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EVALUATION OF IMPACT OF PEER MONITORING ON SUSTAINABILITY OF SELF-HELP GROUPS

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Abstract

Main objective of the study is to understand how self-help groups can give loans and finance to the poor and marginalized by utilizing peer-to-peer and social contracting methods. We believe that a scenario in which a group of people lend money to one another while sharing risk, making use of social capital, financial inclusion and sustainability becomes easier. When members who are in group, exchange information and have joint liability, peer selection and assortative matching leads to better financial behavior in a group. Researchers advocate the development of self-help and joint liability organizations to eliminate selection bias and moral hazard during contract performance. As a result, peer monitoring and screening, as revealed in this study, can help to lower the probability of adverse selection, particularly for high-risk borrowers.

Keywords: Peer Monitoring, Information Asymmetry, Group lending, Moral hazard.

JEL Classification: G21

1. Introduction

More than a billion people are unable to access formal financial institutions due to lack of any kind of fixed asset or physical collateral. The banks and financial institutions suffer from information asymmetry and do not have any information about the creditworthiness of other members in the group, (Demirguc Kunt et al., 2018). Because of the increased costs associated with screening and monitoring these borrowers, lending to the poor results in a drop in assets and an increase in bad debt (Stiglitz, J. E, 1990). Poverty has been addressed through social innovations such as Social capital and collective lending. "Social value" refers to the established network relation, embedded norms and trust among the impoverished. (Ito, Sanae, 2003). Information asymmetry could lead to "adverse selection" or selection of the high-risk borrowers (Jensen and Meckling, 1976) Joint liability groups help in reducing the transaction costs and lead to reduction in moral hazard and adverse selection. According to a number of research studies (Coleman in 1988, Malhotra and Baag in

2021), it is critical to address the problem of adverse selection by using peer mechanisms (Besley, T., Coate, 1995). Peer selection can significantly reduce adverse selection. There are very few studies on the impact of peer mechanisms on joint responsibility groups and this study is the first ever study to fill the gap.

2. Group lending at SHPI Spade

With the aid of the West Bengal State Government, Spade, an NGO, has implemented the Self-Help Group Linkage Program in more than 150 neglected communities across the country. This non-profit organization was founded in 2014 to assist underserved communities. To encourage lending to the poor, without social collateral, self-help groups help to extend credit on the basis of the social capital. Under the joint liability, self-help groups provide that no loan or credit should be provided to the poor until the earlier debts have been paid. In case of the joint liability groups, the loans provided are of extremely small size and provided at much higher frequency.

3. The Research problem

The study seeks to empirically validate that in a community lending programme, the peer mechanism helps in creating information symmetry and creating perfect information. Self-help group lending mitigates the risk of adverse selection and moral hazard by virtue of the joint liability and social capital. There is no study that has investigated the impact of peer mechanism in reducing the risk of moral hazard and adverse selection, (Malhotra, & Baag, 2021). According to Malhotra and Baag, adverse selection can be minimized through assortative matching, or the formation of groups of people with similar risk profiles (2019). Further, the study aims to investigate whether more social ties and access to data can lead to higher repayments from groups. To conclude, the study seeks to measure the impact of peer selection, peer monitoring and sanctioning in mitigating the issue of information asymmetry in the form of moral hazard and adverse selection.

4. Literature Review

Because of the scarcity of collateral and higher cost of monitoring and screening the customers, traditional banks, financial institutions and organizations are wary of lending to the poor. One way microfinance can alleviate poverty and promote social change is by providing credit. The majority of financial institutions do not offer low-cost credit to the poor and middle class. Formal financial institutions face mission drift to strike a balance between their social and financial objectives. That is, they have to decide between the achievement of social objectives and achievement of the return on investment (ROI). In order to achieve the UN Sustainable development goals, it is important that the low-interest loans are made available to rural poor people, says (Von

Pischke, 1991). In the long run, (Morduch, 2000) claims that the presence or absence of group pressure has a significant impact (repayment and group quality are both affected by the amount of social capital in an individual (Androuais, Yawo Noglo & Anne, 2015). Due to a lack of data on the group's creditworthiness, the borrower cannot be pre-selected (Jensen and Meckling, 1976). The lemon problem may arise if a bank charges the same fee to all customers, regardless of risk. Therefore, the self-help groups or joint liability groups suffer from the problem of selection of the safe customers (Akerlof, G. A., 1970). Social capital suggests that the groups having higher level of cohesiveness and belief in one another are less likely to engage in risky behaviour (Sanae, 2003). "Social capital," according to Coleman, is a web of social linkages that establishes group norms based on mutual trust and esteem (1988). Both the group's quality and the amount of loan are affected by social capital (Androuais, Yawo Noglo & Anne, 2015). Members can be selected using a variety of metrics and criteria. People can join groups based on the religion they practice (Hulme and Mosley, 1996). Bank credit is more likely to be granted to people who live in the same house and have some level of homogeneity, according to (Hermes, Lensink, and Mehrtab, 2005) (Karlan, Dean S, 2005). In case of the credit granted to poor people, due to the higher costs the banks are not interested in screening their loan applications. But in a joint liability group, due to the presence of the social capital, the members have incentive to peer monitor each other (Floro SL & PA Yotopoulos, 1991). It is claimed that the use of social capital can help reduce transaction costs. When conducting a study, Tang (1998a) emphasizes the importance of risk homogeneity in mitigating adverse selection and risk of moral hazard when selecting participants. As per the self-help group bank linkage programme, the members can pre select each other as they have prior knowledge about each other (Vigenina, 2005). As in a self-help group the members have information about each other, it helps in reducing the risk of default. If the group is homogeneous, multiple strategies can be employed at the same time to reduce defaults. If no one in the group knows anyone else, the group can be formed by pooling or random matching (Armendariz & Gollier, 2000). Social collateral can be used to prevent moral hazard in lending groups because of a lack of transparency (Simtowe, 2006). Good group repayment behaviour is influenced by number of factors, which include pre-screening and monitoring, peer pressure, self-selection, and social ties (Ahlin and Townsend, 2007). "Moral hazard" refers to a borrower's change in credit behaviour and attitude following a loan from a financial institution. In case of a joint liability group, the members share the responsibility to repay the loan. If even one of the members does not pay the loan, all the other members repay the loan due to the risk of bank sanction. At the same time, in case of the self-help groups, due to joint liability the peers have the motivation to strategically default and avoid paying the loan. The use of Joint Liability Groups (JLGs) allows banks to pass on liability and monitoring costs to customers, according to Carpenter (2014; Stiglitz, J E, 1990). If a co-signer has a poor credit history, lenders will be reluctant to co-sign and monitor them.

