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Microcredit with Voluntary Contributions and Zero Interest Rate - Evidence from Pakistan

Mahreen Mahmud

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Abstract

We study a unique microcredit model with zero interest rate and voluntary contributions, used by Akhuwat, a microfinance organization operating in Pakistan since 2001. Borrowers are encouraged to give any amount they wish to the organization every month, in addition to the instalment for the repayment of principal. These voluntary contributions result in an implicit interest rate of around 4.5%. The analysis of monthly data on voluntary contributions provide evidence that the organization is rewarding borrowers for their contributions by giving them repeat loans and that borrowers are strategically timing these voluntary contributions through their loan cycle to maximize impact. In the case of joint liability loans, borrowers in poorly performing groups make on average higher voluntary contributions, and voluntary contributions in a previous loan cycle correlate with borrower discipline in a subsequent loan cycle. Thus, voluntary contributions can signal borrower quality, and joint liability borrowers appear to be using them to signal their quality independently of their group.

JEL codes: O12, O16, D64
Keywords: Microfinance, Voluntary Contributions, Social Capital

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†School of Economics, Keynes College, University of Kent, Canterbury, CT2 7NP, UK. Email: mm641@kent.ac.uk

Non-technical summary

Microfinance institutions have been the subject of criticism in recent times, due in part to excessively high interest rates and often coercive methods that were used to ensure repayment. Today, the microfinance model is in a phase of rethinking, with experiments with savings and insurance products dominating this process. Against this backdrop, we study a unique microcredit model involving voluntary contributions coupled with zero interest rate, as compared to one with contractually specified fixed interest charge. This model is being used by *Akhuwat*, an interest free microfinance organization operating in Pakistan since 2001. The borrowers are encouraged to give any amount they wish to the organization every month, in addition to the instalment for the repayment of principal. Monthly data on each voluntary contribution made by the borrowers provides a rich source of information on their behaviour and we use it to explore whether the patterns of these contributions, repayment and repeat borrowing are consistent with what we would expect with signalling behaviour.

We use data from the organization's database on 27,427 complete loans issued between June 2010 and June 2013. For this sample, voluntary contributions result in an implicit interest rate of around 4.5%. The interest rates charged by South Asian MFIs are estimated to be around 15-20% and so these voluntary contributions are not generating the same kind of revenues as a fixed interest charge does but they are not trivial either. Employing a hurdle model, we find that borrowers give more often at the start of their loan cycle but frequency drops in the last quarter. However, for borrowers on both individual and joint liability loans who go on to borrow again from the same organization, the size of voluntary contributions towards the end of their loan cycle is actually higher. It appears that borrowers are responding to the incentive of a repeat loan and timing voluntary contributions to maximise impact.

Further, voluntary contributions made in a loan cycle correlate positively with repeat borrowing for both first and second time borrowers. This result holds even when we control for borrower discipline[1] in the last loan cycle. Average monthly donations continue to be an important predictor of repeat borrowing even when we control for basic demographic characteristics, financial condition and degree of social connection of the borrower with the community for a sub-sample of these borrowers.

For borrowers on a joint liability loan, when the group is lagging behind in making instalment payments, they make significantly larger voluntary contributions. The model gives these borrowers the scope to signal their quality independent of their group. Also, for these borrowers, higher voluntary contributions in a previous loan cycle correlate with a higher proportion of months in which the borrower is on time in making payments in a subsequent loan cycle. Hence, this model provides a mechanism through which the organization can separate out the better quality borrowers without incurring additional costs to obtain information when evaluating repeat loan applications. In addition to its value as a signal, it can raise revenues for the organization without burdening those borrowers who are facing financial difficulty.

[1]Measured by proportion of months in which the borrower missed the monthly payments.

1 Introduction

Microfinance institutions (MFIs) have been the subject of criticism in recent times, due in part to excessively high interest rates and often coercive methods that were used to ensure repayment[1]. This led to high indebtedness and defaults resulting in the collapse of several microfinance organizations across the world. Both within and outside the academic world, many questions have been raised around the fundamentals of the microfinance model. These also encompass the sustainability and outreach of the institutions[2]. Of concern is also the failure of microfinance in fulfilling the tall developmental goals it set out to achieve. Proponents of microfinance claimed that it was empowering women and alleviating poverty until the rigorous evaluations based on Randomized Control Trials (RCTs) started questioning this claim[3].

Today, the microfinance model is in a phase of rethinking, with experiments with savings and insurance products dominating this process[4]. Against this backdrop, we study a unique microcredit model involving voluntary contributions coupled with zero interest rate, as compared to one with contractually specified fixed interest charge. But why would borrowers make contributions voluntarily? Voluntary giving is generally associated with the rich and Bekkers and Wiepking (2010) in their review of over 500 articles on philanthropy identify several drivers of it. However, for poor borrowers the motivation is likely to be different. Since the microcredit model is built on dynamic incentives - pay back the first loan to receive another - these contributions can be part of this incentive mechanism.

The system of voluntary contributions provides scope for borrowers to signal their quality. In the conventional 'Grameen' style microcredit model which is based

[1]See Bateman and Chang (2012) for a comprehensive review.

[2]For a review see Hermes and Lensink (2011).

[3]The first of these was the study by Banerjee et al. (2015) who did not find any positive effects on different development indicators. Simultaneously, Roodman and Morduch (2014) questioned the earlier findings of Pitt and Khandker (1998) which was the first study to empirically establish the positive impact of microfinance. Though in places microfinance did lead to business creation, evidence from RCTs (See among others Tarozzi et al. (2015); Crépon et al. (2015); Nghiem et al. (2012)) across the world point to it not being the miracle that it was first thought to be.

[4]See among others Afzal et al. (2014); Atkinson et al. (2013); Brune et al. (2015); El-Gamal et al. (2014); Janzen and Carter (2013); Kast and Pomeranz (2014); Schaner (2012).

on a continued relationship with the borrower, discipline exhibited in a loan cycle by the borrower is critical to the decision to give out another loan. However, among borrowers who pay back the loan on time, without incurring cost of collecting additional information, the MFI cannot tell them apart. These costs can in turn have large implications for the interest rates that MFIs charge (Banerjee and Duflo, 2010). In this alternative model, contributions can reveal information about the borrowers that can help the MFI to decide on the loan size and interest rate to offer.

The model is being used by Akhuwat[5], an interest free microfinance organization operating in Pakistan since 2001. The unique dimension to the organization is that while there is no fixed interest charge, it invites borrowers to make voluntary contributions of any amount they wish every month at the time of making the installment payment for returning the principal. These voluntary contributions result in an implicit interest rate of around 4.5%[6]. The interest rates charged by South Asian MFIs are estimated to be around 15-20%[7] and so these voluntary contributions are not generating the same kind of revenues as a fixed interest charge does but they are not trivial either. Monthly data on each voluntary contribution made by the borrowers provides a rich source of information on their behaviour and we use it to explore whether the patterns of these contributions, repayment and repeat borrowing are consistent with what we would expect with signalling behaviour.

Our results show that for both first and second time borrowers, the organization is rewarding them for their voluntary contributions by giving them repeat loans and there is some evidence that borrowers are strategically timing these voluntary contributions through their loan cycle to maximize impact. We find that borrowers on a joint liability loan when in a poorly performing group, make on average larger voluntary contributions. Unlike the conventional model, this setting provides them with a way to signal their quality independent of that of the group. Finally, for those on a joint liability loan, higher voluntary contributions in a previous loan

[5]Details about the organization in Section 2.

[6]Annualized monthly implicit rate calculated as the ratio of average monthly contribution amount to monthly principal instalment amount.

[7]Microfinance Information Exchange.

cycle correlate with a higher proportion of months in which the borrower is on time in making payments in a subsequent loan cycle. Hence, this model provides a mechanism through which the organization can separate out the better quality borrowers in addition to using information on borrower discipline[8].

Islamic microfinance is still in its nascent stages and rigorous evaluation of Islamic MFIs or of the interest free lending model is scant[9]. The 2008 global survey by the Consultative Group to Assist the Poor (Karim et al., 2008) in 19 Muslim countries revealed that 20-40% of the people were not using conventional microfinance due to religious reasons - the prohibition of interest in Islam. Schoon (2009) discuss how certain customer needs like payment of operating expenses or loans for personal reasons such as education or health cannot be fulfilled through the Islamic forms of financing[10] and so would require cash loans. These are the cases most relevant to MFIs and in such cases, *Qarz-e-Hasna* (charity loan) is given. However, this is not a business model and CGAP (2008) identifies that they have tended to rely on *Zakat*, a mandatory giving of charity every year in Islam. The contributions in Akhuwat model generate additional revenues for the MFI but also gives flexibility to borrowers facing financial hardship. Hence, any learning from this model would be of direct interest and relevance to Islamic MFIs.

The rest of the paper is organized as follows. The next section provides details about the organization and section 3 looks at the theory on voluntary contributions and presents a simple microcredit model with it. Data set is discussed in section 4, the empirical strategy and results are in section 5 and section 6 has some robustness checks based on survey data. Section 7 contains the concluding discussion.

