Microfinance in Rural and Urban Thailand: Policies, Social Ties and Successful Performance

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Abstract

It has been well documented in the theoretical economic literature that joint liability group-based lending helps to overcome the hurdles of adverse selection, moral hazard, auditing cost and enforcement by exploiting local information embodied in specific social networks. Much less attention has been given to explain how other features of microcredit contracts have opened up possibilities for microfinance. In this paper I study a joint liability lending program in Thailand to analyze how social ties and policies such as compulsory savings and training contribute to explain the success of the program in terms of repayment rates in rural and urban communities. I use a novel panel dataset on household loans constructed from household, institutional and community-level data from the Townsend Thai Data Collection. Empirical results are consistent with the repayment predictions of existing theories on joint liability lending. The findings suggest that joint liability may prosper in areas in which social ties are strong enough to permit individuals to costlessly enforce agreements in their community, and the threat of social sanctions exists and is credible. Additionally, I find evidence that suggests that households in rural areas have some knowledge about the customs and characteristics of people and institutions in the region which varies across communities and predicts success and failure of the microfinance program. The estimation results also indicate that the degree of joint liability in the fund is negatively associated with repayment; and that practices such as requiring compulsory savings and providing training or information to borrowers are positive predictors of repayment in both rural and urban environments. The findings are robust to a number of specification checks.

JEL Classification: D82, G21, O12, O16, O17, R51

1 Introduction

Different studies have documented evidence of the positive effects of financial development and improved access to credit on economic growth, poverty alleviation and income distribution.[1] Nevertheless, throughout the world, poor people still face partial or full exclusion from the financial sector and cannot take advantage of the opportunities that come together with having access to finance. Microfinance institutions have played a fundamental role delivering broader access to financial services such as credit, savings and insurance to the poor; however, it is still unclear what policies allow microfinance institutions to successfully offer these services and whether or not the success of such policies depends on the socioeconomic environment in which the institution operates. In this sense, the purpose of this research is to investigate how existing social ties and the use of policies such as compulsory savings and training contribute to explain successful lending practices to individuals with limited access to formal financial markets in rural and urban environments.

The vast majority of studies in the microfinance literature have focused on the mechanisms behind the success of the group lending model that is used by the Grameen Bank in Bangladesh and by many other microfinance institutions around the world. On the theoretical side researchers have studied how joint liability contracts help to overcome the problems of adverse selection (Ghatak 1999; Sadoulet 2000; Armendariz de Aghion and Gollier 2000), moral hazard (Stiglitz 1990; Varian 1990), and enforcement (Besley and Coate 1995).[2] Some theories view the existing level of social capital as critical to the performance of group lending, and state that joint liability contracts can improve repayment because borrowers have better information about each other's type; can more easily monitor each other's investment; and can make use of social sanctions to force people to pay back a loan. Other theories contend that joint liability lending may succeed whether or not the contract is implemented among borrowers with high levels of social capital. Empirical studies show mixed results. Some of them provide evidence that social pressure or social cohesion are positively associated to the group performance (Wenner 1995; Zeller 1998; Abbink *et al.* 2006; Karlan 2005); while others show that strong social ties within borrowing groups make it more difficult to pressure members to repay loans (Wydick 1999; Ahlin and Townsend 2007).

Much less attention has been given to the use of compulsory savings or training components to secure high repayment rates. The inclusion of these components can serve different purposes.

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[1] See Gine and Townsend (2004), Beck, Demirgüç-Kunt, and Levine (2007), among others.
[2] An overview of the theory of group lending is provided by Ghatak and Guinnane (1999).

For instance, saving on a regular basis requires discipline which perhaps makes borrowers more reliable. Savings also provides information about the debt capacity of the borrower and can be used as collateral. In this way, savings accumulation might facilitate self-selection, screening and enforcement (Reinke 2006). Similarly, the advantages of including a training component as a requirement to borrow are many. Training can contribute to strengthen the knowledge base of clients and thus improve business outcomes; this, in turn, may increase the demand for funds and reduce the likelihood to default on a loan (Karlan *et al.* 2007).[3]

In this respect, this research explores the experiences of the denominated "One Million Baht Fund Program" (henceforth Village Fund Program) in Thailand to assess whether social ties play a fundamental role explaining the success of the program in terms of repayment rates.[4] In addition, it analyzes the effect on repayment behavior of using a compulsory savings or a training component together with joint liability.[5] To do this, I use household, institutional and community level annual panel data from the Townsend Thai Data Collection which is one of the longest panels available in developing countries and is characterized by its high level of detail. In particular, I construct a unique panel database on household loans from the Village Fund Program.[6] The panel covers a random sample of 64 rural communities from 2003 to 2010, and 64 urban communities from 2005 to 2009. The database includes information on the characteristics of loans held by a sample of 1,920 households, as well as data on their economic and demographic features. In addition, it includes information on the socioeconomic characteristics of the communities, and on the policies and practices used by the village funds established in these communities under the Village Fund Program.[7]

This empirical investigation differs from other studies that analyze repayment behavior under joint liability lending in four important ways. First, it uses panel data which results in higher variability of data compared to a cross-section design. Additionally, it permits to capture not only the variation that emerges through time or space, but the variation of these two dimensions simultaneously. Second, the analysis uses a sample of rural communities and a sample of urban communities which are located in similar geographic regions. Therefore, it is possible to analyze whether or not rural and urban differences affect the determinants of repayment behavior.

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[3] Reinke (2006) points out the fact that most people are unaware of their lack of abilities and thus are unlikely to seek training on their own. Therefore, providing training to borrowers may enhance the loan productivity.

[4] The official name of the program is the Village and Urban Community Fund program.

[5] The request of co-signers by the village funds is used as evidence of joint-liability practices in the program.

[6] The Village Fund Program was implemented in 2001.

[7] There is one village fund per community.

Specifically, this investigation is the first one that studies the long panel of rural and urban annual data from the Townsend Thai Data Collection. Third, I use information on baseline surveys to construct a proxy measure for social cohesion. In particular, the baseline survey in rural areas was conducted before the program was implemented; accordingly, the proxy measure for social cohesion is exogenous to repayment behavior. And fourth, the data shows wide variation in the use of the policies that are analyzed in this study. In practice most microfinance institutions use the same type of contract terms and policies, thus it is hard to identify the effect on repayment behavior using a cross-section of loans. Arguably, the variation in policies observed among the village funds in the sample contribute to explain the variation observed in repayment behavior.

The empirical analysis is motivated by existing theories on joint liability lending and their predictions on repayment behavior.[8] The success of the program is defined dichotomically, depending on whether a borrower fully pays back the credit to the fund or not at the maturity date of the loan. In addition, I analyze the severity of default defined as the number of months the borrower has been late in repaying the loan.

Using pooled cross-section probit regression analysis the paper estimates the probability of repayment in rural and urban communities using as explanatory variables a set of proxy variables that measure the strength of social ties (such as cooperative behavior and social sanctions) and a set of variables that measure institutional characteristics and policies (such as the use of compulsory savings and training, the quality of institutions, and the degree of joint liability). In addition, the estimation includes variables describing the loan contract terms (such as loan size and interest rate); the characteristics of the community in which the fund operates (such as average land, schooling level, wealth and income variability, and the availability of other sources of credit); and the socioeconomic traits of borrowers (such as age, gender, schooling level and the role of the individual in the job).

Empirical results are consistent with the predictions of existing theories on joint liability lending. I find that repayment is positively associated with cooperative behavior and with the quality of institutions in rural areas. These two variables are measured at the community-level and come from a poll among the surveyed households in a subdistrict; in particular, the variables represent the percentage of households in the subdistrict that voted for the community as the best community in the area in terms of cooperation among people and the quality of institutions, respectively. These two variables are constructed using data from the original baseline surveys which were conducted

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[8] Following Ahlin and Townsend (2007), I focus on four of the best-known and most representative papers in the literature: Stiglitz (1990), Banerjee *et al.* (1994), Besley and Coate (1995), and Ghatak (1999).

before the program was implemented. Thus, the findings suggest that those communities that were rated as the best communities in the area are communities which show the highest repayment rates on loans from the village fund. This further suggests that households in rural areas have some knowledge about the customs and characteristics of people and institutions in the region which varies across communities and predicts success and failure of the microfinance program. This result only holds in rural areas, perhaps because the setting is more stable on rural socioeconomic environments as there is less mobility of people compared to urban areas. In addition, I find that the strength of social sanctions is positively correlated with repayment in both rural and urban areas. Both cooperation and sanctions are common in environments in which social cohesion is strong. Hence, these results suggest that joint liability lending may prosper in areas in which social ties are strong enough to permit individuals to costlessly enforce agreements in their community, and in which the threat of social sanctions exists and is credible. The evidence also suggests that the use of a compulsory savings or a training component with joint liability lending is positively correlated with repayment in both socioeconomic environments. Finally, the degree of joint liability in the fund is negatively associated with repayment in both rural and urban environments. Using pooled OLS regression analysis, the empirical results on the severity of default confirm those on repayment behavior.

The policy relevance of this study is clear. Assessing the role of the existing level of social capital in the performance of joint liability lending programs could shed some light on whether joint liability based mechanisms can work only in very cohesive rural environments, or whether they can work in more urban environments where local information or social enforcement mechanisms may be weaker. Similarly, determining the role and significance of practices such as compulsory savings and training, as well as identifying other determinants of repayment performance, can assist in improving program design and operation.

The study has some limitations which are clearly venues for future research. First, the Village Fund Program is not a universal program. Instead, households decide whether to become members of the fund or not; and if they become members then they have to decide whether to borrow from the fund or not. This investigation takes as given the selection process of households into the program to explain repayment behavior. Additionally, there is the possibility that the differences across communities may have unobserved characteristics (by the econometrician) that influence the choice of policies. Under this scenario, the relationship between repayment behavior and policies would be explained by an omitted variable. For instance, it could be the case that policies are chosen by funds precisely because they have additional information that indicates that

people in the community would not make reliable borrowers. In this context, the policies are used to strengthen the discipline and knowledge of potential borrowers. Note that this additional information may be correlated with the choice of policies and also with repayment; thus, standard estimates would be biased downward.[9] Moreover, from interviews conducted during fieldtrip in Thailand, it seems that the observed differences in the policies chosen by the funds are at some extent explained by the fact that people in the communities interpreted differently a sample guideline of policies that was published and distributed by the Thai government at the beginning of the program together with the manuals describing the objectives of the program, the process to apply for and establish the fund, and the regulation. Although the guideline of policies was shown as an example, many committee members mentioned that the policies were chosen following the regulation on the manuals they got at the time of foundation.[10] In addition, it seems that officers from the Community Development Department (CDD) also made suggestions on how to organize the funds.[11] Perhaps this situation ameliorates the endogeneity bias. In any case, further investigation could help to assess the magnitude of this potential endogeneity problem, especially considering this is a common problem among similar empirical studies.

The paper is organized as follows. The literature is summarized in Section 2. Section 3 presents the theoretical background. Section 4 describes the microfinance program in Thailand, and the characteristics of the village funds. In Section 5, I describe the empirical methodology and the data, discuss the results, and present the robustness checks that were carried out to evaluate the sensitivity of the empirical results. Section 6 concludes the investigation with implications for policy.

2 Review of the Literature

There are a number of theories in the economic literature that seek to explain the high repayment rates frequently associated with joint liability lending. Ghatak and Guinnane (1999) summarize the theories by identifying the four major problems joint liability may help institutions to overcome.

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[9] Similarly, the ability of committee members may have contributed to the choice of policies. In this context, more able officers choose the policies as they have better information about the traits that characterize a successful institution. Under this scenario, standard estimates would be biased upward as the officers' ability may be also correlated with repayment.

[10] It seems that the variation in policies is observed only in those cases in which there were two or more possibilities presented in the guideline. For example, in the case of the interest rate the suggestion was to charge a positive interest rate; and in the case of the number of committee members the suggestion was to choose between 10 and 15 people. In these cases, all members of the fund voted to decide the level of the interest rate and the number of committee members in the first fund meeting.

[11] The CDD operates at the province level.

These problems are: (1) to ensure borrowers will use the loan properly or *ex-ante moral hazard* (Stiglitz (1990), Varian (1990), and Banerjee *et al.* (1994)); (2) to ascertain the riskiness of borrowers or *adverse selection* (Sadoulet (1998), Van Tassel (1999), Ghatak (1999), and Armendariz de Aghion and Gollier (2000)); (3) to make sure borrowers will report their true ability to repay once returns are realized or *auditing costs*; and (4) to find ways to force borrowers to repay the loan in case they are reluctant to do so or *enforcement* (Besley and Coate (1995), Armendariz de Aghion (1999), and Laffont and N'Guessan (2001)).[12]

These theories on joint liability take different stands on the role the existing level of social capital among borrowers plays to the performance of group lending. Cassar *et al.* (2007) identifies three categories: (1) theories that focus on the relational aspects of social capital; (2) theories that focus on the informational aspects of social capital; and (3) theories in which social capital plays no role in explaining the performance of group lending.

The first category of theories is based on the view that relational capital promotes trust that other group members will fulfill the terms of the contract; thus, group members have incentives to repay. In the Besley and Coate (1995) model, for example, borrowers decide whether to repay or not after the project returns are realized by comparing the repayment amount with the severity of the official and unofficial penalties for default. It is precisely the possibility of using social sanctions which offers group lending advantages over individual lending. Along these lines, stronger social ties between group members facilitate social sanctions, which results in higher loan repayment rates. Other papers in this category are Stiglitz (1990), Varian (1990), Banerjee *et al.* (1994), and Armendariz de Aghion (1999) which focus on peer monitoring to explain the successful financial performance of joint liability programs. Stiglitz (1990) and Varian (1990) show how peer monitoring induces the right effort or choice of project among borrowers. Banerjee *et al.* (1994) show that a co-signer can monitor her peers more effectively than the lender as she has local information and can impose higher penalties on borrowing members in case of default. Armendariz de Aghion (1999) develops a model of enforcement in which borrowers can verify at some cost the true project return of their partners and impose sanctions in case their partner chooses to default strategically. A common characteristic among these models is that strong social ties facilitate the task of peer monitoring and the ability to penalize in case of default.

Studies in the second category explain the success of joint liability programs in terms of the local information embodied in specific social networks. For instance, Van Tassel (1999) and Ghatak

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[12] In the economic literature, the enforcement problem is also described as strategic default or ex-post moral hazard.