According to (Rey, 2003), collisions among the group's borrowers may exacerbate moral hazard. Researchers Timothy Besley and Stephen Coate found a collaboration and strategic default issue in the case of a self-help group with joint liability. Due to social collaboration and strategic default, peer sanctions are becoming increasingly important. Peer sanction is essential because if one member defaults on a debt, the entire organisation is at fault. To fulfill this shared responsibility, each member must pay for the other members. In self-help groups, members who don't pay back their loans face peer sanction from their fellow members (T. Besley & Coate, 1995). As a result, the lender is free of any responsibility to the group.

5. Empirical strategy

The term "peer selection" refers to the practice of selecting members of a group based on the opinions of those in the group they will be working with. The simple Order Logit and Logit Model are used to test the peer selection method.

$$\ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k \quad \dots\dots\dots (1)$$

The four models developed by the research are: adverse selection, internal& external delinquency and misuse of funds. External and internal delinquencies as well as adverse selection are just a few of the study's many reliant variables. Data from exploratory factor analysis, cluster analysis, demographics, and dynamic incentives are all used to construct the Borrower risk category.

6. Data collection and design

For the study, 400 SHG members were surveyed for primary data collection. An NGO called Spade has links to self-help groups in Kolkata, India. NGO promotes the group lending, bank linkage scheme with support from Self-help group bank. An online poll was conducted with 400 women from various SHGs, and the results were interesting. Twenty-six per cent are between the ages of 22 and 31, 39 per cent are between 32 and 41, and 34 percent are between the ages 42 and 51 in the sample. More than a quarter of those surveyed were between the ages of 52 and 61. The following table displays the average age of the group's members:

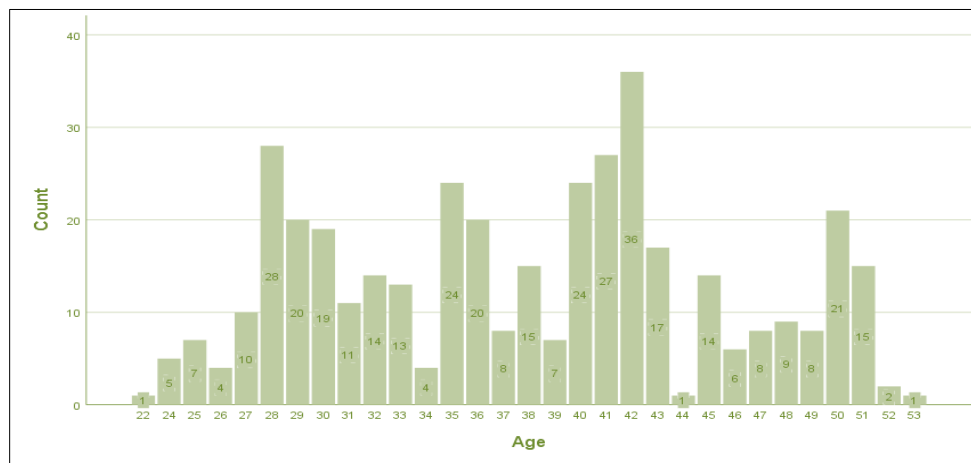


Figure 1: Demographics - Age frequency distribution

In the survey, 16.75% of respondents earn between Rs. 1.25 lakhs and 1.35 lakhs, 23.75 % earn between Rs. 1.45 lakhs and 1.55 lakhs, 14.5% earn between Rs. 1.95-2.05 lakhs, 2.25 % earn between Rs. 2.25-3.35 lakhs, 18.5 % earn income between Rs. 2.45-2.55 lakhs, and 24.25 % earn between Rs. 2.65 lakhs and 2.75 lakhs, the results show.