[8] As measured by the percentage of instalments paid on time by the borrower in the last loan cycle.

[9] El-Komi and Croson (2013) conduct experiments in labs to establish that profit sharing contracts have more compliance as compared to those based on interest. A recent study by El-Gamal et al. (2014) explores the take up of a guaranteed rotated savings scheme (RoSCH) which conforms to sharia as an option to cater to the large Muslim population that remains unbanked due to the interest based nature of microfinance.

[10] *Murabaha* (asset based sale), *Mudaraba* (equity participation) or *Musharakah* (trustee financing).

2 About Akhuwat[11]

Akhuwat began its operation from the city of Lahore in 2001 and since then had expanded to 256 branches across 136 cities of Pakistan as of December 2013 with loans extended to 180,000 active borrowers. The organization has a simple product - small interest free loans to be returned in equal monthly instalments. What this means is that if a loan of Rs.10,000 is made out for 10 months then the amount due each month would be Rs.1,000 and if this is paid regularly for 10 months then the loan cycle is considered complete. There is no fixed charge over and above this every month.

Apart from the zero interest feature, the organization operates like a regular MFI. The organization had an individual lending model till March 2011 where borrowers had to have a person from the neighbourhood as a guarantor. This meant that the guarantor could not borrow till the loan cycle of the person he/she had guaranteed was complete. Complaints from the guarantors regarding this led to the organisation switching to a group lending model. The borrowers form the groups themselves and while there is no restriction on the gender composition, the groups should have between three and six members and no members should be immediate family. All loans are disbursed simultaneously to members of a group and there is strict joint liability and so instalments for principal repayment are only received if it is the complete amount due for the entire group. All instalments, whether individual or group, have to be paid at the local Akhuwat branch. The organization gives loans for what they define as 'productive' and 'non-productive' reasons where non-productive are all loans for personal reasons (like education or health expenditure) and loans taken out by people selling fruits and vegetables on carts which the organization believes does not have the potential to grow. A borrower is only allowed to borrow once for a non-productive reason.

The loans are given after a thorough check of both the household and enterprise of the applicant. All applications have to be accompanied by each borrowers National Identity Card, pictures and a recent utility bill. Once the application is complete,

[11]Please note that this section is based on information provided by the organization on its ideology and operations and not on the author's personal opinion.

Akhuwat staff goes for a visit to the household where a Social Appraisal Form is filled. This serves as a verification of the address of the person and also informs the family members that a loan is being taken out. The organization makes sure that the spouse or the parent of the borrower counter signs on the application so that the entire family is involved. If the loan is for a productive reason, then a business appraisal is also done and detailed information on fixed and working capital is collected in order to assess the repayment ability of the applicant. Also, an expected breakdown of the exact utilization of the loan amount is recorded. Most salient eligibility criteria are the viability[12] of the proposed use of the loan and household having some level of income such that it does not fall into the category of very poor [13].

One aspect in which the organization claims to be different is that it emphasizes inclusion. The word *akhuwat* translates to brotherhood and the organization was based on this idea. They look to foster a feeling of unity among the community and of belonging to the organization. They keep their offices deliberately simple with staff sitting on the floor working on low tables in order to be low cost and welcoming for the borrowers who are poor and feel comfortable sitting on the floor.

In line with this ideology, they encourage borrowers to give something every month to the organization. These are given individually so group members may or may not know about them. Also, there is no compulsion to make these contributions at the time of giving the installment payment or in the presence of the loan officer. However, the norm is for these contributions to be given together with the installment payments every month. Even if one group member brings to the branch the contributions by all members of the group, an individual receipt for the exact contribution by each member is issued. Viewed in this way, according to the organization, these voluntary contributions are a final step in their partnership with the borrowers. They motivate borrowers by telling them to contribute towards the running of the organization which will allow them to help others like themselves.

[12]This is based on checks of the breakdown of the utilization of the loan like for example a check on the cost of any asset that the borrower has proposed to purchase.

[13]In our conversations with the organization, we did not find this to be strictly defined and is likely to vary by branch.

3 Theory on Voluntary Contributions

Before looking at the empirical analysis in detail, we discuss in this section the theories that explain people's donation behaviour in a traditional setting and then analyze the motivation for Akhuwat borrowers to give. We then develop a simple micro-credit model with voluntary contributions to show that it can be advantageous for both the MFIs and borrowers.

3.1 Motivation to donate

There is a rich literature on the motivations and determinants of philanthropy in social sciences. In the literature on charitable voluntary contributions, economists motivate philanthropy using two models: the public goods model in which donors give motivated by what their donation can accomplish, and the private consumption model in which donors give motivated by how giving makes them feel (Duncan, 2004). The defining assumption of the public goods model is that donors contribute because they care about the public good and so are considered purely altruistic. Due to non-excludable nature of a public good, the donor will benefit from the good irrespective of what amount s/he contributes. Hence, any contributions are seen as unselfish. On the other hand, the defining assumption of the private consumption model is that donors dont care about the public good but rather contribute motivated by the personal satisfaction the act of giving itself brings - a warm glow effect[14]. This is referred to as a case of impure altruism (Andreoni, 1989). Studies acknowledge that in reality peoples preferences are probably a function of both. In either case, they largely remain unobservable and most attempts to measure them have been through lab experiments. Extensions to these models also consider factors like the prestige associated with giving (Harbaugh, 1998).

3.2 Voluntary Contributions by Akhuwat Borrowers

In the context of Akhuwat, the voluntary contributions made are unique and quite distinct from the setting in which philanthropy has traditionally been studied. Here

[14]Concept traced to Becker (1974).

the donor is someone who is often the recipient of charity and not the one giving it. The voluntary contributions made by borrowers of Akhuwat are unique not only in terms of the income levels of the people making them but also in their relationship with the organization to which they are donating. The motivation to make voluntary contributions for some borrowers might be purely altruistic, based on a desire to help others like themselves or to give something back to an organization that helped them when they needed it.

On the other hand, voluntary contributions can be motivated by the desire to continue their relationship with the organization. In this case, voluntary contributions made in a loan cycle can be expected to be positively correlated with the likelihood of borrowing again. Borrowers may also consider short term memory and so make larger voluntary contributions towards the end of the loan cycle to increase the impact on their likelihood of getting a repeat loan. Of course, voluntary contributions may be higher at the end as borrowers delay giving due to discounting or because fewer installments have to paid towards the end of the loan cycle resulting in lesser pressure on them. Studying the pattern of voluntary contributions over the loan cycle can hence reveal important insights into the thinking of the borrowers.

For borrowers in a group, there can be peer pressure due to which these borrowers give more than they would have if their voluntary contribution amount was not known to others. On the other hand, they might give less if the group members think of voluntary contributions as a cumulative amount and aim to reach a certain level as a group or if members of the group with more influence are convinced a lower amount is enough. If the group is planning on borrowing again and they are convinced that the level of their voluntary contributions matters in getting another loan then there might be significant pressure to give a high amount in order to continue being a member of the group[15]. Simultaneously, some of the more strategic borrowers would also be concerned about their own relationship with the organization independent of that as a group and use it to signal their own quality.

[15]Continued membership of a group can be important for two reasons: One, the organization prefers to give out loans in groups and two because fallout with the group might send a negative signal.

3.3 Theoretical Model

We show that a microcredit model with screening (voluntary contributions) can result in greater profitability for the MFI. Only borrowers who are able to earn a return above a certain threshold are able to make these contributions thereby signalling their quality. Their incentive to do this is a larger repeat loan from the MFI. For non-screening MFIs, there is no way to tell the difference between borrowers who repay the loan on time without collecting additional information and so they are forced to offer the same terms to all borrowers in a subsequent loan cycle. Therefore, they either risk default or forgo growth by giving repeat loans of the same size.

Let us assume that a project requires an investment of X_i and yields a return of $P_\theta(X_i)$ which is an increasing function of X_i. θ is borrower type which is determined randomly and there are N types of borrowers such that $P_N\ (X_i) > P_{N-1}(X_i) > ...P_1(X_i)$. The MFI offers X_1 at an interest rate i_1 and so the total repayment to be made by the borrower is $(1+i_1)X_1$. If this amount is such that $(1+i_1)X_1 > P_N(X_1)$, then all are expected to default but if $P_2(X_1) < (1+i_1)X_1 < P_N(X_1)$ then only type 2 to N will repay. The MFI may offer a contract where $(1+i_1)X_1 = P_1(X_1)$ since then everyone will be able to repay. But, with such a contract, it is not able to distinguish between borrower types.

In order to distinguish between the types of borrowers, the MFI can ask for voluntary contributions (VC). When the contract is set such that $(1+i_1)X_1 = P_1(X_1)$, only type 2 to N will be able to afford to make contributions since the total repayment that they have to make is less than the expected return from the project $[(1+i_1)X_1 < P_2(X_1) < P_N(X_1)]$. They will have an incentive to make contributions and reveal their type if this signal gives them some benefit (repeat loan in this case).

