Building Social Capital through Microfinance

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Abstract

We exploit experimental variation in the frequency of repayment meetings across first time micro-finance borrower groups to show that repeat interaction among group members builds social capital and improves their financial outcomes. We measure social capital using a lottery which we designed to elicit social preferences in a field setting. Lottery participants who belonged to groups which met more frequently exhibited greater cooperation when offered the choice of adding other group members to the lottery. We provide evidence that this reflects higher expectations of reciprocal behavior. In parallel with this, we also find that clients who met more frequently were less likely to default in subsequent loan cycles.

JEL: C81,C93, O12, O16

1 Introduction

Putnam (1993) famously defined social capital as "features of social organization, such as trust, norms and networks, that can improve the efficiency of society by facilitating coordinated actions". A growing body of research has since documented its importance for economic outcomes.[1] These research findings suggest that building social capital can enable significant gains from trade and protection from financial shocks, especially in poor countries with weak institutions for contract enforcement. For this reason, many development assistance programs actively promote group participation. But can simply inducing people to interact more often build social capital?

To address this question, we focus on a flagship development program that emphasizes group interaction – microfinance – and show that an important but widely ignored externality is the rapid construction of social capital. In the most common "Grameen Bank"-style microfinance program, clients repay loans in frequent installments in a group setting. In addition to facilitating debt collection by loan officers, these meetings provide clients with new opportunities for repeat interactions with members of their communities.[2] We combine a field experiment in which we vary the degree of mandatory interaction between microfinance group members with an innovative experimental measure of economic cooperation to show that frequent repayment meetings build trust and encourage informal sharing arrangements among group members. This, in turn, is reflected in lower default rates on subsequent loans.

The idea that repeated interactions can facilitate cooperation in limited commitment environments has a long-standing theoretical foundation in the repeated games and network theory

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[1]For instance, Knack and Keefer (1997) use cross-country data to show that a society's level of trust correlates positively with its rate of growth, while Guiso et al. (2004) use micro-data to demonstrate that Italians living in high social capital regions engage in more sophisticated financial transactions.Also see Carter and Castillo (2003); Grootaert (2002); Krishna (2001); Temple and Johnson (1998).

[2]An anthropological study of Grameen Bank clients describes these opportunities as including "walking across the village to attend the center meeting, sitting in conversation with a diverse set of women, handling money for the group and receiving personal address" (Larance, 2001).

literatures (e.g. Kreps et al., 1982; Karlan et al., 2009).However, rigorous empirical evidence remains scarce, largely due to the notorious difficulty posed by the endogeneity of social ties (Manski, 1993, 2000). In particular, if more cooperative individuals are also more willing to engage in social interactions then it is near impossible to validate the basic economic model of returns to repeat interactions without randomly varying social distance.

This paper undertakes this exercise, providing the first experimental evidence on the economic returns to short-run differences in repeat interaction. We generated exogenous variation in the frequency of interactions by randomizing whether client groups of a leading microfinance institution in urban India met once per week (now on, weekly groups) or once per month (monthly groups) over their ten month loan cycle. This mandated difference in meeting frequency led to stark differences in individuals' knowledge of and social interactions with other group members in a short period of time: After five months, clients in weekly groups were 90% more likely to know group members' families (by name) and to have visited them in their homes, and were 16% more likely to know about social activities at another group member's house. Moreover, these differences are persistent: More than one year later weekly clients were twice as likely to attend social events together.

To evaluate the economic returns to such interactions, we conducted a second field experiment one year after the loan cycle was completed. This experiment, which built on the standard dictator game, elicited clients' willingness to cooperate and thereby risk share with other group members in a lottery. The lottery was designed as a natural field experiment, so that clients were not conscious of participating in an experiment. Specifically, clients entered a lottery in which they had a 1 in 11 chance of winning a Rs. 200 ($5) promotional coupon redeemable in a retail store. Each client was offered the opportunity to enter any number of her group members into the same lottery. Doing so, increased her expected individual payoff if and only if group members could be expected to share proceeds from the lottery. Since contractual pre-commitment is not possible, potential gains from trade exist only if group members can be trusted to cooperate.[3] The underlying random variation in

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[3]Therefore, an individual's willingness to enter group members into the lottery arguably captures the "resource potential" of her personal network, one common definition of social capital (Sampson et al., 1999)

social distance among group members (arising from our initial experiment) allows us to isolate the causal influence of interaction on cooperative behavior: Relative to clients who met on a monthly basis, clients who met weekly were 30% more likely to enter a group member into the lottery.

