treiman (1996).

Social distance can also be negative (see left hand side of Figure 1). Small negative distances are grouped together with small positive distances (Table 2). Huge negative distances may also exist, however, similar to linking capital on the right hand side of Figure 1. Imagine a high ranking government official in a small village. All his ties to the villagers would be across a power differential. But the social distance from his viewpoint would be negative, while the social distance from the villagers' point of view would be positive. However, such persons are by definition rare and make up only a very small part of the sample. In order to evaluate our assumption that huge negative differences in SIOPS between the respondent and his/her personal network members are rare, we applied the same boundary used with positive links from the

cluster analysis (-17) to the negatives ones (see Table 2). Only 6.6 per cent of all ties fall into this category. We believe that these ties will not create a bias in our analysis. The two lower clusters have therefore been grouped together (negative and low distance). Nevertheless, the number of bonding connections that are ‘upward’ is also likely to be correlated with a household’s having relatively low social status and the number of bonding connections that are ‘downward’ or lateral is likely to be correlated with relatively high social status. The SIOPS of the household head and the percentages of bonding_{link} relationships from the total number of relationships are negatively correlated and the correlation is strong (-0.62). We address this bias later in the model by controlling for the household’s own status measured according to the SIOPS and by aggregating the average SIOPS of all personal network members for each household, which is also an indicator of the status of the household.

Table 2: Cluster analysis social distance

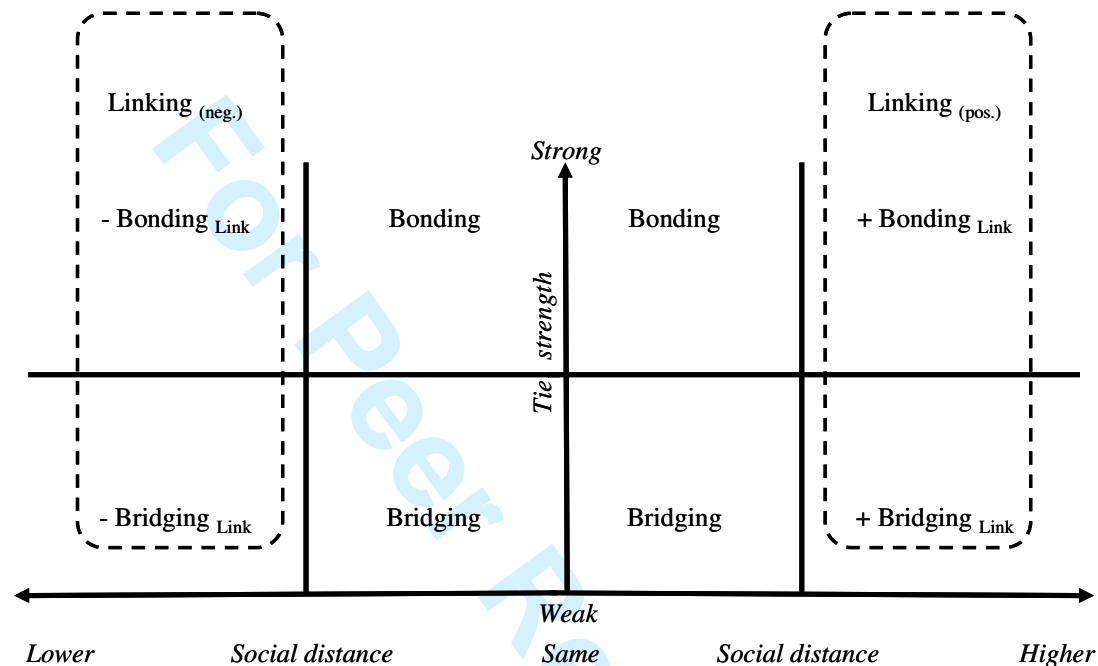
Variable	Mean	Std. Dev.	Min.	Max.
<i>Cluster 1, linking ties</i> N = 1120				
Difference between SIOPS of household head and personal network member	24.92	7.48	17	57
<i>Cluster 2</i> , N = 1112				
Difference between SIOPS of household head and personal network member	8.40	4.47	1	16.5
<i>Cluster 3</i> , N = 1389				
Difference between SIOPS of household head and personal network member	-6.93	9.11	-65	0.5