Assumptions:

1. Borrowers can get a larger loan in the next loan cycle but borrower cannot graduate to a loan size X_{S+2} from X_S before borrowing an amount X_{S+1} (where $X_{S+2} > X_{S+1} > X_S$).
2. Cost of capital is r (fixed) and we assume perfect competition so all firms offer

the same interest rate i_1 in the first period.

3. The MFI will increase the size of the loan offered to a borrower from one loan cycle to another if and only if doing so does not diminish expected profits.

We will show that in each period, the screening MFI is expected to earn a higher profit than a non-screening MFI. In the first period, if the MFI does not screen, then expected profit from all borrowers is $(i_1 - r)X_1$. If there is screening, then the profit from type 1 borrowers is $(i_1 - r)X_1$ and from type 2 to N borrowers who also make VCs it is $\overline{VC} + (i_1 - r)X_1$ where $\overline{VC}$ is the minimum required/accepted voluntary contribution and the amount of this is common knowledge. Due to these VCs, the total profit in period 1 for a screening MFI $(N(i_1 - r)X_1 + (N - 1)\overline{VC})$ will be higher than that for a non-screening MFI $(N(i_1 - r)X_1)$.

In the second period, if the MFI did not screen in the first period then it will offer the same contract to all borrowers - a larger loan of amount X_2 at an interest rate i_2 where $X_2 > X_1$ (scenario 1) or offer everyone a loan of size X_1 again (scenario 2). In case of scenario 1, the larger loan of size X_2 is such that $P_2(X_2) = (1 + i_2)X_2$ and so type 1 borrower would default since $P_1(X_2) < (1 + i_2)X_2$. Expected profit from type 1 who are all expected to default will be $-(1 + r)X_2$ while from type 2 to N is $(i_2 - r)X_2$. Hence, total profit is $-(1 + r)X_2 + (N - 1)(i_2 - r)X_2$. In the other scenario where same loan is offered to everyone, the total profit will be $N(i_1 - r)X_1$ which is the same as in period 1 for a non-screening MFI.

An organization that screened in the first period, will use the information from it and offer a larger loan of size X_2 to borrowers who made voluntary contributions while X_1 will be offered to the rest. Type 3 to N will be able to make a VC in period 2 but type 1 and 2 cannot since project will yield just enough for them to be able to repay their loan and interest due. Profit from type 1 and type 2 will be $(i_1 - r)X_1$ and $(i_2 - r)X_2$ respectively while from type 3 to N it will also include VCs $(\overline{VC} + (i_2 - r)X_2)$. The total profit in the second period for a screening MFI is thus: $(i_1 - r)X_1 + (i_2 - r)X_2 + (N - 2)\overline{VC} + (N - 2)(i_2 - r)X_2 \Rightarrow$ $(i_1 - r)X_1 + (N - 2)\overline{VC} + (N - 1)(i_2 - r)X_2$.

We show that the profit for firms with screening is higher than the profit for firm without screening under both scenarios.

Scenario I

$$(i_1 - r)X_1 + (N-2)\overline{VC} + (N-1)(i_2 - r)X_2 > -(1+r)X_2 + (N-1)(i_2 - r)X_2$$

$$\Rightarrow (i_1 - r)X_1 + (N-2)\overline{VC} > -(1+r)X_2$$

Scenario II

$$(i_1 - r)X_1 + (N-2)\overline{VC} + (N-1)(i_2 - r)X_2 > N(i_1 - r)X_1$$

$$\Rightarrow (N-2)\overline{VC} + (N-1)(i_2 - r)X_2 > (N-1)(i_1 - r)X_1$$

If Assumption 3 is satisfied (i.e. $(N-1)(i_2 - r)X_2 \geq (N-1)(i_1 - r)X_1$) and VCs are a strictly positive amount, the LHS will be larger than the RHS.

In the third and last period, following from the reasoning above, a screening MFI offering a contract of size X_1 to type 1, X_2 to type 2 and X_3 to type 3 to N will not be worse off than a non-screening MFI. Borrowers will have no incentive to make VCs since this is the last period. Hence, if there are N periods, then borrowers will make VCs till period N-1.

We have demonstrated that screening for borrower quality using voluntary contributions can have potential benefits for the lending organization as well as for the borrowers. Next, we will use data on borrower behaviour to look for evidence of this signalling mechanism in practice.

4 Data

The data for this study comes from the Akhuwat database which contains information on the loan amount, credit period, issue and expiry date and the timing and amount of the instalment for principal repayment that is made each month for all loans issued. In addition, it also has information on each voluntary contribution made by a borrower. A receipt is issued every time a voluntary contribution is made which is then used to record the date and amount of the contribution in this database against the borrowers unique identification number. This provides a unique and distinctive data set of monthly borrower voluntary contribution behaviour.

4.1 Sample Selection

Since it is of interest to understand borrower behaviour, it is imperative that the sample selected has a mix of first time and repeat borrowers. Further, the time period should be long enough to observe people over several loan cycles. Unfortunately, this means restricting the sample to the city of Lahore[16] where the organization began its operations and so provides an opportunity to obtain data for a longer period of time. The criterion for selection of branches was that it should have been in operation for at least 3 years[17] and 14 of the 30 branches in Lahore at that time met the criterion. These are hence the oldest and largest branches of the organization and form the basis of our analysis in this paper. They are spread all over the city and there is variation in the age of these branches with some branches in operation for just 3 years at the end of the sample period in July 2013 and others for over 10 years.

4.2 Sample Description

Data for the 1st July 2010 to 31st June 2013 period reveal that there were 46,535 loans that were issued by these 14 branches. The relevant sample are the 27,427 loans issued after 1st July 2010 for which the loan cycle is complete i.e. they have paid back the loan principal within the maximum duration of the loan[18]. We are restricting the sample to borrowers with a complete loan cycle since borrowers may behave differently (both in their giving behaviour and in making installment payments) over the loan cycle and incomplete loan cycles will also not allow an analysis of repeat borrowing. Table 1 gives a distribution of these loans by the loan cycle and 66% of the sample consists of first time loans. Loan size and duration of the loan increase with subsequent loan cycles.

[Table 1 here]

Looking at the distribution of these loans across branches (Table 2) reveals that

[16]Lahore is a provincial capital and the second largest city in the country with a population of around 12.5 million according to the last census in 2012.

[17]This time duration was chosen to ensure that the criterion is not too restrictive which would have led to very few branches being selected.

[18]Default rate is under 0.2% and borrowers who defaulted are not part of the analysis.

while the overall male-female proportion are slightly dominated by men, there are some branches where a particular gender dominates. For example, the Walton and Badar Colony branches, which are residential areas, are female dominated with over 70% female borrowers. On the other hand, Madhulal Hussain and Daroghawala branches based in commercial centers have less than 35% female borrowers.

[Table 2 here]

We observe the behaviour of the borrowers over their complete loans cycles for 314,291[19] months. Borrowers on average make a voluntary contribution between 65-70% of the months that their loan is active; that is for a 10 month loan, a borrower will make a contribution in about 7 months of it (Table 3). The sample period is one of high inflation in Pakistan with monthly inflation rate close to 1%. Hence, to be able to make comparisons over time, all data has been adjusted using monthly Consumer Price Index (CPI)[20].

[Table 3 here]

Voluntary contributions made by the borrowers translate into an implicit interest rate[21] of between 4 and 4.5% for the sample with a standard deviation of around 4.2%. Hence, there is a high variation in the voluntary contributions given by the borrowers. The implicit interest rate declines with subsequent loans [22] and the reason for this is that borrowers do increase the absolute amount of voluntary contributions they give from one loan cycle to the next but the amounts don't increase in proportion to the increase in the loan amount from one loan cycle to the next.

Next, we look at the voluntary contributions made by the borrowers over the loan cycle. There might be an element of coercion, maybe implicit, from the organization. If this is true, we can expect homogeneity in giving behavior from people who take out loans with similar terms. Figure 2 is a plot based on the behaviour of 10,007 first time borrowers on a 10 month loan and 2,231 second time borrowers on a 12 month loan. Significant variation in donating behavior make us comfortable in concluding

[19]The top 0.05% of the sample has been trimmed for outliers.

[20]Data series obtained from Reuters EcoWin.

[21]This is a nominal rate and is calculated as the annualized average monthly voluntary contribution taken as a ratio of the instalment amount.

[22]The difference is 0.25% and is statistically significant.

that the organization does not implicitly fix a rate of contribution which would then replace a normal interest rate [23]. We see that behaviour over the loan cycle is such that for both first and second time borrowers, as loan matures, borrowers are less and less likely to give. As for the amount given, we find that it also starts declining as loan ages but it picks up towards the end of the loan cycle even though the average amounts given are still not as much as it was in the first few months. With the end now nearer, people may be more generous or it might be that in order to continue a relationship with the organization in future they want to end on a good note. We look at these relationships more systematically in the next section.

