

Repaying Microcredit Loans: A Natural Experiment on Liability Structure*

Mahreen Mahmud[†]

October 2017

Abstract

Microcredit loans were traditionally extended to groups of people but recent years have seen a shift towards individual lending. This is because there is no clear evidence that joint liability lending leads to better borrower discipline. This paper utilises the exogenous shift from individual to joint lending by a microfinance organization in Pakistan. First, we show that there is an improvement in borrower discipline under joint liability loans. Second, we explore the types of groups people formed by using the variation in number of months borrowers had till the expiry of their individual loans at the time of the announcement of the shift to joint leading. We find that the more time they had, the more likely they were to form groups with people they knew from before and met frequently. This in turn had a positive impact on their repayment discipline. We do not find any evidence for the presence of other mechanisms like informal insurance networks or cultural similarity.

JEL classification: D71, D82, G21, O12, O16

Keywords: Microcredit, Group lending, Joint liability, Social capital

*This research was provided financial support by the School of Economics, University of Kent who had no involvement in the design, data collection or analysis. I am thankful Research Assistants Arslan, Mahniya, Omair, Saba, Shahzeb and Ubair without whom it would not have been possible to conduct it. I am also grateful to Jagjit Chadha, Guy Tchuente and Zaki Wahhaj for helpful discussions and invaluable comments. All remaining errors are my own.

[†]Centre for the Study of African Economies, Blavatnik School of Government, University of Oxford, mahreen.mahmud@economics.ox.ac.uk

1 Introduction

Joint liability microcredit was considered to be the cornerstone of the microfinance movement. By lending to group of borrowers jointly responsible for the loan, it was believed to overcome information asymmetries inherent in lending to poor borrowers. However, recent years have seen a shift away from joint liability¹ towards more flexible contracts with individual liability or group lending without imposing joint liability (see Giné and Karlan, 2014; de Quidt et al., 2015, for details). Part of the reason for this shift is inconclusive evidence on whether joint liability improves borrower performance.

Due to borrowers self-selecting into a particular contract type, their behaviour cannot be compared within or across organizations. This makes the empirical investigation of liability design and borrower performance a challenge. As a result, recent studies have relied on carefully designed Randomized Control Trials (RCTs)². In this paper, we tackle this issue by using a natural experiment setting to study borrower discipline under joint versus individual lending. Akhuwat, a MFI operating in Pakistan, made an organization wide decision to switch from individual to joint liability lending without group meetings. This change was effective immediately (from the very next month) and was not accompanied by any other changes to the loan contract. This addresses a key concern with existing evidence (such as the one by Carpena et al. (2013)) where other changes in loan contract made it difficult to pin down any change in behaviour to just liability type.

¹Microfinance Institutes (MFIs) such as the BancoSol in Bolivia and the ASA in Bangladesh have converted a large part of their portfolios to individual lending and even the Grameen Bank has relaxed the strict joint liability clause for defaulters.

²Giné and Karlan (2014) conducted two RCTs to study the difference in default rates between individual and joint liability loans for borrowers of a Philippine Bank and found no difference. Attanasio et al. (2015) using village level randomization in Mongolia also do not find any significant difference in repayment rates

Akhuwat allowed all ongoing individual loans to continue without any change till the loan term ended (i.e. the loan was fully repaid). For our analysis, we use the group of borrowers with an ongoing individual loan at the time that the MFI decided to change liability structure who then also go on to borrow under joint liability. This gives us a natural control and treatment group to compare the performance under different liability conditions without worrying about the issue of selection into a contract type. Since default is extremely low (less than 0.2%), it is an extreme event and therefore monthly missed payments is a more relevant measure for borrower performance. Each missed payment results in the loan officer spending time and other resources to get in touch with the client to investigate the reason for missed payment and to make sure it is paid soon. We find significant improvement in borrower discipline under joint liability as compared to under individual liability loans. It is important to note that the sample for our study only comprises of borrowers who ‘choose’ to borrow under joint liability. This is exactly the group we are interested in since ultimately the performance of those who agree to borrow under joint liability is important. The primary argument in favour of joint liability is that it results in selection of ‘safer’ borrowers and incentivises group members to monitor and exert pressure on each other (Ghatak and Guinnane, 1999). Since we are looking at the performance of a selected ‘safer’ group, we are able to isolate the impact of the latter channel - peer monitoring and pressure on borrower performance.

Theoretical literature has highlighted the benefits of joint liability in alleviating some of the constraints in lending to the poor in developing countries such as due to lack of collateral and poor contract enforcement. Other issues include adverse selection (where borrowers who are better at repaying are not observable to the MFI) and moral hazard (where borrowers in groups may take too much risk). The effect of these can be mitigated by imposing strict joint liability where borrowers have an

incentive to choose the safer borrowers and to monitor each other. However, as Besley and Coate (1995) first pointed out, the burden of paying for others could, instead, lead to individuals defaulting on their own loans too. Hence, it is not immediately obvious which type of liability will result in superior borrower discipline.

Recent studies have pointed towards the importance of social cohesion fostered by group meetings which are a common practice for many MFIs³. However, group meetings can be both difficult and costly to arrange and coordinate for the lender and borrowers, especially in urban areas. Using a more comparable setting than existing literature, we provide evidence that suggests that the move away from joint liability lending may not be optimal in all settings. Joint liability without mandatory group meetings can be a cheaper alternative for improving repayment rates unless the MFI has reason to believe that there would be insufficient interaction between the borrowers without it.⁴

A next natural question is if there is heterogeneity in borrower discipline across different types of borrower groups. The issue of self-selection has made groups types and its impact on performance another difficult empirical question to study. Early evidence from studies by Wydick (1999) and Sharma and Zeller (1997) showed that social capital is not correlated with better performance. On the other hand, recent more robust studies that use exogenously formed groups (Karlan, 2007) or preselected groups (Feigenberg et al., 2013), do find some evidence that social capital matters for repayment and default rates.

³Giné and Karlan (2014) provide empirical evidence that there was no difference in performance of borrowers on individual versus joint liability loans when weekly group meetings were held under both.

⁴Feigenberg et al. (2013) varied the frequency of meeting of groups to find that higher frequency does result in higher degree of social integration. This improvement in informal insurance in these groups then resulted in better repayment rates. However, de Quidt et al. (2015) show that requiring group meetings, even if it leads to creation of social capital, may be inefficient unless there is basis to believe that borrowers will not be able to coordinate meetings on their own.

In order to study group type and borrower performance for Akhuwat, we deal with the issue of self-selection by exploiting the exogenous variation in amount of time borrowers had till expiry of their individual loan at the time of announcement of the shift to a different liability contract. Using variation in time left to the completion of the individual liability loan as an instrument, we find that the more time borrowers had, the more likely they were to form groups with people they interact socially with. This in turn made these groups better disciplined in making instalment payments. This provides evidence that in the absence of mandatory group meetings, groups with a higher proportion of members who interact socially, do better. This could be a potential screen that MFIs use, particularly in urban areas, where group meetings are costly.

The remainder of the paper is organized as follows. Section 2 gives details of the data used, an outline of the estimation strategy and results for the analysis on comparison of borrower performance under joint versus individual lending. Analysis of group characteristics and borrower performance using primary data is in Section 3. The limitations are outlined in Section 4 and concluding comments are in Section 5.

2 Comparison of borrower performance under individual vs. joint liability loans

2.1 Natural Experiment Setting

The partner organisation is a non-profit MFI Akhuwat that started its operations from Lahore, Pakistan in 2001 with the objective of providing interest free credit to the poor. Apart from the zero interest feature, the organization operates like a

regular MFI. The organization gives loans for what they define as ‘productive’ and ‘non-productive’ reasons. Loans given for non-productive reasons include all loans for personal expenditures (such as education or health) and loans taken out by people selling fruits and vegetables on carts which the organization believes does not have the potential to grow. Clients are permitted to borrow once only for a non-productive reason.

