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Joint-liability lending: Does it raise repayment performance?

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Abstract: The aim of this paper is to examine whether joint-liability lending, a lending method often used by microfinance organizations, has positive impacts on repayment performance, as suggested in the theoretical literature. There has been an abundance of studies that investigate theoretically the impact of joint liability lending on repayment, yet the empirical evidence has been scarce due to the difficulties in obtaining reliable data. To test the joint-liability lending relationship, this paper uses a dataset for Thailand, collected by the Bank for Agriculture and Agricultural Cooperative in early 2000. As repayment performance is measured by a dummy variable, therefore a logit model is utilized to show the impact of joint liability lending on repayment. Results show that joint-liability lending may have positive impacts on repayment, but only under certain circumstances. Microfinance organisations should utilise this type of lending to improve repayment performance if suitable conditions can be obtained.

Keywords: Microfinance, joint-liability lending, repayment performance, Thailand.

1. Introduction

The aim of this paper is to examine the empirical relationship between repayment performance and joint-liability lending by microfinance organizations. Under joint-liability lending, people who wish to borrow from a microfinance organization join a group with a number of other borrowers. Loans are given separately, but repayment responsibility is collective, which means that all members are responsible for repayment of the others. If anyone defaults, the rest of the group either repay or face the same penalty as the defaulted. Hence, borrowers have an incentive to choose carefully with whom they join. The theoretical arguments, examined by Creedy and Hoang (2018), suggest that there are circumstances under which joint-liability lending may reduce the associated information asymmetry and moral hazard problems. However, it cannot be expected unequivocally to increase repayment rates.

To assess the impact of joint-liability lending on repayment performance is a challenge, given the difficulties of obtaining appropriate data, including information on characteristics of borrowers. The present paper uses a dataset for Thailand previously utilized by Ahlin and Townsend (2007), and collected under the aegis of the Bank for Agriculture and Agricultural Cooperative (BAAC). However, there are substantial differences in the precise sample and variables used here. This paper finds that joint-liability lending does not work under all circumstances, which perhaps explains why this lending technique has not been universally

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adopted and some MFOs, having experimented, have abandoned it.

This paper provides more reliable evidence on the use of joint liability lending. If properly constructed, this typical type of lending still can be used as a way to improve repayment performance for microlending, counter to the suggestion of shifting from group lending to individual lending (Altinok, 2023; Cheng & Zhang, 2020).

2. Literature review

2.1. Joint liability lending

Being a novel microfinance tool, joint liability lending has been discussed thoroughly in the literature. Obaidullah and Khan (2008), Simtowe et al. (2006), and Ranabahu and Wickramasinghe (2022) are among those that describes joint-liability lending as 'a contract in which the provision of the private good, such as an individual's access to credit, is made conditional on the provision of the public good, such as group repayment'. Joint-liability lending refers to a situation in which two or more borrowers are liable for repayment of a debt or obligation, and a lender can be compensated by them both individually or jointly (Giné & Karlan, 2014). Many group-loan contracts in developing countries have joint liability as a characteristic.

In terms of responsibility to repay, members of a group are mutually responsible for repaying the loans (Gallenstein et al., 2020, Stiglitz, 1990). Hence, one of the criteria for loan eligibility is acceptance to pay the debt of any member in the group who does not repay. Intra-group lending is one of the possible forms of joint-liability arrangement. It is made when members give loans to others in a group (to repay for others) in order to fulfil the repayment responsibility of these borrowers. This intra-group debt must later be repaid by the defaulters in cash or in kind. Joint liability may increase repayment rates for the group, but it also generates interdependence between the members of the group, which may have a negative impact on repayment when borrowers who can repay individually default due to the burden of the joint liability (Besley & Coate, 1995, Gallenstein et al., 2020). In addition, joint liability can also be expressed in terms of equality among partners in a group: all members of a group are being treated as defaulting if there is any delinquency (De Aghion & Morduch, 2004; Ghatak & Guinanne, 1999).

In other contexts, joint liability can be the sharing of the common-group savings fund to which all members have to contribute before they are given the loan. If the fund is used for repaying the debt of any defaulting members, and members can only withdraw their money if they cancel membership after fulfilling responsibilities, this also represents joint liability.