[Figure 2 here]

5 Empirical Strategy and Analysis

To study if borrower's behaviour is consistent with what we would expect of signaling behavior, we first look at borrower contribution behaviour over the loan cycle. Next, we study the link of these contributions with repeat borrowing and finally if there is a correlation between contributions made in a loan cycle and borrower discipline in a subsequent cycle.

5.1 Voluntary Contribution Behaviour over the Loan Cycle

For the first of the analysis on borrower behaviour over the loan cycle we specify the following equation:

$$Y_{it} = \alpha_i + \beta_i \mathbf{X}_i + \gamma_i \mathbf{Z}_i + \tau_i \mathbf{K}_i + \sum_{m=2}^{14} \theta_m + \varepsilon_{it} \tag{1}$$

where Y_{it} is the total voluntary contribution made by individual i in month t. For each individual, t will depend on the number of months for which the loan is active. $\mathbf{X}_i$ is a vector of loan contract characteristics - amount and duration of loan, loan cycle and whether loan was extended as a group or individually. Loan size is highly

[23] It might be argued some loan officers pressurize borrowers more than others but we are unable to test for this since we do not have information on the loan officers. However, significant variation in contribution behaviour makes us confident that the effect is not entirely due to coercion.

correlated with loan cycle since each time a borrower takes out another loan, the loan size increases. Hence, we only include the size of the loan which also captures the impact of the number of previous loans a borrower has taken. $\mathbf{Z}_i$ is a vector of borrower characteristics - gender (=1 if male), age, loan purpose (=1 if loan taken for a personal reason rather than for an enterprise). The summary statistics for these characteristics are in Table 4.

[Table 4 here]

K_i is a vector of variables that capture the behaviour of the borrowers over the loan cycle. In order to capture this, we introduce dummies for both the first quarter (= 1 if it is one of the first three months after taking out a loan) and last quarter (=1 if it the last three months of the loan cycle) of the loan cycle. This is to study if borrowers specifically behave any differently at the start and end of the loan cycle. Since we do not have information on the financial condition of the borrower during the loan cycle, as a crude proxy for any financial hardship faced by the borrower (and in the case of a joint liability loan by the group), a dummy variable =1 if till *t-1* the loan instalments were being paid on time is included.

Banerjee (2013) in a recent review article discusses in detail the importance of reputation and the related durability of MFIs. Borrowers are much more likely to repay when they expect to get another loan if they do. Therefore, it is important that the MFI is expected to stay in business. We use age of business as a proxy for perceived durability of the MFI which is likely to also impact their decision to make voluntary contributions to the organization.

Finally, location of the branch may play a key role in giving behaviour depending on how integrated a neighbourhood is or whether it is predominantly a residential or commercial area. Beyond the location of the branch, certain branch staff may work better than others or be more effective. They may be better able to motivate people and communicate the essence of the organization. Alternatively, they may be more coercive. θ_m are the branch dummies to capture these impacts.

5.1.1 Empirical Specification

The nature of the dependent variable is such that it takes a value of 0 for a non-trivial proportion of the population (see Figure 1). These are the months in which the borrower decides to not make a voluntary contribution and therefore we have a distribution with a corner at zero and is continuous for strictly positive values. An obvious choice for modelling such a distribution is a Tobit model. However, a Tobit model assumes that a single mechanism determines the choice between $Y_{it} = 0$ and $Y_{it} > 0$ and the amount of Y_{it} given $Y_{it} > 0$ such that it constrains the partial effects $\partial P(y > 0|x)/\partial x$ and $\partial E(y|x, y > 0)/\partial x$ to have the same sign. However, it is possible that the same characteristics have a different impact on $Y_{it} = 0$ vs. $Y_{it} > 0$ since value of 0 represents a distinct decision making process from that of the amount of voluntary contributions to be given.

[Figure 1 here]

Corner solution might also raise concerns about selectivity. However, it is important to note that the outcome is always observed. We cannot think of a counterfactual for the observed 0 - what would the voluntary contribution amount be if there was no voluntary contribution made? Thus, the need for a Heckman selection model does not arise[24].

We want to model observed voluntary contributions and not what potentially contributions could have been. Therefore, we are interested in $E[Y|X]$ and not $E[Y^*|X]$. We use a two part Hurdle Model which has been used in the literature on health and education to model behaviour of people like for example the decision to smoke and then conditional on the decision, what determines how much they smoke (see for example, Aslam and Kingdon (2008),Madden (2008)). The first hurdle in our case is the decision to make a voluntary contribution and then conditional on this decision, borrowers will proceed to the next stage which is the decision on how much to give. This will take following form:

Stage:1

$$Pr\left[Y_{it} > 0\right] = \alpha_i + \beta_i \mathbf{X}_i + \gamma_i \mathbf{Z}_i + \tau_i \mathbf{K}_i + \sum_{m=2}^{14} \theta_m + \varepsilon_{it} \tag{2}$$

[24]This section is based on Wooldridge (2010).

where $Y_{it} = 1$ if borrower makes a voluntary contributions in month i and 0 otherwise. Rest of the variables are as defined in equation 1. Since it is a binary outcome, this is estimated using a standard Probit Model.

Stage:2 /par Conditional on $Y_{it} = 1$, we estimate the following using Ordinary Least Square (OLS):

$$log\left(Y_{it}\right) | \left(Y_{it} > 0\right) = \alpha_i + \beta_i \mathbf{X}_i + \gamma_i \mathbf{Z}_i + \tau_i \mathbf{K}_i + \sum_{m=2}^{14} \theta_m + \varepsilon_{it} \tag{3}$$

5.1.2 Results

Table 5 contains results for the estimation of equation 2 and 3 with and without controls for individual and loan characteristics. Since we are interested in the 'average' behaviour rather than how behaviour of a specific borrower varies over the loan cycle, these are results for the pooled sample with errors clustered at the borrower level . As expected, estimates of the first stage (in column 1 and 2) show that not being on time in making instalment payments has a negative impact on a borrowers likelihood of donating. Consistent with Figure 2, borrowers on average are significantly more likely to make a voluntary contribution in the first three months as compared to the rest of the loan cycle while the opposite is true for the last three months. This may be because in the initial months after a loan is disbursed, people feel richer and so give more. Simultaneously, feelings of gratitude towards the organization that has given them a loan may be motivating higher voluntary contributions. Also, loan officers talk to borrowers about donating at the time of disbursement of loans emphasizing that they should give whatever possible to help others like themselves and the effect of this talk can wear off with time. Another possible explanation might be that those who anticipate borrowing again from the organization are just as likely (if not more likely) to make voluntary contributions towards the end of the loan cycle as at the start and the likelihood to give only declines for the rest who do not borrow again. How voluntary contributions correlate with probability of borrowing again will be explored in the next part of our analysis.

While not being on time was a negative predictor of making a voluntary contribution, it does not affect the amounts actually given once we control for

individual and loan characteristics (in column (4) in Table 5). The point in loan cycle impact also disappears such that is there is no significant difference in the amounts given in the first and last quarter of the loan cycle as compared to the rest of it. Hence, these factors only impact the decision to make a voluntary contribution and not the amount.

[Table 5 here]

5.1.3 Joint Liability Loans

In the Akhuwat model, the ability to give voluntary contributions provide the borrowers in a poor performing group with the possibility to give an individual signal. This is because even though Akhuwat has strict joint liability such that the installment for any month is not accepted till the entire amount due for the group is given, voluntary contributions are made individually. Each member of the group is issued a separate receipt for the amount s/he gives.

To test if borrowers under joint liability loans do use this as a signal, we estimate equation 2 using the sample of only joint liability loans. Results in Table 6 show that like the results for the full sample (in table 5), borrowers are on average less likely to make voluntary contributions when they are lagging behind in their instalment payment (in column 1). However,those who do give, make larger voluntary contributions when they are not on time in making their instalment payment (in column 2). Hence, borrowers appear to be compensating for the poor performance of their group by donating larger amounts individually.

Further, we look at if group performance as measured by whether they are on time in making instalment payments or not, impact individual voluntary contributions differently as the loan ages. We introduce an interaction between loan age and borrower discipline and find that borrowers are less likely to donate as loans age and are also less likely to give if they are lagging behind in making instalment payments. However, the amount they give is significantly larger as loan ages when they are behind in making payments though the impact of borrower discipline itself is negative. Hence, individuals in poorly performing groups who do make a voluntary contribution, give larger amounts as the loan ages. As loan maturity nears, it appears

that they are keen to make their individual quality known in order to be able to borrow again. This option to give an individual signal independent of their group is a powerful aspect of this model.