Prior to February 2011, Akhuwat extended loans on individual liability where each borrower had to be guaranteed by a person who could then not borrow from the organization till the loan they had guaranteed finished. The primary motivation for shifting from individual to group liability loans was complaints from guarantors about not being able to borrow from Akhuwat during the period they had guaranteed a loan.

The transition from individual to joint liability was immediate and was simultaneously implemented in all branches. Beginning in March 2011, all new loans issued were group liability but all existing loans were allowed to continue till the end of their loan term. There were no accompanying changes to the loan contract with this shift - loan amount, duration, repayment frequency and of course the zero interest rate remained the same as before. All loans continued to be repaid in equal monthly instalments at the MFI branches. Instalment payment for the entire group could be made by any member so long as the full amount due for the group was paid. Akhuwat staff was given training to inform them about the additional procedures related to joint liability lending, such as the restrictions on group size and location of members. With the shift to joint liability lending, the organization did not start relying on peer selection and so borrower appraisal and verification procedures continued as before.

Mandatory group meetings were not introduced with the shift since the

organisation worried about the potential loss in income for the borrowers due to being away from their business. The borrowers are required to come together as a group twice, once when they are briefed about the terms and conditions of group liability and a second time when they formally sign the contract. There is no requirement for the groups to nominate a leader. This is to avoid one person dominating the group and potential issues with him/her resulting in the whole group defaulting⁵.

2.2 Data and variables of interest

For this study, we use data for all loans issued between the 1st July 2010 and 30th June 2013 period in 14 branches of Akhuwat in Lahore, Pakistan. Since these are the oldest branches of the organization, we could obtain data for at least 3 years from each branch. The data is from the Akhuwat central database and contains detailed information on the loan characteristics and month wise instalment payment by the borrowers. From this dataset, we select the borrowers who had an ongoing individual liability loan in February 2011. To select the sample for the study, we only consider the borrowers from this group who also go on to borrow under group liability. 30% of the borrowers with an ongoing individual loan qualify which is in line with the average rate of re-borrowing for the organization in the data set. Table 1 provides the summary statistics for the 2,029 borrowers who form the sample for the study. Since each subsequent loan is larger and longer in duration, the average loan size for individual liability is Rs. 12,691 (\$118) and for group liability is Rs. 18,637 (\$173).

⁵This information was obtained in a meeting with *Akhuwat* Regional Manager Mr. Aftab Hussain in August 2014. He was part of the core team at the time changes were introduced in 2011.

Table 1: Summary Statistics - Individual and Joint Liability Loans

<i>(Average)</i>	Individual	Joint
Loan cycle	1.8	2.8
Loan amount (Rs.)	12,691	18,637
Loan duration (months)	11.45	14.13

Note: Table reports summary statistics for individual and joint liability loan cycles of borrowers who received both an individual and joint liability loan.

2.3 Measuring Borrower Performance

As a measure of borrower performance, we consider the likelihood of the borrower missing a monthly installment payment. However, since the borrowers are allowed to overpay, we need to be careful. It might be that even after missing a payment, the borrowers are actually not behind in making their payments⁶. Hence, we only consider a payment to be missed if the borrower does not make an instalment payment and this results in him or her behind in making payments (variable ‘missed & behind’). It is also possible that in spite of making an instalment payment in a particular month, the borrower is still behind. So we define another measure called ‘on time’ which is not dependent on whether a payment was made in that particular month or not. Instead, it is defined to take a value of 1 for each month the borrower is on time in making his or her payments and 0 if they are behind.

A look at raw data shows a significant improvement across all measures of borrower performance after shift to group liability (Table 2 and Figure 1). The likelihood of missing a payment is higher (the variable ‘missed’ in Table 2) when we use the definition of Carpena et al. (2013) who don’t consider the possibility of over

⁶Borrowers have the option of paying more than the instalment amount due in any month. It is possible that they don’t trust themselves with any extra money that they may have so prefer to overpay.

payment by borrowers in previous periods as compared to the other measure ‘missed & behind’.

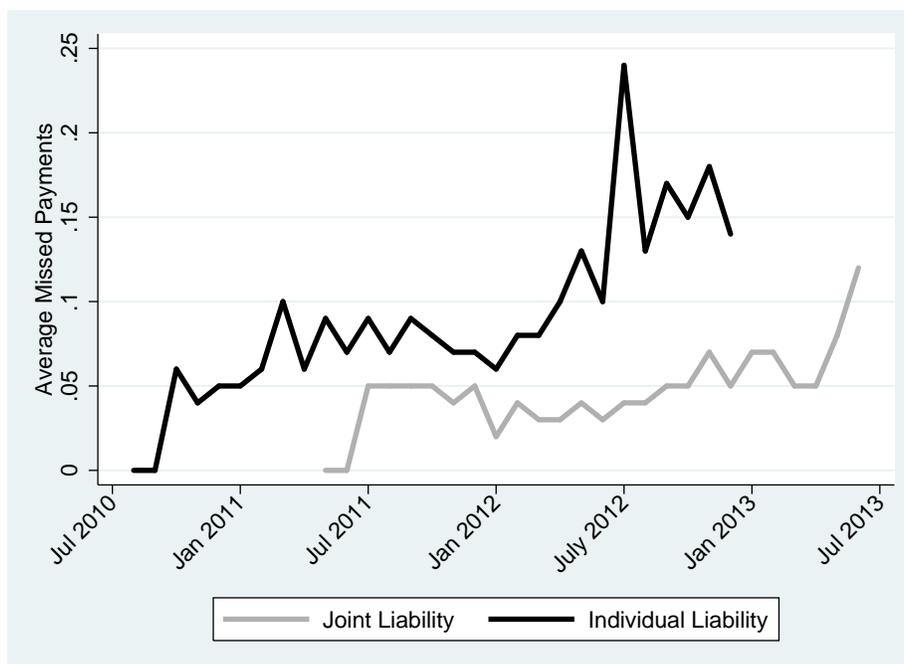
Using missed payments as a measure for borrower performance has been criticized by Banerjee (2013) on account of these payments being eventually made up. He argues that it might be that loan officers are more tolerant of missed payments as compared to fellow group members. However, in the case of Akhuwat, missed payments were taken very seriously even under individual liability and loan officers had to investigate the reason for payment being missed and contact the guarantor. Hence, they are costly for the organization. While Akhuwat provides loans at zero interest, the actual cost of capital is higher than zero which means that delayed repayment increases the cost of the subsidy that the organisation is providing on the loans. Further, given the extremely low levels of default experienced by microfinance organizations at large and by Akhuwat in particular (under 0.2%), we believe that delayed payments are a more relevant measure of borrower performance than default rates.

Table 2: Average Borrower Performance (%)

	Overall	Individual	Joint	Individual - joint p- value
Missed	6.35	10.21	5.98	0
Missed & behind	4.44	6.35	4.02	0
On time	80.95	68.31	84.61	0
Observations (months)	450,507	22,649	23,383	

Note: Table reports average performance for the whole sample as well as the sample of borrowers who received both an individual and joint liability loan.

Figure 1: Average Monthly Missed Payments - Individual vs. Joint Liability Groups



Note: The figure plots the average months missed payments over time for the sample that received both individual and joint liability loans.