} Grouped into no-linking ties

Linking social capital can be connected either to bridging social capital, when the link is connected by way of a weak tie, or to bonding social capital, when the link is connected via a strong tie. Consequently, we have four different measures of social capital: 1. bonding, 2. bridging, 3. bonding_{link}, and 4. bridging_{link}. For the analysis,

these four different measures of social capital are aggregated for each person in each of those exclusive categories, leaving us with four social capital variables.

Figure 1 The different forms of social capital



Source: Authors' figure.

Personal network data collection

We used the name and position generator to measure personal networks and to create measures of individual social capital. The name generator asks questions about certain domains of the personal network, such as: 'Whom can you ask to help you fix your car?' Then the name of this person is recorded. Later, more questions can be asked about that person, for instance to ascertain the person's sex, age, occupation, and so forth, or to establish the relationship of this person to the respondent. This part of the survey is called 'name interpreter'. The name generator has often been criticised for being biased towards strong ties because the first names that people recall are usually those of persons who have been known to them for a long time, or whom they meet more often, and so forth. As a result, the amount of bonding social capital may be

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3 overstated. The 'position generator' partly corrects for this.^{ix} In its pure form it does
4 not create names and it has no name interpreter. The respondents are asked whether
5 they know or do not know persons from a sample of occupations, such as: 'Do you
6 know a primary school teacher'? However, a simple yes/no answer does not suffice
7 for our social capital measures. The names of the 'teacher' and so on were therefore
8 also recorded, and a name interpreter was applied.
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18 **Name generator:** A single name generator question may generate results biased
19 towards a single form of social capital; for example the question 'whom would you
20 ask to borrow a large amount of money?' will reveal a large number of close
21 relationships such as core family members and ultimately result in a very large
22 amount of bonding social capital (Marin and Hampton, 2007). Therefore, we applied
23 ten different name generators (see Box 1 in the online Appendix for exact wording).
24 The name generator questions are all based on specific resources, skills, or knowledge
25 that can potentially be exchanged among rural people. This leaves little room for the
26 respondents to interpret the questions differently. The specific resources, skills, or
27 knowledge were determined during several group discussions with farmers. We
28 restricted the number of persons named per question to a maximum of three to limit
29 the interview burden on the respondent.
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48 **Position generator:** The position generator was primarily applied to measure weak
49 ties. This data collection tool builds on a sample of occupations and asks respondents
50 to indicate contacts in each of the occupations. The position generator utilises a
51 person's occupation as an indicator of the resources available to that person. A
52 person's occupation is a good indicator of his/her social roles and resources, and
53 hence the kinds of help that s/he might be able to provide. The sample of occupations
54 should range widely in prestige and represent different sectors of the economy in
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3 order to meet the theoretical goal of measuring access to different parts of the social
4 structure and their differing resources. The occupations should have fairly large
5 populations since few people, if any, will know anyone in a very rare occupation. The
6 occupations should have clear titles that all respondents will understand. If good
7 census information is available, one should always use occupational titles from the
8 census. Finally, 15-30 different occupations is a good number to obtain meaningful
9 results (Erickson 2004). We used a representative sample of 26 different occupations,
10 selected from the national 'labour force survey' in Thailand. For our sample we used
11 the official translation of the National Statistical Office in Bangkok. Occupational
12 groups are classified in the survey by the four digit code ISCO-88 from ILO (NSO,
13 2007).^x The complete list of chosen occupations can be seen in Table 1 in the online
14 Appendix.

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33 **Reference group creation:** Reference group effects occur when the dependent
34 variable is directly influenced by the behaviour of the person's social reference group.
35 Furthermore, people are more significantly influenced by strong ties such as friends or
36 relatives. Hence, the model should be able to differentiate the tie strength (Bandiera
37 and Rasul, 2006). We depicted a sample of the personal network of the respondents
38 by using several name generators and a position generator (see above) (Fletschner and
39 Carter, 2008). This sample of personal network members is also a sample of the
40 reference group of each respondent. By using several name generator tools, the
41 reference group sample became sufficiently large. The calculated tie strength of the
42 respondent and his/her personal network members allowed for weighted peer
43 variables.