[Table 6 here]

5.2 Repeat Borrowing

Next, we look at if these voluntary contributions patterns link to likelihood of borrowing again. This is set up as:

$$Repeat_{it} = \alpha_i + \beta_i \mathbf{X}_i + \gamma_i averagedonation + \tau_i + \sum_{m=2}^{14} \theta_m + \varepsilon_{it} \quad (4)$$

where $Repeat_{it}$ is a dummy =1 if the borrower takes out another loan within a period of time after the expiry of the last laon and 0 otherwise. The coefficient of interest is γ_i which measures the impact of average monthly voluntary contributions made in a cycle on borrowing again. $\mathbf{X}_i$ is a vector of borrower characteristics (gender, part of group, reason for borrowing) and of performance during the loan cycle (a variable that measures the proportion of months that the borrower was not on time in making the instalments taking a value between 0 and 1).

Equation 4 will be estimated for both first and second time borrowers since for other loan cycles the sample size is insufficient to carry out this exercise. An important point to consider here is the length of time period after the expiry of the last loan that should be considered sufficient to observe repeat borrowing. For example, since the data period ends in June 2013, should a loan that expired in March 2013 be considered as part of the sample? In other words, is observing a borrower three months after the expiry of his or her loan enough? To decide on the duration, we calculate the average time it takes first and second time borrowers to take out another loan after expiry of the last loan. We find that 75% of the first time borrowers take out another loan within 2 months and 60% of second time borrowers take out another loan within 1 month of the expiry of the last. We use these as the cut off points and hence $Repeat_{it} = 1$ for a first time borrower if s/he takes out another loan within 2 months of the expiry of the last loan and 0 otherwise.

All loans expiring within 2 months of the end of our sample period are excluded. Similarly, for second time borrowers all loans expiring within the last month of the sample period are excluded. The results are robust to the use of the median time it takes borrowers to take out another loan instead of the average time.

5.2.1 First time borrowers

Before we turn to results from the estimates of equation 4 for all first time borrowers who complete their loan cycles by April 2013, we look at the voluntary contribution behaviour of the two groups - those who borrow again and those who do not. Figure 3 shows how first time borrowers with a 10 month loan make voluntary contributions over their loan cycle. We see very clearly the stark difference in the behaviour of those who go on to borrow again and those who do not. For those who do not borrow again, there is a steady decline in the likelihood of giving as the loan matures. However, for those who do borrow again, the likelihood to make a voluntary contribution on average remains constant and actually increases in the last months of their loan. The amounts given by both groups are quite similar till the last 4 months of the loan cycle which is when they diverge. While there is also an upward trend in the amounts given by the group who do not borrow again, the increase is much steeper for those who do. This pattern is evidence against voluntary contributions being motivated purely by altruism in which case we would expect consistent behaviour across the two groups and over the loan cycle. However, we see clear differences in the behaviour of the two groups over the loan cycle in both the decision to make a voluntary contribution and the amount given[25].

[Figure 3 here]

Results from Probit estimates of equation 4 in Table 7 for first time borrowers confirm the pattern displayed by the raw data. Average monthly voluntary contributions made in the last loan cycle consistently has a positive impact on the

[25]We compared the behaviour of borrowers who take out another loan within 2 months of the expiry of their last loan with those who take out a loan between 3 to 6 months after the expiry of their last loan. We find that though their behaviour is similar (both donate more towards the end), those who borrow 3-6 months after are both less likely to donate and donate lesser amounts than the group that borrows again within 2 months. This points to the likelihood of planning on the part of borrowers and so those who are surer about taking out another loan donate even more towards the end.

likelihood of borrowing again in addition to that of borrower discipline in the last loan cycle. As expected, borrowers with poor repayment discipline as measured by proportion of months they were not on time in making payments are less likely to borrow again.

[Table 7 here]

We find that how much you give on average in your last loan cycle does increase likelihood of borrowing again and we explore next if the timing of voluntary contributions made over the loan cycle is also important. For this, we introduce a dummy variable that takes on a value of 1 if a borrower makes larger voluntary contributions in the last quarter than the first quarter. We find that those who give larger amounts in the last quarter are more likely to borrow again. This can be attributable to both borrowers strategically timing voluntary contributions to have maximum impact for repeat borrowing and to the interest of borrowers in maintaining a relationship with the organization motivating them to give more.

For those borrowing in a group, we also explore if giving behaviour of others in the group matter. Keeping the same set of controls as in column 2, we replace individual monthly voluntary contributions made in the loan cycle by the average of those made by the rest of the group. We find that like individual voluntary contributions, it is also a positive indicator of borrowing again (in column 3). Higher voluntary contributions by others might also signal that group members are doing well financially and this then increases likelihood of wanting to borrow again.

5.2.2 Second time borrowers

Turning to the results for the sample of second time borrowers, those who borrow for a third time within 1 month of the expiry of their second loan are consistently more likely to make a voluntary contribution over their loan cycle as compared to the borrowers who do not (Figure 4). Also, the decline towards the end is much steeper for the non-repeater group of borrowers and that widens the gap between the likelihood of donating by the two groups (repeaters and non-repeaters). The amounts given also diverge much sooner as compared to for first time borrowers (Figure 3) and the gap widens as the loan maturity nears.

[Figure 4 here]

Estimates of equation 4 in table 8 for second time borrowers show very similar results to those obtained for first time borrowers. There is no statistically significant difference in the magnitude of the impact of average monthly donation between first and second time borrowers on likelihood of borrowing again[26]. It gives an indication of borrowers continuing to behave in a strategic manner after it paid off for their first loan cycle i.e. people borrowing a second time who go on to borrow again also tend to give larger amounts at the end of their loan as compared to at the start. Consistent with findings for first time borrowers, we find that voluntary contributions by the rest of the group members are also a positive predictor of likelihood of borrowing again.

[Table 8 here]

5.3 Voluntary contributions as a Signalling Mechanism

We find that voluntary contributions impact likelihood of borrowing again in addition to discipline displayed by borrower in the last loan cycle but do these voluntary contributions in fact predict superior borrower performance? This is important since identifying good quality borrowers in microfinance is considered to be a difficult and costly exercise. In the conventional model, it is common to rely just on the borrower discipline in a last loan cycle. To test if average voluntary contributions made by borrowers in the loan cycle relate to borrower performance in a subsequent loan cycle, we estimate the following specification:

$$Borrowerdiscipline_{il} = \alpha_i + \beta_i \mathbf{X}_i + \gamma_i averagedonation_{l-1} + \sum_{m=2}^{14} \theta_m + \varepsilon_{it} \qquad (5)$$

where $Borrowerdiscipline_{il}$ is measured by the proportion of months for which borrower i was ***not*** on time in making instalment payments in a loan cycle l. The coefficient of interest here is γ_i which captures whether voluntary contributions in the last loan cycle *(l-1)* predict borrower discipline in the subsequent loan cycle. $\mathbf{X}_{il}$

[26]The coefficient on the interaction of second time borrower dummy and average donations made is 0.000 with a p-value of 0.818 when Equation 4 is estimated for the combined sample of first and second time borrowers.

is a vector of controls for individual and loan characteristics of borrower i for loan l.

Since the dependent variable $Borrowerdiscipline_i$ is a proportion, it is restricted to a unit interval [0,1] and predicted values from OLS regression may not always lie between these values much like for binary data. Traditional alternative proposed is to use a logs-odds transformation but that leads to boundary values (0 and 1) to be dropped since no transformation is possible for them. Instead, we use a Generalized Linear Model (GLM) to estimate equation 5 with a logistic function where dependent variable in this case can by any value in [0,1], as proposed by Papke and Wooldridge (1996).

There are 3,939 borrowers who we observe over more than one complete loan cycle and the majority of these (70%) are first time loans. We find that the higher the average voluntary contributions made during the last loan cycle, the better the borrower discipline in the next loan cycle (see Table 9). This is robust to the inclusion of borrower discipline in the last loan cycle and so voluntary contributions do in fact provide additional information. Interestingly, when we limit the sample to previous loan being a individual liability loan, we find that voluntary contributions are insignificant (in column 4). Hence, it is only under strict joint liability that these voluntary contributions appear to be a useful tool. This might be due to discipline in this case not being solely determined by the borrower and so is not accurate representation of the financial situation of the borrower. Hence, voluntary contributions provide an extra layer of useful information whereas in the individual loan case, loan performance is highly visible.

[Table 9 here]

5.4 Gender Dynamics

We briefly explore the gender dynamics of giving since behaviour is quite different across the two groups. Men on average are less likely to give as compared to women but when they do give, the amounts are larger (see Table 5). Interestingly, while giving behaviour is different, we find that the average amounts given by the end of

the loan cycle are not significantly different[27].

The two groups may have varying degree of control over resources or have different motivations to give. Hence, we look at if in addition to the difference in behaviour in the likelihood of giving and how much they give, the two groups also differ in their pattern of giving over the loan cycle. We find that the behaviour, on average, is consistent across the two genders over the loan cycle - both are significantly less likely to give as loan ages (see Table 10). However, in terms of the amounts given, men tend to give significantly less at the start while the opposite is true for women.