Our lottery design also allows us to disentangle two motivations for increased sharing in weekly groups: altruism versus trust and reciprocity. We randomly varied the lottery prize across clients, such that a participant either received the chance to win one large voucher or four smaller vouchers (of equal total value). By doing so, we varied a group member's perceived ability to share earnings with the participant. We observe a significant increase in giving only for the more easily divisible four voucher option indicating that more frequent interaction enhances trust and not only altruism.[4] Survey data are consistent with the experimental findings: Weekly clients were 25% more likely to say that they would help one another in the event of a health emergency.

Existing theories of repeated games suggest multiple reasons for why a higher frequency of interactions may increase reciprocal behavior. First, if more frequent meetings increase opportunities to engage in reciprocal behavior, then a higher meeting frequency is equivalent to increasing members' discount factor and, therefore, the sustainability of reciprocal behavior in equilibrium. Consistent with this, we show that more frequent meetings predominantly improves the cooperative behavior of more impatient members (as measured in baseline data). Second, if clients lack information on other members' actions or types, then more frequent meeting may enhance cooperation by improving information flows. Specifically, if member actions are imperfectly observed, then the sustainability of a cooperative equilibrium will increase with the available (distinct) public signals regarding member actions. More frequent meetings are likely to increase the number of such signals. On the other hand, if members' type (level of impatience, trustworthiness etc.) is unknown, then more frequent meeting may improve client's ability to identify who she would like to risk share with.

Our experimental set-up allows us to evaluate the relative importance of information about

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[4]Our finding is consistent with laboratory experiments, which reject that sending behavior in trust games reflects pure altruism (Carter and Castillo, 2003; Gneezy et al., 2000; Do et al., 2009), and supports the theoretical idea that network-based trust can be used as social collateral to facilitate informal borrowing (Karlan et al., 2009).

member type versus member actions in sustaining cooperation. At the time of conducting the lottery, a subset of participants had entered a new loan cycle in which they were re-randomized into weekly or monthly repayment schedules. The fact that a client's new group, typically, shared a majority of members with her first loan group provides us with experimental variation in the frequency of mandatory meetings at two points: Once when clients are new to each other and once they have been interacting regularly for over a year and appear to know one another well. Relative to clients required to interact at a high frequency only in the beginning, those randomly assigned to a high frequency meeting schedule in both loan cycles give significantly more tickets. We interpret this as evidence that increased opportunities to interact increase cooperative behavior by improving the monitoring technology available to clients.

A central innovation of microfinance is to exploit social capital within communities in order to increase the viability of lending to the poor (Besley and Coate, 1995). Our lottery results suggest that, by requiring frequent repayment in a group setting, microfinance can also cause a persistent and economically meaningful expansion of social capital. Using transactions data on the loan repayment history of our client base, we show that improvements in social capital have important implications for client default in the medium run: First-time clients who were randomly assigned to interact more regularly were significantly less likely to default in their next loan cycle. This finding suggests that the basic microfinance lending model may reduce default risk through channels other than group liability, and provides a rationale for the current policy trend among MFIs of maintaining repayment in groups despite the transition from group to individual liability contracts (Karlan and Gine, 2009).

The rest of this paper is structured as follows. Section 2 discusses theoretical links between meeting frequency and cooperative behavior and the related empirical literature. Section 3 describes our study setting, the repayment frequency experiment and its impact on client interactions. Section 4 provides lottery results on how repeat interactions influences cooperation. Section 5 examines impact of meeting frequency on default. Section 6 discusses alternative channels (other than increased interactions) for why meeting frequency may influence cooperation, and Section 7 concludes.

2 Background

A key opportunity for repeat interactions among micro-finance group members are the group repayment meetings. Our empirical analysis examines whether increasing meeting frequency from once a month to once a week improves members ability to engage in pairwise cooperation. Here, we use insights from the theory of repeated games to motivate our analysis and identify relevant predictions. We then describe the related empirical literature that our analysis builds on.

2.1 Analytical Framework

Consider a microfinance group which consists of n risk averse members, indexed by $i = 1, .., n$. Meetings occur at moments in time $t = 0, \Delta, 2\Delta...$ At time t each member independently chooses effort level $a_i^t = 1$ or $a_i^t = 0$ (i.e. exert effort or shirk). Positive effort incurs a cost c. If members $i = 1, 2$ have entered a pairwise insurance arrangement, then at the meeting they observe and share the output accruing to them.[5] Member i's payoff in period t is given by the stage game payoff function $g_i(a_1, a_2)$. Members discount time continuously at rate r; as a period is of length Δ, the effective discount rate is $\delta = e^{-r\Delta}$. The repeated game payoff is given by

$$\Pi_i = \sum_{t=0,\Delta,2\Delta,..}^{\infty} g_i(a^t)\delta^t$$

induced by the profile of actions a^t for every $t = 0, \Delta, 2\Delta$.