2.4 Empirical Specification and Results

We set up the following equation to study the impact of switch from individual to joint liability loans:

$$Y_{ilt} = \alpha + \beta T_{il} + \mathbf{X}_{il}\gamma + \tau_t + \sum_{m=2}^{14} \theta_m + \varepsilon_{ilt} \quad (1)$$

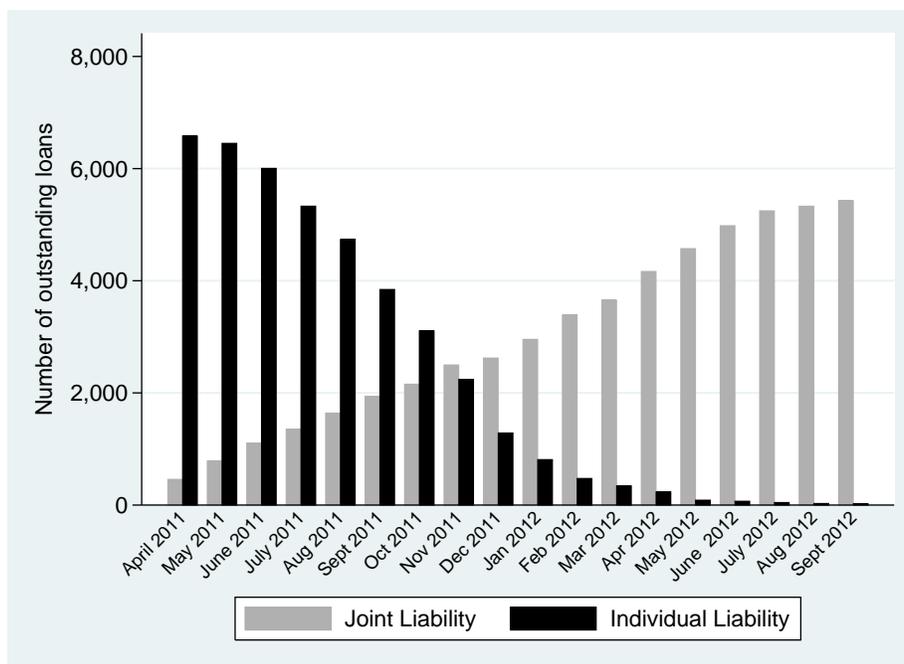
where Y_{ilt} is a dummy variable to capture loan repayment discipline in month t , for individual i , loan l . T_{il} is a dummy variable =1 if loan l for individual i is a joint liability loan and 0 otherwise. The coefficient of interest is β which captures if there are any differences between behaviour of borrowers on individual and joint liability loans. \mathbf{X}_{il} is a vector of individual characteristics like gender and number of previous

loans, τ_t and θ_m are time and branch dummies. ε_{ilt} is the error term.

2.4.1 Estimation strategy

To estimate equation 1, we first consider only the overlapping months in which both individual and joint liability loans were simultaneously active. In order to make a comparison, we need a sufficient number of both types of loans in each month. Immediately after the switch, there were very few joint liability loans and so we only consider the period post April 2011. We end the sample period in April 2012 to have a sufficient number of individual liability loans still outstanding (see Figure 2).

Figure 2: Distribution of outstanding Individual and Joint Liability Loans (April 2011 to September 2012)



Note: The figure plots the total number of individual and joint liability loans that were outstanding each month for the sample that received both individual and joint liability loans.

For each month, individual liability loans still active form the control group while

loans issued to borrowers who had paid their individual loans and had borrowed as part of a group from the treated group. This estimation strategy has the advantage that it allows a comparison at the same point in time. Hence, organization wide changes over time cannot be argued to be the reason for any differences in behaviour. However, since individual liability loans would always be older in any month as compared to joint liability loans, we cannot control for loan age⁷ when comparing borrower behaviour. This is likely to be important since borrower behaviour can be expected to vary with the time it has been since the loan was issued.

An alternate strategy is to consider the entire individual and joint liability loan cycles of the borrowers. Even though this means that borrower performance is not being compared within the same period, this should not be a problem since discussions with the organization staff present at the time of the switch in lending methodology make us confident that there were no other accompanying changes to operations. To estimate equation 1 with the full sample of months, we can use a fixed effects model or pool observations.

2.4.2 Results

Results in Table 3 show a significant improvement across all specifications in borrower performance - measured by missed payments that make the borrower behind in their payment schedule - under joint liability (the group dummy coefficient is negative and significant). All coefficients reported are from ordinary least squares (OLS) (results are comparable when a logit model is used - Table A1 in Appendix). These results are based on monthly loan cycle data with standard errors clustered at the borrower level. Results are robust to the inclusion of controls for the number of times the

⁷Loan age and dummy for group liability loan will be highly correlated.

individual had borrowed before, the stage of the loan cycle and branch and calendar fixed effects. 70% of the sample is comprised of borrowers who are the only ones in their group that we include in our sample. To account for intra-group correlation in borrower performance for the 30% where we have borrowers who belong to the same group, we also cluster standard errors by the group (in column 4) and find similar results.

Table 3: Borrower Performance: Missed Payments

	(1) Overlapping months	(2) Fixed effects	(3) Pooled sample	(4) Pooled sample
Group dummy	-0.035*** (0.007)	-0.026*** (0.002)	-0.027*** (0.003)	-0.027*** (0.004)
No of previous loans	0.007*** (0.002)		0.00140 (0.001)	0.00140 (0.001)
Gender	0.003 (0.004)		0.007** (0.003)	0.007** (0.003)
Loan Age		0.0102*** (0.001)	0.00858*** (0.001)	0.00858*** (0.001)
Loan Age Squared		-0.001*** (0.000)	0.000** (0.000)	0.000** (0.000)
Mean of dependant var.	0.054	0.052	0.052	0.052
Observations	18,548	45,334	45,334	45,334

Note: Table reports results from an OLS regression with dependent variable equal to one if the borrower has missed installment payment in that month making him/her behind schedule, zero otherwise. The sample includes all loans irrespective of whether the loan had matured or not by the end of our sample period. In Column (1) are estimates using data only for months May 2011 to April 2012. In Column (2) are results using fixed effects model and in Column (3) and (4) are results using the pooled sample with errors clustered by the borrower in Column (3) and by the group in Column (4). All specifications except (2) include time and branch fixed effects. Robust standard error in parenthesis.*** $p < 0.01$,** $p < 0.05$,* $p < 0.1$.

Quite expectedly, as loan ages, there is a higher likelihood of people missing a payment. This might be the reason for the higher coefficient value for group dummy in column 1 when overlapping months are used. In this case, older individual liability loans are being compared with comparatively newer group liability loans and so we find a larger improvement in borrower performance.

The estimates in Table 3 are based on the entire sample of borrowers irrespective of whether their joint liability loan had expired or not by the end of our sample period. Since, borrowers tend to miss more payments as loans mature, we might be overestimating the impact of switch to joint liability by not considering the months near maturity for borrowers whose loans had not expired. To check if this is the case, we estimate equation 1 for the sample of borrowers for whom the joint liability loan had also expired. We find very similar results (in Table A2 in appendix) to those for the full sample and so estimates in Table 3 are not driven by the behaviour of individuals who borrowed close to the shift to joint liability.

It appears that the pressure exerted by joint liability is leading to a beneficial improvement for the organization without investing in the administrative cost of group meetings. To measure borrower discipline, if we use a definition similar to that of Carpena et al. (2013), our estimates are larger. It could be that by not considering the possibility of overpayment by borrowers, they overestimated the impact. Using our alternate measure of borrower discipline (on time in making payment), we still find that those on joint liability loans are significantly more likely to be disciplined (results in Table A3 in appendix). We also considered a measure based on ‘intensity’ i.e. the percentage of cumulative payment due that the borrower has missed. The results are similar to those obtained with the measures used in this section and are available upon request.