Joint-liability contracts have the potential to provide a mechanism that allows borrowers to signal their creditworthiness at low cost, for example by being willing to be jointly liable for other members' debt. This allows lenders to recognize safe and risky borrowers and therefore the adverse-selection problem is reduced. Group lending also induces borrowers to monitor each other and prevent borrowers' risky behavior that harms others' interests, because borrowers are connected by joint responsibility. This helps to reduce moral-hazard. Finally, joint liability combined with strong social sanctions between members within a group helps to enforce repayment, in the sense that it reduces cases when borrowers have sufficient income but refuse to pay (Alaro & Alalubosa, 2018). Threats of social sanctions make borrowers more willing to repay when they are able. These differences from individual lending, which is single-based mechanism, may have a positive impact on the repayment performance of the group-lending method Rathore (2017).

2.2. Theory and evidence on joint-liability lending and repayment

As mentioned above, it has been suggested that joint-liability lending can reduce strategic defaults (Alaro & Alalubosa, 2018; Munandar, 2023), which is a problem if borrowers do not pledge collateral. Such lending also makes it easier for lending organisations to sort and screen customers (Malhotra & Baag, 2021; Mahmud, 20230), which reduces adverse selection problems. Besides, under joint-liability lending, it is less costly for banks to monitor the way in which borrowers use the funds. All of these impacts improve repayment rates in banks. Finally, theories have suggested that joint liability lending help to improve repayment by social sanctions, in which members in groups, who know each other very well, enforce repayment by helping each other or using social threats (Mahmud, 2020; Sangwan & Nayak, 2021). In a group lending arrangement, everyone in the group consents to watch over one another and share obligations. Even when a member takes on dangerous initiatives but fails to repay the loan on time, other members may threaten to inflict "social sanctions" on that person (Alaro & Alalubosa, 2018).

There have been few empirical studies, for a number of reasons. First, measuring the characteristics of the borrowers and the groups is difficult. For example, it is not easy to measure borrowers' risk types and the degree of information that borrowers know about each other, because each of them depends on different factors that are difficult to capture. A measurement of borrowers' risk type must embrace the probability that a project of the borrower is successful or not. This probability

depends on the nature of the borrower's project, which may consist of many aspects, which are complicated to measure. Secondly, data on repayment rates are difficult to obtain, largely because the data are confidential.

Earlier empirical studies include Kassim and Rahman (2018), Kodongo and Kendi (2013), and Wydick (2001). These papers use a dichotomous variable, which equals 1 if groups have average arrears of less than three days per loan and no loans in arrears more than seven days, and 0 otherwise. With the same focus on repayment performance, some studies have used continuous variables based on repayment rate or default rates, computed as the proportion of the amount that has been paid (arrears) on the total loan amount at the date when full repayment was promised. Similarly, the repayment rate can be measured by the percentage of loans fully paid at due date. This proxy is used in Alam et al., (2021) and Mapesa (2015).

Both theories and empirical evidence mentioned above suggest that joint liability lending improves repayment performance. This is because joint liability lending helps to screen, monitor, and enforce repayment. This research will attempt to test this relationship by using Thailand data.

3. Methodology

To examine the situations under which joint liability can improve repayment rates, this paper uses a dataset collected in Thailand. The focus of this study is about repayment performance and how joint-liability lending incentives in the three stages of the lending process affect groups' repayment performance. Nevertheless, repayment incentives of joint-liability contracts in this study are also the same as some repayment implications in Ahlin and Townsend (2007), which results in some overlap between the two studies. However, the present analysis adds information and specifications by looking deeply into the dataset, dividing it into different sub-samples and using different variables.

3.1. The Thailand context

Like other developing countries in Asia, Thailand has implemented development policies which favor agriculture and small businesses. The BAAC is a government-owned development bank, and is the main financial institution in Thailand that delivers low-interest credit to low-income people (Fitchett, 1999).

Thailand is thus an appropriate context to examine the relationship between joint liability and repayment performance. The clientele of BAAC consists of farmers and small businesses who need credit for their agricultural production (Ahlin, 2020; Fitchett, 1999). They are borrowers who have an income source to repay their loans.