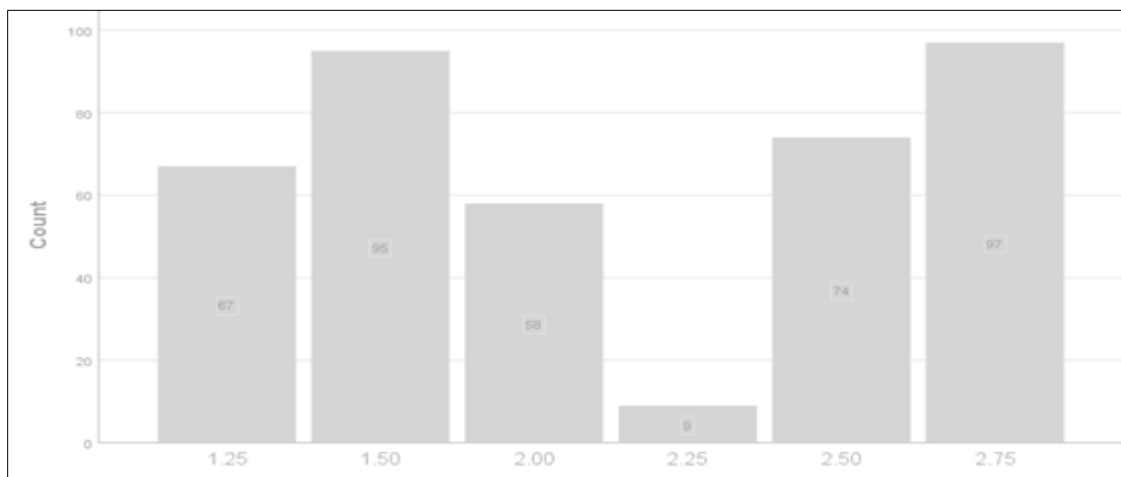


Figure 2: Demographics - Frequency distribution for income

6.1 Design of the research instrument

The data was gathered using a simple questionnaire that could be completed in a few minutes. There were 29 questions in the design that were based on a study (Vigenia, 2005). There is an appendix with a list of the survey's key variables. It's shown here: the correlation matrix between the various questions.

	q1	q2	q3	q4	q7	q9	q11	q12	q13	q14	q15	q16	q17	q18	q25	q26	q27	q28	q29
q1	1																		
q2	-0.0776	1																	
q3	0.0842	-0.0157	1																
q4	0.1427	0.0027	0.0715	1															
q7	-0.0756	0.0347	0.0174	-0.0289	1														
q9	-0.0553	0.0744	-0.0429	-0.0771	0.0389	1													
q11	-0.0373	-0.0422	-0.0699	-0.1087	0.485	-0.0105	1												
q12	0.0999	0.0547	0.0901	0.0453	0.3506	0.05	0.2407	1											
q13	-0.0931	-0.0216	-0.2039	-0.0683	0.005	0.0496	0.0925	0.0268	1										
q14	-0.0935	-0.0167	-0.1706	-0.0645	0.0532	0.0392	0.0827	0.1178	0.6586	1									
q15	0.124	-0.0262	-0.088	0.021	0.0031	-0.0254	-0.0247	0.0349	0.0062	0.0358	1								
q16	0.0277	0.0791	-0.038	-0.0267	0.1398	0.0011	-0.0426	0.1437	-0.0299	-0.0123	-0.0226	1							
q17	0.084	-0.5749	-0.0418	0.1294	-0.107	-0.072	0.0365	0.0379	0.092	0.0145	-0.0313	-0.0684	1						
q18	0.0754	0.2207	0.0743	-0.0052	-0.061	0.0749	-0.021	0.2064	-0.0283	0.0496	0.0261	0.2205	-0.1248	1					
q25	-0.0079	-0.1081	0.0072	-0.0439	-0.0617	0.0488	-0.0426	-0.1687	0.0281	0.0382	-0.0027	-0.2021	0.0935	-0.1901	1				
q26	0.0385	-0.0543	-0.0063	0.0239	-0.2468	0.0242	-0.23	-0.09	0.0005	0.0764	0.0385	-0.046	0.0829	0.0399	-0.0598	1			
q27	-0.0046	0.3595	0.0312	-0.1009	0.0232	-0.0166	0.1077	0.048	0.0867	-0.0459	-0.0189	-0.0265	0.008	0.135	-0.0549	-0.0404	1		
q28	0.0452	0.1056	-0.0783	-0.0798	0.3222	0.0141	0.5242	0.2481	0.1121	0.1132	0.0271	0.0696	-0.207	0.0851	-0.113	-0.3509	-0.0385	1	
q29	0.0825	-0.0572	-0.0711	0.0276	0.0352	0.0398	0.0326	-0.0787	-0.0463	-0.0391	0.0243	-0.1577	0.0495	-0.1297	0.1529	0.09	-0.0785	0.0043	1

Figure 3: Correlation between variables

The term "Group Quality" refers to how the members perceive the riskiness of other members of the group. Group quality comprises of 5 different classifications that include – highest risk as the first category, somewhat risky is the second category, risk neutral is the third category, somewhat safe is category four and the safest is the fifth category.

Borrower Risk Type

When conducting interviews, it is imperative that the borrower risk categories be identified. Risk types and clusters can be identified using Cluster Analysis. Creditworthiness is used to categorize borrowers into one of two categories: high, moderate risk or the low-risk category. Self-help groups run by SPADE NGO drew the most participants in the survey (Non-Government Organization). According to a recent study (Malhotra & Baag, 2021), low-risk borrowers should rely on the information provided by their customers when making lending decisions. In a joint liability group the members with homogenous risk type, tend to group together. This implies that the member with the low risk will not be willing to group with the members with the high risk. It is impossible for those who have a low tolerance for credit risk to participate in high-risk endeavors. In a homogenous group the members with the same riskiness tend to group together and due to the joint liability, they peer monitor each other. Pressure is exerted on a member of the group if they fail to repay a loan on time. In this study, we have used the Cluster analysis to determine the borrower risk type. ANOVA analysis is used to identify the importance and significance of the various factors impacting the risk category. From the ANOVA analysis, growth of income, stability of the borrower's project, preference for progressive lending, low transaction costs, preference for lower interest rate and the preference for the long-term maturity loan.