IV The influence of different forms of social capital on loan repayment

The model

We use a binary probit regression to estimate the effects of social capital on loan repayment performance. The binary dependent variable (Y1) is one for all households that paid on time (principal or interest) and zero otherwise.

Y1: Have you always paid the principal or interest on time and/or are you able to pay the loan back on time?

Table 3 depicts the full list of variables. The default rate is perhaps the single most important credit performance indicator (Karlan, 2007). However, regressing credit default over social capital may, in our case, lead to biased results because we employ cross-sectional data that ignore the time lag between these two variables. Furthermore, Karlan (2007) points out that default typically begins somewhere in the middle of the loan term, at which point the client stops making the scheduled loan payments.

On the one hand, the dependent variable contains an objective measure of repayment performance as the borrower has already caused administrative costs to the lender. On the other hand, it also contains a subjective element due to the self-assessment of the borrower's ability to pay back a running loan on time. This is necessary as we are looking at running loans and sometimes the principal is paid back only at the end of the loan cycle. This applies particularly for short term loans. If a borrower responded 'can't pay on time', his/her loan is considered to be doubtful and will be coded with a one. If a borrower responded with 'can pay on time', his/her loan is deemed safe and receives a zero. We realise that a distortion may occur with these proxies. Some doubtful loans may not in fact be defaulted when they mature, while some loans that

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are presumed secure may prove troublesome in the end. However, Pham and Lensink (2007) point out that the potential risk of default can be an appropriate proxy for an actual event, because the information is derived from the risk perception of borrowers, rather than from risk judgement by lenders

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Table 3: Descriptive statistics of dependent and independent variables

Dependent variables	Mean	Std. dev.	Min.	Max.
Y1 = Always paid the principal or interest on time and/or are able to pay back on time (yes = 1, no = 0)	0.89	0.31	0	1
Independent variables				
<i>Personal network variables</i>				
SC_Bo= Social capital bonding (number of ties)	4.10	2.81	0	12
SC_BoLi = Social capital bonding _{link} (number of ties)	1.09	2.00	0	14
SC_Bri= Social capital bridging (number of ties)	3.47	3.18	0	15
SC_BriLi = Social capital bridging _{link} (number of ties)	1.61	1.65	0	11
Net_default = Number of persons who defaulted on a credit	0.14	0.68	0	5.5
SIOPS_av = Average SIOPS of personal network	41.51	4.07	25	58
Net_shock = Number of persons who experienced an income shock within the last five years	1.65	2.72	0	18
Net_family = Number of relatives inside the personal network	2.00	1.91	0	10
<i>Loan control variables</i>				
C_age = Age of running credit (month)	20.57	28.10	0	255
C_size = Loan size (THB 1,000)	55.19	108.16	0.5	900
Dum_gov = Dummy government lending programs (yes = 1, no = 0) ^a	0.50	0.50	0	1
Dum_bank = Dummy bank (yes = 1, no = 0) ^a	0.39	0.49	0	1
Entr_skills = Lack of entrepreneurial skill measured by loan use or source of loan repayment (nonproductive = 1, others = 0)	0.43	0.50	0	1
Interest_y = Interest rate per year	7.02	4.92	0	48.9
<i>Household head control variables</i>				
C_bad = Bad credit history; defaulted credits, late payment of interest or principal (yes = 1, no = 0)	0.12	0.33	0	1
Edu = School years of household head	4.73	3.09	0	16
Ethnic = Ethnicity of household head (Thai = 1, non Thai = 0)	0.89	0.31	0	1
Sex = Sex of household head (male = 1, female = 0)	0.71	0.46	0	1
Group = Number of groups per household head Lagged ^b	2.81	1.64	0	7
Leader1 = Special position in a group (yes = 1, no = 0)	0.22	0.41	0	1
Leader_info = Outdegree personal networks, numbers of persons seeking advice from the household head on finance, jobs, or agriculture	3.51	6.53	0	50
Shock = Number of income shocks during the last five years	0.91	0.79	0	3
Land = Land holdings (1,000m ²) Lagged ^b	14.58	24.18	0	240.6
Employ = Regular employment, formal jobs, pensions of any household member (yes = 1, no = 0)	0.13	0.33	0	1
SIOPS_hh = SIOPS of household head	34.49	9.47	6	78
Income = Total household income 2003 (deciles)**	3.22	2.35	1	10
In_village_w = Number of survey households known by the household head inside his village weighted by village size	23.09	22.94	0.62	151.8
Out_village = Number of survey households known by the household head outside his village.	9.13	12.47	0	100
Six dummies for seven subdistricts (descriptives are not shown)	-	-	-	-