2.5 Robustness Checks

Next, we check the internal validity of the results following the discussion in Carpena et al. (2013). Those on group liability loan may be displaying better performance due to or at least in part due to the experience of having borrowed before (learning effect). It is important to note that 45% of the individual liability loans were a second or higher loan cycle so any discontinuous learning effect between first and second loan cycle would not be expected to drive the results that we see once the borrowers switch to joint liability. When we restrict the sample to experienced borrowers, that is those who were on a second or higher individual liability loan, we still obtain similar results (see Table 4). Since our sample period starts less than a year before the switch to joint liability loans, we cannot use two consecutive individual liability loans of a borrower to formally check for learning effect. So, we consider instead two complete joint liability loan cycles of borrowers. If the improvement that we find is due to the experience of having borrowed before, then borrower performance should also significantly improve between two cycles of joint liability loans. ‘Second joint loan’ is a dummy that takes on a value of 1 for the second round of borrowing under joint liability and is 0 for the first round of joint liability loans. We estimate equation 1 with the sample of borrowers with two complete joint liability loans using the ‘second joint loan’ dummy instead of the group dummy. Results in Table 5 show that the coefficient on the variable of interest is insignificant. Even when we add other controls (in column 3), we find no difference in the performance of borrowers between two rounds of joint liability loans. Hence, our findings cannot merely be a result of learning effect.

Table 4: Borrower Performance of Experienced Borrowers - Average Missed Payments

	(1) Overlapping months	(2) Fixed effects	(3) Pooled sample	(4) Pooled sample
Group dummy	-0.055*** (0.013)	0.029 (0.101)	-0.038*** (0.006)	-0.038*** (0.006)
No of previous loans	0.006 (0.004)	-0.063 (0.101)	0.0028 (0.0025)	0.0028 (0.0024)
Gender	0.011 (0.008)	-0.024 (0.025)	0.011** (0.005)	0.011** (0.005)
Loan Age		0.010*** (0.001)	0.008*** (0.002)	0.008*** (0.002)
Loan Age Squared		0.000*** (0.000)	0.000 (0.000)	0.000 (0.000)
Mean of dependent var.	0.063	0.054	0.054	0.054
Observations	8,352	20,410	20,410	20,410

Note: Table reports results from an OLS regression with dependent variable equal to one if the borrower has missed installment payment in that month making him/her behind schedule, zero otherwise. The sample includes all loans of experienced borrowers (those on a second or higher individual liability loan) irrespective of whether the loan had matured or not by the end of our sample period. In Column (1) are estimates using data only for months May 2011 to April 2012. In Column (2) are results using fixed effects model and in Column (3) and (4) are results using the pooled sample with errors clustered by the borrower in Column (3) and by the group in Column (4). Robust standard error in parenthesis.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5: Borrower Performance over two joint liability loan cycles

	(1)	(2)	(3)
Second Joint Loan	-0.016 (0.010)	-0.016 (0.010)	-0.008 (0.010)
Gender			0.016 (0.012)
Loan Age			0.010** (0.004)
Loan Age Squared			-0.001 (0.001)
No of Previous Loans			-0.007* (0.004)
Observations	2,124	1,962	1,962

Note: Table reports results from an OLS regression with dependent variable equal to one if the borrower has missed installment payment in that month making him/her behind schedule, zero otherwise. The sample is restricted to two consecutive complete joint liability loan cycles of borrowers. Robust standard errors clustered by the borrower in parenthesis. ** $p < 0.01$, * $p < 0.05$, $p < 0.1$.

Another concern relates to borrowers performing better under joint liability due to it being a new experience. To test this, we compare the performance of first time borrowers on individual liability loan with first time borrowers on joint liability loans. Using a sample of 13,053 first time joint liability loans, we find that borrowers miss 4% of the payments while the 5,139 borrowers on a first time individual liability loan miss significantly more (6%)⁸. It might be argued that even if the borrower is taking out a loan for the first time, the experience of others in the group may be important and contributing to better performance. To check for this, we restrict the sample to first time borrowers who are in a group with all other members also on a

⁸The t-test on the mean difference has a value of -15.38.

first time loan. We still find that these borrowers miss fewer payments as compared to those on a first time individual liability loan⁹. Results for ‘learning effect’ above are also contrary to this hypothesis since borrower’s performance did not get worse during the second round of joint liability loans. If borrowers did well under joint liability loan only because it was a new experience, then we would have expected their performance to get worse under a second joint liability loan.

3 Group characteristics and borrower performance

While we find that there is an improvement in likelihood of missed payments under joint liability, there is still considerable variation in performance within the group of all joint liability borrowers¹⁰. A next natural question is, why might some groups perform better than others? The degree of social capital is proposed in literature as one explanation for this. More specifically, Cassar et al. (2007) point to the relational and informational aspects of this social capital as possible mechanisms through which it operates. They find through a series of field experiments that it is personal trust and social homogeneity that improves group performance and not the general level of trust of the group members in the society.

Measuring social capital is complex and in the context of microfinance, quantifying its impact on group performance is further complicated by the formation of groups on the basis of self-selection. Hence, any analysis is subject to issues

⁹The sample decreased to 7,128 borrowers and the t-test on the mean difference has a value of -13.86.

¹⁰The average likelihood of missing a payment is 4% and the standard deviation is 20%. Under joint liability, 25% of the borrowers miss a payment at least once and 12% miss a payment more than once.

of endogeneity: individuals are likely to sort themselves into groups with certain characteristics which may be unobservable. Karlan (2007) uses exogenously formed groups by a MFI in Peru to counter the issue of endogeneity as well as the potential simultaneity problem¹¹ to study how social connections impact the discipline of borrowers. He concludes that stronger social connections as measured by geographic and cultural proximity do in fact lead to higher repayment and savings.

However, the evidence on the impact of social ties on group performance is mixed since studies by Wydick (1999) and Ahlin and Townsend (2007) find that stronger the social ties, the poorer the group performance due to these hindering social sanctions. Wydick (1999) uses a small data set from Guatemala to study three types of social cohesion - peer monitoring, social ties and borrowing group pressure. He finds that peer monitoring affects performance through stimulating intra group insurance instead of the degree of pre-existing social ties. Ahlin and Townsend (2007) find similar evidence using data from Thailand. They warn that some social ties as measured by sharing among non-relatives, clustering of relatives and village run savings and loan institutions actually has a negative impact on repayment rates. Correlated returns and strong informal sanctions on the other hand positively impacts it. Hence, groups formed between relatives where sanctions are difficult to impose are likely to harm borrower performance rather than improve it.

Another channel through which joint liability loans may lead to improvement in performance is mandatory group meetings. These help foster linkages and the development of an informal insurance network amongst borrowers. A series of experiments have been conducted to try to understand how repayment frequency

¹¹Successful groups may simultaneously result in better social connections and better performance of business.

correlates with the formation of social capital and default¹². However, this is not a relevant channel in our case since there are no mandatory group meetings.

3.1 Instrument

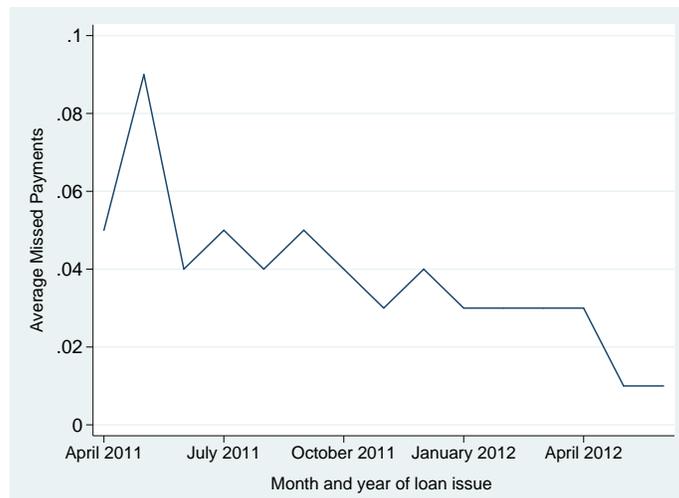
Given that group characteristics are endogenous, we cannot directly estimate the impact of these on borrower performance. To counter this inherent problem of endogeneity, we utilize the exogenous variation in the time the borrower had to form a group to borrow again as an instrument for group characteristics. Due to the staggered nature of introduction of group loans, borrowers who had just started their individual liability loan at the time of the announcement of shift to joint liability lending, had much more time to look for potential group members. On the other hand, borrowers whose individual loans were close to expiry had far less time. In fact, in the sample, borrowers who had between 0 and 18 months to the expiry of their loan with the average borrower having around 7 months.