Table 2: Results of ANOVA Analysis

	Cluster Mean Square	DF	Error Mean Square	DF	F Statistics	Sig
What is the rating of members regarding the growth of income after forming SHG?	1.718	2	0.404	397	4.248	0.015
How the borrower assesses the stability of his business project?	0.002	2	0.292	397	0.006	0.994
Do you prefer progressive lending?	32.648	2	0.868	397	37.59	0.000
Do members prefer lower transaction costs?	10.20	2	0.574	397	17.76	0.000
Do members prefer lower interest rates?	111.51	2	0.353	397	316.25	0.000
Do members prefer long-term maturity?	176.67	2	0.586	397	301.57	0.000

Before speaking with a borrower, make sure you understand their level of risk. The Cluster Analysis is done using SPSS 26 to identify the various types of risks on the basis of debt and income profile. We have identified three kinds of clusters on the basis of the questions given above. Borrowers with a high default risk, those with a moderate default risk, and those with a low default risk are three types of borrowers. The respondent for the survey were selected from the SPADE NGO's self-help groups (Non-Government Organization). In a homogenous group, the members have social ties and business correlation which helps them to form a group (Malhotra & Baag, 2021). This implies that low risk borrowers will match and form a group with the low-risk borrowers. Due to the joint liability, the members have a joint liability and are responsible for the loan taken by the other community members of the group. Thus, members have individual limited liability but joint liability for the group. In order to avoid sanction these members peer monitor each other. Individuals in a group exert pressure on one another and impose social sanctions when another member of the group fails to make timely repayment of a loan. Cluster analysis is used to identify various types of borrower risk. After joining a self-help group, an increase in revenue is the best indicator of lower risk of the borrower or his repayment capacity. A borrower's risk is determined by a variety of factors, including the length of time the loan will be outstanding, the interest rate, and any transaction costs. The risk profile of a borrower is largely determined by his or her ability to pay back the loan and the level of current income.

Following a more thorough examination of the data, the following groups were discovered:

Table 3: Classification on the basis of risk

Cluster Membership	
Cluster 1	84
Cluster 2	108
Cluster 3	208
Total cases	400

Table 4: Descriptive Statistics of clusters based on ANOVA (Comparison of Means)

	Units		Average	Deviation	Std. Error	LLCI	ULCI	Min	Max
Income Growth	1	101	3.52	0.576	0.057	3.41	3.64	3	5
	2	211	3.69	0.687	0.047	3.60	3.79	3	5
	3	88	3.57	0.583	0.062	3.44	3.69	3	5
	Total	400	3.62	0.641	0.032	3.56	3.69	3	5
Progressive Leading	1	101	1.51	0.559	0.056	1.40	1.63	1	3
	2	211	1.48	0.538	0.037	1.41	1.56	0	3
	3	88	3.48	0.742	0.079	3.32	3.63	3	5
	Total	400	1.93	1.014	0.051	1.83	2.03	0	5
Transaction Cost	1	101	1.56	0.842	0.084	1.40	1.73	1	4
	2	211	1.64	0.777	0.054	1.53	1.74	1	4
	3	88	1.73	0.754	0.080	1.57	1.89	1	3
	Total	400	1.64	0.789	0.039	1.56	1.72	1	4
Long term loan	1	101	1.97	0.921	0.092	1.79	2.15	1	4
	2	211	1.77	0.970	0.067	1.64	1.90	1	4
	3	88	2.03	0.928	0.099	1.84	2.23	1	4
	Total	400	1.88	0.954	0.048	1.78	1.97	1	4
Internal loan	1	101	3.67	0.814	0.081	3.51	3.83	3	5
	2	211	1.36	0.563	0.039	1.28	1.44	0	2
	3	88	2.13	1.004	0.107	1.91	2.34	1	4
	Total	400	2.11	1.212	0.061	1.99	2.23	0	5

The descriptive statistics for the clusters formed are shown in Table 4. Second and third-party borrowers prefer to borrow from family and friends rather than banks. Because of the higher interest rates they pay, long-term borrowers' higher probability to default on loan. Second and third-party borrowers prefer to borrow from family and friends rather than banks.

While the second group prefers bank loans, the first group prefers internal funding. Category 3 is more likely to go bankrupt due to joint liability because of its higher default risk and preference for more debt than the other categories. Those in this group 3 prefer long-term, high-risk loans. There is no need to worry about the borrowers' financial well-being when using Category 2, they are the safest risk category. Saving is a priority for members of this group rather than borrowing money. Borrowers in Category 1 have a moderate level of risk. They prefer internal loans and are more likely to save as a result.

Table 5: Borrower risk identification

Cluster One	Risk Moderate
Cluster Two	Risk Low
Cluster Three	Risk high

In Table 5, a cluster analysis is used to identify the various risk categories. The K Means Cluster has been used to identify the borrowers into various risk types. Table 6, provides the result of a ANOVA to compare the means between the group and within the group. As in (a), the number of non-fixed clusters in a sample average

Table 6: Significant difference between clusters based on risk types

		ANOVA				
		Sum of Squares	df	Mean Square	F	Sig.
Income growth	Between Groups	2.242	2	1.121	2.752	0.065
	Within Groups	161.755	397	0.407		
	Total	163.998	399			
Progressive lending	Between Groups	270.166	2	135.083	383.401	0.000
	Within Groups	139.874	397	0.352		
	Total	410.040	399			
Low transaction costs	Between Groups	1.251	2	0.625	1.004	0.367
	Within Groups	247.187	397	0.623		
	Total	248.438	399			

Term or long-term lending	Between Groups	5.568	2	2.784	3.092	0.046
	Within Groups	357.429	397	0.900		
	Total	362.998	399			
Internal lending	Between Groups	365.469	2	182.735	329.052	0.000
	Within Groups	220.468	397	0.555		
	Total	585.938	399			

As per the One Way ANOVA, the level of income growth, dynamic incentives, long term debt and internal lending are significant.