To explore the variation in behaviour for an individual over his or her own loan cycle, we estimate the Hurdle Model (equation 2 and 3) using a fixed effects estimator. In the first stage, borrowers who make a voluntary contribution in all months of their loan cycle will not be part of the sample since there is no variation in the dependent variable of interest for them. Results in column (1) and (2) of Table 11 show that both genders are significantly more likely to make a voluntary contribution when they are not on time in making instalment payments as compared to when they were but the amounts given are significantly lower. While this is in contrast to the results from the specification without fixed effects in Table 10 where we were considering the average behaviour of the borrowers, the pattern of giving over the loan cycle is similar in both estimations.

[Table 10 here]

[Table 11 here]

5.5 Heterogeneity in Groups

Akhuwat does not impose any condition on the gender composition of groups and there are an almost equal number of all-male, all-female and mixed gender groups in the data. We briefly look a these by introducing group types with mixed gender group as the excluded category. There is no longer a significant difference in the behaviour of the two genders (see Table 12). Rather, it is being part of an all-male

[27]The contributions made result in a monthly average of Rs.44.40 for male borrowers and Rs.44.13 for female borrowers. The t-statistic for the mean difference between the average amounts given by male and female borrowers is 0.66.

group that then results in smaller voluntary contributions. Hence, men in mixed gender groups behave no differently to women in their likelihood to make a voluntary contribution. Of course, since group formation is endogenous, it is likely that these people self-select themselves into forming groups with others like themselves. When we consider the amount of contribution made, men tend to make larger voluntary contributions as compared to women (in column 3) but here the impact does not disappear when group characteristics are introduced and men in all-male groups give even larger amounts.

[Table 12 here]

6 Robustness Checks

Since the data used for analysis is obtained from the organization, it has limited information on borrower characteristics. Hence, our main result that higher the average voluntary contributions made in the last loan cycle, the more likely a borrower is to take out another loan may be driven by some omitted variables that we are not able to control for. For example, higher income levels may lead to larger voluntary contributions by people and this strong financial condition on its own may lead to greater chances of getting another loan. It is then the impact of this omitted variable that is being picked up by the amount of contributions made. Similarly, those with greater connections in the neighbourhood may for this reason make voluntary contributions more often. However, for the same reason, they may also form groups more easily and therefore are more likely to borrow again.

In order to address these alternate hypotheses, a survey was conducted with a sub-sample of these borrowers. Given budgetary and time constraints, we opted for a telephone survey through which we collected information from 1,350 borrowers. Basic information on individual characteristics as well as on household financial condition was collected through a telephone survey in August 2014. A random sample stratified by the branch, gender and loan cycle of the borrower was drawn to have a proportionate representation of the main 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 responding. The concern in this case was that we may over sample borrowers who had taken out a loan more recently since there would be a lesser likelihood of their number having changed. Hence, we made sure that replacement borrowers were from the same period The final sample after accounting for missing values is 1280 (summary statistics in Table 13).

[Table 13 here]

We estimate equation 4 for the combined sample of first and second time borrowers[28] controlling for age, education and marital status. In the first column in Table 14, we include borrower characteristics without introducing average monthly donations. To capture the financial condition of the household, we include a measure for dependency ratio in terms of the number of people dependent on those earning[29] and if the house the borrower lives in is their own. We collected information on the involvement of the borrower in any community organizations and a small number (15%) report being a part of it. We also consider the proportion of life individual has spent in the same area to proxy for social capital which may impact how connected the borrower is to the neighbourhood. Income is likely to be a noisy measure but we still collected information on it. Since come people refused to tell their income level, when we introduce monthly per capita income, the sample becomes slightly smaller (in column 2).

Nearly all borrower characteristics are insignificant in explaining likelihood of repeat borrowing. It might be that many of these characteristics are screened for by the organization when giving the first loan and so therefore are not important to subsequent borrowing. The important determinant is whether borrower experienced improvement in financial condition during the loan cycle and was disciplined in making instalment payments. Most importantly, average donation amount continues to be a strong significant predictor of repeat borrowing. Therefore, it was not merely a proxy for borrower characteristics that we are unable to control for.

[Table 14 here]

Finally, the size and frequency of voluntary contributions may be impacted by

[28] As discussed above, we found no significant difference in the average contributions made and likelihood of borrowing again between first and second time borrowers.

[29] Dependency ratio = (Total number of people number of working people)/no of people working.

degree of religiosity of a person since the organization is seen to conform to Islamic principles of prohibition of interest. Any direct questioning on obligatory religious practices may be offensive and unlikely to be answered honestly. Therefore, we asked if the individual performs any non-obligatory prayers (like *tahajud*) or fasts outside the month of Ramadan. This question was included in the second half of the surveying so we have limited observations on it. We introduce a dummy variable =1 if the borrower responded with a yes to this question in column 3 and do find that while it has a marginally significant impact, average contributions continue to be important.

7 Conclusion and Discussion

We analyse a model of interest free microcredit where the organization invites borrowers to make a voluntary contribution of whatever amount they can at the time of making instalment payment for the principal repayment each month. We find that borrowers are less likely to make a contribution as their loan matures. While for the overall sample there is no difference in the amount of contribution made, in the case of joint liability loans, even the amount of contribution made is significantly lower towards the end of the loan cycle. However, for those who go on to borrow again from the same organization, the amount of voluntary contributions towards the end of their loan cycle is actually higher. Karlan (2007) highlights how the promise of repeat lending as a repayment incentive is one of the important mechanism designs of microcredit today. It appears that borrowers are responding to this incentive and timing voluntary contributions to maximise the impact on the likelihood of being given a loan again.

As repeat loan applications are evaluated, the discipline displayed by the borrower in repaying the last loan cycle is very important. This is measured by the timeliness in making payments in the last loan cycle and we find that in addition to this discipline, the amount of voluntary contributions made in the last loan cycle also has a strong significant impact on the likelihood of borrowing again. We also find that larger the voluntary contribution given under a joint liability

loan, the more likely is a borrower to be disciplined in a subsequent loan cycle. Hence, these voluntary contributions can credibly act as an additional signalling mechanism to borrower discipline for the microfinance organization as they evaluate repeat borrowing applications

The findings of this study and the insights into borrower behaviour can be useful for the ongoing debate on alternate models of microfinance. Islamic Microfinance organizations can directly learn from the case of Akhuwat and for interest based organizations, this can point towards a possible combination of lower fixed interest charge with an extra payment that can be varied by the borrowers depending on their financial situation.

While there may be some external validity concerns[30] regarding the results, the advantage of the Akhuwat model is that the organization gets additional information from the borrowers as compared to a conventional model. In a conventional model, organizations are able to just observe behaviour of the borrowers as a binary outcome - whether they did or did not make the instalment payments on time while in this case, there is greater variation in the signal that they are receiving from the borrower. Further, in a conventional model, those on group loans under strict joint liability do not have any way to signal their individual quality. Since voluntary contributions are made as individuals even when principal repayment is to be made as a group every month, it provides these individuals with the option to signal their quality independently from that of the group. We do find evidence that borrowers in poorly performing groups are making larger voluntary contributions than individuals in groups doing well. In addition to its value as a signal, it can raise revenues for the organization without burdening those borrowers who are facing financial difficulty. Further research on the topic can explore the question of the sustainability of this model as well as how giving behaviour correlates with making an application for another loan and chances of its success.

[30]Our sample is drawn from a single large metropolitan city and therefore it raises questions about whether these results will be valid in other settings. The dynamics in smaller cities or rural areas might be different as would be if we are to use a similar model in a different culture and religion.

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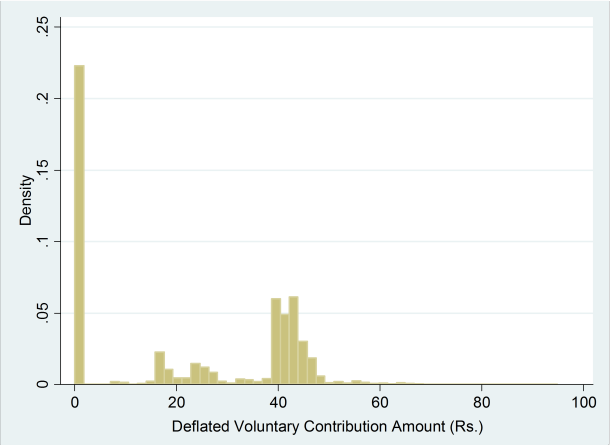
Figure 1: **Histogram of Monthly Voluntary Contributions**