Note: n = 346 credits within 214 households; ^a Source of loan has been grouped into three categories: Government lending programmes (173), banks (134), and others (39). Thus, two dummy variables have been applied; ^b Data on land bought and group membership taken up by the household head after the disbursal of the oldest running credit in the household have been excluded; ^c The highest category consists of the average monthly income in 2003 in Chiang Mai plus 25 per cent.

Econometric concerns

In empirical research three primary econometric concerns are frequently raised: sample selection bias, simultaneity, and correlated unobservables. Selection bias is not a concern here because we are analysing only borrowers.

Simultaneity: Social ties are the basis for our social capital measures and may be endogenous to good credit performance. Microcredit is supposed to widen the personal network of borrowers (a vast amount of literature exists, for example, on empowerment of women via microcredit). This is particularly true for group loans but may also apply to individual borrowers. However, the personal network consists almost exclusively of relationships with a lifespan longer than three years (more than 95 per cent of the relationships). This implies that our measures of social capital are not endogenous. It might also be argued that bad loan performance could have an effect on network ties. Bad loan performance may cut loose one tie or another, for instance due to shame or social punishment. Our measures of social capital could thus be endogenous to bad loan performance. While this argument is probably valid for group loans with joint liability (Karlan, 2007), it is hard to see how, in the short term, how social capital could be influenced by positive or negative repayment behaviour on the part of individual borrowers. Furthermore, anecdotal evidence from our research suggests that no such effects are present in cases of defaulting on a formal loan. This leads us to the conclusion that our measures of social capital are not endogenous. A badly performing loan may reduce the social status of the respondent. This would leave our measurement variable for linking social capital (that is, assessment of social status) endogenous to loan performance, and hence the measures of linking social capital may be endogenous. However, our measure for social status