(1999, 2000) discuss the role of peer selection in improving repayment rates by means of mitigating adverse selection. The studies explain how group lending can take advantage of inside information that only borrowers have about each other to attract relatively safer borrowers. Consequently, repayment rates are higher and the outcome is more efficient under group lending than under individual lending contracts.

In the third category of theories the success is merely attributed to the characteristics of joint liability contracts. For example, Armendariz de Aghion and Gollier (2000) develop an adverse selection model in which borrowers are uninformed about their partners, and auditing is costly for the lender. The authors show that group lending can reduce the interest rate as it acts as a cross subsidy between low- and high-risk borrowers. In this way, group lending acts as a risk pooling mechanism; and thus, attracts safer borrowers and induces higher repayment rates relative to individual lending.

The empirical research has lagged behind theoretical work. Moreover, the results of the existing evidence are mixed.[13] Wenner (1995) studies the repayment behavior of 25 groups from a lending program in Costa Rica, and finds evidence that delinquency rate decreases when groups have written rules stating how members should behave. The rules covered measures of screening, monitoring and enforcement activities that take place within the group. Similarly, using data of 146 groups in Madagastar, Zeller (1998) demonstrates that groups with internal rules have higher repayment rates. In addition, the author finds evidence that group performance is positively correlated to social cohesion and to the variance of risky assets of the group members. Wydick (1999) uses data from rural and urban borrowing groups in Guatemala to test the relative importance of social ties, group pressure, and monitoring in explaining repayment performance. His econometric results confirm the evidence that peer monitoring is positively related to repayment performance. However, they also indicate that social ties may create a conflict of interest as it makes more difficult to pressure other group members to repay loans. Paxton, *et al.* (2000) uses data of 140 groups from a lending program in Burkina Faso, and shows that repayment problems are more likely to occur in groups in which members are more homogenous (in terms of their ethnicity, age, gender, income level, occupation, etc.) as they may have lower incentives to monitor and enforce repayment.

Most empirical studies fail to explain their empirical results in terms of the theories on joint liability lending. To address this limitation, Ahlin and Townsend (2007) derive and test the repayment predictions of four major theoretical models, namely Stiglitz (1990), Banerjee *et al.* (1994),

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[13] Hermes and Lensink (2007) summarize the empirical evidence on joint liability group lending.

Besley and Coate (1995), and Ghatak (1999).[14] To test these predictions, the authors use detailed information on 262 groups of the Bank for Agriculture and Agricultural Cooperatives (BAAC) in Thailand. Their findings suggest that cooperation and the degree of joint liability are negatively associated with repayment; while correlation between borrower returns and the strength of social sanctions are positively associated with repayment. In particular, the authors find evidence in support of the model by Besley and Coate in the poorer regions of Thailand, and of the model by Ghatak in the wealthier region.

Only a few empirical studies have investigated the importance of compulsory savings and training in the performance of group lending programs. Results in Wydick (2000) support that training sessions contribute to the performance of group lending; in particular, those training sessions in which members are encouraged to monitor and pressure one another to make timely payments, and to support one another in the event of misfortune. Paxton, *et al.* (2000) also finds evidence that training can lead to higher loan repayment rates. On the other hand, Zeller (1998) finds evidence that savings contribute to improve repayment. The author favors the role of savings in promoting financial discipline and as loan collateral. Wenner (1995) also supports this view.

3 Theoretical Background

The analysis in this paper is motivated by existing theories on joint liability lending. Following Ahlin and Townsend (2007), I focus on four of the best-known and most representative papers in the literature to motivate my empirical work. These papers are: Stiglitz (1990), Banerjee *et al.* (1994), Besley and Coate (1995), and Ghatak (1999). In this section, I briefly describe the repayment implications of these four joint liability lending models using the corresponding extended version of the models developed and tested empirically by Ahlin and Townsend (2007). Accordingly, I focus on the mechanics and intuition behind the repayment implications of each model. Note that not all of the repayment implications that are analyzed in this study correspond to the theoretical results of the original models. Some of these implications are derived in Ahlin and Townsend (2002, 2007). Additionally, to assess the effect of practices such as requiring compulsory savings and providing training to borrowers on repayment, I introduce the variables in the models in a relatively general way. The repayment implications of these lending policies are described in Section 3.5.

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[14] The authors show that some of the repayment predictions differ between models; specifically, they find contradictory predictions for the role of cooperation or social capital; the correlation between the returns of the borrowers; and the degree of joint liability.

In general, the theories that are analyzed below assume that groups consist of two borrowers and that both of them face the same contract terms. Table 1 summarizes the repayment implications of the models.

3.1 Moral Hazard Model of Stiglitz (1990)

The theoretical model by Stiglitz (1990) shows how peer monitoring under joint liability lending can help to mitigate ex-ante moral hazard. In this model, all individuals receive a loan L and choose to undertake a risky or a safe project. If successful, the risky project will yield a return of $Y_R(L)$ with probability p_R, while the safe project will yield a return of $Y_S(L)$ with probability $p_s > p_R$. If a project fails, returns are zero. The model assumes that the safe project yields a higher expected return than the risky project, but it yields a lower return when successful. Individuals maximize their expected utility, where utility is a standard utility function that depends on the net return of the project. Limited liability implies that the lender will get rL from a borrower who succeeds, and zero from a borrower who fails. Thus, limited liability increases the incentives to choose the risky project. To mitigate this problem, the lender offers a joint liability contract in which he gets nothing from a borrower who fails; rL from a borrower who succeeds; and an additional payment qL from a borrower who succeeds and whose partner fails. In addition, the author imposes symmetry in the choice of project and assumes borrowers behave cooperatively; that is, borrowers decide together whether to undertake the safe or the risky project.

Stiglitz (1990) shows the repayment rate decreases with the interest rate and the size of the loan. In both cases, success becomes a less attractive outcome compared to the case in which the project fails; therefore, an increase in the interest rate or in the size of the loan causes the risky project to dominate the safe project. In addition, Ahlin and Townsend (2007) show that the repayment rate is lower for groups with higher degree of joint liability and higher for groups acting cooperatively. First, higher joint liability reduces the payoff of risky and safe projects; however, the reduction in the payoff of safe projects is larger than the reduction in the payoff of risky projects as choosing the safe project implies paying for delinquent borrowers more often and during times in which the returns are lower. Therefore, an increase in the degree of joint liability encourages the choice of risky projects. Similarly, if borrowers do not act cooperatively regarding the choice of the type of the project then both of them have incentives to deviate to risky projects and free-ride on their partner's safe behavior. Hence, when groups do not act cooperatively they choose risky projects more often; this in turn reduces the repayment rate.

3.2 Moral Hazard Model of Banerjee *et al.* (1994)

Banerjee *et al.* (1994) also studies how joint liability lending can help to overcome the problem of ex-ante moral hazard. The authors introduce monitoring and demonstrate how local information facilitates the role of borrowers as monitors since they can impose higher penalties on their peers in case of default. Groups consist of one borrower and one cosigner, who assumes the role of monitor. The borrower receives one unit of capital and chooses a project with probability of success p. The return of the project is a function of the probability of success, and is equal to zero if the project fails. If the project succeeds, the borrower pays the interest to the lender; if the project fails, the cosigner has to respond for the borrower.

As in Stiglitz (1990), limited liability increases the incentives to choose riskier projects. The model assumes the cosigner acts as a monitor and has the ability to penalize the borrower in case she opts for a risky project. The more the cosigner monitors, the less likely she will end up paying back the borrower's loan; however, monitoring is costly. The monitor chooses the optimal project riskiness so as to maximize his payoff. In this context, a higher degree of joint liability increases the benefit from monitoring; and, as a result, repayment rates are higher. This result contradicts the prediction of the Stiglitz model. In addition, Ahlin and Townsend (2007) show repayment rates are lower for groups with larger loans or higher interest rates. Both cases make more attractive to repay the loan less often; so the borrower has incentives to choose riskier projects. Similarly, the authors introduce cooperation in the model and find that repayment rates are higher for groups that cooperate and enforce a joint agreement as long as the marginal cost of penalizing is greater than one; otherwise, the non-cooperative case results in higher repayment rates as it is cheaper for the monitor to enforce a higher probability of repayment.

3.3 Strategic Default Model of Besley and Coate (1995)

Besley and Coate (1995) analyze the borrowers' decision regarding whether to repay the loan or not after the project returns are realized. This decision depends on the cost of repayment (*i.e.* the gross interest rate, r) and the severity of the penalties imposed by the lender and the group or community. In this model, each borrower undertakes a project that requires one unit of capital and yields Y units of income. The model assumes that returns are drawn independently on $[0, \bar{Y}]$ from distribution $F(Y)$; thus, repayment decisions are made non-cooperatively. Under the joint liability contract, if the lender does not receive the full repayment amount from the group, he imposes a penalty on each borrower. Clearly, this feature of the contract introduces interdependence between the borrowers' decisions. It is assumed that the penalty is increasing on the project return; consequently, borrowers

who realize high returns will choose to repay and borrowers who realize low returns will choose to default. The authors identify situations in which there is disagreement in the borrower's decision to repay or not the loan and in which neither borrower is willing to bail out the group; as a result, the group default. They show how unofficial penalties can increase the willingness to repay of the low-return borrower in these situations of disagreement. The severity of these penalties will depend on the partner's desire to repay which is assumed to be proportional to his gain from repayment relative to default.

Besley and Coate's model predicts that repayment rates increase with the severity of official and unofficial penalties, as these penalties raise the cost of default and do not affect the cost of repayment; and that repayment rates decrease with the gross interest rate as this implies an increase in the cost of repayment. The extended model by Ahlin and Townsend (2007) includes cooperation; their analysis shows that repayment rate is lower for groups acting cooperatively if unofficial penalties are greater than the loss of the non-defaulting borrower from default, and vice versa.

3.4 Adverse Selection Model of Ghatak (1999)

As in Stiglitz (1990) and Banerjee *et al.* (1994), limited liability makes borrowing more attractive to risky than to safe borrowers; and thus less profitable to lenders as risky borrowers default more often. Ghatak (1999) analyzes how joint liability lending programs take advantage of local information that borrowers have about each other's projects through self-selection of group members. In this model, a borrower is characterized by the probability of success of her project $p \in \left[\underline{p}, 1\right]$; the type of project is fixed and is observable among borrower, but not to the lender; and the return of a type p project is a random variable which takes two values, $Y(p) > 0$ if successful and 0 otherwise. Also, it is assumed the contract stipules an individual liability component r, and a joint liability component q. Thus, given the limited liability restriction, if the project fails the borrower pays nothing to the lender; however, if the project is successful then the borrower has to pay her own debt plus an additional joint liability payment per member of the group whose project has failed.

Under this economic environment, a borrower has two decisions to make. First, she has to decide with whom to borrow. Ghatak shows that the self-selection process results in homogenous groups, which make the market more attractive for safer borrowers who would otherwise have been excluded from the market. Second, a borrower has to decide whether or not to borrow. The model assumes all borrowers get the same expected return; however, safer borrowers exhibit higher

expected repayment as they succeed more often. Hence, borrowers will choose to borrow if their expected net return is higher or equal to their non-borrowing outside option. This implies that only borrowers riskier than some cutoff risky-type will borrow; and safer borrowers will opt for the outside option. Note that any change that makes borrowing more attractive draws in more safer borrowers, which increases repayment rates.

Ghatak's model predicts that repayment rates decrease with the degree of joint liability, as higher joint liability makes borrowing a less attractive option for safer borrowers. In addition, the repayment predictions of the extended version of the model developed by Ahlin and Townsend (2007) are as follows: first, if borrowers cannot screen other borrowers, the matching process in groups is random; this makes borrowing less attractive to safer borrowers since their projects succeed more often. Second, a higher loan size makes borrowing more attractive relative to the outside option; this attracts a greater number of safer borrowers and, in turn, increases repayment rates. However, the authors note that at large loan sizes, a higher loan size decreases repayment rates. This is explained by the fact that, under diminishing returns to capital, the borrower's marginal product is low; and observing a large loan implies that the borrower's cost of capital is even lower than her marginal product. Since the cost of capital declines with risk, as the loan size increases the pool of borrowers becomes riskier which, in turn, reduces repayment rates. And third, a higher correlation of project returns results in higher group repayment rates. In particular, higher correlation means that if a borrower is successful her partners is more likely to be successful; this makes borrowing more attractive compared to the outside option and more safer borrowers are drawn into the market.

3.5 Policies: Compulsory Savings and Training

In this section, I analyze the effect on repayment of two practices that can be used with joint liability lending to ensure timely repayment. In particular, in light of the joint liability models presented above, I examine the effect of using compulsory savings to secure loans; and the effect of providing training to borrowers to enhance the project's probability of success.

3.5.1 Including a Compulsory Savings Component

Assume the lender requires borrowers to accumulate savings prior to borrowing or during borrowing, and that savings are used to secure loans. In the Stiglitz model, introducing a compulsory savings component decreases the payoff of safe and risky projects, but the reduction in the payoff of risky projects is larger than the reduction in the payoff of safe projects. This is explained by the fact

that choosing the risky project implies defaulting on the loan more often; and, therefore, losing the accumulated savings that are used to secure the loan. Consequently, using a compulsory savings scheme promotes the choice of safe projects; which in turn results in higher repayment rates.

Similarly, in Banerjee *et al* (1994) a compulsory savings scheme increases the incentives to choose safer projects. In this model, the minimum penalty needed to enforce a project with probability of success p decreases by requiring the borrower to accumulate savings. This is because if the project fails, the borrower loses her accumulated savings. A decrease in the size of the additional penalty needed to lower cost reduces the cost of monitoring without affecting the benefit. Hence, using a compulsory savings component increase the incentives of the borrower for performing well which results in choosing more often safer projects.

In the strategic default model of Besley and Coate (1995), requiring borrowers to accumulate savings is similar to increasing official and unofficial penalties. First, official penalties increase as the borrower consequentially loses her savings in case of default. Likewise, unofficial penalties increase as the desire to repay of the borrower's partner increases for the same reason. In both cases, the cost of default increases, while the cost of repayment remains constant. Hence, repayment rates increase when the lender uses a compulsory savings component.

3.5.2 Including a Training Component

Next assume the lender requires borrowers to undergo training on basic financial concepts that may be useful to cope with the managerial aspects of their projects. This educational component may help borrowers to increase their loan productivity. In this way, the effect on repayment of including a training component into the models of joint liability is similar to the effect of borrower productivity analyzed by Ahlin and Townsend (2002). The authors show that the four models predict that repayment rates increase with borrower productivity; thus, including a training component may increase repayment rates. In particular, in Stiglitz (1990) and Banerjee *et al* (1994) the result is explained by the fact that higher borrower productivity increases the payoff of safe projects relative to risky projects. Thus, training may encourage the choice of safer projects.