There are three clusters in Table 6, which are tested using one-way ANOVA and compared using various factors such as the growth in income, progressive lending, transaction costs, long term loan and internal loans.

Table 7: Significant difference between the different risk types (Post Hoc)

Dependent Variable		Mean Difference (I-J)		Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Growth in income	1 2	-0.167	0.077	0.097		-0.36	0.02
	3	-0.043	0.093	0.897		-0.27	0.19
	2 1	0.167	0.077	0.097		-0.02	0.36
	3	0.124	0.081	0.312		-0.08	0.32
	3 1	0.043	0.093	0.897		-0.19	0.27
	2	-0.124	0.081	0.312		-0.32	0.08
Progressive loans	1 2	0.031	0.072	0.909		-0.15	0.21
	3	-1.962*	0.087	0.000		-2.18	-1.75
	2 1	-0.031	0.072	0.909		-0.21	0.15
	3	-1.994*	0.075	0.000		-2.18	-1.81
	3 1	1.962*	0.087	0.000		1.75	2.18
	2	1.994*	0.075	0.000		1.81	2.18
Transaction costs	1 2	-0.071	0.095	0.760		-0.31	0.16
	3	-0.163	0.115	0.368		-0.45	0.12
	2 1	0.071	0.095	0.760		-0.16	0.31
	3	-0.092	0.100	0.655		-0.34	0.15
	3 1	0.163	0.115	0.368		-0.12	0.45
	2	0.092	0.100	0.655		-0.15	0.34

Long term loan	1	2	0.203	0.115	0.212	-0.08	0.48
		3	-0.064	0.138	0.899	-0.40	0.28
	2	1	-0.203	0.115	0.212	-0.48	0.08
		3	-0.266	0.120	0.088	-0.56	0.03
	3	1	0.064	0.138	0.899	-0.28	0.40
		2	0.266	0.120	0.088	-0.03	0.56
Internal loans	1	2	2.313*	0.090	0.000	2.09	2.53
		3	1.548*	0.109	0.000	1.28	1.82
	2	1	-2.313*	0.090	0.000	-2.53	-2.09
		3	-.765*	0.095	0.000	-1.00	-0.53
	3	1	-1.548*	0.109	0.000	-1.82	-1.28
		2	.765*	0.095	0.000	0.53	1.00

ANOVA Post Hoc Scheffe was used in Table 7 analyses whether there is significant difference among the clusters. ANOVA results show that, there are significant differences among the cluster on the basis of growth of income and the terms of loan.

Hypothesis formulation and testing

In case of a community group lending, the group members are together responsible for the repayment of the loan or they have shared liability. At the same time, the members who have the joint liability have the responsibility to peer monitor each other. The major motivation behind the peer monitoring of the members is the incentive to receive additional loan from the bank on the repayment of the earlier loans. Peer selection is significant in the formation of a new group. In case of the joint liability groups, the bankers do not have any incentive to peer monitor other members of the group. The banks are wary to monitor the members of the group due to higher screening cost and transaction costs. In case of a group adverse selection, refers to the issue of selecting the borrowers with the higher risk, who might not the repay the loans in time. By virtue of the joint liability, the members peer monitors each other, and this reduces the probability of moral hazard and adverse selection.

Hypothesis 1: Adverse selection among the group is less likely if information about the borrower's riskiness is available.

The hypothesis given above is described in the form of the regression equation:

Y_i (Group Quality) = $a_0 + \beta_1$ Risk Type of borrowers + β_2 Information + β_3 Education + β_4 Financial Literacy + β_5 Technology + β_6 Peer pressure + β_8 Peer Monitor + β_9 Social Ties + β_{10} Leadership + β_{11} Leadership + β_{12} Information + β_{13} Default by members + β_{14} Use of informal finance + ε_i . In this empirical analysis we have taken Risk Category 1 as the base category. From the cluster analysis, category 2 is the moderate risk category, category 1 is the low risk category and category 3 is the high risk category. The risk type of a borrower is depicted in the regression equation above using the Cluster analysis classification. We have used the binary or dichotomous variables as proxy for the second and third levels of risk. To begin, this is the most basic category. The relationship between Borrower risk type, Group Quality, and other individual risk factors has been examined using order logit regression.