Discussions with Akhuwat management reassured us that the decision to shift was made by the Head Office and implemented across all branches simultaneously. It is therefore unlikely to be endogenous to borrower characteristics. It can be argued that borrowers had the option of delaying borrowing again and so this time they had till expiry of their loan is not important. However, we find that the average amount of time borrowers take to re-borrow is between one and two months and with more experience, this time decreases. While borrowers had the option to delay re-borrowing, this is not something that we observe them doing. This might be attributable to them relying on these loans to finance their working capital and so any delay in borrowing again is costly for their enterprise.

¹²Feigenberg et al. (2013), Feigenberg et al. (2014), Field and Pande (2008)

We observe that borrower performance of those on joint liability improves with time after the shift was made to joint liability (see Figure 3 for sub-sample of borrowers who we observe borrowing under both individual and joint liability). This could be due to organization side learning where with experience they improve and develop a better understanding of the kind of monitoring required for joint liability lending. If this is the case, then with time, we should see an improvement in performance of all borrowers and not just the sub-sample we are studying. A branch wise look at borrower performance reveals that it is only this special group who had an outstanding individual liability loan at the time of the announcement for whom there was a consistent decline in average missed payments (See Figure 4a). For other borrowers, who did not have an outstanding individual liability loan at the time of the announcement, this is not the case for all branches (See Figure 4b).

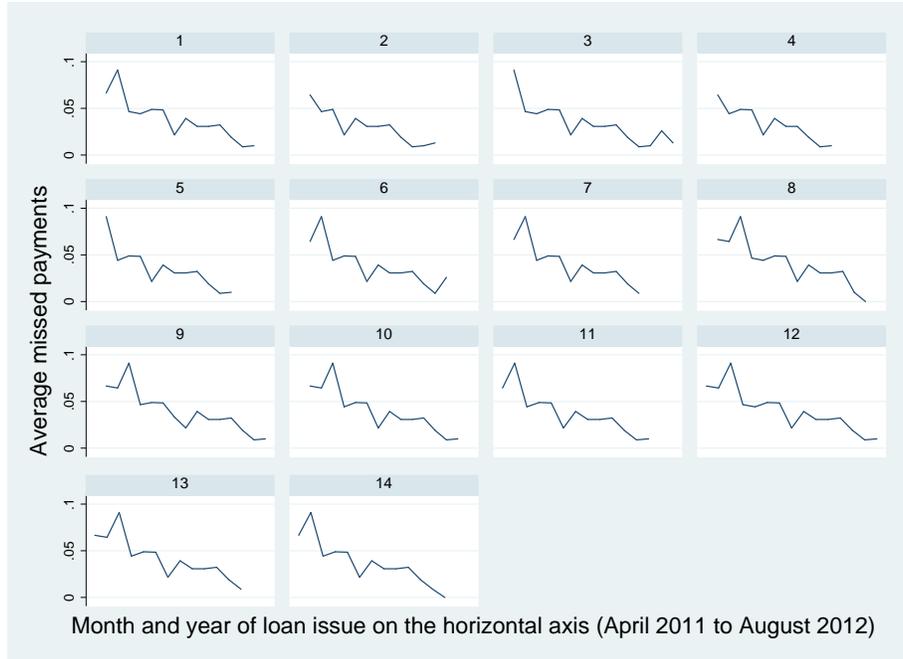
Figure 3: Average Missed Payments - Joint Liability Loans Only



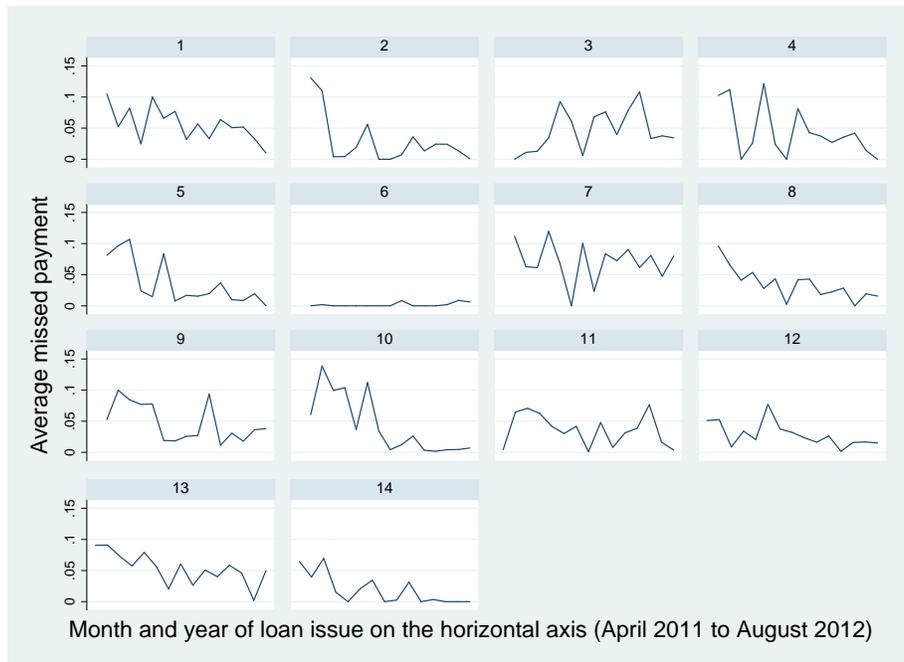
Note: It is a plot of the average missed payments over a complete loan cycle of all loans issued in the same month and year. It is based only on the performance of the sample of borrowers on joint liability loans who had an outstanding individual liability loan at the time of the announcement of the switch to joint liability.

Figure 4: Branch wise Average Missed Payment by Month and Year of Loan Issue

(a) Switch



(b) Others



Note: The figure above is a plot of the average missed payments over a complete loan cycle of all loans issued in the same month and year in each of the fourteen Akhuwat branches that form the sample for this study. 'Switch' refers to borrowers issued a joint liability loan who we observe taking out both an individual and joint liability loan and 'others' to all other borrowers who did not have an outstanding individual liability loan at the time of the announcement of the shift.

Since the time they had till the expiry of their individual liability loan is a constraint only for the group of borrowers who had an outstanding loan at the time of the switch, we argue that the improvement in borrower performance with time is likely to be driven by the choice of group members. It is possible that borrowers who had longer till the expiry of their individual liability loan at the time of the announcement of the shift had more time to think carefully about who to form groups with instead of being rushed into it. More time also means that they had the time to convince the people they consider more trustworthy to form a group with them. On the other hand, borrowers who were short on time, likely made compromises. This may explain why repeat borrowers, who had less time, had a higher proportion of first time borrowers in their group.

3.2 Selection of group characteristics

In order to test this hypothesis - if the time borrowers had to form a group to re-borrow had any impact on the choice of group members - we need to select group characteristics to study. Is it that groups are formed between members with pre-existing social capital and/or an informal insurance structure? The existing evidence on the importance of social ties is mixed and we draw on literature for the selection of group characteristics for our analysis.