3.2. Data and sampling

The data combine information from two substantial cross-section surveys-a household survey and a BAAC survey. The two surveys were conducted in two provinces in the Northeast and two in the Central region of Thailand. These two surveys were part of a large-scale project to evaluate informal and formal financial institutions, and to construct and evaluate macro models of growth, fluctuation, and crisis. The project is administered in the United States at the National Opinion Research Centre and the University of Chicago. The overview of raw data from the surveys can be extracted from the Robert M. Townsend Dataverse of the Harvard Dataverse Network.[1]

The present paper-due to the different research questions and some concerns about endogeneity problems-uses a different sample compared to the one used by Ahlin and Townsend (2007). This paper uses a different sample and from that a sub-sample is created. From the raw data taken from Robert M. Townsend Dataverse of the Harvard Dataverse Network, this study extracts 251 observations, which combines groups existing from one to 50 years. After cleaning the data by deleting observations with missing data, the sample goes down to 219 observations.[2] The deleted observations include groups that existed from 23 up to 50 years, which considered outliers.

3.2.1. Variables

This section presents variables used in the repayment models. All variables have been suggested by previous theoretical and empirical research. However, due to the fact that this research utilises the data provided by Robert M. Townsend Dataverse of the Harvard Dataverse Network. A list of the variables is presented in Table 1.

4. Econometric model

Due to the fact that the dependent variable is a dummy variable, a logit model is utilised instead of an ordinary least squares (OLS) model.

Denote y as the event of interest (group is not being punished). This is coded as 0 or 1 for the group which has been punished or has not been punished, respectively. Denoting Pr as the probability of y to have the event group is not being punished; x_i as independent variables (can be categorical or continuous); β_i as unknown regression coefficient; and G as a function taking

[1] The link to the website: http://dvn.iq.harvard.edu/dvn/dv/rtownsend. This is a scientific data source for reproducible research.

[2] It is purely coincidental that this is the same number of observations as in Ahlin and Townsend (2007).

values strictly between 0 and 1, a binary response model for the probability of y is:

$$\Pr(y=1|x) = G(\beta_1 + \beta_2 x_2 + ... + \beta_k x_k)$$

The general specification is a logit equation of the following form:

$$ln\frac{\Pr\ (group\ not\ having\ interest\ penalty)}{1-\Pr\ (group\ not\ having\ interest\ penalty)} = f(control, screening, monitoring, sanction\ variable)$$

where Pr(.) indicates probability, group not have interest penalty is a dummy variable that is 1 if the group has not ever been punished, and 0 otherwise.

Table 1: List of the variables

Variable	Description
Panel A: Dependent variable	
Repayment performance	
Interest penalty	Binary variable indicating whether or not a group has any interest penalty. If a group has ever been interest-punished, this variable receives the value of 0, and 1 otherwise.
Panel B: Control variables	
Village characteristics	
Village risk	Indicating village-wide risk. A continuous variable, value from 0 to 1, measuring the deviation of the villager's expected income
Village wealth	A continuous variable measuring village's average wealth
Member-COOPs	Percentage of villagers in the group's village who are members of a production cooperative group or credit cooperative
Member-banks	Percentage of villagers in the group's village who are members of a commercial bank
Groups' characteristics	
Group duration	Number of years in existence
Size of groups	
Group size	Number of borrowers in a group
Productive factors	
Land Own	Average land held by borrowing members of the group
Education	Weighted average of education level of the group
Level of joint liability	
	Percentage of landless members in a group
Panel C: Correlation of borrowers' outcome	
Covariance1	Probability (p) that two respondents in the village reported the same year as their worst when being asked which year (in terms of income) was their worst
Covariance2	Probability (h) that two interviewees (randomly chosen from a group) reported the same occupation
Panel D: Cooperation between members	
Sharing-Relatives	Number of yes answers for the five questions regarding production for relative members
Sharing-Non Relatives	Number of yes answers for the five questions regarding production for non-relative members
Best cooperation	Percentage of nearby villagers naming the village where the group resides as best cooperation
Joint decisions	Number of decisions the group makes collectively regarding three producing resolutions: crops to grow; pesticide and fertiliser usage; and production technique
Panel E: Screening	
Screening 1	Equals 1 if there is anyone who would like to join but was refused by the group
Screening2	Equals 1 if the common members in a group know about the others' businesses (not including the head of the group), and 0 otherwise
Head-knowing	Equals 1 if the head of the group knows about others' businesses
Bank inspection	Average number of the bank's inspections on a group per year
Panel F: Monitoring	
Livehere	Percentage of the group living in the same village
Relatives	Percentage of the group being relatives

Source: Table created by the author.