Table 8: *Impact of Peer mechanism, Peer selection, and Peer sanction on Group Quality*

	Model (1) Group Quality
Moderate risk	0.257 (0.278)
Low risk type	0.498*** (0.254)
Education	0.531*** (0.244)
Financial Literacy	0.168 (0.256)
Access to technology	0.563*** (0.249)
Peer pressure	-0.365** (0.190)
Peer monitor	0.484*** (0.177)
Social Ties	-0.008 (0.201)
Leadership	0.137 (0.185)
Information	-0.489*** (0.186)
Default of members	0.0938 (0.202)
Use of informal finance	0.420*** (0.202)
Intercept (1)	-0.318 (0.349)
Intercept (2)	0.886 (0.353)
Intercept (3)	2.42 (0.373)
Number of observations	400
Nagelkerke R²	9.5%

Table 8: *Impact of Peer mechanism, Peer selection, and Peer sanction on Group Quality (Dependent variable is Group Quality – ordinal variable with 1 as high risk and 5 as low risk, independent variables are education, financial literacy, access to technology, peer pressure, peer monitor, social ties, leadership, information, default of members, informal finance, intercept are for ordered logit – Dependent variable is 5 level variable but respondent used only 4 levels, none of the respondent said that group is not at all risky – level 5)*

There are out of three two types of homogenous groups: those formed by members of high-risk groups and those formed by members of low-risk groups. Education has a positive effect on group quality for a variety of reasons. It's also beneficial for the group to have access to technology. Peer pressure has a negative impact on the group quality and the peer monitoring has a positive impact on the group quality. Borrower information has a negative impact on the group quality. Borrower information becomes more available, and the group's quality suffers as a result.

In addition, the R squared of the model is approximately 9.8%. Based on the intercept analysis, we can say that no adverse selection has occurred because the high-risk type corresponds to the high-risk type. From the probability distribution based on the riskiness of the members, we find that high risk borrowers mainly group with high

risk borrowers as 42% of the high risk borrowers perceive that their members are high risk. In case of the high risk borrowers there is homogenous matching, which augurs well for the group quality.

	All risky	Many risky	Average	Few Risky
Risk type 1	36%	34.75%	10.30%	
Moderate Risk				
Risk Type 2	30%	40.20%	12.67%	
Low Risk				
Risk Type 3	42%	29.16%	8.16%	
High Risk				

Probability on basis of Ordered Logit Model

Hypothesis 2: This hypothesis is to test if the peer mechanism and dynamic incentives have an impact on internal loan payback is the goal of this hypothesis;

When a group of people cannot pay back the money they borrowed from the bank's internal reserves, it is referred to as "internal delinquency." While the overall risk is shared by all members of a group, each individual member's liability is limited. Any member who fails to repay their loans in accordance with the group's agreement will be punished by having their loans repaid in full. This hypothesis suggests that group members may be vulnerable to default within the group.

Internal default (I.D.) = $a_i + \beta_0 \text{ Group Pressure} + \beta_1 \text{ Group Sanctions} + \beta_2 \text{ Frequency of Meetings} + \beta_3 \text{ Willingness} + \beta_4 \text{ Leadership of members} + \beta_5 \text{ Factor Scores for Dynamic Incentives} + \beta_6 \text{ Education} + \beta_7 \text{ Loan from other channel} + \beta_8 \text{ Financially literate} + \beta_9 \text{ Access to technology} + \beta_{10} \text{ Age} + \beta_{11} \text{ Business Correlation} + \beta_{12} \text{ Informal sources of finance} + \beta_{13} \text{ Group Quality} + \beta_{14} \text{ Cluster1} + \beta_{15} \text{ Cluster 2} + \varepsilon_i$

Table 9: Impact of Peer mechanism, Peer selection, and Peer sanction on internal loan delinquency

Internal loan default (Logit)	Model (2)	Margins
Group pressure	-0.073 (0.308)	-0.016 (0.069)
Group sanction	0.1332 (0.309)	0.030 (0.070)
Frequency of meetings	-0.039 (0.165)	-0.008 (0.0375)
Willingness to help others	-0.670*** (0.244)	-0.152*** (0.0553)
Leadership	-0.415** (0.226)	-0.094*** (0.051)
Factor scores	0.385*** (0.166)	0.087*** (0.0375)
Education	0.102 (0.293)	0.0233 (0.06)
Loan from other channel	0.351 (0.256)	0.0796 (0.058)
Financially illiterate	-0.247 (0.319)	-0.056 (0.0723)

Access to technology	-0.694*** (0.295)	-0.056 (0.0723)
Business correlation	0.170 (1.08)	-0.157*** (0.0723)
Use of informal channels	0.333 (0.266)	0.038 (0.245)
Age	-0.000 (0.014)	-0.0001 (0.003)
Group Quality	0.020 (0.109)	0.005 (0.0247)
Moderate risk	0.300 (0.368)	0.068 (0.083)
Low risk	0.145 (0.391)	0.032 (0.088)
Constant	0.943 (0.751)	
Nagelkerke R square	0.162	

Table 9: Impact of Peer mechanism, Peer selection, and Peer sanction on internal loan delinquency (In the given model dependent variable is internal default on loan and independent variables are group pressure, group sanction, frequency of meetings, willingness to help others, leadership, dynamic incentives, education, loan from other channels, financial literacy, business correlation, use of informal source of finance, age, group quality- ordinal variable -1 high risk & 5 low risk, risk category as per debt and income – base category high risk and it is a binary variable with values 0 and 1, significance level is 0.05)

As shown by the evidence presented above, borrowers who are willing to lend a hand to others are less likely to default on their loan payments. Leadership reduces the chances of internal loan default and use of technology also reduces the chances of internal loan delinquency. Dynamic incentives such as progressive lending increases the chances of internal loan delinquency. Further, internal loan delinquency is reduced by the willingness to help other social ties.

Hypothesis 3: Misuse of funds in a group is impacted by the Peer mechanism and dynamic incentives

If this hypothesis is correct, peer mechanisms will be tested to see if they can reduce the amount of money and resources wasted in an entire organization. Peer-to-peer mechanisms will be the focus of this investigation.