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3 is based on the occupational prestige of the household head and occupational prestige
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5 is unaffected by repayment behaviour.
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9 ***Unobserved variables:*** We apply a range of control variables to deal with the problem
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11 of unobserved variables (see Table 3). Two groups of unobserved effects cause
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13 particular concern in regression analysis of rural finance: leadership and
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15 entrepreneurial skills. To control for leadership, we used two variables. First, a
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17 variable indicating whether the household head holds a special position such as
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19 cashier in formal and semiformal groups; second, a variable measuring the numbers
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21 of persons seeking advice or information on finance, jobs, or agriculture from the
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23 household head. When social capital is measured by involvement with others in the
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25 community, then an omitted variable may exist as households with greater
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27 entrepreneurial spirit may also have stronger social capital (Karlan, 2007). While we
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29 could not measure entrepreneurial skills directly, we incorporated two dummy
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31 variables to measure lack of entrepreneurial skills. The dummy indicates whether the
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33 loan was used for nonproductive purposes such as consumption smoothing, or
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35 whether the loan was paid back or is going to be paid back by taking up another credit
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37 or by money received from friends or relatives, by selling assets, by dissolving
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39 savings, or whether the source of repayment is not yet known. In such cases,
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41 entrepreneurial skills are assumed to be low.
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49 Social and ethical attitudes may influence both network size and financial probity.
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51 Furthermore, proximity to social services also influences network size and makes it
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53 easier to repay by affecting enterprise viability. Some of the proximity to social
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55 infrastructure may be controlled for by the number of groups the household belongs
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57 to. However, these effects are not fully captured and we cannot directly control for
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59 social and ethical attitudes. We can, however, control for total network size of
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3 households via two proxy indicators. The first is the number of households known by
4 the household head in our survey inside his village, weighted by village size. The
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6 second is the number of households in our survey known by the household head
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8 outside his village. Wealth also influences the ability to repay and at the same time the
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10 size of the personal network. While we do not have data on total household assets, we
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12 can proxy household wealth by land size and past income. Social status may have an
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14 effect similar to that of wealth. We control for social status using the occupation of
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16 the household head by adding his SIOPS into the model.
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23 **Reflection problem:** The reflection problem arises because social interactions are
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25 symmetrical in the sense that a person's behaviour affects the behaviour of the other
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27 members in the group, and the group's behaviour affects the behaviour of the
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29 individual. Several problems arise from this. First, they are endogenous, thus
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31 potentially biasing the regression coefficients. We circumvented this simultaneity
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33 problem of reference group effects because our dependent variable is based on
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35 ongoing late repayment of credit interest or principal. But our reference group
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37 variable is based on defaulted credit in the past. We can therefore assume that
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39 knowing a credit defaulter may influence one's own repayment performance. But it is
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41 difficult to see how this could work the other way.^{xi} Second, pure reference group
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43 effects are masked by correlated behaviour within groups arising out of two different
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45 kind of social effects (Manski 1993):
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52 (1) *Exogenous social effects* arise if a borrower's loan performance is affected by
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54 characteristics of his/her social reference group, irrespective of whether the reference
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56 group member has a credit. For instance, a borrower's repayment performance may be
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58 better if his/her group includes people who are more educated. We use three control
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60 variables: the average occupational status of the personal network members (SIOPS),

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3 the number of personal network members who experienced income shocks, and
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5 finally the number of family members in the reference group. These variables not only
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7 control for exogenous social effects, but may also partly control for correlated
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9 idiosyncratic characteristics (see below).
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13 (2) *Correlated effects* occur when a borrower and his/her social group behave
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15 similarly, not because they influence each other in any way but because the behaviour
16
17 of each is shaped by the same or highly correlated factors (Fletschner and Carter,
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19 2008). Two types of correlated effects exist: (2a) *correlated contextual effects* that
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21 result from the fact that borrowers of a social reference group may live in the same
22
23 area, have access to the same markets, financial institutes, and so forth; we control for
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25 subdistrict fixed effects and thus also for correlated contextual effects and, (2b)
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27 *correlated idiosyncratic characteristics* that result when borrowers endogenously
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29 identify or affiliate with social reference groups comprising persons with similar
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31 personal characteristics. As we cannot fully control for correlated idiosyncratic
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33 characteristics, we cannot establish causality between pure reference group effects
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35 and our dependent variables.
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43 ***Empirical results and discussion***

44 The regression diagnostics are all within standard range. The overall fit of the model
45
46 is satisfactory and the correlation tables and the variance inflation factor showed no
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48 problems with regard to multicollinearity (Table 4). Observations may not be
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50 independent within the village. This inference problem we dealt with by village
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52 clustering. Our estimates of the probit coefficients may be biased due to the low share
53
54 of zero observations (10 per cent). We therefore ran a ‘rare event logit’ and compared
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56 the results with our standard probit regression.^{xii} The rare event logit produced
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58 somewhat more conservative results on which we focus on below. Unbalanced
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3 samples with a poor fit are typical for survey analyses in the social sciences. In a
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5 binary probit analysis with unequal sample frequencies of the two outcomes, the less
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7 frequent outcome always has lower estimated prediction probabilities than the other
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9 outcome. As suggested by Cramer (1999), one can replace the standard cutoff point of
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11 0.5 by the relative share, which in our case is 0.896 for Y1.
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16 Below we only interpret those variables that produced significant coefficients in both
17
18 regressions. Bonding social capital has a positive impact on repayment performance.
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20 For bonding social capital, the arguments from section II hold (for example, better
21
22 access to information, support in hard times, and so forth) and explain its positive
23
24 sign. We speculate that bonding social capital influences the repayment rate positively
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26 by two routes: first by an indirect route, through income and access to informal
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28 resources such as labour and money channels through strong ties, and second by the
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30 route of shame.
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Table 4: Modelling repayment performance