5. Results

5.1. Variable descriptions

Table 1 shows descriptive statistics for the sample of 219 observations. The default level is almost the same for all groups, regardless of whether the borrowers are in a group in which they know (or do not know) about each other's business (26.7 per cent and 25.8 per cent, respectively). There also is a slight difference between the percentages having interest penalties of groups which screen members and groups which do not. Those rates for screened groups and non-screened groups are 24.3 per cent and 28.3 per cent, respectively. This suggests that maybe the dummy variables 'whether group's members know about each other' business' and 'whether the group has ever disallowed membership for any person who would like to join' do not capture sufficiently the characteristics of screening.

The number of members in a group ranges from five to 37. Most groups have 10 members, which is twice as large as a standard group of the Grameen Bank in Bangladesh (Husain, 2008). The proportion of the groups having from five to 25 members is 98.4 per cent. Groups larger than 25 are potentially ranked as outliers. Small groups may have the advantage of a low cost of monitoring, because there is a tendency for everyone to know each other. However, small groups may not have the same power as large groups in terms of sharing risks and harnessing social sanctions (Ahlin, 2015).

Table 2: Variable description (N = 219)

Variables	Minimum	Maximum	Mean	Standard deviation
Interest penalty	0	1	0.26	0.44
Group duration (years)	1	50	11.38	8.60
Village risk	0.08	0.52	0.30	0.09
Village wealth (in millions)	0.1	16.74	1.19	2.27
Group size	5	37	12.34	5
Interest rate	1	17.45	10.87	2.03
Loan size (in thousands)	2.27	150	18.93	18.16
Q (degree of joint liability)	0	1	0.07	0.16
Land Own	0	94	23.61	15.95
Education	1.4	4.29	3.07	0.32
Screening1	0	1	0.37	0.49
Screening2	0	1	0.95	0.23
Covariance1	0	1	0.29	0.16
Covariance2	0.13	1	0.86	0.24
Livehere	0.03	1	0.87	0.23
Relatives	0	1	0.57	0.36
Sharing-relatives	0	5	2.15	1.58
Sharing-non-relatives	0	5	1.55	1.43
Best cooperation	0	0.58	0.25	0.10
Joint decisions	0	3	0.37	0.92
Member-COOPs	0	0.92	0.08	0.17
Member-Banks	0	0.80	0.27	0.18
Best institution	0	0.80	0.27	0.19
Informal (social) sanctions	0	0.53	0.10	0.11

Source: Author's calculations.

5.2. Empirical results and discussion

This section tests the impact of joint liability lending on repayment. The econometric model combines variables for screening, monitoring, and enforcement, while the dependent variable is unchanged. This model eliminates biases due to omitting important variables that may have appeared in the last three models. According to theory, it is expected that the coefficients of screening, monitoring, and social-sanction variables are positive and significant. Results found by this paper have shown some convergence with early empirical papers, such as Mahmud (2020), Munandar (2023), Obaidullah and Khan (2008), and Shang et al. (2020).

Table 2 shows the results of the econometric model for the sub-sample of 219 observations. Panels A, B, and C of the table are the results for the three separate hypotheses that have been seen in previous sections. Panel D is the result for the joint hypotheses, where all variables for screening, monitoring, and sanctions are included.

Several outcomes can be seen from Table 2. First, including all variables improves the

results. For example, the screening variable, *head-knowing,* is significantly positive at 15 per cent in Panel A, but becomes significantly positive at 5 per cent in Panel D. The same result is seen for variables indicating joint liability *Q*. The joint of all variables also strengthens the results of the separate variables where it improves the confidence levels of the significant variables. Second, the results show that the joint-liability and repayment relationship is upheld. Joint liability improves repayment performance because it makes the borrowers, before the bank, the residual risk-bearers. From the results in Table 2, it can be seen that joint liability induces the borrowers to undertake some activities that are costly for the banks to do, especially the screening and enforcing. The variables for screening *head-knowing*, and enforcement *informal (social) sanctions* are significantly positive at and 5 per cent. This means both screen and enforcement by group members help improve repayment.