Misuse of funds (Y_i) = $\alpha_i + \beta_0$ Group Pressure + β_1 Group Sanctions + β_2 Frequency of Meetings + β_3 Willingness + β_4 Leadership of members + β_5 Factor Scores for Dynamic Incentives + β_6 Education + β_7 Loan from other channel + β_8 Financially literate + β_9 Access to technology + β_{10} Age + β_{11} Business Correlation + β_{12} Informal sources of finance + β_{13} Group Quality + β_{14} Age + β_{15} Group Quality + β_{16} Income + β_{17} Internal default + β_{18} External default + Risk Type (1) + Risk Type (2) + ε_i . When there is joint liability, moral hazard or financial mismanagement affects everyone. Peer monitoring can help reduce the risk of moral hazard. When there is joint liability, moral hazard or financial mismanagement affects everyone. Peer monitoring can help reduce the risk of moral hazard.

Table 10: Impact of Peer mechanism, Peer selection, and Peer sanction on External loan delinquency

Misuse of funds	Model (2)	Marginal Effects
Income	0.285 (0.192)	0.067 (0.045)
Educated	-0.311 (0.259)	-0.073 (0.061)
Loan from other channel	-0.121 (0.244)	-0.028 (0.058)
Group pressure	-0.095 (0.306)	-0.022 (0.072)
Group sanction	0.534** (0.312)	0.126** (0.074)
Frequency of meetings	-0.081 (0.173)	-0.019 (0.0411)
Willingness to help other people	-0.243 (0.238)	-0.057 (0.056)
Leadership	-0.0784 (0.216)	-0.018 (0.051)
Factor Scores_Dynamic	-0.569***	-0.135***
Incentives	(0.164)	(0.038)
Use of informal sources of finance	-0.164 (0.252)	-0.0389 (0.059)
Financial Literacy	-0.129 (0.405)	-0.03 (0.096)
Moderate risk	-1.24*** (0.348)	-0.295*** (0.0824)
Low Risk	-1.06 (0.382)	-0.253 (0.090)
Internal loan default	0.448** (0.242)	0.106 (0.057)
External loan default	-0.789*** (0.249)	-0.187 (0.0591)
Constant	0.185 (0.591)	
Nagelkerke R²	0.153	

Table 10: Impact of Peer mechanism, Peer selection, and Peer sanction on External loan delinquency (In the given model the dependent variable is misuse of funds and independent variables are income, education level, loan from other channels, group pressure, group sanction, frequency of meetings, willingness to help others, leadership, dynamic incentives, use of informal sources of finance, financial literacy, external and internal loan default, risk category- the base category is the high risk and risk category is a binary variable with value 0 and 1). Significance level used for the analysis of the regression is 0.05)

Research shows that when sanctions are imposed collectively, the misuse of funds increases. When dynamic incentives like progressive lending are in place, funds are less likely to be misappropriated. In order to reduce the likelihood of money being misused, defaults on both internal and external loans are taken into account. From the statistical analysis, if a member has defaulted on internal loan, he is more likely to misuse the funds. On the contrary if a person has defaulted on external loan, the

chances of misuse are less due to the external pressures and mechanism build in the financial system. It's possible that the use of progressive loans and social penalties is a contributing factor.

Hypothesis 4: Peer mechanisms and Dynamic Incentives may have an impact on external loan repayment rates.

There are many different types of external loans, including those from banks and microfinance institutions. Members of the Self-Help Groups Bank Linkage Program can apply for loans as a group. According to the agreement, it will then be distributed among the group members. An external delinquency occurs when members of a group fail to pay off debts that are outside of their control. Using a statistical model known as a 'logit estimation,' we can see how peer selection, monitoring, and sanctioning affect group borrowing behaviour. Experimentation has shown that peer pressure, sanctions, and peer monitoring have an impact on borrowers' financial performance, but more research is needed. This method is recommended when it comes to dealing with external loan defaults.

$$\text{External funds (I.D.)} = a_i + \beta_0 \text{ Group Pressure} + \beta_1 \text{ Group Sanctions} + \beta_2 \text{ Frequency of Meetings} + \beta_3 \text{ Willingness} + \beta_4 \text{ Leadership of members} + \beta_5 \text{ Factor Scores for Dynamic Incentives} + \beta_6 \text{ Education} + \beta_7 \text{ Loan from other channel} + \beta_8 \text{ Financially literate} + \beta_9 \text{ Access to technology} + \beta_{10} \text{ Age} + \beta_{11} \text{ Business Correlation} + \beta_{12} \text{ Informal sources of finance} + \text{Age} + \text{Group Quality} + \text{Risk Type (1)} + \text{Risk Type (2)} + \varepsilon_i$$

Table 11: Impact of Peer mechanism, Peer selection, and Peer sanction on misuse of funds

External loan default (Logit)	Model (2)	Margins
Group pressure	-0.442 (0.309)	-1.07 (0.074)
Group sanction	0.636** (0.313)	0.154** (0.076)
Frequency of meetings	-0.051 (0.181)	-0.012 (0.044)
Willingness to help others	0.131 (0.241)	0.031 (0.058)
Leadership	0.240 (0.223)	0.058 (0.054)
Factor scores	0.181 (0.160)	0.044 (0.038)
Education	-0.848*** (0.286)	-0.205*** (0.069)
Loan from another channel	0.250 (0.253)	0.060 (0.061)
Financially literacy	-0.916*** (0.314)	-0.222*** (0.076)
Access to technology	0.020 (0.296)	0.005 (0.071)
Business correlation	0.316 (0.123)	0.0766 (0.298)
Use of informal channels	0.390 (0.260)	0.094 (0.063)
Age	-0.007 (0.014)	-0.001 (0.005)