In the model by Besley and Coate (1995), the effect of training on repayment can be explained by the fact that both official and unofficial penalties are increasing on the project return; hence, a training component increases the cost of default and does not affect the cost of repayment. This in turn results in higher repayment rates. Finally, in the Ghatak model, higher productivity makes the borrowing option more attractive compared to the outside option; this draws safer borrowers into the market and, consequently, results in higher repayment rates.

4 Microfinance in Rural and Urban Thailand

In this section, I provide a brief description of the Village Fund Program, as well as the experiences and characteristics of the funds.[15] In particular, I describe the founding of the funds, and their experience regarding membership, savings and lending services in both rural and urban areas.

4.1 The Village Fund Program[16]

The Village Fund Program is a microcredit project of the government of Thailand, which was created in 2001 when the government agreed to provide one million baht (approximately 22.5 thousand US dollars)[17] to every village and urban community in the country as working capital for a locally run rotating credit organization.

The program is described as one of the government strategies to fight poverty for sustainable development. The objectives are to develop the ability of communities to manage funds; encourage awareness and self-reliance for communities; benefit low-income families; and stimulate the economic performance in the region. Basically, the fund is aimed to be used as star-up capital to develop occupations and target new income-generating activities.

The project was put into effect in approximately 6 months. The government issued the policy before the parliament in February 2001; three months later, the Village and Urban Community Fund Bill was established; and by July 2001, the first set of funds were transferred to organizations to start up the fund. According to official figures, in October 2002 there were 73.8 thousand funds already established which represented about 98.6 percent of the program's targeted communities.[18] Thus, the total initial injection of capital into the economy involved about 75 billion baht, which is approximately 1.8 billion US dollars or 1.5 percent of Thailand GDP. Because of its scale, the Village Fund program is considered one of the most ambitious interventions in microcredit in the world.

The process for a fund to start operations is as follows. First, communities have to set up a local committee to administrate the fund and to decide on the membership, savings and lending

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[15] This information is based on data from the Townsend Thai Project Data Collection; government materials from the National Village and Urban Community Fund office; and informal interviews of committee members of funds and National Village and Urban Community Fund officers in the summer of 2010. Approximately 50 fund committees were interviewed in ChachoengSao, LopBuri, Buriram and Sisaket.

[16] See Kaboski and Townsend (2009) for additional information regarding the program.

[17] In 2001 the exchange rate was about 44.5 baht per US dollar.

[18] Out of the 73.8 thousand funds, 71.4 thousand were founded in rural communities.

policies of the institution. Second, the committee submits an application for the fund to the government. Third, if the application is accepted, the committee has to open an account at the BAAC or at the Government Savings Bank (GSB); and the government deposits the money into this account.[19] Fourth, the committee evaluates the loan applications of members and decides who may borrow and the loan conditions. Fifth, borrowers open an account at the BAAC or the GSB (as applicable) to which the loan is transferred. And sixth, the borrower repays the loan under the conditions that were established by the committee. Repayments are collected by committee members or are deposited directly in the fund's account at the BAAC or the GSB. Once repayments are collected, the committee evaluates the new loan applications and the lending process starts again.

The government distributed manuals describing the program, its goals and regulations to communities through the CDD offices. In addition, the guidebooks included an example of policies to operate a village fund. Kaboski and Townsend (2009) explains that although the policies were shown as an example, it appears, from their interviews, that many committees felt that these suggested policies were fixed regulations for all funds. I had a similar impression during my interviews with committee members of approximately 50 funds, as most of them explained that the policies were set by regulation; this suggests that committee members viewed the policies that were offer as an example as a requirement of the government to actually participate in the village fund program. This subject will be discussed in more detail in the next section.

According to the regulation, the fund committee is chosen in a meeting in which at least three of four households in the community must be present. The committee should have between 10 and 15 members; and a similar ratio of male and female must be considered during the committee selection. In addition, committee members must have been living in the area for at least two years and must be at least 20 years old.[20] The term of service is two years, but members can be reelected by the majority of the fund members.[21] Local funds have freedom in governing their finance and business decisions. The role of the government is merely to supervise the funds and provide guidance. In particular, the funds have some discretion in setting the terms of the loan such as the interest rates, the length of the loan, and the loan size. However, funds must charge a positive interest rate; all debts must be paid within a year; and loans must not be over 20,000 baht ($449 in 2001 US dollars). Only under special circumstances a loan may be over 20,000 baht, but not more

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[19] The BAAC operates only in rural and semi-urban areas; while the GSB operates mostly in urban areas.

[20] The regulation also mentions committee members must be ethical; never have been imprisoned or convicted of a crime; never have been fired from a job; must exercise on a regular basis their democratic rights; and must not be involved in any political activity.

[21] However, a committee member may only serve for two consecutive terms.

than 50,000 baht ($1,123 in 2001 US dollars). In addition, it is recommended to require each loan applicant to present at least two guarantors for the loan.

To encourage improvement, village funds are awarded additional grants based on performance which is evaluated using an array of efficiency and social criteria. In 2005, for example, funds that were rated as excellent managed funds (or AAA) were awarded 100,000 baht ($2,483 in 2005 US dollars). Similarly, in 2009 the government announced an additional award for village funds with good performance records that are registered as a juristic person under Thai law. In this case, the size of the award is determined by the number of members in the fund and ranges between 100,000 and 300,000 baht (this is, between $2,900 and $8,700 in 2009 US dollars).

Furthermore, successful village funds have the option of getting a loan from the BAAC or the GSB to increase financial access in their communities. The size of these loans is determined by the lender based on their own evaluation criteria. Nevertheless, only a small number of funds have taken this option as it seems committee members must guarantee the loans.[22]

The plan for the village funds is to gradually develop into community banks. The purpose of this expansion is to offer people an institution they can trust with their money; promote public and community welfare; and promote financial discipline. The National Village and Urban Community Fund Office indicated there are some village funds that have already developed as community banks, but the number is small. The project is still in its test phase.

4.2 Description of Village Funds

Most of the funds started operations within a year of the announcement of the program. Before the funds were established, formal sources of credit were limited in rural communities. There were more financial options in urban areas, but households had limited access to credit mainly because of the lack of collateral. According to figures from the Townsend Thai Data, the most common institutions providing financial services before the village fund program were BAACs, agricultural cooperatives, GSBs, and commercial banks. A number of respondents in the surveys mentioned they had to rely on their family members; use their savings; or borrow money from non-relatives or moneylenders because they could not secure a loan from a formal source of credit.

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[22] A number of committee members mentioned that the original one million baht was not enough to cover the financial needs of people in the community, but they did not want to get a loan from the BAAC or the GSB because of the risk of going bankrupt.

The policies chosen by the village funds are described in further detail below. Table 2 shows the proportion of funds in both rural and urban areas that make use of each of the policies. It is important to mention that some of the policies were stipulated in the rules and regulations issued by the National Village and Urban Community Fund Committee on the establishment and administration of the village fund in 2001; while other policies were set by the village funds themselves, based on examples from printed materials or from suggestions from CDD officers.[23]

4.2.1 Training

The vast majority of village funds organized training sessions for officers at the time of foundation, whereas only some of them offered training for members. In most cases the training was given by CDD officers from the district or subdistrict level. Moreover, some funds offered additional training for officers and/or for members in the subsequent years of operation.[24] The objective of training sessions is to teach borrower about the rules and policies regarding late payment and ways to avoid loan repayment problems. The sessions are generally short, between one and three days; and they include topics such as basic accounting; loan management; strategies for savings and investment; and the advantages for the community of the institution.

4.2.2 Membership

In general, village funds are small in size. According to official figures, the average number of members is 99.[25] In principle, any adult living in the village is eligible for membership; thus, it is common to observe households with multiple village fund members.[26]

Funds have different policies in place that address issues surrounding effective recruitment. For instance, to get information on applicants some funds use membership application forms and/or interviews;[27] to select new members they use different criteria to evaluate the applicants such

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[23] As it was noted above, from interviews, it seems people felt the policies that were suggested in materials distributed by the government were part of the regulation.

[24] About 100 percent of funds provided training to officers at the time of foundation, while only 46 percent provided training to members. Similarly, approximately 92 percent of funds provided additional training to officers, while only 35 percent offered additional training for members.

[25] On average funds in rural communities started with 94 members, while funds in urban communities started with 132 members. The median initial number of members in rural and urban communities was 83.5 and 101.5, respectively. In rural areas, the smallest fund had 50 members, while the largest one had 275. In urban areas, the smallest fund had 43, whereas the largest one had 544 members.

[26] However, members from the same household cannot guarantee each other.

[27] The funds that do not interview applicants mentioned they know all the applicants and get the information they need in the application form.

as the applicant's expected amount of savings, or her occupation; and to pay for any administrative cost some of them charge a fee to applicants or a fee to members.[28] Table 2 shows that the vast majority of funds screen applicants either by using a membership application fund or by using interviews as a screening device (92 percent in rural areas and 98 percent in urban areas). The funds that do not screen members mentioned that committee members know all people in the community; in addition, these funds charge an application fee which can serve as a screening device. Similarly, most of the funds charge a fee to cover their administrative cost (95 percent of funds in rural areas and 98 percent of funds in urban areas).

4.2.3 Internal savings

In rural areas, around 70 percent of funds offered savings facilities to its members at the time of foundation, while in urban areas 98 percent of funds did. Funds only accept cash deposits, and the savings services they offer are pledged savings accounts. This type of savings required the agreement of members to deposit a certain amount of money on a specific date; pledge savings are generally required on a monthly basis. In addition, some funds required members to buy shares only one time when they open their account with the fund.[29] None of the funds offer flexible savings account to members; therefore, if a fund offers saving facilities then the number of savers in the fund is equal to the number of members. Table 2 shows that 61 percent of funds in rural areas and 53 percent of funds in urban areas use a compulsory savings scheme; while 28 and 44 percent of funds, respectively, require members to buy shares when they open their account with the fund.

The median total initial savings deposits in the funds were around 9,400 and 12,100 baht ($211 and $272 in 2001 US dollars) in rural and urban areas, respectively; finally, the median initial savings deposits were approximately 100 and 122 baht ($2.2 and $2.7 in 2001 US dollars) in rural and urban funds, respectively.

4.2.4 Internal lending

All funds provide lending facilities to its members since the year they started operations. The loans are made in cash, and non-members are not allowed to borrow from the fund. By regulation, members are required to fill in an application loan;[30] the committee cannot approve loans of more

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[28] The average fee to applicants and to members is 30 baht (or $0.67 in 2001 US dollars).

[29] The average total share value is 100 baht ($2.25 in 2001 US dollars).

[30] Table 2 shows that 100 percent of the funds in rural and urban areas screen loan applicants either by using a loan application form (as it is required by regulation) or by interviewing loan applicants. Note that only half of the funds in

than 20,000 baht ($449 in 2001 US dollars);[31] the committee must charge a positive interest rate; and the loan term must not exceed one year. Fund committees have the freedom to determine the rest of the conditions of the loans. According to the Townsend Thai Data Collection, the average size of loans is 15,500 and 17,700 baht in rural and urban areas, respectively; the average interest rate is 7 percent in rural areas and 8 percent in urban areas; the average loan term is 12 months; and payments have to be made once a year at the end of the loan term.

Another suggestion is to require each loan applicant to present at least two guarantors for the loan, who have to be also members of the fund. In general, this is a practice that most of the funds follow.[32] Fund committees generally approve all loan applications, but they use a variety of criteria to determine the terms of the loan contract. The most common decisive factors are the purpose of loan; the ability to repay; the occupation; and the amount of savings in the fund (see Table 2). Finally, in addition to the regular loans for income generating activities, some funds offer emergency loans (only 38 percent of rural funds and 34 percent of urban funds).[33]

5 Empirical Analysis

In this section I describe my empirical results from data on household loans from a joint liability program in rural and urban communities in Thailand. In Section 5.1 I present the estimation methodology. Section 5.2 describes the data and the resulting dataset I use in the empirical analysis. Section 5.3 presents the estimation results. In Section 5.4, I report the robustness checks carried out in order to evaluate the sensitivity of the empirical results reported in the previous section. Finally, in Section 5.5, I discuss some empirical concerns.

5.1 Empirical Specification

The empirical analysis is motivated by the theoretical predictions about repayment behavior under joint liability lending presented in Section 3. The analysis focuses on investigating whether or not

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urban areas interview applicants; the reason committee members gave for this is that all information they need is already in the loan application form and that they know all of their applicants because they are members of the community.

[31] The regulation stipulates that special loans can be larger than 20,000 baht, but cannot be more than 50,000 baht.

[32] Both the Townsend Thai Data Collection and the interviews suggest that at least all surveyed funds follow this practice.

[33] Emergency loans are of smaller size than regular loans -the average size is 4,700 baht ($106 in 2001 US dollars). Funds also require members to present two or more guarantors for this type of loans. Emergency loans are generally authorized for a five-month period; and payments are usually scheduled as to be made every month or just as a one-time payment at the end of the loan term.

social ties and a number of institutional characteristics and policies are associated with the repayment behavior of borrowers under joint liability loan contracts. I analyze two different repayment outcomes: one is the incidence of repayment and the other one is the severity of default.

I define default as the inability to comply with the terms of the loan. Thus, a loan is considered to be in default when payment has not been made in full after the maturity date. Using this description, repayment is defined as a binary indicator (not in default/default); and the incidence of repayment is estimated by means of probit models. As a starting point for the analysis of the panel dataset on household loans, I consider a pooled cross-section probit model. Accordingly, the probability of repayment can be written as

$$P(R_{ijt} = 1) = \beta_1' \, Social \, Ties + \beta_2' \, Policy + \gamma' X + \theta_t + \theta_R + \varepsilon_{ijt}$$

where R_{ijt} is the repayment outcome of household i to village fund j at time t; *Social Ties* is a set of variables that measure the strength of social ties; *Policy* includes a set of dummy variables indicating whether a village fund uses a policy or not; X includes a set of variables that measure observable loan, household, institutional and community characteristics; and θ_t and θ_R denote time and region fixed effects (namely, province- and subdistrict-specific fixed effects).

Repayment behavior is also measured as the severity of default, which is defined as the time period a loan has been in default. In this case, I use a pooled OLS regression to estimate the effect of social ties, policies and the vector of explanatory variables X on the severity of default. The specification includes the variables listed above, as well as time and region fixed effects.