To capture the degree of social connection, we look at whether group members knew each other from before the group was formed and their frequency of meeting. We also consider the caste of the group members. While it is likely to be a more important factor in a rural setting, it might still be relevant in understanding the degree of connection in an urban area.

Some studies have highlighted the importance of the group leader's social ties and

quality in running the group as factors leading to superior repayment performance and reducing moral hazard (Paxton et al., 2000; Hermes et al., 2005, 2006). However, since *Akhuwat* does not require any group member to act as a leader, we cannot look at this. Similarly, we cannot explore the geographic variation highlighted by Karlan (2007) to be important since this has been enforced by the organization¹³. Since all groups were formed for the first time, prior experience of borrowing with each other is not relevant. Their experience of borrowing in groups in other microfinance organizations may be important but we cannot control for it. However, we do consider if they have ever done (or are doing) business together. How connected a group member is with the community may also play an important role. We use the number of years the borrower has lived in the community as a proxy for this. Finally, we also consider the degree of trust within the group. This is proxied by whether the borrower, before the group formed, would have asked another group member for a loan in time of need.

3.3 Survey

Groups are formed by the borrowers on the basis of self-selection and have to be comprised of three to six members. An important condition is that immediate family members cannot be in the same group. However, unlike conventional microfinance organizations, *Akhuwat* does not place any minimum requirement on the number of women in a group. Hence, there are all female, all male and mixed groups that take out loans as a group.

In order to obtain data on the degree of social connection of the borrower with the group, we conducted a short telephone survey with a sub-sample of the borrowers

¹³Borrowers have to be from the same neighbourhood and preferable live not farther away than a lane from each other.

used for the first part of the analysis on borrower performance. The survey was carried out between August and September 2014 with a stratified random sample of borrowers. The sample was stratified on both the gender mix of the group and the loan cycle of the borrower in order to have a proportionate representation of borrowers with prior experience of borrowing. The selected borrowers were asked questions about each group member in turn.

We find that in our survey sample, men have been oversampled from within the mixed groups leading to a larger proportion of men (71%) as compared to the full sample¹⁴ (63%). We will control for the gender of the borrower in our analysis to account for this. The reason for this might be the cultural make-up of the society in Pakistan where women are more reluctant to talk to strangers on the phone or may not be in possession of the mobile phone number provided. This is a downside of carrying out a telephone survey and so it may be the case that we have sampled a special group of women who are different from the overall group of female borrowers. However, a comparison of the individual and loans characteristics of the sample of women surveyed with the overall sample reveals that there is no significant difference except for a slight age difference (see Table 6).

¹⁴Full sample here refers to the borrowers who we observe taking out a loan under both individual and joint liability.

Table 6: Comparison of Individual and Loan Characteristics of Female Borrowers

	Full Sample	Survey Sample	Mean difference p -value
Age	42.9	41.61	0.011
Personal Loan (=1)	8.37%	8.47%	0.954
All female group (=1)	50.66%	53.03%	0.414
Loan Amount	Rs.18,164.02	Rs.18,139.53	0.923
No. of previous loans	2.58	2.51	0.234
Monthly donation	Rs. 57.78	Rs. 57.64	0.951
On time in paying instalments	94.88%	95.24%	0.773
Observations	756	215	

Note: The table reports summary statistics for the full sample of female borrowers who received both an individual and joint liability loan and for the sub-sample of them who were surveyed. The variable age has missing values so it is based on 705 observations for the full sample and 207 for the survey sample.

While the refusal rate was quite low (3.5%), there were a large number (around 30%) of calls that were either not picked up or the number was not responding¹⁵. This may result in borrowers who had taken out a loan more recently being oversampled since they are less likely to have changed their number. To counter this, all replacements borrowers were drawn from the same month of loan issue and so the survey sample is representative of the full sample (Table 7 gives a month wise distribution of loans).

¹⁵Possible reasons for this might be that the borrower has several SIMs or a switch in network used. Within the income group under study, these are common practices.

Table 7: Month wise Distribution of Loans in the Full and Survey Sample

Year	Month	Full sample		Survey Sample	
		No.	%	No.	%
2011	March	19	1.12	8	1.23
2011	April	34	2.01	15	2.31
2011	May	59	3.49	12	1.85
2011	June	36	2.13	10	1.54
2011	July	137	8.11	45	6.93
2011	August	140	8.28	61	9.40
2011	September	139	8.22	49	7.55
2011	October	9	0.53	1	0.15
2011	November	284	16.80	106	16.33
2011	December	262	15.50	104	16.02
2012	January	247	14.62	101	15.56
2012	February	138	8.17	61	9.40
2012	March	83	4.91	32	4.93
2012	April	49	2.90	18	2.77
2012	May	33	1.95	16	2.47
2012	June	21	1.24	10	1.54

Note: The table reports the month wise disbursement of joint liability loans for the full sample of borrowers who received both an individual and joint liability loan and for the sub-sample surveyed.

3.3.1 Survey Data

Data on 1,821 group members collected from 755 borrowers reveals that a large number (87%) knew their group members from before the group was formed (Table 8). Of the group members they knew from before, they met 82% of them weekly. This results in around 66% of our sample comprising of individuals who knew all their group members from before and met them weekly. We do not find any significant differences across gender in the proportion of group members they knew from before and how frequently they met them. Borrowers from both genders are also equally

likely to have neighbours in their group though women are slightly more likely to have a relative. While there is low variation in the other characteristics, women are significantly more likely than men to form a group with someone who they could have borrowed in times of need or had done a business with before. Hence, it appears that women are choosing group members more on the basis of people they knew well as compared to men.

Table 8: Group Characteristics - by Gender (%)

	Overall sample	Male	Female	Mean difference p-value
Knew before		87	87	0.819
Same caste	16	14	21	0.007
Would have borrowed	28	26	33	0.072
Business partners	13	11	17	0.028
<i>How they know group member</i>				
Neighbours	71	71	72	0.603
Relatives	8	7	10	0.086
Friends	6	7	4	0.109
<i>Frequency of meeting</i>				
Weekly	73	73	72	0.709
Sometimes	9	9	9	0.889
Observations	755	540	215	

Note: The table reports group characteristics for the full sample as well by gender for borrowers who were surveyed. Knew before is a measure for if the borrower knew group member from before the group was formed, same caste is if they are from the same caste, would have borrowed refers to if the borrower would have borrowed from the group member in time of need and business partners refers to if they did business together. For those who knew a group member from before, they were asked if they know them because he/she is a neighbour, a relative or a friend. Borrowers were also asked about the frequency at which they met group members they knew from before and table reports the two main categories: those who reported meeting weekly or sometimes.

We also find difference in behaviour if we consider the gender mix of the groups.

More than 70% of all male and all female groups are comprised of people the borrower knew from before and met weekly while in mixed groups, the ratio drops to 52%. This might be attributable to it being rare for unrelated men and women to interact with each other in Pakistan and these groups are formed with the spouse or sibling of someone of the same gender that they know rather than a direct connection.

3.4 Measures of group characteristics

Since we only have one exogenous variable (time borrowers had to form a group) and several group characteristics, we combine them into a single index. In order to do this, weight to be given to each characteristic needs to be decided. As Filmer and Pritchett (2001) pointed out, while using equal weights is the simplest solution, there is no justification for doing this. Since there is no theoretical ground to assign the weights, we use the statistical technique of Principal Component Analysis (PCA) to obtain them. The first principal component is a linear combination of the original variables with the weights based on the correlation matrix that captures the largest amount of information in the variables used. The characteristics used for the PCA along with the factor weightings are in Table 9. The index obtained based on the first principal component is a continuous scale of the relative social connection of the groups.