	Probit			Rare event logit		
	Coef.	Robust Std. Err.*	P > z	Coef.	Robust Std. Err.	P > z
sc_bo	0.221	0.084	0.008	0.320	0.169	0.058
sc_boli	0.107	0.100	0.286	0.164	0.149	0.271
sc_bri	0.100	0.064	0.119	0.115	0.107	0.281
sc_brili	-0.166	0.076	0.029	-0.267	0.171	0.119
net_default	-0.447	0.257	0.082	-0.764	0.412	0.064
SIOPS_av	0.108	0.050	0.031	0.158	0.109	0.147
net_shock	-0.012	0.067	0.857	0.000	0.123	0.998
net_family	0.045	0.111	0.683	0.012	0.218	0.958
c_age	-0.034	0.006	0.000	-0.043	0.010	0.000
c_size	0.002	0.001	0.166	0.004	0.002	0.088
dum_gov	-0.982	0.785	0.211	-0.942	1.724	0.585
dum_bank	-1.644	0.762	0.031	-1.899	1.528	0.214
entr_skills	0.586	0.307	0.057	0.857	0.666	0.199
interest_y	-0.067	0.025	0.007	-0.086	0.044	0.054
c_bad	-1.172	0.364	0.001	-1.525	0.590	0.010
Edu	-0.064	0.055	0.247	-0.099	0.104	0.338
Ethnic	1.307	0.708	0.065	1.931	1.248	0.122
Sex	0.364	0.292	0.213	0.542	0.557	0.330
Group	-0.118	0.095	0.214	-0.143	0.162	0.377
leader1	-0.141	0.388	0.717	-0.225	0.689	0.744
leader_info	0.007	0.019	0.690	0.005	0.029	0.864
Shock	-0.097	0.184	0.598	-0.097	0.300	0.747
Land	-0.004	0.004	0.394	-0.008	0.009	0.367
Employ	0.313	0.488	0.521	0.277	0.945	0.769
siops_hh	0.009	0.023	0.708	0.011	0.051	0.820
Income	0.281	0.095	0.003	0.353	0.164	0.031
in_village_w	-0.014	0.005	0.006	-0.019	0.012	0.111
out_village	0.006	0.015	0.707	-0.016	0.026	0.540
subdistri_2	0.771	0.483	0.110	1.139	0.902	0.206
subdistri_3	-0.350	0.496	0.480	-0.044	1.291	0.973
subdistri_4	1.570	0.701	0.025	1.968	1.151	0.087
subdistri_5	1.728	0.650	0.008	2.101	1.120	0.061
subdistri_6	1.224	0.524	0.020	1.603	0.982	0.102
subdistri_7	0.760	0.431	0.078	1.053	0.767	0.170
Constant	-3.652	2.807	0.193	-5.876	5.630	0.297
Pseudo R ²		0.45				-
Wald chi ² (34)		2096.70				-
Prob > chi ²		0.00				-
Sensitivity in per cent*		80.97				-
Specificity in per cent*		88.89				-
Correctly classified in per cent*		81.79				-
N		346			346	

Note: Standard errors adjusted for 40 village clusters.

The reference group effect on repayment of interest is, as expected, negative and significant. However, as we cannot clearly identify pure reference group effects, we

1
2
3 can only speculate that this is a moral hazard phenomenon. The variables age of
4 credit, interest rate, and bad credit history are all negative and significant as expected,
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6 whereby the bad credit history has the biggest effect. Also unsurprisingly, the past
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8 income category is positive and significant. Finally, several subdistrict dummies are
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10 significant. Location matters in Thailand. In case of rural finance this not only relates
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12 to the physical infrastructure but also to the organisational infrastructures of the rural
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14 financial institutes. Different subdistricts are often handled by different branches or
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16 credit officers of the financial institutions, with different performances.
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26 **V Conclusions and policy recommendations:**