5.2 Data

The empirical analysis is based on a novel panel dataset constructed from the Townsend Thai Data Collection. In particular, I use household, institutional, and community level survey data for rural and urban communities in Thailand.[34] The initial surveys were conducted in 1997 in rural areas, and in 2005 in urban areas; however, both surveys include retrospective information. Follow-up surveys

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[34] The household survey provides an extensive and detailed array of socioeconomic and demographic information such as household composition; education and occupation history; household, agricultural and business assets; land holdings; income and expenditures; financial activity involving borrowing, lending and saving; and organizational involvement. The institutional survey includes information on the policies used by the funds; their experiences regarding membership, savings and lending; the characteristics of the officers of the funds, including schooling level, occupation and experience; and the internal structure of the institution. Finally, the community-level survey is administered to the village headman to get information on the general characteristics of the community. Among other things, it includes information on settlement, population and migration; the history of institutions and organizations; and the status of the transportation and communication systems.

have been carried out every year until 2010. The surveys covered two distinct regions of Thailand: the fertile and industrialized Central region and the semi-arid and relatively poor Northeast. There were four provinces chosen within these two regions: LopBuri and Chachoengsao in the Central region; and Sisaket and Buriram in the Northeast region. Figure 3 shows the geographic location of the four provinces included in the survey. Within each of the provinces, 32 communities were selected: 16 in rural areas and 16 in urban areas. Hence, there are 64 rural and 64 urban communities included in the surveys. An important characteristic of the selected communities is that each of them received one million baht under the Village Fund Program. Figure 4 shows the geographical location of the surveyed communities. Finally, within each of the 128 communities, 15 households were selected at random. Therefore, the household survey was administered to 960 households in rural and 960 households in urban areas every year since the year of the initial survey.

The panel dataset includes information on all household loans from the village fund, which represent 42 percent of the total number of loans in rural areas; and, 70 percent of the total number of loans in urban areas.[35] The rural sample includes household loans from 2003 to 2010, while the urban sample includes loans from 2005 to 2009. In total, there are 4,796 and 2,498 loans in the rural and urban samples, respectively. The variables used in this study are described in further detail below. Unless otherwise noted, variables are constructed using data from the household survey. It is also important to note that the data does not identify members of borrowing groups; hence, the relevant group variables are constructed at the fund level and not at the group level. The summary statistics for the entire rural and urban samples are reported in Tables 3 and 4. In addition, Tables 5 and 6 report the summary statistics of time varying variables in the rural and urban samples, respectively.

There are two dependent variables analyzed in this study. One is *repayment* which is a binary variable that equals one if the borrower pays the loan before or by the maturity date and zero otherwise. The other, is *months in default* which is the number of months the borrower has been late in repaying the loan. The latter variable provides additional information about the severity of default. Figure 1 shows the repayment performance by year in rural and urban areas. Note that borrowers in urban areas are more likely to default on a loan than borrowers in rural areas.

The role of social ties is investigated by looking at indicators of cooperation, and official and unofficial penalties in the communities. First, cooperation is measured by two different variables: *best*

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[35] Beside the village fund, the more common formal sources of credit are BAACs, Production Credit Groups (PCGs), agricultural cooperatives, commercial banks, and poverty eradication programs; and the more common informal sources of credit are relatives, neighbors and moneylenders.

cooperation and *sharing with people*. The variable *best cooperation* represents the percentage of households in the subdistrict that voted for the community as the best community in the subdistrict in terms of cooperation among people. To avoid partiality in people's judgment, I exclude the votes of households choosing their own community as the best community in the subdistrict. Households in the rural sample voted in 1997, before the fund program was established; accordingly, the proxy measure for cooperation is plausibly exogenous to repayment behavior. The variable *sharing with people* is an index constructed with information from the household survey. The index equals the number of positive responses to twelve yes-or-no sharing questions, which investigate whether or not the household helps or receives help from relatives or/and non-relatives in terms of work equipment, free labor, or money.

Following Ahlin and Townsend, I measure official and unofficial penalties using two community-level variables constructed from household data. Official penalties are proxied using the variable *best institutions* which represents the percentage of households in the subdistrict that voted for the community as the best community in the subdistrict in terms of availability and quality of institutions.[36] Unofficial penalties are measured by the variable *social sanctions* which is the percentage of loans in a community in which the borrower indicates that in case of default she would not be able to access credit not only from the actual lender, but also from alternative sources of credit in the community.

The peer monitoring variable indicates the extent to which group members can acquire information about each other. Following the argument that the cost of monitoring members decreases if they undertake the same economic activity, I use the variable *similarity in occupations* to proxy for peer monitoring. The variable is defined as the probability that two members selected at random from the same village fund have the same occupation. In principle, the more homogenous the group of members of the fund in terms of occupation, the easier it is for them to monitor each other.

The degree of joint liability variable reflects the likelihood that members of the group end up paying for a delinquent borrower. I use the percentage of members in the fund that owns no land as a proxy variable for the degree of joint liability. The hypothesis is that the higher the percentage of members that are landless in the fund, the higher the likelihood a borrower may end up paying in case his partner defaults on the loan. In urban areas, I also use the percentage of members that own no house in the fund to proxy for the degree of joint liability.

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[36] This variable is also constructed using data from the original baseline surveys which in rural areas were conducted before the program was implemented.

The contract terms include the annual interest rate and the size of the loan. The variable *interest rate* is calculated using information on the loan amount, the loan term, and the total payment amount that is due at the end of the loan term. The *LN loan size* represents the natural logarithm of the loan amount.

The institutional policies that are analyzed in this paper are: (i) the use of a compulsory savings component; and (ii) the requirement for borrowers to attend a training session before loans are disbursed. I use two dummy variables to indicate whether a fund uses the institution policy or not; these variables are constructed using information from the institutional survey. The *compulsory savings* dummy variable is equal to one if the fund requires members to save a fixed amount of money every year, and zero otherwise; and the *training* dummy variable is equal to one if the fund requires borrowers to attend a training session in which CDD or BAAC officers cover basic accounting and financial concepts, and loan management practices; and talk about the advantages for the community of having a healthy financial institution.

The community-level controls include information on the community average land, schooling level, wealth and variability of income. First, *average land* is the average amount of land per household in rai.[37] Second, the *average schooling* variable is the average number of years of schooling of the household heads in the community. The number of years of schooling is constructed using information on the highest grade completed and the education track chosen by the individual.[38] Third, the *average wealth* is calculated as the average wealth of households surveyed in the community. Household wealth is constructed using detailed information on all household, agricultural and business assets a household owns in a given year, as well as its land holdings.[39] And the average variability of income in a community is measured by the *average risk* variable. To compute this variable, I use household information to construct the coefficient of variation of income for all households in the sample, and calculate the community average.

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[37] One rai is equivalent to 0.395 acres.

[38] The schooling system in Thailand offers both academic and vocational tracks. The academic track is divided into primary education (P1 – P6); secondary education (M1 – M3); and high school education (M4 – M6). Students who choose the academic track have the option to pursue a bachelor degree after completing their high school education. The vocational track is similar to the academic track, except that students have to attend vocational upper secondary schools after completing their secondary education. This track offers students two options: to get a technical education certificate (PWT1 – PWT2) or to get vocational high school education (PWC1 – PWC3). Students who opt for vocational high school education can get a higher vocational education certificate (PWS1 – PWS3) after completing the PWC3 grade; and a bachelor degree (in two years) after completing the PWS3 grade. This schooling system has been in place since 1978.

[39] It is assumed that household, agricultural and business assets depreciate at a 10% rate.

In addition, I include two variables to measure outside borrowing opportunities in the community: *PCG membership* and *bank membership*. These variables indicate the percentage of household surveyed in the community who are members of a Production Credit Group (PCG) or a commercial bank, respectively.[40] Controlling for official and unofficial sanctions, more outside borrowing opportunities could result in lower repayment rates.

Finally, household-level controls include information on the head of the household such as gender, age, age squared, years of schooling, a dummy variable indicating the relevant schooling system, and a set of dummy variables indicating the role of the head in the job.[41] In addition, I include controls for household wealth, BAAC membership, and the variability of household income.

5.3 Results

The empirical results are presented in Tables 7 to 12. Tables 7 to 9 show the marginal effects on the probability of repayment in rural and urban communities; while Tables 10 to 12 show the pooled OLS estimates of the severity of default. The rural sample includes around 4,800 loans between the years 2003 and 2010, while the urban sample includes about 2,500 loans between 2005 and 2009. All regressions include year and province fixed effects. Additionally, to focus on within-subdistrict variation, I include specifications with subdistrict dummies. In Tables 8, 9, 11 and 12, regressions [4] to [8] include community-level controls; and regressions [5] to [8] include household-level controls. Standard errors are clustered at the community-year level.

First, I analyze the empirical results presented in Tables 7 to 9. I use two variables to proxy cooperation among people in the community. One is a the net percentage of households in the subdistrict naming the community best in the subdistrict in terms of cooperation among people and the other is a measure of sharing among related and unrelated people in the community. These two measures of cooperation can be interpreted as the opportunity of people to costlessly enforce agreements in their community. The community cooperation poll shows a positive relationship with repayment, but this relationship is only significant in rural areas. The relationship between the measure of sharing and repayment is not significant. In general, these results seem to favor the Stiglitz model as they indicate a positive relationship between cooperation and repayment rates. He indicates that borrowers acting in a cooperative way tend to choose safe

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[40] Production credit groups are locally-run organizations that promote saving habits and offer lending services at the community level. PCG loans are usually smaller than 10,000 baht and are granted for a 2-, 6-, or 12-month period. The loan interest rate is relatively higher than the interest rate charge by Village Funds.

[41] The categories for the type of worker in the job are: inactive, unpaid family worker, employee (daily or monthly wage, or piece rate), government worker, and business owner. The business owner type is used as the reference category.

projects over risky projects more often, which in turn results in higher repayment rates.[42] Hence, communities in which people behave in a cooperative way may choose to repay more often rather than default on a loan (assuming the pressure to repay and/or the penalties for defaulting on a loan are constant). Additionally, note that both official and unofficial penalties seem to be good predictors of repayment, especially in rural areas. Ahlin and Townsend (2007) find a similar result regarding the effect of penalties on repayment to the BAAC in rural areas. These results confirm the role of penalties in the Besley and Coate model. The fact that the community cooperation and quality of institutions polls are constructed using information from the original baseline survey in 1997 in rural areas suggests that those communities that were rated as the best communities in the subdistrict in 1997 are the ones which have the hither repayment rates. Accordingly, this suggests that households in rural areas may have some information about local conditions which varies across communities and predicts success and failure of the program.

Also, note that the evidence does not support results in Banerjee *et al.* model regarding the cost of monitoring. The proxy for peer monitoring is negatively associated to repayment in the rural sample; and positively associated but not significant in the urban sample. The argument for using a measure for similarity in occupations to proxy peer monitoring is that the cost of monitoring members decreases if they undertake the same economic activity. Perhaps this proxy variable does not capture the ability of people to obtain information about their peers especially if their workplaces are located far away from one another. As an alternative, I use the percentage of relatives in the community and find that the relationship with repayment is positive but not significant.[43] In contrast, Ahlin and Townsend find some evidence in favor of Banerjee *et al.* model.[44]

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[42] These results are not in line with previous results by Ahlin and Townsend (2007) regarding the effect of cooperation on repayment to the BAAC in rural areas. Perhaps the reason is that people perceive differently the role of the BAAC and the village fund in the community. During the interviews, it was common to hear committee members (especially in rural areas) say that the village fund belong to the community; that it was their only affordable source of credit; and that they were aware that if the fund failed they were not going to receive any further assistance from the Thai government.

[43] This result is not shown in the paper but is available upon request.

[44] The authors use two different variables to proxy the cost of monitoring: one is the percentage of group living in village which they find is positively associated with repayment; and the other is the percentage of members with a relative in the group which they show is negative associated with repayment.

The degree of joint liability is proxied as the landless fraction of members in the fund. In both, rural and urban areas, it has a significantly negative effect on repayment.[45] Also, note that the effect seems to be stronger in urban communities. In rural areas, a one percentage point increase in the fraction of landless members in the fund decreases repayment in about 0.07 to 0.08 percentage points; while in urban areas, a one percentage point increase in the fraction of landless members in the fund decreases repayment in 0.17 to 0.28 percentage points. These results are consistent with the Stiglitz and Ghatak models. In the Stiglitz model, higher joint liability lowers the payoff of both the safe and risky projects; however, the payoff under the safe project is hurt more than the payoff under the risky project as it implies paying for delinquent borrowers more often and during times when returns are lower. Therefore, an increase in the degree of joint liability encourages the choice of risky projects and decreases repayment. In the Ghatak model, higher joint liability makes borrowing a relatively less attractive option relative to the outside option; and thus, safer borrowers decide to stay out of the market.

To analyze the use of compulsory savings and training components on repayment rates I include two dichotomous variables that indicate whether a loan is granted under the policy or not. In both, rural and urban areas, these policies seem to positively predict repayment.[46] These results seem to confirm the predictions of the extended models analyzed in this paper. First, it is assumed that compulsory savings increases the burden of default on the loan as the amount of savings can be used as collateral in case of default; because of this, compulsory savings is expected to increase repayment. Second, it is assumed that providing information to borrowers on the terms of the loan or the benefits of the fund, or offering training on basic accounting and administrative concepts may result in an increase in the project's return in case of success.[47] An empirical concern with these results is the possibility that intrinsic socioeconomic differences across communities may have contributed to determine the lending policies that were actually implemented by the funds. In this situation, the estimation results would be biased. In Section 5.5, I discuss in more detail this potential endogeneity problem.

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[45] This result holds even after controlling for the average land area in the community. In addition, in urban areas, I also proxy the degree of joint liability as the fraction of members in the fund that own no house. The variable also shows a significant negative effect on repayment.

[46] These results remain robust even after controlling for the average schooling level and wage of the official of the fund; the average schooling level in the community; and the schooling level of the borrower.

[47] This increase in output can be explained either by a reduction in the time spend to administrate the loan or by an increase in effort after experiencing the benefits of repaying and maintaining a good status in the fund.