Table 9: Characteristics used in PCA and the Factor Weightings

Knew from before	0.5803
Meet weekly	0.5252
Same caste	0.1341
Would have borrowed	0.2924
Neighbour	0.4716
Had done business together before	0.2481

Note: The table reports the weighting assigned to each factor by PCA. Knew from before is a measure for if the borrower knew group member from before the group was formed, met weekly is if they met at least once a week, same caste is if they belong to the same caste, borrowed refers to if the borrower would have borrowed from the group member in time of need, neighbour refers to if the group member is a neighbour and had done business together before the group was formed.

In order to comment on specific channels, we also consider each characteristic separately. Since groups have between 3 and 6 members, using proportion of group members for whom the borrower answered ‘yes’ for that characteristic results in a peculiar variable. This is because there are an increasing number of possible values that the variable can take as group size becomes larger. So, at the expense of losing variation in the variable, we convert it into a binary variable. We define three dummy variables, each taking a value of one for different proportion of the group meeting the criterion. The three thresholds used are: all group members, half the members and at least one member (this translates into 20% for the maximum group size of 6).

3.5 Empirical Analysis

We use two stage least squares, as recommended by Angrist (2001), for cases where the dependent variable in both stages is a binary variable:

First stage:

$$GC_i = \pi_0 + \pi_1 T_i + \mathbf{X}_i \delta + \sum_{m=2}^{14} \theta_m + \nu_i \quad (2)$$

where GC_i is the measure for group characteristics of borrower i . T_i is the instrument - number of month to expiry of the loan at the time of the switch. The first stage coefficient π_1 is of direct interest to us since it will measure how people's choice varies depending on time they had to form group. \mathbf{X}_i is a vector of controls like gender, number of previous loans, loan age and loan age squared. θ_m are the branch fixed effects.

Second stage:

$$Y_{it} = \alpha + \beta \hat{GC}_i + \mathbf{X}_i \gamma + \sum_{m=2}^{14} \theta_m + \varepsilon_{it} \quad (3)$$

where Y_{it} is a dummy variable=1 to capture loan repayment discipline in month t , for individual i . Coefficient of interest is β on \hat{GC}_i which are the instrumented group characteristics. The rest is the same as defined above for equation 2.

We first introduce the aggregate index constructed using PCA directly into a regression on the dependent variable of interest - monthly missed payments (in Column 1 in Table 10). The estimates are based on a sample of 755 borrowers from whom primary data was collected. We find that higher values of the index predicts better borrower performance, though the impact is only marginally significant. Instead of using the index directly, when we use an instrument (number of months till expiry of the individual liability loan at the time of the announcement of the switch) for group characteristics and estimate equation 2-3 using two stage least squares, we find that it has a positive and significant coefficient in the first stage (Column 2 in Table 10). This indicates that people tend to choose the kind of people we have defined as having close social ties when they have more time. This in turn then has a positive impact on their performance by lowering the likelihood of missing a

payment (negative and significant coefficient in column 3 in Table 10).

Table 10: Group Characteristics Index and Borrower Performance

	(1)	(2)	(3)
	Missed Payments	Group characteristics (First Stage)	Missed Payments (Second Stage)
PCA index	-0.003* (0.002)		-0.517*** (0.119)
Instrument		0.059** (0.023)	
Observations	7,672	7,672	7,672

Note: Instrument refers to the number of months till the expiry of the individual liability loan at the time of the announcement of the switch to joint liability. PCA Index is based on the first principal component of a continuous scale of the relative social connection of the groups. All regression include controls for gender, number of previous loans, loan age and loan age squared. Robust standard errors clustered by the group in parenthesis.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Next, we try to unbundle the channels for the impact we find by estimating equation 2-3 separately for each characteristic instead of using the PCA index. A dummy variable is specified for every characteristic which takes a value of 1 if group members satisfy the criterion at a particular threshold and 0 otherwise. We vary the threshold so as to understand at which level a particular characteristic is important (or not). For example, in the first row in Table 11, 100% refers to the group characteristics variable is 1 if all group members meet the criterion and 0 otherwise. We find that when people have more time, they are significantly more likely to choose people they knew from before and met weekly. Measures of cultural similarity (same caste) and informal insurance network (if would have borrowed in time of need) are insignificant at all thresholds while only the likelihood of having an all-neighbour group increases with time.

Table 11: Group Characteristics and Borrower Performance

		Knew before	Met weekly	Same Caste	Borrowed	Neighbour
100%	FS	0.016*** (0.006)	0.014** (0.007)	0.002 (0.004)	0.006 (0.007)	0.017** (0.007)
	SS	-0.208** (0.100)	-0.239* (0.143)	-1.386 (2.626)	-0.518 (0.580)	-0.201* (0.117)
50%	FS	0.010** (0.005)	0.012* (0.006)	0.004 (0.006)	0.004 (0.007)	0.009 (0.007)
	SS	-0.322* (0.179)	-0.275* (0.167)	-0.805 (1.165)	-0.842 (1.584)	-0.353 (0.281)
20%	FS	0.009** (0.005)	0.011* (0.006)	0.001 (0.006)	0.003 (0.007)	0.011 (0.007)
	SS	-0.341* (0.187)	-0.307 (0.195)	-6.168 (70.167)	-1.128 (2.862)	-0.301 (0.207)

Note: All regression based on the monthly instalment behaviour of the sample of borrowers who were surveyed and their joint liability loan cycle is complete. FS is first stage coefficient where a group characteristic dummy is the dependent variable and number of months till the expiry of the individual liability loan at the time of the announcement of the switch to joint liability is the instrument and SS is second stage of an instrumental variable regression where borrower performance as measured by monthly missed instalments is the dependent variable. All group characteristics refer to the pre-group formation situation. Knew before is a measure for if the borrower knew group member from before the group was formed, met weekly is if they met at least once a week, same caste is if they belong to the same caste, borrowed refers to if the borrower would have borrowed from the group member in time of need and neighbour refers to if the group member is a neighbour. All include controls for gender, number of previous loans, loan age and loan age squared. Robust standard errors clustered by the group are in parenthesis.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4 Conclusion

Using a natural experiment setting, we find significant improvement in borrower performance under joint liability loans as compared to individual loans. This is in a setting with no mandatory group meetings and individual loans having collateral in the shape of a guarantor. This indicates that the recent shift towards individual

liability might not be optimal for all borrower types. Our findings are in line with those of Carpena et al. (2013) but differ from the no impact found by Giné and Karlan (2014) and Attanasio et al. (2015) based on RCTs. These studies have been criticized on account of differences in loan contracts between individual and joint liability loans. Since, there were no changes to the contract in the case of Akhuwat, we believe that this study provides evidence in a more comparable setting. However, it should be noted that the analysis is based on behaviour of borrowers in a large metropolitan city and it is possible that borrowers in a smaller urban city or rural setting may behave differently.

The study also finds some evidence of the importance of social connections, discussed in literature on joiny liability lending, as a possible mechanism for improvement in borrower performance. The variation in the time people had to form groups is used to show that when they have time to think carefully about the formation of the group, borrowers choose on the basis of social ties such as knowing people from before and meeting them frequently. It is important to note an important limitation: since we only have information on the person who was interviewed, we are unable to control for how other group members interacted with each other. Due to the strict joint liability nature of the contracts, interaction of others in the group with each other may also be important, and so this study at best presents a partial picture of group interaction. We are also unable to comment on how these connections evolved through the course of the loan and how that in turn impacted borrower performance. We only comment on the degree of pre-existing connections of the borrower we surveyed with the rest of the group members. We do not find any evidence regarding the importance of other mechanisms like informal insurance networks or cultural similarity. The results suggest that encouraging borrowers to take time to form groups and choosing members that they interact with frequently

may be advantageous for MFIs, particularly those who do not want to bear the cost of arranging mandatory group meetings.