As predicted by the theory, correlation between projects' outcomes is positively associated with repayment performance, as the coefficient of correlation *covariance1* is positive and significant at 10 per cent, and 5 per cent (Panel A, B, and D). However, one important result for non-focus variables is that the variable for alternative sources of credit, *member-COOPs,* reduces the probability of repayment. The coefficient of *member-COOPs* is -3.495 and is significant at 5 per cent.

Table 3: Regression results: alternative specifications (N = 219, duration < 23 years)

	A (N = 219) Log likelihood = -93.131 R^2 = 22.41%		**B (N = 219) Log likelihood = -89.810 R^2 = 25.18%**		**C (N = 219) Log likelihood = -92.026 R^2 = 23.34%**		**D (N = 219) Log likelihood = -83.956 R^2 = 30.06%**	
Interest penalty	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Group duration	-0.164$^{(***)}$	0.039	-0.173$^{(***)}$	0.040	-0.154$^{(***)}$	0.037	-0.191$^{(***)}$	0.043
Village risk	-1.434	2.347	-3.762$^{(*)}$	2.508	-0.377	2.395	-2.749	2.678
Village wealth	0.007	0.096	0.030	0.096	-0.028	0.094	0.027	0.096
Group size	0.045	0.043	0.065$^{(*)}$	0.046	0.019	0.043	0.064	0.051
Land own	-0.006	0.014	-0.016	0.015	-0.012	0.014	-0.021	0.016
Education	0.790	0.697	1.200$^{(*)}$	0.746	0.916	0.716	1.394$^{(**)}$	0.817
Member-COOPs	-3.376$^{(***)}$	1.101	-3.532$^{(***)}$	1.149	-3.981$^{(***)}$	1.157	-4.395$^{(***)}$	1.260
Member-banks	0.037	1.137	-0.200	1.189	-0.128	1.159	-0.703	1.309
Q	-2.270$^{(*)}$	1.560	-2.765$^{(**)}$	1.563	-2.532$^{(*)}$	1.574	-3.342$^{(***)}$	1.655
Covariance1	2.125$^{(*)}$	1.449	2.893$^{(**)}$	1.517	1.953	1.465	3.057$^{(**)}$	1.718
Covariance2	0.175	0.821	0.717	0.834	0.013	0.807	0.550	0.933
Sharing-relatives	0.816$^{(***)}$	0.287	0.789$^{(***)}$	0.290	0.716$^{(***)}$	0.270	0.698$^{(***)}$	0.294
Sharing-non-relatives	-0.968$^{(***)}$	0.301	-1.015$^{(***)}$	0.307	-0.849$^{(***)}$	0.286	-0.846$^{(***)}$	0.315
Best cooperation	-2.961$^{(**)}$	1.750	-4.141$^{(***)}$	1.800	-3.657$^{(**)}$	2.172	-5.034$^{(***)}$	2.345
Joint decisions	0.468$^{(**)}$	0.260	0.561$^{(***)}$	0.261	0.589$^{(***)}$	0.267	0.773$^{(***)}$	0.284
Screening1	0.040	0.397					0.116	0.427
Screening2	-0.935	0.961					-1.873$^{(**)}$	1.088
Head-knowing	1.154$^{(*)}$	0.798					1.991$^{(***)}$	0.885
Bank inspection	0.029	0.070	0.041	0.065			0.051	0.082
Livehere			0.704	0.867			0.960	0.941
Relatives			-1.714$^{(***)}$	0.613			-2.272$^{(***)}$	0.688
Best institution					0.709	1.258	0.478	1.342
Informal sanctions					4.170$^{(***)}$	2.059	5.639$^{(***)}$	2.267
cons	0.299	2.693	0.206	2.746	0.104	2.599	-0.621	3.051

Notes: $^{(***)}p < 0.05$ $^{(**)}p < 0.1$ $^{(*)}p < 0.15$

Dependent variable: A binary variable which equals 0 if a group receives interest penalties, and 1 otherwise. Independent variables: screening, monitoring, sanction, and control variables.