In all regressions, the coefficients of the interest rate and the size of the loan are not significantly different from zero. Of the community-level control variables, the average schooling level in the community exhibits a significantly positive correlation with repayment in rural communities, but not in urban communities. Moreover, commercial bank membership is negatively correlated with repayment in urban areas. This last result is consistent with Ghatak story, as it seems that having more outside options makes loans from the village fund relatively less attractive (keeping the degree of joint liability constant), which drives out of the market the safe type borrowers. In addition, note that there is evidence that community income variability predicts higher repayment in both rural and urban communities (even after controlling for the household income variability). The relationship is also positive and significant when the average variability of income of fund members is considered. These variables can be viewed as a measure of diversification in income and occupational activities among members of the fund. In this way, the positive and significant relationship with repayment can indicate that as the variability of income in the community (or in the fund) increases the portfolio of the fund is diversified and less vulnerable to covariate shocks.[48]

Of the household-level control variables, the gender of the head of the household, BAAC membership, and variability of income exhibit a robust correlation with repayment in rural areas.[49] Similar to other studies, the estimation results suggest that repayment is higher for households with a female head. The same relationship holds true for households with membership to the BAAC; perhaps because there is a strong link between village funds and BAACs in rural areas, so defaulting on a village fund loan reduces access to credit from the BAAC. Finally, the coefficient of variation of household income is negatively correlated with repayment; this result only confirms that risky borrowers default on a loan more often.

Using pooled OLS regression analysis, the empirical results on the severity of default confirm those on repayment behavior (see Tables 10 to 12). I find a significant negative association between the community cooperation poll and the number of months the loan has been on default in rural areas, but not in urban areas. The proxy for official and unofficial sanctions also shows a negative significant relationship with the severity of default in both rural and urban areas (see Table 10); however, once I include the community-level controls only the estimate for social sanctions remains robust (see Tables 11 and 12). This result again supports the Besley and Coate story about

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[48] Zeller (1998) finds a similar result. He shows that repayment rates of group-lending schemes significantly improve with an increasing variability of risky asset holdings among members. The author argues that his results indicate that groups exploit scale economics of risk by pooling risks and by entering into informal insurance contracts.

[49] The coefficients of these variables exhibit the similar signs for the urban sample, but are not significant. These results are not shown in Tables 8 or 9, but are available upon request.

the role of social sanctions. Thus, even that it may be difficult for a microfinance institution to apply sanctions against delinquent borrowers because of the lack of collateral, there can be strong social sanctions against those who default if social ties among members are strong enough; as a result, social ties ameliorate the enforcement problem. The compulsory savings and training variables show a negative and significant relationship with the number of months in default (with the exception of the coefficient of training which, once I include community and household controls, is not statistically different from zero in the rural sample).

Note that the degree of joint liability predicts a greater severity of default in both rural and urban communities. The estimated coefficients indicate that a ten percentage points increase in the degree of joint liability increases in 3 to 5 days the number of days a loan is in default in rural areas; while it increases in 22 to 47 days in urban areas. Furthermore, the variability of income exhibits a significant and negative relationship with the severity of default in urban areas. The estimate indicates that a one percentage point increase in the average risk of the community decreases severity of default in 4 to 6 days.

In summary, the empirical results indicate that repayment increases with cooperative behavior as in the Stiglitz model; and with the strength of official and unofficial sanctions as in the Besley and Coate model. This in turn suggests that social ties play a central role in explaining performance under joint liability lending. Moreover, repayment decreases with the degree of joint liability in both rural and urban communities as the Stiglitz and Ghatak model predict. The findings further indicate that the use of compulsory savings and training components with joint liability are good predictors of loan repayment in rural and urban areas. And finally, an interesting finding in this study is the effect of the variability of income among members on repayment behavior as it seems that it improves repayment rates.

5.4 Robustness Checks

In this section I report the robustness checks that were carried out in order to evaluate the sensitivity to the empirical results reported in the previous section. Tables 8 and 9 report the estimation results of different specifications that, in addition to year and province fixed effects, include subdistrict fixed effects and a set of community- and household-level control variables. These inclusions do not affect much the estimation results. Additionally, Appendix Tables 1 to 3 report the estimation results of a number of robustness checks that were performed using the rural and urban samples, respectively. I describe these below.

First, instead of using the probit model, I use the linear probability and the logit model to estimate the effect of the explanatory variables on repayment. Regression [1] reports the estimates using the linear probability model, while Regression [2] reports the estimates using the logit model. The signs of the relevant variables are not affected, but some coefficients lose significance. The coefficients that lose significance using the linear probability model are the ones for the variables that measure penalties for default, joint liability and training in rural areas; and social sanctions in urban areas. Using logit regressions, the coefficients that lose significance are the coefficients for the joint liability variable in rural areas, and for the social sanctions variable in urban areas.

Second, I include a set of controls to capture the level of development of the community. These variables are the number of households; the distance to the main road; the fraction of households with electricity; the fraction of households with telephone; the fraction of households with television; and the fraction of households in rice farming. In general, the signs are consistent with the results reported in the previous section, but the coefficients for the proxy variables for penalties for default and joint liability lose significance in rural areas (see Regression [3]).

Third, I add two variables to control for the characteristics of village fund officials. These variables are the average schooling level of committee members and the amount of money they get paid for administering the fund (see Regression [4]). Fourth, I added a set of dummy variables to control for the actual use of the loan (see Regression [5]). In both cases, the results are robust for the rural and urban samples.

Fifth, I use an alternative proxy for joint liability. Instead of using the percentage of landless households in the fund, I use the percentage of households in the fund that owns no house (see Regression [6]). The estimates are significant in both the rural and urban samples.

Sixth, I assess the robustness of the results to the definition of default. In particular, I define repayment equal to one if the loan was paid within 30, 60 or 90 days of the maturity date. These results are presented in Regression [7] to [9], respectively. The empirical results show consistent signs, but some of them lose significance.

Finally, to focus on within-community variation, I include community-specific fixed effects. In this latter case, it is not possible to estimate the effect of cooperation or best institutions because the variation of these variables is only at the community level. Appendix Table 3 shows the estimated coefficients of the policies under this specification. It is worth to notice that the estimated coefficients for compulsory savings and training are robust across the different specifications, but there are some exceptions for the coefficient of training in rural areas.

5.5 Empirical Concerns

The study has some limitations that need to be taken into account when interpreting the estimation results. However, these limitations can be seen as fruitful avenues for future research under the same topic. First, the Village Fund Program is not a universal program. The number of members of the fund is relatively similar to the number of households in the community, but not all the members apply for loans. Village fund clients are more educated and richer than the typical household in rural areas; and less educated and poorer than the typical household in urban areas. However, this investigation does not attempt to explain the determinants of borrowing decisions among members. Instead, it takes as given the selection of households into the program. Clearly, this assumption can be relaxed in future studies.

Second, an empirical concern associated to standard estimation methods is the possibility that intrinsic socioeconomic differences across communities in the sample may have contributed to determine the policies that were implemented by the funds. Under this scenario, the relationship between repayment behavior and policies would be explained by an omitted variable that is unobserved by the econometrician but not by the members of the fund. One possibility is that policies are chosen by funds precisely because committee members have additional information about the quality of potential borrowers in the community which indicates people would not make reliable borrowers. Hence, they choose certain policies to screen members and to strength the discipline and knowledge of potential borrowers. Note that the quality of borrowers may be correlated not only with the choice of policies, but also with their repayment behavior; thus, standard estimates would be biased downward. Another possibility is that the ability of committee officers may have contributed to the choice of policies; that is, more able officers may have better information about the set of policies that can be used to start and run a successful local organization. Note that committee members' ability may be also correlated with repayment behavior; thus, standard estimates would be biased upward.

From interviews conducted during fieldtrip in Thailand, it seems that intrinsic socioeconomic differences across communities did not play a fundamental role in determining the policies chosen by the funds. Committee members mentioned that at the time of foundation they got a set of manuals from the Thai government describing the program and the regulation; and in order for them to apply for the fund, they had to follow a list of requirements that was included in the manuals. This was a common story in all the interviews. In fact, it seems that the variation in policies is observed only in those cases in which there were given two or more

possibilities; or in those cases in which the suggestion was over a wide range of alternatives (as in the case of the interest rate or the number of committee members). For instance, the sample guideline recommended the use of co-signers to guarantee loans. The data shows that all surveyed funds follow this option as there was no other alternative. The sample guideline also suggested the use of a membership application form and charging a fee to applicants or members; most of the funds followed these policies (see Table 2). In the case of savings the guideline suggested to offer savings services, and two different terms were used to describe the products that they could offer: pledge shares and pledge savings. In general, all the funds in the sample decided for either one of these products or for both of them based on the way they interpreted the "regulation". However, the way the funds implemented the policy varies across funds. In addition, there were cases in which committee members mentioned that they did not include either product because they did not have to do it as there was already another institution providing savings facilities in the community. This suggests that the differences in policy choices are explained at some extent by the way in which committee members interpreted the sample list of policies. Under this scenario, the endogeneity problem may not be particularly severe. In any case, further investigation can help to assess the magnitude of the problem. These limitations must be taken into account when interpreting the results in this investigation.

6 Conclusions

This paper uses a novel panel dataset on household loans from the Village Fund Program in rural and urban communities in Thailand to investigate how social ties and the use of policies such as compulsory savings and training contribute to explain successful lending practices under joint liability to individuals with limited access to formal financial markets. Specifically, the panel dataset is constructed using household, institutional and community-level annual data from the Townsend Thai Data Collection, which is one of the longest panel data in developing countries and is characterized by its high level of detail. Successful performance is defined in terms of repayment rates. This investigation differs from other empirical studies that analyze repayment behavior under joint liability lending in four important ways: (i) it uses a panel dataset on household loans from the microfinance program; (ii) it uses a sample of households in rural communities and a sample of households in urban communities; (iii) the proxy variable for social cohesion is constructed using information from the baseline surveys which in the case of the rural sample is conducted before the program started; thus, the proxy measure for social cohesion is exogenous to repayment behavior in

rural areas; and (iv) the data shows wide variation in the use of the policies that are analyzed in this study.

The empirical analysis is motivated by the repayment predictions of existing theories on joint liability lending. The central findings of this investigation are consistent with the predictions of some of these models. The results suggest that repayment is positively associated with cooperative behavior in rural areas as predicted by the Stiglitz model; and with the strength of social sanctions in rural and urban areas as predicted by the Besley and Coate model. Both cooperative behavior and the ability to use social sanctions are common in environments in which social cohesion is strong. In this context, these findings suggest that social ties play a central role in explaining performance under joint liability lending. The findings also point out that the use of a compulsory savings or a training component with joint liability lending is positively correlated with repayment. From the perspective of the microfinance institution, the benefits of including these practices into the design of the program are many. For example, the amount of accumulated savings can serve as loan collateral; and training can be used for capacity building so as to enhance the loan productivity.

Moreover, there is evidence that repayment decreases with the degree of joint liability in both rural and urban communities as the Stiglitz and Ghatak model predict; and with the availability of formal sources of credit in urban communities as in the Ghatak model. Finally, an interesting finding in this study is the positive relationship between the average variability of income among members of the fund and repayment in both rural and urban areas. Perhaps this suggests that the more diversified the portfolio of the fund the less vulnerable to covariate shocks.[50]

The descriptive analysis of the founding and the organization of the funds, and the econometric analysis of the repayment performance of village fund clients in rural and urban communities lead to a number of conclusions for the design of microcredit programs and for the type of services provided by financial institutions. First, the evidence suggest that joint liability lending may prosper in areas in which social ties are strong enough to permit individuals to costlessly enforce agreements in their community, and in which the threat of social sanctions exists and is credible. Second, the findings suggest that households in rural areas have some knowledge about the customs and characteristics of people and institutions in the region which predicts success and failure of the microfinance program. This local knowledge should be exploited in the design of new programs. In the case of the Village Fund Program, this information can be used to decide the optimal scale of the funds, and their transformation into community banks. Third, it seems that

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[50] This result was previously documented by Zeller (1998).

including policies such as compulsory savings or training is beneficial for the lender as it results in higher repayment rates. However, in order to determine whether any of these policies should be implemented, it is necessary to compare the cost and benefits of implementation so as to assess whether or not including the component represents a profitable innovation for the program. And fourth, lending to a less homogenous group of borrowers in terms of economic activity may also be advantageous for the lender as it seems that a more diversified pool of borrowers is less vulnerable to shocks.

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Figure 1. Default rates by borrowing year in rural and urban areas
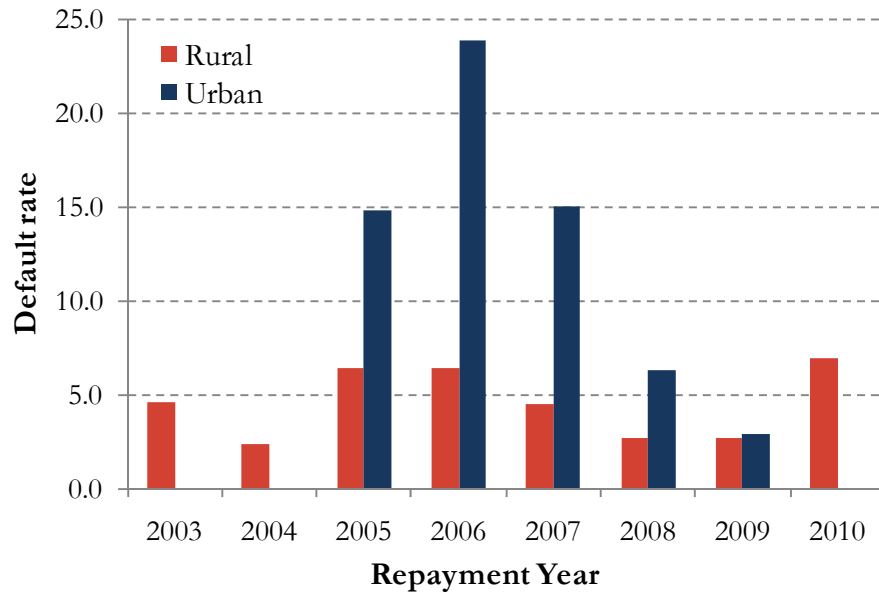
Figure 2. Thailand Provinces included in the samples