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28 The literature on credit repayment performance in rural areas has so far focused
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30 predominantly on credit group and intragroup ties. Our measure of social capital,
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32 meanwhile, went beyond intra credit group ties and our unit of analysis was individual
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34 credit. Social capital plays a role, but not to the extent that the theoretical literature
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36 suggests. In our analysis we distinguish between three different forms of social
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38 capital: bonding, bridging, and linking. We assumed that different forms of social
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40 capital have a distinct influence on the loan repayment performance of borrowers. It
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42 turned out that bonding social capital has a significant and positive influence on
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44 repayment performance. However, we find no significant evidence for an effect of
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46 bridging and linking social capital on loan repayment performance. But we cannot
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48 rule out large effects either. This is surprising, as most of the literature has suggested
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50 finding significant evidence following the famous argument of Granovetter (1973) on
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52 'the strength of weak ties', which highlights the informational gains to be made
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54 through weak ties. This could be another example from Asia supporting the finding
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3 from Bian (1997) in China, who brought the positive effects of strong ties back into
4 the discussion. What policy conclusions could be drawn from these findings?
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9 One recommendation for credit institutes to foster bonding social capital among their
10 clients would be the use of credit group schemes to strengthen the relationships
11 between different borrowers. However, this approach comes with strings attached,
12 particular for the borrower as part of the screening, monitoring, and enforcement costs
13 are passed on to the borrowers. Furthermore, as other research has shown (for
14 example Ahlin and Townsend, 2007), too close ties in credit groups can be
15 counterproductive as they hamper or even impede social sanctioning and promote
16 collusion among group members. An alternative could be the use of credit groups
17 without joint liability. But even individual borrowers could be encouraged to engage
18 in a variety of joint activities to further strengthen their relationships with other
19 people. Training provision by credit institutes also seems to be a good measure, as this
20 might not only improve the human capital of borrowers, but also their social capital.
21 The aim here would be to increase the 'pressure to conform'. But of course this would
22 also produce costs for the credit institutes. Whether the benefits of having more
23 bonding social capital would outweigh the costs for generating it, cannot, however, be
24 answered with our data.
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53 ⁱ Scientists have not yet agreed upon a uniform definition of social capital. Nevertheless, social
54 networks or social ties are part of almost all definitions of social capital. We define social capital as
55 interpersonal networks (ties) plus resources.
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59 ⁱⁱ Research on credit groups, social capital, and loan repayment performance is more frequent, but the
60 evidence is rather mixed. This can be due to the fact that in certain situations the effects of social

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- and/or financial sanctions associated with solidarity group arrangements are important, while in other setups, the incentive of continual access to credit is the driving factor behind repayment. The ambiguity may also be caused by the great diversity of studies in this area. Many types of credit groups are studied over a wide range of countries and using diverse methods and terminology (Dufhues *et al.*, 2009).
- iii Exceptions are for instance Fletschner and Carter (2008), who used name generators to create a reference group.
 - iv Personal communication of BAAC staff.
 - v Formal lenders are generally bureaucratic organisations, often under the supervision of the central bank. Informal lenders tend to be individuals or small groups.
 - vi Bonding and bridging social capital are distinguished by tie strength, while linking social capital is distinguished by social distance between the respondent and the personal network member.
 - vii The classic exploitative patron-client relationship is found mainly in very poor households. These households are usually not catered for by the formal or semi-formal financial sector (Wood 2003). We excluded households borrowing exclusively from informal sources from our analysis. Therefore, we believe that this indirect effect via income is negligible in our study.
 - viii The respondents' perception of the 'closeness' or intensity of the relationship is a good measure of the strength of the relationship. We used a 5-point Likert scale to estimate the closeness of a relationship, with higher scores indicating greater closeness.
 - ix In correcting the bias on strong ties we created a bias on social distance. Our whole sample and the sub-sample of 214 households used in this analysis have a bias towards upwards links. The average SIOPS of the household head is 34.49 and the average SIOPS of the personal network member is 41.51. The position generator offers a rather wide range of occupation to choose from. This, wide range of occupation is not found in village societies in Northern Thailand.
 - x To avoid possible arbitrariness in the selection process we applied the following procedure: from each two digit section occupation code, we choose the three digit occupational code with the highest number of employed persons. In one case, the second highest was chosen. Within the group of 'senior officials', the four digit code with the highest number of people was 'legislators' and second highest 'traditional village chiefs'. As our survey is limited to rural areas, we found the category of traditional chiefs and village heads more appropriate.