Source: Author's calculations.

6. Conclusion

This paper has empirically examined the impact of joint-liability lending on repayment performance, while controlling for other factors such as the village's risk, alternative sources of credit, and the groups' cooperation level, along with the correlation between the borrowers' project outcomes. The theoretical models of joint-liability lending do not give unequivocal results, and are based on some strong assumptions, which cannot be directly tested.

The results show that joint-liability lending, especially combined with screening and enforcement by the joint-liability groups, improves repayment performance as predicted by the theoretical models. First, joint liability improves the repayment probability if joint-liability groups are formed by borrowers who know each other by living in close proximity, but only combined with the reinforcing influence of the bank. This explains why joint-liability groups work better in microfinance organisations which have specially trained credit officers. In fact, special banks (development banks) and microfinance organisations-rather than other organisations that engage in lending to the asset-constrained borrowers (for example NGOs)-have more highly-trained credit staff. Second, the role of the group head is important. He or she may act on behalf of the group to choose the new members, monitor members, and so on. Sometimes, the head of a group is given a bonus from the bank. Therefore, the bank should have close contact with the head and should guide the group on choosing the head.

Third, screening from the group members is more effective if the members live at the same place. It helps the borrowers to know about each other and reduces the costs of screening and monitoring. The closeness between borrowers may also create social bonding between them, which strengthens social sanctions. That helps to reduce opportunistic behaviour, not only by being more carefully observed, but also by the threats of being excluded from community activities. Social sanctions improve repayment rates. They provide a unique characteristic of group lending that contributes positively to repayment in the situation when it is difficult for the bank to force the borrowers to pay according to the loan terms. The results therefore suggest that joint-liability lending groups should mainly be established in areas where group members live in close proximity and enjoy closely-shared activities, such as communal ceremonies and festivals around the year.

Fourth, the results show that groups with a higher level of joint liability and better cooperation are expected to have a better repayment performance. Groups that have better cooperation follow a rule of joint liability more strictly: where there is anyone in a group who cannot repay, the others in the group are willing to help. Even although they have to do so (as requested by the credit contract, and enforced by a ban on future credit), the more cooperative groups do this better, because they are keen to help each other. The cooperative borrowers would like to help each other to repay, maybe because they are afraid of being excluded from future credit.

Fifth, alternative sources of credit may affect the willingness of borrowers to repay, especially when they are in difficulty. The ability to have access to other sources of credit reduces the strength of the best sanction-credit rationing-that the bank can impose on the borrowers. This might also apply for individual loans, but it is more severe for the case of joint liability. This is because there would be a greater number of defaults in joint liability than in individual cases when one borrower in a group defaulting may trigger the default to spread to others in the group (as analysed in Besley and Coate, 1995). Therefore, in regions where credit is available, for example in credit cooperatives where the villagers are members, then joint liability might not be the best choice.

However, the results show that joint liability works only under certain circumstances. Joint-liability lending works best if the three effects - screening, monitoring, and enforcement-are all undertaken. If a group is screened before it is given loans, it is more likely to be formed by the creditworthy borrowers who use the loans more carefully. Under the groups' monitoring, the borrowers would invest the loans in less-risky projects and put more effort into using the loans. As a result, it increases the probability of the loans being repaid, because the loans have been invested in less-risky projects by creditworthy borrowers. Finally, the borrowers who have the income from the fruitful projects would choose to repay instead of undertaking opportunistic behaviour, because it is more costly to default within a group which they have been carefully chosen to join. That means screening would help to improve the success of monitoring and repayment enforcement.

Besides the above results, this research poses a limitation, which has been mentioned above, regarding the data. It is very difficult and costly to observe and measure the impact of joint liability lending on repayment, which explains the rare empirical evidence compared to theory in the microfinance field. This research uses the data collected in early 2000 which is not very updated, but it is useful as the data came from the most comprehensive and trusted source. Therefore, future research in this area can develop more insights for the relationship using recent data.

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