Figure 3. Communities in rural and urban samples

Central Region
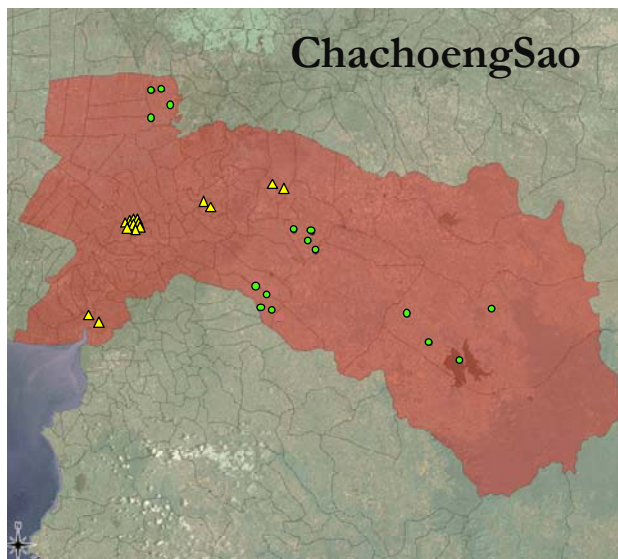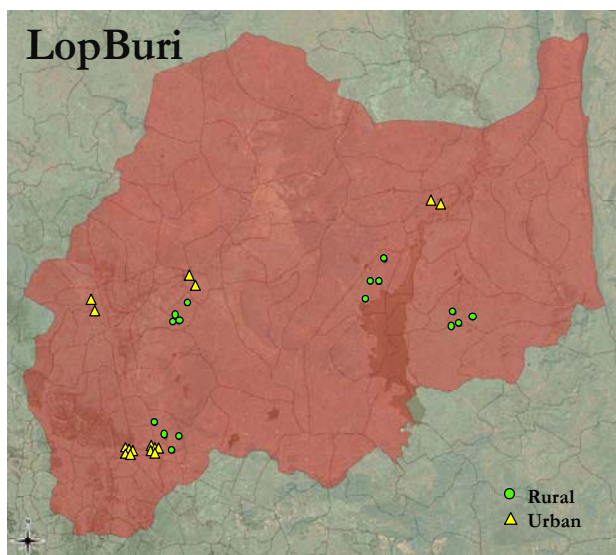
Northeast Region
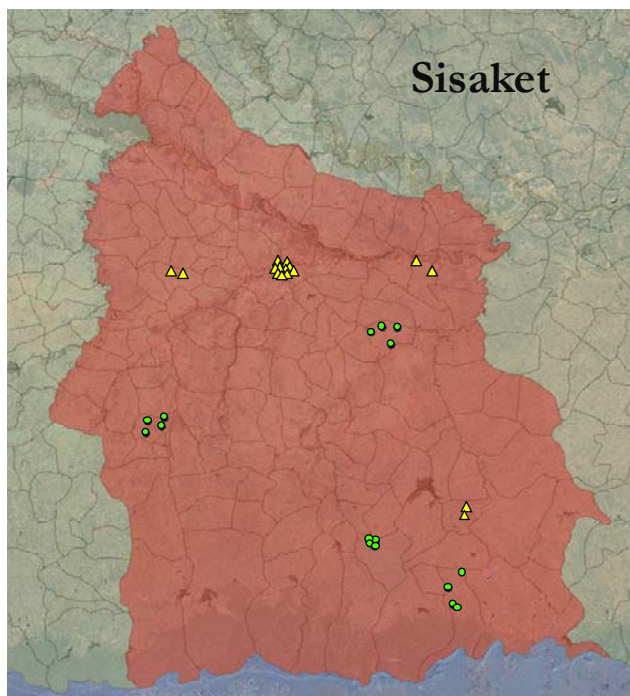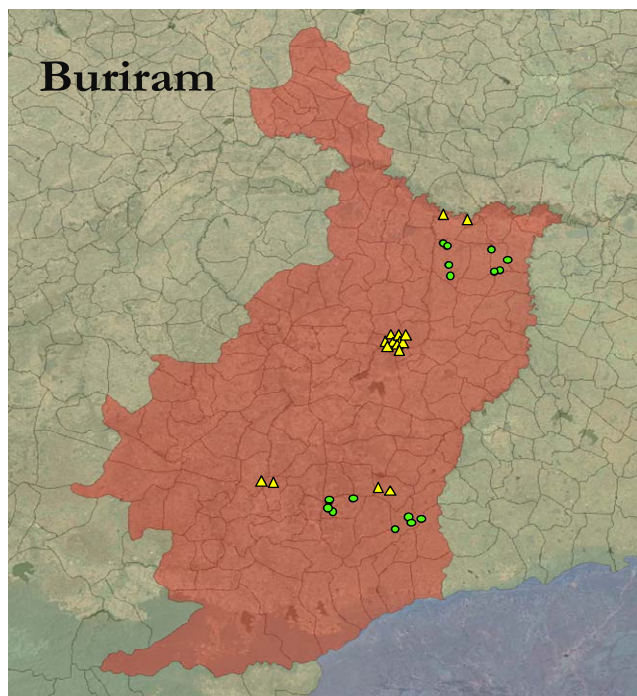
Table 1. Repayment implications of joint liability models

Variable	Effect on repayment			
	Stiglitz (1990)	Banerjee *et al.* (1994)	Besley and Coate (1995)	Ghatak (1999)
Degree of joint liability	Negative[+]	Positive[+]		Negative[+]
Cooperative behavior	Positive[++]	Negative[++]	Negative[++]	
Cost of monitoring		Negative[+]		
Official sanctions			Positive[+]	
Unofficial sanctions			Positive[+]	
Interest rate[+]	Negative	Negative	Negative	Negative
Loan size	Negative[+]	Negative[++]		Pos - Neg[++]
Training[+++]	Positive	Positive	Positive	Positive
Compulsory Savings[+++]	Positive	Positive	Positive	Positive

Source: Ahlin and Townsend (2002, 2007).

[+] Variables included in the original model; [++] Variables included in the extended models developed by Ahlin and Townsend (2002, 2007); [+++] New variables (policies).

Table 2. Proportion of funds by policy choices

Policy	Rural	Urban
Screening members	92.2	98.4
Membership application form	84.4	96.9
Interviews	85.9	57.8
Criteria to evaluate applicants		
Expected amount of savings	78.1	85.9
Occupation	26.6	26.6
Fee	95.0	98.4
Application fee	68.8	48.4
Membership fee	39.1	56.3
Type of savings		
Pledge savings	60.9	53.1
Shares	28.1	43.8
Screening loans	100.0	100.0
Loan application form	98.4	100.0
Interviews	100.0	54.7
Criteria to evaluate applicants		
Amount of savings	9.4	56.3
Purpose of loan	96.9	90.6
Ability to repay	95.3	85.9
Occupation	40.6	64.1
Number of funds	64	64

Table 3. Summary statistics

Variable	Rural		Urban	
	Mean	SD	Mean	SD
Repayment	0.96	0.21	0.85	0.35
Months in default	0.58	4.33	2.70	8.60
Cooperation				
Best cooperation	0.55	0.22	0.42	0.19
Sharing w/people	5.22	3.87	2.90	3.02
Penalties for default				
Best institutions	0.28	0.28	0.20	0.21
Social sanctions	0.09	0.20	0.01	0.02
Peer monitoring				
Similar occupation	0.30	0.16	0.22	0.09
Degree of joint liability				
Percent landless in village	0.44	0.20	0.38	0.22
Percent houseless in village	0.38	0.16	0.28	0.20
Contract terms				
Interest rate	0.06	0.04	0.08	0.06
Loan size	17,148	7,466	18,448	6,348
Community-level controls				
Average land value[*]	1.43	1.37	1.40	1.44
Average land area[**]	17.81	10.29	4.82	4.53
Average schooling level	4.36	0.89	7.18	1.62
Average wealth	1.63	1.45	1.65	1.57
Average risk	0.21	0.10	0.12	0.05
PCG membership	0.30	0.31	0.27	0.23
Bank membership	0.67	0.23	0.86	0.14
Observations	4,796		2,498	

[*] In millions of 2009 baht.
[**] In rai (1 rai = 0.395 acres).

Table 4. Summary statistics

Variable	Rural		Urban	
	Mean	SD	Mean	SD
Individual-level controls				
Gender (Female = 1)	0.29	0.45	0.46	0.50
Age	54.34	11.80	52.55	10.89
Schooling level	4.43	2.69	7.10	4.16
Schooling system	0.16	0.37	0.30	0.46
Type of worker on the job				
Inactive	0.07	0.25	0.05	0.21
Unpaid worker	0.03	0.18	0.08	0.27
Worker (wage and piece-rate)	0.20	0.40	0.21	0.41
Government worker	0.01	0.12	0.09	0.28
Business owner	0.69	0.46	0.58	0.49
Wealth*	1.73	4.96	1.48	4.38
Risk	0.21	0.17	0.13	0.14
BAAC membership	0.41	0.49	0.15	0.35
Policies				
Compulsory savings	0.56	0.50	0.70	0.46
Training	0.18	0.38	0.15	0.35
Payment year				
Payment year = 2003	0.12	0.32		
Payment year = 2004	0.12	0.32		
Payment year = 2005	0.12	0.33	0.24	0.43
Payment year = 2006	0.14	0.35	0.26	0.44
Payment year = 2007	0.15	0.36	0.21	0.41
Payment year = 2008	0.14	0.35	0.17	0.38
Payment year = 2009	0.13	0.34	0.11	0.31
Payment year = 2010	0.08	0.26		
Observations	4,796		2,498	

*In millions of 2009 baht.

Table 5. Summary statistics of time varying variables (means)
Rural sample

Variable	2003	2004	2005	2006	2007	2008	2009	2010
Repayment	0.95	0.98	0.94	0.94	0.96	0.97	0.97	0.93
Months in default	0.35	0.15	0.79	1.62	0.58	0.41	0.15	0.30
Cooperation								
Share w/people	5.64	5.25	5.03	5.87	5.43	5.68	3.70	4.96
Penalties for default								
Sanctions	0.08	0.09	0.08	0.09	0.08	0.09	0.10	0.09
Peer monitoring								
Similar occupation	0.29	0.29	0.29	0.29	0.28	0.25	0.30	0.32
Phone service	0.36	0.50	0.56	0.62	0.66	0.71	0.77	0.80
Degree of joint liability								
Percent landless	0.41	0.41	0.41	0.43	0.44	0.46	0.47	0.50
Percent houseless	0.34	0.34	0.35	0.37	0.39	0.40	0.41	0.45
Terms of the contract								
Interest rate	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06
Loan size	15,182	16,979	17,591	16,939	17,566	17,428	17,998	17,322
Community-level controls								
Average land value*	1.60	1.57	1.48	1.38	1.43	1.41	1.33	1.19
Average land area**	17.9	18.4	18.4	17.8	18.6	17.2	17.2	16.5
Average schooling level	4.14	4.08	4.16	4.17	4.37	4.56	4.68	4.84
Average wealth	1.79	1.78	1.67	1.57	1.63	1.60	1.52	1.39
Average risk	0.31	0.32	0.27	0.20	0.15	0.14	0.13	0.14
PCG membership	0.34	0.30	0.35	0.30	0.27	0.29	0.29	0.22
Bank membership	0.73	0.72	0.70	0.68	0.67	0.63	0.63	0.59
Individual-level controls								
Gender (Female = 1)	0.29	0.26	0.29	0.30	0.27	0.32	0.29	0.34
Age	54.0	53.8	54.4	54.4	54.3	54.7	54.6	54.8
Schooling level	4.13	4.15	4.20	4.20	4.49	4.59	4.81	5.02
Schooling system (New = 1)	0.12	0.12	0.13	0.13	0.15	0.19	0.21	0.26
Type of worker on the job								
Inactive	0.09	0.08	0.08	0.07	0.07	0.07	0.05	0.04
Unpaid worker	0.01	0.02	0.02	0.02	0.04	0.04	0.06	0.08
Worker (wage or piece-rate)	0.17	0.15	0.21	0.17	0.23	0.24	0.21	0.19
Government worker	0.03	0.02	0.01	0.01	0.02	0.01	0.01	0.02
Business Owner	0.71	0.74	0.68	0.73	0.65	0.64	0.68	0.67
Wealth*	1.62	1.93	1.92	1.77	1.69	1.85	1.46	1.53
Risk	0.31	0.32	0.28	0.21	0.15	0.14	0.14	0.14
BAAC membership	0.39	0.41	0.39	0.40	0.41	0.42	0.44	0.41
Observations	568	554	598	691	715	669	637	364

* In millions of 2009 baht. ** In rai (1 rai = 0.395 acres).

Table 6. Summary statistics of time varying variables (means)
Urban sample

Variable	2005	2006	2007	2008	2009
Repayment	0.84	0.76	0.85	0.94	0.97
Months in default	3.22	4.25	2.94	0.95	0.16
Cooperation					
Share w/people	2.78	3.18	3.03	2.90	2.26
Penalties for default					
Sanctions	0.01	0.01	0.00	0.00	0.00
Peer monitoring					
Similar occupation	0.20	0.22	0.21	0.23	0.27
Phone service	0.87	0.89	0.90	0.90	0.91
Degree of joint liability					
Percent landless	0.28	0.37	0.42	0.44	0.44
Percent houseless	0.20	0.30	0.31	0.32	0.32
Terms of the contract					
Interest rate	0.08	0.08	0.07	0.07	0.07
Loan size	16,964	16,920	17,983	17,193	17,175
Community-level controls					
Average land value*	1.64	1.62	1.30	1.07	1.06
Average land area**	5.35	4.90	4.91	4.22	4.27
Average schooling level	7.27	7.15	7.29	7.02	7.08
Average wealth*	1.95	1.87	1.55	1.27	1.27
Average risk	0.17	0.11	0.11	0.12	0.10
PCG membership	0.28	0.24	0.27	0.28	0.28
Bank membership	0.98	0.88	0.81	0.78	0.78
Individual-level controls					
Gender (Female = 1)	0.45	0.47	0.46	0.45	0.46
Age	51.6	52.0	52.7	53.7	54.0
Schooling level	7.01	7.00	7.37	6.98	7.19
Schooling system (New = 1)	0.26	0.30	0.31	0.30	0.34
Type of worker on the job					
Inactive	0.06	0.06	0.03	0.03	0.02
Unpaid worker	0.06	0.07	0.06	0.10	0.14
Worker (wage or piece-rate)	0.21	0.22	0.21	0.20	0.20
Government worker	0.08	0.07	0.11	0.08	0.09
Business Owner	0.60	0.58	0.59	0.58	0.56
Wealth*	1.60	1.71	1.48	1.18	1.10
Risk	0.19	0.10	0.12	0.10	0.10
BAAC membership	0.13	0.15	0.14	0.16	0.17
Observations	609	656	526	431	276

*In millions of 2009 baht. ** In rai (1 rai = 0.395 acres).