References

- Ahlin, C. and Townsend, R. M. (2007). Using repayment data to test across models of joint liability lending. *Economic Journal*, 117(517):F11–F51.
- Angrist, J. D. (2001). Estimation of limited dependent variable models with dummy endogenous regressors. *Journal of Business & Economic Statistics*, 19(1).
- Attanasio, O., Augsburg, B., De Haas, R., Fitzsimons, E., and Harmgart, H. (2015). Group lending or individual lending? Evidence from a randomised field experiment in Mongolia. *American Economic Journal: Applied Economics*, 7(1):90–122.
- Banerjee, A. V. (2013). Microcredit under the microscope: What have we learned in the past two decades, and what do we need to know? *Annual Review of Economics*, 5(1):487–519.
- Besley, T. and Coate, S. (1995). Group lending, repayment incentives and social collateral. *Journal of Development Economics*, 46(1):1–18.
- Carpena, F., Cole, S., Shapiro, J., and Zia, B. (2013). Liability structure in small-scale finance: Evidence from a natural experiment. *World Bank Economic Review*, 27(3):437–469.
- Cassar, A., Crowley, L., and Wydick, B. (2007). The effect of social capital on group loan repayment: Evidence from field experiments. *Economic Journal*, 117(517):F85–F106.
- de Quidt, J., Fetzter, T., and Ghatak, M. (2015). Group lending without joint liability. *Journal of Development Economics*. Forthcoming.
- Feigenberg, B., Field, E., and Pande, R. (2013). The economic returns to social interaction: Experimental evidence from microfinance. *Review of Economic Studies*, 80(4):1459–1483.
- Feigenberg, B., Field, E., Pande, R., Rigol, N., and Sarkar, S. (2014). Do group dynamics influence social capital and female empowerment? Experimental evidence from microfinance. *Journal of Policy Analysis and Management*, 33(4):932–949.
- Field, E. and Pande, R. (2008). Repayment frequency and default in microfinance: evidence from India. *Journal of the European Economic Association*, 6(2-3):501–509.

- Filmer, D. and Pritchett, L. H. (2001). Estimating wealth effects without expenditure data or tears: An application to educational enrollments in states of India. *Demography*, 38(1):115–132.
- Ghatak, M. and Guinnane, T. W. (1999). The economics of lending with joint liability: theory and practice. *Journal of Development Economics*, 60(1):195–228.
- Giné, X. and Karlan, D. S. (2014). Group versus individual liability: Short and long term evidence from Philippine microcredit lending groups. *Journal of Development Economics*, 107:65–83.
- Hermes, N., Lensink, R., and Mehrteab, H. T. (2005). Peer monitoring, social ties and moral hazard in group lending programs: Evidence from Eritrea. *World Development*, 33(1):149–169.
- Hermes, N., Lensink, R., and Mehrteab, H. T. (2006). Does the group leader matter? The impact of monitoring activities and social ties of group leaders on the repayment performance of group-based lending in Eritrea. *African Development Review*, 18(1):72–97.
- Karlan, D. S. (2007). Social connections and group banking. *Economic Journal*, 117(517):F52–F84.
- Paxton, J., Graham, D., and Thraen, C. (2000). Modeling group loan repayment behavior: New insights from Burkina Faso. *Economic Development and Cultural Change*, 48(3):639–655.
- Sharma, M. and Zeller, M. (1997). Repayment performance in group-based credit programs in Bangladesh: An empirical analysis. *World development*, 25(10):1731–1742.
- Wydick, B. (1999). Can social cohesion be harnessed to repair market failures? Evidence from group lending in Guatemala. *Economic Journal*, 109(457):463–475.

Appendices

Table A1: Borrower Performance - Average Missed Payments

	(1) Overlapping months	(2) Fixed effects	(3) Pooled Sample	(4) Pooled Sample
Group dummy	0.442*** (0.041)	0.561*** (0.026)	0.572*** (0.042)	0.572*** (0.048)
No of previous loans	1.126*** (0.042)		1.028 (0.029)	1.028 (0.030)
Gender	1.067 (0.095)		1.147** (0.076)	1.147** (0.083)
Loan Age		1.325*** (0.031)	1.266** (0.039)	1.266*** (0.042)
Loan Age Squared		0.986*** (0.002)	0.990*** (0.003)	0.990*** (0.003)
Mean of dependent var.	0.054	0.150	0.052	0.052
Observations	18,548	25,012	45,334	45,334

Note: Table reports odds ratio from estimation of a logit model with dependent variable equal to one if the borrower has missed installment payment in that month making him/her behind schedule, zero otherwise. A value of less than one for the odds ratio for Group dummy means individuals in groups are less likely to miss a payment. The sample includes all loans irrespective of whether the loan had matured or not by the end of the sample period. In Column (1) are estimates using data only for months between May 2011 to April 2012. In Column (2) are results using fixed effects model and in Column (3) and (4) are results using the pooled sample with errors clustered by the borrower in Column (3) and by the group in Column (4). All specifications except (2) include time and branch fixed effects. (2) is only estimated for borrowers with some variation in the dependent variable i.e. do miss at least one payment. Robust standard error in parenthesis.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A2: Borrower Performance: Missed payments - Sample of Expired Loans Only

	(1) Overlapping months	(2) Fixed effects	(3) Pooled sample	(4) Pooled sample
Group dummy	-0.041*** (0.005)	-0.024*** (0.002)	-0.025*** (0.004)	-0.025*** (0.004)
No of previous loans	0.007*** (0.002)		0.002 (0.002)	0.002 (0.002)
Gender	0.003 (0.004)		0.006* (0.003)	0.066 (0.004)
Loan Age		0.013*** (0.001)	0.012*** (0.001)	0.012*** (0.001)
Loan Age Squared		-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Mean of dependant var.	0.054	0.052	0.052	0.052
Observations	18,548	37,784	37,784	37,784

Note: Table reports results from an OLS regression with dependent variable equal to one if the borrower has missed installment payment in that month making him/her behind schedule, zero otherwise. In Column (1) are estimates using data only for months May 2011 to April 2012. In Column (2) are results using fixed effects model and in Column (3) and (4) are results using the pooled sample with errors clustered by the borrower in Column (3) and by the group in Column (4). All specifications except (2) include time and branch fixed effects. Robust standard error in parenthesis.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A3: Borrower Performance: On Time in Making Payments

	(1) Overlapping months	(2) Fixed effects	(3) Pooled sample	(4) Pooled sample
Group Dummy	0.343*** (0.015)	0.169*** (0.000)	0.189*** (0.0111)	0.189*** (0.0138)
No of previous loans	-0.019*** (0.006)		-0.0160*** (0.005)	-0.0160*** (0.005)
Gender	-0.076*** (0.015)		-0.054*** (0.011)	-0.054*** (0.012)
Loan Age		-0.039*** (0.002)	-0.035*** (0.002)	-0.035*** (0.003)
Loan Age Squared		0.001*** (0.000)	0.001*** (0.000)	0.001** (0.000)
Mean of dependant var.	0.716	0.766	0.766	0.766
Observations	18,387	45,334	45,334	45,334

Note: Table reports results from an OLS regression with dependent variable equal to one if the borrower is on time in making payments at the end of the month irrespective of whether a payment was missed in that month or not and zero otherwise. The sample includes all loans irrespective of whether the loan had matured or not by the end of our sample period. In Column (1) are estimates using data only for months May 2011 to April 2012. In Column (2) are results using fixed effects model and in Column (3) and (4) are results using the pooled sample with errors clustered by the borrower in Column (3) and by the group in Column (4). All specifications except (2) include time and branch fixed effects. Robust standard error in parenthesis.*** $p < 0.01$,** $p < 0.05$,* $p < 0.1$.