Group Quality	0.066 (0.109)	0.016 (0.026)
Moderate risk	-1.039*** (0.367)	-0.251*** (0.088)
Low Risk	-0.990 (0.403)	-0.239*** (0.097)
Constant	1.224 (0.745)	
Nagelkerke R square	0.190	

Table 11: Impact of Peer mechanism, Peer selection, and Peer sanction on misuse of funds (In the given model the dependent variable is external funds and the independent variables are group pressure, group sanction, willingness to help others, frequency of meetings, leadership, dynamic incentives, education, loan from other channels, financial literacy, access to technology, business correlation, use of informal loan, age, group quality, age, risk category- the base category is the high risk and risk category is a binary variable with value 0 and 1). Significance level used for the analysis of the regression is 0.05)

There is a strong correlation between education and financial literacy and external loan defaults. External default is more likely when the risk is greater. Moderate risk category (1) and low risk category (2) have lower risk of external loan default as compared to the higher risk category (3). This study establishes that financial literacy reduces the risk of mismanagement of funds. Formal education of an individual also reduces the risk of misuse of funds. To the contrary group sanctions increases the chance of mismanagement of funds. It appears that sanctioning the members demotivates the members and it works adversely leading to the higher misuse of internal funds.

7. Conclusion

We've discovered that the risk propensity of borrowers affects both internal and external debt delinquency. In addition, the study's findings show that peer monitoring and sanctions help to reduce the likelihood of financial misuse, as well as both internal and external criminality. The general theory of the peer mechanism reduced financial fraud and delinquency, both external and internal. Financial fraud is more likely to occur if peers are sanctioned for loan defaults. Adverse selection is less likely when people in a group are matched with others who face the same risk. Homogeneous groups have a lower risk of members being selected for unfavorable reasons. According to data analysis, peer monitoring improves repayment rates and reduces both internal and external delinquency. Modern technology, cross-industry cooperation, and a desire to help others can all help to reduce the number of defaults on debt. The additional incentives provided by progressive loans' dynamic incentives make it more likely that members of a joint liability group will repay their bank loans on time. Lower-risk clients were less likely to go into arrears or misappropriate their funds. Peer sanctions are a bad idea because they encourage people to default on their obligations. Because of this, there may also be a strategic default. Negative forces like adversity selection help reduce defaults and fraud, but peer sanctions increase them.

APPENDIX

Attached below is the Questionnaire for the study

Variables	Questionnaire
Dependent Variable – Group Quality	The relative perception of the respondent about the riskiness of the members at the time of joining the group 1- All quite risky 2- Some risky 3- Equal 4- Some safe 5- Quite safe
Borrower's Risk Types	Cluster membership for borrowers 1- Extremely risky 2- Moderate riskiness 3- Extremely low on the riskiness
Education	Are the members educated? 1- Yes (Secondary completed) 0 No (Not completed)
Financial literate	Is the member financially literate? 1- Yes (Financially literate) 0 No (Financially illiterate)
Access to technology	Has access to technology? 1- Yes 0 No
Peer Pressure	Does the member exert peer pressure on members? 1- Yes 1 No
Peer Monitoring	Do the members peer monitor each other? 1- Regular Meeting (Yes) 0 Irregular Meeting (No)
Social Ties	Do members know each other at the time of formation of the group? 1- Yes 0 – No
Leadership	Whether a group has a capable leader? 1- Yes 0 – No
Information	Whether members know about each other at the time of formation of groups? 1- Yes 0 – No
Default by the members?	Whether the members default on the repayment of loans? 1- Yes 0 – No
Use of informal finance	Whether members utilize the informal source of finance? 1- Yes

	0 – No
Dynamic Incentives refers to the terms in social contract that promote progressive lending	1 Strongly disagree 2 Disagree 3 Moderate 4 Agree 5 Strongly Agree
1) Preference for progressive lending	
2) Lower transaction cost	
3) Longer term maturity loan	

Data set for the research study: 10.6084/m9.figshare.19468001

1. Copy the article's DOI that you want to access (e.g.: 10.2991/jnmp.2006.13.4.1).
2. Go to <http://dx.doi.org>, enter the DOI in the text box provided and click 'Go'.

Some information to generate results

- Cluster Analysis is on the basis of QCL_6. This is generated using Q3, 19, 20, 21, 23
- Factor scores are generated for Dynamic Incentives using Q.19,22, 23
- Table 9 uses the Ques 13,14,15,16,18,factor scores, 7,10,11,12,27,29,cluster 1, cluster2 and cluster 3 as Independent variable and Q 25 as the dependent variable
- Table 8 uses cc1, cc2, cc3, q7, q11, q14, q16,q18, q24, , q25, q29, q12, q15 as IV and Dependent Variable q1
- Table 10 uses Q24 as DV, and q9, q7, q10, q13, q14, q15, q16, q18, factor score, q29, q28, cc1, cc2, cc3, q25, q26
- Table 11 Q26 as DV and Q13 , Q14, Q15, Q16, Q18, Fact_1, Q7, Q10, Q11, Q12, Q27, Q29, age, Q1, CC1, CC2, CC3
- Table 6,7,4,2 and cluster generation use Ques 3, 19, 20, 21, 23

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