Table 7. Marginal effect on the probability of repayment in rural communities

Dependent Variable: Binary variable equal to one if loan was paid by the maturity date

	Rural						Urban					
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
Cooperation												
Best cooperation	0.113***						0.088					
	(0.037)						(0.061)					
Sharing w/people	0.000						0.001					
	(0.001)						(0.003)					
Penalties for default												
Best institutions		0.376***						0.151				
		(0.126)						(0.114)				
Social sanctions		0.081*						0.828*				
		(0.046)						(0.474)				
Peer monitoring												
Similarity in occupations			-0.002						0.042			
			(0.045)						(0.145)			
Policies												
Compulsory savings				0.046**		0.046**				0.083***		0.086***
				(0.023)		(0.023)				(0.027)		(0.028)
Training					0.027***	0.028***					0.070**	0.076**
					(0.011)	(0.011)					(0.030)	(0.029)
Observations	4796	4796	4796	4796	4796	4796	2498	2498	2498	2498	2498	2498
Chi-squared	29.56	31.05	19.87	23.49	23.57	29.39	109.36	109.38	109.85	111.80	108.26	117.65
Pseudo R-squared	0.100	0.114	0.058	0.076	0.062	0.081	0.118	0.121	0.116	0.129	0.119	0.132

Standard errors clustered at the community-year level are reported in parenthesis. All regressions include year and province fixed effects.

* indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Table 8. Marginal effect on the probability of repayment in rural communities

Dependent Variable: Binary variable equal to one if loan was paid by the maturity date

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Cooperation							
Best cooperation	0.079**	0.073**	0.074***	0.072***	0.058**	0.068**	0.054*
	(0.037)	(0.029)	(0.026)	(0.027)	(0.028)	(0.027)	(0.028)
Sharing w/people	0	0	0	0	0	0	0
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Penalties for default							
Best institutions	0.247***	0.210***	0.178**	0.167*	0.187**	0.163*	0.183**
	(0.086)	(0.079)	(0.091)	(0.092)	(0.094)	(0.091)	(0.092)
Social sanctions	0.090**	0.067	0.069*	0.070*	0.074**	0.063*	0.064*
	(0.041)	(0.042)	(0.037)	(0.037)	(0.035)	(0.037)	(0.035)
Peer monitoring							
Similarity in occupations	0.018	-0.095*	-0.079*	-0.075	-0.066	-0.074	-0.065
	(0.041)	(0.051)	(0.047)	(0.047)	(0.045)	(0.046)	(0.045)
Degree of joint liability	-0.078**	-0.070*	-0.082**	-0.077*	-0.073*	-0.077*	-0.073*
	(0.034)	(0.040)	(0.041)	(0.041)	(0.044)	(0.041)	(0.044)
Contract terms							
Interest rate	0.167	-0.008	-0.006	-0.001	-0.013	0.007	-0.007
	(0.232)	(0.084)	(0.077)	(0.079)	(0.048)	(0.085)	(0.050)
LN Loan size	0	0.006	0.01	0.009	0.008	0.009	0.009
	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Community-level controls							
Average schooling level			0.013*	0.014*	0.013*	0.015**	0.014**
			(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Average wealth			0.026	0.026	0.033	0.022	0.03
			(0.032)	(0.032)	(0.033)	(0.033)	(0.033)
Average risk			0.239***	0.264***	0.284***	0.249***	0.266***
			(0.084)	(0.087)	(0.088)	(0.087)	(0.088)
PCG membership			-0.04	-0.040*	-0.013	-0.038	-0.01
			(0.025)	(0.024)	(0.026)	(0.024)	(0.026)
Bank membership			-0.067	-0.071	-0.092	-0.079	-0.105*
			(0.053)	(0.053)	(0.057)	(0.053)	(0.057)
Policies							
Compulsory savings					0.042**		0.043**
					(0.017)		(0.017)
Training						0.020*	0.023**
						(0.011)	(0.011)
Subdistrict FE		Yes	Yes	Yes	Yes	Yes	Yes
Community-level controls			Yes	Yes	Yes	Yes	Yes
Household-level controls				Yes	Yes	Yes	Yes
Observations	4796	4796	4796	4796	4796	4796	4796
Chi-squared	59.58	97.82	133.39	176.93	201.88	182.77	200.73
Pseudo R-squared	0.139	0.208	0.228	0.236	0.245	0.238	0.248

Standard errors clustered at the community-year level are reported in parenthesis. All regressions include year and province fixed effects. Community-level controls include the community average land, schooling level, wealth, and variability of income; and membership to PCGs and commercial banks. Household-level controls include information on the head of the household and on the household. The head of the household controls are gender, age, age squared, years of schooling, a dummy variable indicating the relevant school system, and a set of dummy variables indicating the role of the worker in the job; the household controls are wealth, a dummy variable indicating BAAC membership, and the variability of income. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Table 9. Marginal effect on the probability of repayment in urban communities

Dependent Variable: Binary variable equal to one if loan was paid by the maturity date							
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Cooperation							
Best cooperation	0.012	-0.021	0.008	0.025	0.044	0.046	0.072
	(0.079)	(0.105)	(0.119)	(0.120)	(0.116)	(0.118)	(0.115)
Sharing w/people	0	-0.002	-0.003	-0.003	-0.003	-0.003	-0.003
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Penalties for default							
Best institutions	0.125	-0.11	-0.195	-0.228	-0.199	-0.252	-0.226
	(0.139)	(0.202)	(0.237)	(0.239)	(0.243)	(0.235)	(0.243)
Social sanctions	0.686	0.717*	0.684*	0.653*	0.561	0.728*	0.641*
	(0.468)	(0.406)	(0.404)	(0.397)	(0.378)	(0.394)	(0.373)
Peer monitoring							
Similarity in occupations	0.078	0.074	0.009	0.025	-0.024	0.014	-0.039
	(0.146)	(0.131)	(0.122)	(0.122)	(0.122)	(0.121)	(0.121)
Degree of joint liability	-0.174***	-0.196**	-0.277***	-0.263***	-0.212**	-0.280***	-0.229***
	(0.064)	(0.080)	(0.087)	(0.086)	(0.086)	(0.082)	(0.082)
Contract terms							
Interest rate	-0.148	-0.02	-0.008	-0.012	0.004	-0.021	-0.004
	(0.105)	(0.086)	(0.089)	(0.085)	(0.086)	(0.087)	(0.088)
LN Loan size	-0.008	0.003	-0.002	-0.005	-0.003	-0.004	-0.002
	(0.018)	(0.020)	(0.020)	(0.022)	(0.021)	(0.022)	(0.021)
Community-level controls							
Average schooling level			-0.004	-0.004	-0.004	-0.003	-0.002
			(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Average wealth			0.009	0.008	0.005	0.006	0.003
			(0.008)	(0.007)	(0.008)	(0.007)	(0.008)
Average risk			0.665**	0.732***	0.583**	0.801***	0.654**
			(0.261)	(0.267)	(0.276)	(0.271)	(0.277)
PCG membership			0.072	0.072	0.044	0.074	0.046
			(0.054)	(0.056)	(0.055)	(0.055)	(0.055)
Bank membership			-0.400***	-0.406***	-0.338**	-0.404***	-0.332**
			(0.131)	(0.129)	(0.137)	(0.128)	(0.138)
Policies							
Compulsory savings					0.064**		0.070**
					(0.027)		(0.029)
Training						0.073**	0.081***
						(0.033)	(0.030)
Subdistrict FE		Yes	Yes	Yes	Yes	Yes	Yes
Community-level controls			Yes	Yes	Yes	Yes	Yes
Household-level controls				Yes	Yes	Yes	Yes
Observations	2498	2498	2498	2473	2473	2473	2473
Chi-squared	131.53	204.34	217.96	433.00	450.32	456.45	457.60
Pseudo R-squared	0.132	0.188	0.208	0.212	0.219	0.215	0.223

Standard errors clustered at the community-year level are reported in parenthesis. All regressions include year and province fixed effects. Community-level controls include the community average land, schooling level, wealth, and variability of income; and membership to PCGs and commercial banks. Household-level controls include information on the head of the household and on the household. The head of the household controls are gender, age, age squared, years of schooling, a dummy variable indicating the relevant school system, and a set of dummy variables indicating the role of the head in the job; the household controls are wealth, a dummy variable indicating BAAC membership, and the variability of income. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Table 10. Pooled OLS estimates of the severity of default in rural communities

Dependent Variable: Number of months the loan has been on default

	Rural						Urban					
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
Cooperation												
Best cooperation	-2.227**						-2.035*					
	(1.131)						(1.113)					
Sharing w/people	0.01						-0.108					
	(0.019)						(0.070)					
Penalties for default												
Best institutions		-4.209***						-3.662*				
		(1.538)						(2.117)				
Social sanctions		-1.241**						-38.731***				
		(0.491)						(11.200)				
Peer monitoring												
Similarity in occupations			0.421						0.972			
			(0.895)						(2.972)			
Policies												
Compulsory savings				-1.833**		-1.843**				-3.280***		-3.317***
				(0.794)		(0.796)				(1.035)		(1.039)
Training					-0.322**	-0.385**					-1.393**	-1.610**
					(0.158)	(0.184)					(0.594)	(0.655)
Constant	1.262**	0.688***	0.018	1.830***	0.261	1.968***	4.027***	3.257***	2.396**	3.815***	2.919***	4.216***
	(0.522)	(0.252)	(0.460)	(0.634)	(0.273)	(0.665)	(0.959)	(0.827)	(1.003)	(0.850)	(0.781)	(0.936)
Observations	4796	4796	4796	4796	4796	4796	2498	2498	2498	2498	2498	2498
F-stats	0.83	1.04	1.07	0.87	1.42	0.99	7.55	7.76	8.25	8.60	9.27	8.17
R-squared	0.040	0.038	0.027	0.051	0.028	0.052	0.105	0.112	0.102	0.127	0.104	0.130

Standard errors clustered at the community-year level are reported in parenthesis. All regressions include year and province fixed effects.

* indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Table 11. Pooled OLS estimates of the severity of default in rural communities

Dependent Variable: Number of months the loan has been on default

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Cooperation							
Best cooperation	-1.886	-2.948**	-3.166**	-3.218**	-2.804**	-3.214**	-2.792**
	(1.158)	(1.257)	(1.319)	(1.326)	(1.112)	(1.332)	(1.116)
Sharing w/people	0.009	0.007	0.01	0.009	0.01	0.009	0.009
	(0.018)	(0.018)	(0.016)	(0.017)	(0.016)	(0.016)	(0.016)
Penalties for default							
Best institutions	-2.031***	-2.015*	-0.809	-0.453	-1.162	-0.449	-1.151
	(0.753)	(1.061)	(1.402)	(1.431)	(1.326)	(1.421)	(1.320)
Social sanctions	-1.069**	-0.828**	-1.047***	-0.986***	-1.281***	-0.980***	-1.264***
	(0.453)	(0.327)	(0.384)	(0.377)	(0.440)	(0.379)	(0.440)
Peer monitoring							
Similarity in occupations	0.107	2.869*	3.259**	3.159**	3.298**	3.158**	3.296**
	(0.850)	(1.664)	(1.581)	(1.558)	(1.440)	(1.560)	(1.441)
Degree of joint liability	1.665**	1.101**	1.144**	1.020**	0.909*	1.021*	0.912*
	(0.644)	(0.500)	(0.527)	(0.519)	(0.546)	(0.521)	(0.548)
Contract terms							
Interest rate	-2.384	-0.382	0.023	0.132	0.23	0.127	0.215
	(1.885)	(0.703)	(0.669)	(0.680)	(0.779)	(0.698)	(0.789)
LN Loan size	0.128	-0.02	-0.068	-0.003	0	-0.003	-0.001
	(0.116)	(0.104)	(0.111)	(0.111)	(0.110)	(0.111)	(0.110)
Community-level controls							
Average schooling level			-0.452**	-0.434**	-0.393**	-0.435**	-0.395**
			(0.200)	(0.190)	(0.169)	(0.187)	(0.166)
Average wealth			-0.912**	-0.906**	-1.568***	-0.902**	-1.557***
			(0.375)	(0.377)	(0.459)	(0.372)	(0.456)
Average risk			0.156	-0.124	-1.149	-0.095	-1.068
			(2.891)	(2.727)	(2.499)	(2.935)	(2.702)
PCG membership			1.755***	1.823***	0.429	1.820***	0.42
			(0.658)	(0.665)	(0.435)	(0.671)	(0.442)
Bank membership			0.187	0.176	0.965	0.186	0.993
			(0.810)	(0.795)	(0.761)	(0.821)	(0.782)
Policies							
Compulsory savings					-2.212***		-2.213***
					(0.632)		(0.632)
Training						-0.026	-0.071
						(0.266)	(0.264)
Constant	-0.365	1.277	2.648	2.988	4.666**	2.981	4.507*
	(1.122)	(1.246)	(1.840)	(2.173)	(2.345)	(2.215)	(2.494)
Subdistrict FE		Yes	Yes	Yes	Yes	Yes	Yes
Community-level controls			Yes	Yes	Yes	Yes	Yes
Household-level controls				Yes	Yes	Yes	Yes
Observations	4796	4796	4796	4796	4796	4796	4796
F-stats	0.97	0.93	0.90	1.00	1.15	1.00	1.15
R-squared	0.049	0.128	0.138	0.142	0.164	0.142	0.164

Standard errors clustered at the community-year level are reported in parenthesis. All regressions include year and province fixed effects. Community-level controls include the community average land, schooling level, wealth, and variability of income; and membership to PCGs and commercial banks. Household-level controls include information on the head of the household and on the household. The head of the household controls are gender, age, age squared, years of schooling, a dummy variable indicating the relevant school system, and a set of dummy variables indicating the role of the worker in the job; the household controls are wealth, a dummy variable indicating BAAC membership, and the variability of income. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Table 12. Pooled OLS estimates of the severity of default in urban communities