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- ^{xi} Some observers might point out that an individual may default on a loan after finding out that someone else has been paying the interest or principal late. However, we assume that this is not the normal case and can therefore be disregarded.
- ^{xii} Michael Tomz, Gary King and Langche Zeng. 1999. RELOGIT: Rare events logistic regression, Version 1.1 Cambridge, MA: Harvard University, October 1, <http://gking.harvard.edu/> (accessed in January 2010).

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Appendix

Box 1 Name generator questions

Areas	Questions
Agricultural inputs	1) In times of need whom would you ask for external agricultural inputs such as chemical fertiliser, manure, seeds, seedlings?
Agricultural machinery	2) Whom would you ask to lend you farm machinery (for example mower, sprayer, ploughing machine)?
Information exchange	3) If you have a problem on your farm, whom would you ask for advice/information concerning this problem?
	4) Whom would you ask for information about a bank credit or a bank account?
	5) If you are looking for an off-farm or nonfarming job, whom would you ask for advice or information?
Labour	6) Whom would you ask to help you on the farm or to build a house?
Money	7) Whom would you ask for a small sum of money as a credit? (approximately THB 2500 ^a)
	8) Whom would you ask for a large sum of money as a credit? (approximately THB 8500 ^b)
Skill exchange	9) Whom would you ask for help to fix a motorbike or agricultural machinery?
Transport	10) Whom would you ask to borrow a motorbike?

Note: We did not select food exchange related items as these were mentioned in only a few cases and never regarded as important. For the same reason we did not choose any of the luxury items that were exchanged among farmers. ^a is about EUR 55; ^b is about EUR 200.

Table 1: Occupation sample for position generator

ISCO-88*	SIOPS**	Occupational title*
1130 ^a	63	Head of sub-district
1220	63	Production and operations department manager (25 and more employees)
1310	50	Small enterprise managers (including shop owner, restaurant manager, and so forth)
2140	63	Architects, engineers, and so forth
2230	54	Nursing and midwifery professionals (registered nurses or midwives)
2331 ^b	57	Primary school teacher
2410	57	Business professionals (accountants, auditors and so forth)
3152	54	Safety, health, and quality inspectors
3220	51	Modern health associate professionals (except nursing)
3310^b	50	Primary education teaching associate professionals
3430	49	Administrative associate professionals (for example bookkeepers)
4140	37	Library, mail and related clerks
4210	37	Cashiers, tellers and related clerks
5120	26	Housekeeping and restaurant service worker
5220	32	Shop salespersons and demonstrators
6110	40	Market gardeners and crop growers
6200	38	Subsistence agricultural and fishery workers
7120	34	Building frame and related trades workers
7230	43	Machinery mechanics and fitters
7310	45	Precision workers in metal and related materials
7430	34	Textile, garment and related trade workers
8130	31	Glass, ceramic and related plant operators
8280	33	Assemblers
8320	32	Motor vehicle drivers
9110	25	Street vendors and related workers
9210	23	Agricultural, fishery and related labourers
9310	16	Mining and construction labourers

Sources: * NSO (2007); ** Ganzeboom and Treiman (1996)

Notes: ^a Our sample focuses on rural areas in Thailand. We believe that most villages are still small enough for everybody to know the village head and the village head to know everybody in the village. Therefore, instead of 'village head' we use the position of the 'Sub-district head' in Thailand. ^b The 3310 code was also selected initially, but the description of 'teaching associate professionals' is too close to the description of 'primary and pre-primary education teaching professionals'. Many farmers failed to appreciate the slight difference, so we left this group out, to avoid confusion.