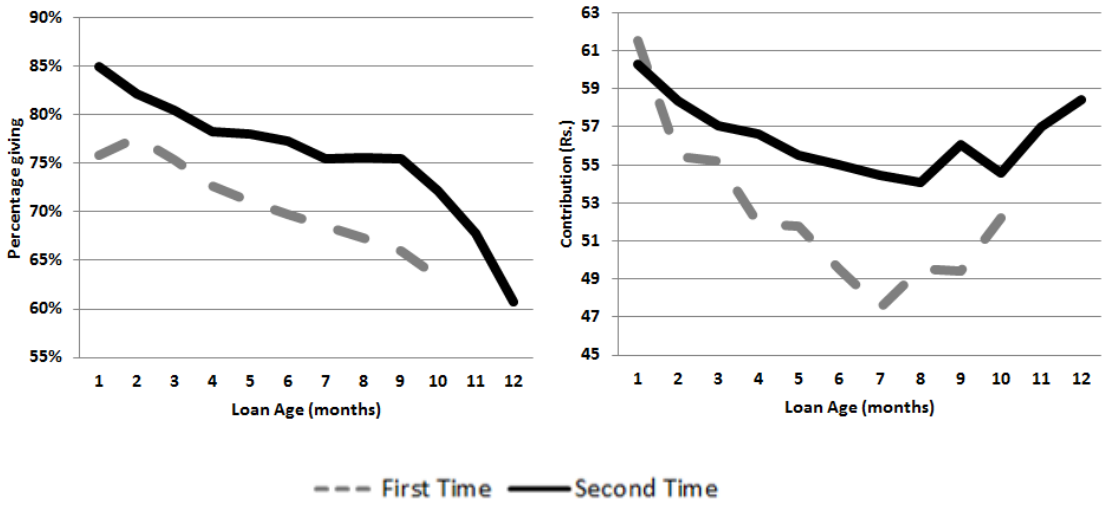


Note: The figure above is a plot of monthly voluntary contributions for the full sample.

Figure 2: **Voluntary Contribution Behaviour over the Loan Cycle**

(a) Likelihood of giving

(b) Average Amount Given



Note: The figure above is a plot of the likelihood of making a voluntary contribution and the average amount given over the loan cycle for borrowers on first and second loan cycles of duration 10 and 12 months respectively.

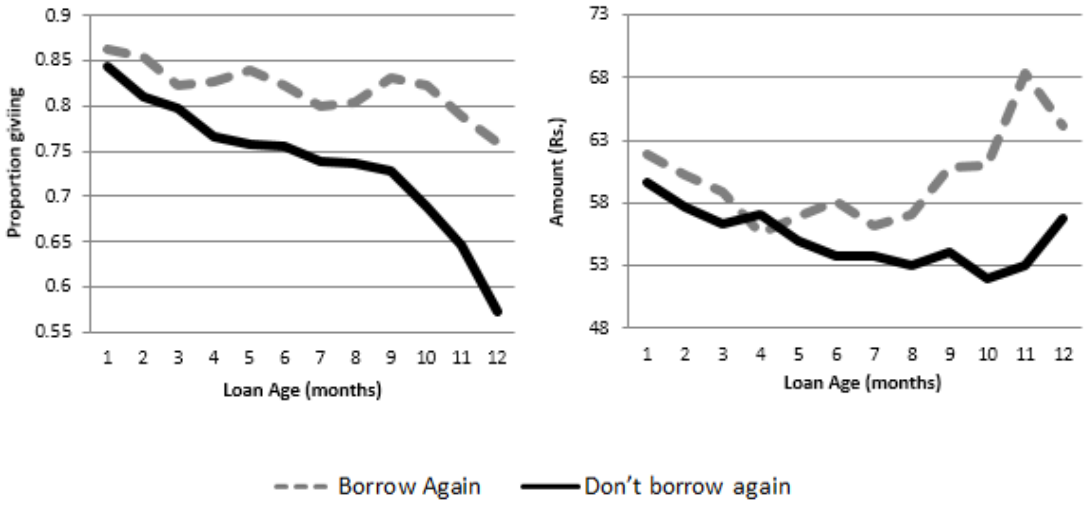
Figure 3: **Voluntary Contribution Behaviour - First Time Borrowers**

Note: The figure above is a plot of the likelihood of making a voluntary contribution and the average amount given over the loan cycle for first time borrowers on a loan of 10 month duration. Those who go on to take a second loan and those who don't are plotted separately.

Figure 4: **Voluntary Contribution Behaviour over the Loan cycle - Second Time Borrowers**

(a) Likelihood of giving

(b) Average Amount Given



Note: The figure above is a plot of the likelihood of making a voluntary contribution and the average amount given over the loan cycle for second time borrowers on a loan of 12 months duration. Those who go on to take a third loan and those who don't are plotted separately.

Table 1: **Distribution of loans by loan cycle**

Loan Cycle	No. of loans	Average Loan Period (months)	Average Loan Size (Rs.)
First	18,192	11.73	13,088
Second	5,454	13.12	16,345
Third or more	3,781	14.39	19,262

Note: The table above reports the summary statistics by loan cycle for the sample of 27,427 loans that we observe over a complete loan cycle.

Table 2: **Branch wise distribution of borrowers**

Name of Branch	No. of Loans	% of total	Male	Male (%)	Female	Female (%)
Green Town	2,611	10%	1,559	60%	1,052	40%
Samanabad	2,241	8%	1,254	56%	987	44%
Township	2,058	8%	1,325	64%	733	36%
Hall Road	1,435	5%	751	52%	684	48%
Mian Meer	2,056	8%	925	45%	1,131	55%
Badar Colony	1,961	7%	594	30%	1,367	70%
Walton	1,903	7%	491	26%	1,412	74%
Firdaus Market	1,663	6%	866	52%	797	48%
Shah Jamal	1,796	7%	1,064	59%	732	41%
Wassan pura	1,694	6%	1,045	62%	649	38%
Data Sahab	2,002	7%	1,247	62%	755	38%
Madhulal Hussain	2,751	10%	2,023	74%	728	26%
Daroghawala	2,164	8%	1,490	69%	674	31%
Nain Sukh	1,092	4%	444	41%	648	59%
Total	27,427		15,078	55%	12,349	45%

Note: The table above reports the gender wise distribution of 27,427 loans issued in the 14 branches that form the sample for study.

Table 3: **Summary Statistics - Voluntary contributions**

Loan Cycle	Proportion of months (%)	Average Contribution (Rs.)	Standard Deviation	Implicit Interest Rate (%)
First	66.79	39.60	68.28	4.51
Second	72.33	47.47	67.18	4.29
Three or more	71.43	52.84	85.81	4.11

Note: The table above reports the summary statistics for voluntary contributions made by borrowers over the loan cycle. It is based on 27,427 complete loans that form the sample for this study. 'Proportion of months' is the number of months the borrower makes a voluntary contribution out of the total number of months the loan is active.

Table 4: **Summary Statistics - Loan and borrower characteristics**

Variable	Obs	Mean	Std. Dev.	Min	Max
Loan Characteristics					
Loan Amount (Rs.)	27427	14586.63	5067.01	4000	1000000
Loan Duration (months)	27427	12.37	2.39	8	35
Loan Cycle	27427	1.58	1.05	1	9
Group Loan (=1)	27427	0.70	0.46	0	1
Borrower Characteristics					
Gender (Male=1)	27427	0.55	0.50	0	1
Age at borrowing	24504	39.55	10.13	18.15	78.63
Non-productive reason (=1)	27427	0.09	0.28	0	1

Note: The table above reports the summary statistics for the loan and borrower characteristics of the sample for this study.

Table 5: **Voluntary Contribution Behaviour - Full Sample**

	First stage: Decision to Give		Second Stage: Amount Given	
	(1)	(2)	(3)	(4)
First Quarter (=1)	0.028***	0.032***	0.009***	-0.003
	(0.002)	(0.002)	(0.003)	(0.003)
Last Quarter (=1)	-0.034***	-0.033***	-0.029***	-0.002
	(0.002)	(0.002)	(0.003)	(0.003)
Not on time at t-1(=1)	-0.147***	-0.110***	0.021***	0.004
	(0.004)	(0.004)	(0.007)	(0.006)
Individual and Loan characteristics:				
Male (=1)		-0.024***		0.037***
		(0.004)		(0.005)
Installment amount		0.017***		0.073***
		(0.001)		(0.002)
Personal loan (=1)		-0.015**		-0.046***
		(0.006)		(0.009)
Group (=1)		0.039***		-0.034***
		(0.005)		(0.008)
Age of branch		0.019***		-0.007
		(0.003)		(0.005)
Observations	314,291	314,291	215,686	215,686

Note: Dependent variable in Columns (1) and (2) is equal to one if borrower makes a voluntary contribution in that month and zero otherwise. Marginal effects are reported. In Columns (3) and (4) dependent variable is the log of the amount of voluntary contribution made. All regression are with branch fixed effects. Robust standard errors clustered by the borrower in parenthesis. $***p < 0.01, **p < 0.05, *p < 0.1$.