Dependent Variable: Number of months the loan has been on default

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Cooperation							
Best cooperation	0.041	3.11	2.858	3.05	3.022	1.988	1.852
	(1.503)	(2.152)	(2.493)	(2.539)	(2.487)	(2.441)	(2.394)
Sharing w/people	-0.037	-0.017	0.013	-0.004	0.001	0.003	0.008
	(0.064)	(0.055)	(0.057)	(0.057)	(0.056)	(0.057)	(0.055)
Penalties for default							
Best institutions	-4.209	-3.609	0.113	-0.085	-4.522	0.116	-4.504
	(2.738)	(3.455)	(4.173)	(4.351)	(5.374)	(4.271)	(5.317)
Social sanctions	-31.129***	-32.518***	-29.990***	-28.924***	-25.580***	-32.477***	-29.334***
	(10.363)	(9.917)	(10.582)	(10.066)	(9.599)	(10.386)	(9.792)
Peer monitoring							
Similarity in occupations	0.297	-1.041	-0.992	-0.981	1.741	-0.291	2.626
	(2.873)	(2.441)	(2.000)	(1.968)	(2.125)	(1.947)	(2.202)
Degree of joint liability	7.321***	11.071***	13.997***	14.216***	12.585***	15.538***	13.963***
	(2.408)	(3.535)	(2.997)	(3.015)	(2.946)	(3.020)	(2.912)
Contract terms							
Interest rate	5.709	1.586	0.801	0.844	-0.387	0.793	-0.499
	(4.674)	(2.544)	(2.147)	(2.207)	(2.081)	(2.277)	(2.162)
LN Loan size	0.07	-0.222	-0.091	-0.044	-0.047	-0.145	-0.158
	(0.449)	(0.530)	(0.500)	(0.524)	(0.518)	(0.524)	(0.518)
Community-level controls							
Average schooling level			0.178	0.254	0.287	0.155	0.18
			(0.224)	(0.208)	(0.198)	(0.205)	(0.195)
Average wealth			-0.328	-0.317	-0.19	-0.23	-0.088
			(0.303)	(0.304)	(0.313)	(0.300)	(0.315)
Average risk			-19.888**	-19.284***	-13.843**	-20.438***	-14.861**
			(7.932)	(7.099)	(6.810)	(7.347)	(6.967)
PCG membership			-3.473**	-3.362**	-2.505	-3.351**	-2.454
			(1.452)	(1.486)	(1.528)	(1.475)	(1.527)
Bank membership			14.091**	14.333**	11.716*	14.372**	11.637*
			(5.698)	(5.588)	(5.932)	(5.632)	(5.986)
Policies							
Compulsory savings					-2.786**		-2.914**
					(1.164)		(1.172)
Training						-3.194***	-3.513***
						(0.861)	(0.911)
Constant	1.017	6.609	-6.219	-13.888	-9.653	-11.702	-7.053
	(4.514)	(4.846)	(7.612)	(8.754)	(9.093)	(8.945)	(9.379)
Subdistrict FE		Yes	Yes	Yes	Yes	Yes	Yes
Community-level controls			Yes	Yes	Yes	Yes	Yes
Household-level controls				Yes	Yes	Yes	Yes
Observations	2498	2498	2498	2473	2473	2473	2473
F-stats	5.89	13.44	19.62	23.20	19.30	22.39	18.16
R-squared	0.136	0.190	0.217	0.224	0.237	0.230	0.244

Standard errors clustered at the community-year level are reported in parenthesis. All regressions include year and province fixed effects. Community-level controls include the community average land, schooling level, wealth, and variability of income; and membership to PCGs and commercial banks. Household-level controls include information on the head of the household and on the household. The head of the household controls are gender, age, age squared, years of schooling, a dummy variable indicating the relevant school system, and a set of dummy variables indicating the role of the worker in the job; the household controls are wealth, a dummy variable indicating BAAC membership, and the variability of income. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Table 1. Marginal effect on the probability of repayment in rural communities

Dependent Variable: Binary variable equal to one if loan was paid before or by the maturity date

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Cooperation									
Best cooperation	0.142***	0.043	0.047*	0.073**	0.055**	0.044	0.011	0.004	0.009
	(0.055)	(0.028)	(0.028)	(0.028)	(0.028)	(0.027)	(0.023)	(0.021)	(0.014)
Sharing w/people	0.000	0.000	0	0.000	0.000	0.000	0.000	-0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Penalties for default									
Best institutions	0.092	0.235**	0.152	0.155*	0.180**	0.191**	0.221***	0.243***	0.101**
	(0.080)	(0.115)	(0.102)	(0.088)	(0.091)	(0.087)	(0.085)	(0.089)	(0.043)
Social sanctions	0.057	0.063*	0.054	0.058*	0.067*	0.071**	0.046	0.076***	0.068***
	(0.043)	(0.035)	(0.034)	(0.034)	(0.035)	(0.034)	(0.028)	(0.028)	(0.022)
Peer monitoring									
Similarity in occupations	-0.147**	-0.046	-0.067	-0.073	-0.063	-0.06	-0.035	-0.015	-0.021
	(0.071)	(0.053)	(0.046)	(0.046)	(0.045)	(0.044)	(0.032)	(0.032)	(0.021)
Degree of joint liability	-0.097	-0.07	-0.054	-0.075*	-0.075*	-0.079*	-0.070*	-0.064	-0.015
	(0.062)	(0.047)	(0.044)	(0.045)	(0.043)	(0.048)	(0.040)	(0.043)	(0.032)
Community-level controls									
Average schooling level	0.022**	0.015**	0.015**	0.016**	0.014**	0.015**	0.006	0	-0.001
	(0.009)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)	(0.005)
Average wealth	0.054	0.03	0.028	0.036	0.028	0.035	0.041	0.039	0.097**
	(0.043)	(0.035)	(0.033)	(0.034)	(0.033)	(0.033)	(0.029)	(0.029)	(0.038)
Average risk	0.244**	0.282***	0.244***	0.256***	0.260***	0.274***	0.116*	0.084	0.097**
	(0.117)	(0.091)	(0.085)	(0.085)	(0.085)	(0.086)	(0.064)	(0.063)	(0.046)
PCG membership	-0.049	-0.013	-0.01	-0.024	-0.011	-0.009	0.041*	0.019	0.003
	(0.037)	(0.025)	(0.026)	(0.027)	(0.025)	(0.024)	(0.021)	(0.020)	(0.012)
Bank membership	-0.097*	-0.120*	-0.121**	-0.098*	-0.101*	-0.108**	-0.135**	-0.081	0.014
	(0.054)	(0.065)	(0.059)	(0.057)	(0.056)	(0.055)	(0.055)	(0.053)	(0.033)
Policies									
Compulsory savings	0.063**	0.047**	0.045***	0.045**	0.042**	0.045***	0.060***	0.078***	0.058***
	(0.025)	(0.019)	(0.017)	(0.018)	(0.017)	(0.017)	(0.017)	(0.020)	(0.014)
Training	0.013	0.025**	0.028**	0.023**	0.023**	0.021*	0.027***	0.015	0.003
	(0.015)	(0.012)	(0.047)*	(0.011)	(0.011)	(0.011)	(0.008)	(0.009)	(0.009)
Constant	0.686***								
	(0.153)								
Observations	4796	4796	4796	4796	4796	4796	4796	4446	4391
Chi-squared/F-stats	1.48	282.98	205.93	198.14	302.15	201.33	242.66	296.68	424.16
Pseudo R-squared/R-squared	0.124	0.258	0.256	0.252	0.254	0.248	0.276	0.307	0.369

Standard errors clustered at the community-year level are reported in parenthesis. All regressions include year and province fixed effects. Community-level controls include the community average land, schooling level, wealth, and variability of income; and membership to PCGs and commercial banks. Household-level controls include information on the head of the household and on the household. The head of the household controls are gender, age, age squared, years of schooling, a dummy variable indicating the relevant school system, and a set of dummy variables indicating the role of the worker in the job; the household controls are wealth, a dummy variable indicating BAAC membership, and the variability of income. Regression [1] reports the estimates using the linear probability model. Regression [2] reports the estimates using the logit model. Regression [3] includes a set of variables to control for the level of development of the community. Regression [4] includes a set of variables to control for village fund officers characteristics. Regression [5] includes a set of variables to control for the use of the loan. In regression [6], the percentage of members in the fund that owns no house is used to proxy for the degree of joint liability. In regressions [7] to [9] the definition of default is relaxed: repayment is equal to one if loan was paid within 30, 60, and 90 days of the maturity date, respectively. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Table 2. Marginal effect on the probability of repayment in urban communities

Dependent Variable: Binary variable equal to one if loan was paid before or by the maturity date									
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Cooperation									
Best cooperation	-0.006	0.089	0.01	0.042	0.071	0.012	-0.011	0.025	0.03
	(0.097)	(0.137)	(0.098)	(0.108)	(0.113)	(0.105)	(0.105)	(0.109)	(0.105)
Sharing w/people	-0.003	-0.002	-0.004*	-0.003	-0.003	-0.004	-0.003	-0.002	-0.002
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Penalties for default									
Best institutions	-0.061	-0.249	-0.08	-0.177	-0.236	-0.125	-0.16	-0.244	-0.22
	(0.197)	(0.286)	(0.217)	(0.230)	(0.242)	(0.218)	(0.217)	(0.231)	(0.226)
Social sanctions	0.765	0.634*	0.745**	0.591	0.672*	0.59	0.593*	0.429	0.605*
	(0.473)	(0.385)	(0.334)	(0.377)	(0.380)	(0.382)	(0.341)	(0.309)	(0.351)
Peer monitoring									
Similarity in occupations	-0.038	-0.018	-0.033	-0.049	-0.047	0.001	-0.16	-0.16	-0.151
	(0.109)	(0.133)	(0.119)	(0.125)	(0.122)	(0.118)	(0.117)	(0.118)	(0.115)
Degree of joint liability	-0.365***	-0.241***	-0.313***	-0.263***	-0.232***	-0.348***	-0.270***	-0.232***	-0.244***
	(0.106)	(0.083)	(0.096)	(0.082)	(0.081)	(0.074)	(0.070)	(0.069)	(0.065)
Community-level controls									
Average schooling level	-0.005	-0.001	0.015	-0.003	-0.003	0.005	-0.003	-0.005	-0.004
	(0.010)	(0.008)	(0.009)	(0.007)	(0.008)	(0.007)	(0.007)	(0.006)	(0.006)
Average wealth	0.01	0.002	0.003	0.003	0.003	0.001	0	-0.002	-0.004
	(0.012)	(0.008)	(0.009)	(0.008)	(0.008)	(0.006)	(0.007)	(0.007)	(0.007)
Average risk	0.434*	0.631**	0.641**	0.642**	0.651**	0.749***	0.517**	0.645***	0.606**
	(0.226)	(0.294)	(0.271)	(0.278)	(0.273)	(0.285)	(0.249)	(0.242)	(0.248)
PCG membership	0.063	0.049	-0.033	0.064	0.05	0.072	0.056	0.067	0.078
	(0.066)	(0.058)	(0.051)	(0.052)	(0.056)	(0.047)	(0.051)	(0.049)	(0.048)
Bank membership	-0.515***	-0.331**	-0.382***	-0.358***	-0.335**	-0.445***	-0.372***	-0.364***	-0.347***
	(0.169)	(0.145)	(0.134)	(0.138)	(0.140)	(0.135)	(0.125)	(0.126)	(0.127)
Policies									
Compulsory savings	0.086**	0.064**	0.055**	0.066**	0.070**	0.056**	0.060**	0.065**	0.066**
	(0.036)	(0.030)	(0.025)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.029)
Training	0.094**	0.088***	0.060*	0.077**	0.079***	0.068**	0.080***	0.068**	0.080***
	(0.043)	(0.032)	(0.031)	(0.030)	(0.030)	(0.030)	(0.029)	(0.030)	(0.028)
Constant	1.428***								
	(0.323)								
Observations	2473	2473	2473	2473	2472	2473	2473	2473	2473
Chi-squared/F-stats	16.84	456.53	489.72	488.90	676.35	474.02	635.55	889.91	921.18
Pseudo R-squared/R-squared	0.197	0.223	0.25	0.224	0.228	0.234	0.254	0.28	0.287

Standard errors clustered at the community-year level are reported in parenthesis. All regressions include year and province fixed effects. Community-level controls include the community average land, schooling level, wealth, and variability of income; and membership to PCGs and commercial banks. Household-level controls include information on the head of the household and on the household. The head of the household controls are gender, age, age squared, years of schooling, a dummy variable indicating the relevant school system, and a set of dummy variables indicating the role of the worker in the job; the household controls are wealth, a dummy variable indicating BAAC membership, and the variability of income. Regression [1] reports the estimates using the linear probability model. Regression [2] reports the estimates using the logit model. Regression [3] includes a set of variables to control for the level of development of the community. Regression [4] includes a set of variables to control for village fund officers characteristics. Regression [5] includes a set of variables to control for the use of the loan. In regression [6], the percentage of members in the fund that owns no house is used to proxy for the degree of joint liability. In regressions [7] to [9] the definition of default is relaxed: repayment is equal to one if loan was paid within 30, 60, and 90 days of the maturity date, respectively. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Table 3

Marginal effect on the probability of repayment in rural and urban communities

Dependent Variable: Binary variable equal to one if loan was paid before or by the maturity date								
	Rural				Urban			
	[Baseline]	[1]	[2]	[3]	[Baseline]	[1]	[2]	[3]
Compulsory savings	0.043**	0.095***		0.094***	0.070**	0.046+		0.061*
	(0.017)	(0.036)		(0.036)	(0.029)	(0.030)		(0.035)
Training	0.023**		0.015	0.013	0.081***		0.064**	0.078**
	(0.011)		(0.020)	(0.020)	(0.030)		(0.032)	(0.031)
Observations	4796	3677	3677	3677	2473	2201	2201	2201
Pseudo R-squared	0.248	0.291	0.277	0.291	0.223	0.301	0.301	0.304

Pooled OLS estimates of the severity of default in rural and urban communities

Dependent Variable: Number of months the loan has been on default								
	Rural				Urban			
	[Baseline]	[1]	[2]	[3]	[Baseline]	[1]	[2]	[3]
Compulsory savings	-2.213***	-2.594***		-2.608***	-2.914**	-2.152*		-2.694*
	(0.632)	(0.896)		(0.900)	(1.172)	(1.271)		(1.375)
Training	-0.071		0.133	0.265	-3.513***		-2.439**	-3.247**
	(0.264)		(0.322)	(0.354)	(0.911)		(1.164)	(1.334)
Observations	4796	4796	4796	4796	2473	2473	2473	2473
R-squared	0.164	0.246	0.231	0.246	0.244	0.409	0.408	0.413

Standard errors clustered at the community-year level are reported in parenthesis. All regressions include year, province and community-specific fixed effects except the baseline regressions which include year, province and tambon-specific fixed effects (the baseline regressions correspond to regression [8] in Tables 8, 9, 11 and 12). Community-level controls include the community average land, schooling level, wealth, and variability of income; and membership to PCGs and commercial banks. Household-level controls include information on the head of the household and on the household. The head of the household controls are gender, age, age squared, years of schooling, a dummy variable indicating the relevant school system, and a set of dummy variables indicating the role of the worker in the job; the household controls are wealth, a dummy variable indicating BAAC membership, and the variability of income. + indicates significance at 15%; * significance at 10%; ** significance at 5%; *** significance at 1%.