Table 6: **Voluntary Contribution Behaviour - Joint Liability Loans Only**

	First Stage: Decision to give		Second Stage: Amount Given	
	(1)	(2)	(3)	(4)
First Quarter (=1)	0.056***		-0.003	
	(0.002)		(0.003)	
Last Quarter (=1)	-0.032***		-0.007**	
	(0.002)		(0.003)	
Not on $time_{t-1}$	-0.152***	-0.032***	0.035***	-0.064***
	(0.005)	(0.008)	(0.008)	(0.015)
Not on time*loan age		-0.012***		0.022***
		(0.000)		(0.001)
Loan Age		-0.015***		-0.022***
		(0.000)		(0.000)
Observations	218,267	218,267	155,499	155,499

Note: Dependent variable in Columns (1) and (2) is equal to one if borrower makes a voluntary contribution in that month and zero otherwise. Marginal effects are reported. In Columns (3) and (4) dependent variable is the log of the amount of voluntary contribution made. All regression include controls for gender, reason for borrowing, loan size, age of branch and has branch fixed effects. Robust standard errors clustered by the borrower in parenthesis. $***p < 0.01, **p < 0.05, *p < 0.1$.

Table 7: **Voluntary Contributions and Repeat Borrowing (1st Time Borrowers)**

	(1)	(2)	(3)
Avg. Monthly Contribution	0.003***	0.003***	
	(0.000)	(0.000)	
Avg.Monthly Contribution by Group			0.001***
			(0.000)
Proportion of months not on time	-0.235***	-0.229***	-0.431***
	(0.015)	(0.015)	(0.023)
Greater contribution in last quarter		0.113***	
		(0.008)	
Observations	16,540	16,540	11,529

Note: Dependent variable is equal if a first time borrower takes out another loan; zero otherwise. Marginal effects reported. All regression include controls for gender, reason for borrowing, dummy for borrowers on joint liability loan and has branch fixed effects. Robust standard errors in parenthesis.$***p < 0.01, **p < 0.05, *p < 0.1$.

Table 8: **Voluntary Contributions and Repeat Borrowing (2nd Time Borrowers)**

	(1)	(2)	(3)
Avg. Monthly Contribution	0.003***	0.003***	
	(0.000)	(0.000)	
Avg.Monthly Contribution by Group			0.001***
			(0.000)
Proportion of months not on time	-0.246***	-0.246***	-0.458***
	(0.031)	(0.031)	(0.057)
Greater contribution in last quarter		0.123***	
		(0.015)	
Observations	5,035	5,035	3,416

Note: Dependent variable is equal if a second time borrower takes out another loan; zero otherwise. All regression include controls for gender, age, reason for borrowing, dummy for borrowers on joint liability loan and has branch fixed effects. Robust standard errors in parenthesis.$***p < 0.01, **p < 0.05, *p < 0.1$.

Table 9: **Impact of Voluntary Contributions and Borrower Discipline in the Next Loan Cycle**

	(1) Full Sample	(2) Full Sample	(3) Joint Liability	(4) Individual Liability
Average contributions$_{t-1}$	-0.0033***	-0.0033***	-0.0041**	-0.0026
	(0.001)	(0.001)	(0.002)	(0.002)
Borrower discipline$_{t-1}$		0.619***	0.769***	0.414***
		(0.08)	(0.10)	(0.134)
Observations	3,939	3,939	2,037	1,092

Note: Dependent variable is proportion of months borrower was on time in making installment payments. Column (1) and (2) are estimates using the full sample, Column (3) with sample restricted to borrowers for whom the last loan was on joint liability and Column (4) with sample restricted to borrowers for whom the last loan was individual liability. All regression include controls for gender,loan amount and number of previous loans of the borrower. Robust standard errors in parenthesis.$***p < 0.01, **p < 0.05, *p < 0.1$.

Table 10: **Voluntary Contribution behaviour by Gender - Pooled Estimates**

	First stage: Decision to Give		Second Stage: Amount Given	
	(1)	(2)	(3)	(4)
	Male Sample	Female Sample	Male Sample	Female Sample
First Quarter (=1)	0.023***	0.045***	-0.011***	0.005
	(0.003)	(0.002)	(0.004)	(0.004)
Last Quarter (=1)	-0.030***	-0.036***	0.005	-0.009**
	(0.003)	(0.003)	(0.004)	(0.004)
Not on $time_{t-1}$	-0.107***	-0.123***	0.002	0.011
	(0.005)	(0.006)	(0.009)	(0.009)
Observations	175,071	139,220	114,997	100,689

Note: Dependent variable in Columns (1) and (2) is equal to one if borrower makes a voluntary contribution in that month and zero otherwise; marginal effects are reported. In Columns (3) and (4) ddependent variable is the log of the amount of voluntary contribution made. All regression include controls for loan size, reason for borrowing, dummy for borrowers on joint liability loan, age of branch and has branch fixed effects. Robust standard errors clustered by the borrower in parenthesis. $***p < 0.01, **p < 0.05, *p < 0.1$

Table 11: **Voluntary Contribution Behaviour by Gender - Fixed Effects Estimates**

	First stage: Decision to Give		Second Stage: Amount Given	
	(1)	(2)	(3)	(4)
	Male Sample	Female Sample	Male Sample	Female Sample
First Quarter (=1)	0.311***	0.453***	-0.020***	0.005
	(0.016)	(0.019)	(0.003)	(0.004)
Last Quarter (=1)	-0.436***	-0.479***	-0.028***	-0.039***
	(0.015)	(0.017)	(0.003)	(0.004)
Not on $time_{t-1}$	0.493***	0.438***	-0.089***	-0.047***
	(0.021)	(0.026)	(0.006)	(0.007)
Observations	144,195	104,655	114,997	100,689

Note: Dependent variable in Columns (1) and (2) is equal to one if borrower makes a voluntary contribution in that month and zero otherwise; marginal effects are reported. In Columns (3) and (4) dependent variable is the log of the amount of voluntary contribution made. Robust standard errors clustered by the borrower in parenthesis. $***p < 0.01, **p < 0.05, *p < 0.1$

Table 12: **Heterogeneity in Groups and Voluntary Contribution Behaviour**

	First stage: Decision to Give		Second Stage: Amount Given	
	(1)	(2)	(3)	(4)
Male (=1)	-0.032***	-0.008	0.041***	0.024**
	(0.004)	(0.006)	(0.006)	(0.010)
All Female Group (=1)		0.010*		-0.004
		(0.006)		(0.008)
All Male Group (=1)		-0.029***		0.013
		(0.006)		(0.009)
Observations	218,267	218,267	155,499	155,499

Note: Dependent variable in Columns (1) and (2) is equal to one if borrower makes a voluntary contribution in that month and zero otherwise; marginal effects are reported. In Columns (3) and (4) dependent variable is the amount of voluntary contribution made. All regression include control for reason for borrowing, installment amount, group size and has branch fixed effects. Robust standard errors clustered by the borrower in parenthesis. $***p < 0.01, **p < 0.05, *p < 0.1$

Table 13: **Summary Statistics - Survey Data**

Variable	Obs	Mean	Std. Dev.	Min	Max
Age	1280	38.66	9.29	18	73
Education	1280	5.87	4.49	0	16
Married (=1)	1280	0.90	0.29	0	1
Proportion of years lived in the area	1280	0.55	0.33	0	1
Own house (=1)	1280	0.75	0.43	0	1
Part of an organization (=1)	1280	0.16	0.36	0	1
Income	1227	22947.43	11417.82	1000	150000
Dependency Ratio	1280	2.87	2.03	0	29
Condition improved (=1)	1280	0.84	0.37	0	1
Extra religious rituals	976	0.33	0.47	0	1

Note: Table above reports the summary statistics for the sub-sample of borrowers that were surveyed.

Table 14: **Repeat Borrowing and Voluntary Contributions with Additional Borrower Characteristics**

	(1)	(2)	(3)
Age	-0.001	-0.002	-0.002
	(0.002)	(0.002)	(0.002)
Education	0.00318	0.00410	0.00398
	(0.003)	(0.003)	(0.003)
Married	0.069	0.063	0.035
	(0.0479)	(0.0494)	(0.0575)
Proportion of years lived	-0.0294	-0.016	-0.077
	(0.045)	(0.047)	(0.052)
Own house (=1)	0.00555	0.0141	-0.0106
	(0.034)	(0.035)	(0.038)
Part of comm org (=1)	-0.0145	-0.020	-0.034
	(0.038)	(0.039)	(0.042)
Monthly per capita income		-0.001	
		(0.001)	
Extra religious rituals			0.058*
			(0.0344)
Dependency Ratio	-0.005	-0.006	-0.004
	(0.008)	(0.008)	(0.009)
Financial condition improved (=1)	0.062*	0.067*	0.057
	(0.037)	(0.038)	(0.041)
Proportion not on time	-0.446***	-0.358***	-0.537***
	(0.107)	(0.108)	(0.142)
Average monthly donation		0.0021***	0.002***
		(0.001)	(0.001)
Observations	1,276	1,217	968

Note: In the table above the dependent variable =1 if borrowers takes out another loan and 0 otherwise. It is based on the sub-sample of first and second time borrowers that were surveyed. Monthly per capita income is scaled by 1000. Robust standard errors in parenthesis. $***p < 0.01, **p < 0.05, *p < 0.1$

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