We start with the case where members observe both actions and output (i.e perfect monitoring). The set of equilibrium outcomes is characterized by the well known folk theorem (see, for example, Fudenberg and Maskin (1986)) which states that any mutually beneficial outcome can be achieved as long as members discount factor is close to one. Here, a higher meeting frequency is equivalent to reducing Δ and, thereby, increasing the effective discount rate δ. This gives us

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[5]Since one member may have entered multiple pairwise arrangements we do not put too much structure on the exact division rules.

Prediction 1 *With perfect monitoring, a higher meeting frequency increases the likelihood of cooperation. The effect is more pronounced for impatient members, i.e. those with a higher r.*

Next, we consider the implications of higher meeting frequency when member i lacks perfect information about either her potential partner's patience (i.e. the r parameter) or actions. For a given Δ, cooperation is more likely to be sustained with a member with lower r. More frequent meeting can improve the scope of cooperation if it facilitates learning about member's r (for instance, if observing a member's repayment behavior and interacting with her at higher frequency reveals more precise information about her r). It is reasonable to assume that returns to such learning, and, therefore, to more frequent meetings diminishes across loan cycles.

If, instead, a member lacks information about other members actions then the implications of meeting at a higher frequency for cooperative behavior are more nuanced. Assume that information about the evolution of output arrives continuously but is publicly observed during the meeting at time t. The effect of reducing Δ and, therefore, increasing the frequency at which information arrives on cooperation will depend on whether higher frequency signals increases or reduces the reliability of information extracted from the public signals (Abreu et al., 1991; Fudenberg and Levine, 2009). In recent work, Osorio-Costa (2009) identifies sufficient conditions for higher frequency of monitoring to improve signal precision (specifically, if two different actions of player i have associated different initial conditions that can be statistically distinguished and public signals are Brownian and continuously available). The authors argue that this is, for instance, likely to be the case when the variable that is the object of monitoring is physical activity of the worker for which information is continually available. More generally,

Prediction 2 *If the informativeness of public signals increases with monitoring, then members who meet more frequently in every loan cycle will sustain the highest cooperation.*

In contrast, if the main informational constraint is knowledge about types then the importance of frequency of meeting in maintaining cooperation is likely to decline across loan cycles. Equally, if more frequent meeting does not the increase informativeness of public signal then more frequent meeting may not increase cooperation.

Taken together, the above discussion also implies

Prediction 3 *If monitoring is either perfect or improves the informativeness of public signals then higher meeting frequency will reduce loan default.*

This prediction follows from the fact that (in the situations identified) clients in micro-finance groups that interact more regularly will have access to better informal insurance arrangements.

This repeated game framework provides predictions on when meeting at a higher frequency can allow selfish economic agents to sustain cooperation by the use of self enforcing punishment strategies. An alternative view is that more frequent interactions directly changes client motivations, specifically it enhances a client's other regarding preferences. That is, higher meeting frequency may encourage informal sharing arrangements simply by increasing member i's directed altruism towards her group members. Our empirical analysis will directly test whether, over and above any such altruism effect, repeat interactions matter because they allow agents to put greater weight on future incentives (relative to current). Our test will, in effect, reduce member i's perception of the cost of effort c faced by other members.

Prediction 4 *For a given meeting frequency, lower perceived effort cost for member j will increase the likelihood of member i sharing with her only if (atleast some of) member i's motivation is selfish.*

2.2   Related Literature

Our empirical analysis examines the role of repeat interactions in sustaining cooperation; in doing so it bridges two parallel but relatively unconnected literatures on the returns to social interaction.[6] First, multiple papers examine the relationship between survey measures of trust or civic engagement and miscellaneous personal and community characteristics, such as race and income heterogeneity (Costa and Kahn, 2003; Alesina and Ferrara, 2002), home ownership (DiPasquale and Glaeser, 1999), industrialization (Miguel et al., 2005) and media access (Olken, 2009). The general pattern

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[6]An important exception is Glaeser et al. (2000) who explicitly link the two literatures by analyzing individual determinants of social capital as measured by survey and experimentally-generated trust measures.

of findings is that community characteristics that imply more frequent interaction among individuals are associated with greater trust and civic engagement. However, these studies are largely unable to isolate the social interaction channel from other channels through which community characteristics may influence attitudes and beliefs. A second shortcoming is the reliance on survey-generated measures of trust, which are often inconsistent with incentivized trust measures (Glaeser et al., 2000).

A more recent literature explores returns to social interaction using experimental trust measures generated from laboratory games, which are considered more reliable indicators of cooperative behavior (e.g. Glaeser et al., 2000; Carter and Castillo, 2004; Karlan, 2005; Ligon and Schecter, 2008). These papers typically use some variant of the dictator or trust games (Forsythe et al., 1994; Berg et al., 1995). In the dictator game the experimenter asks an individual (sender) to divide a fixed amount of money between herself and another individual (receiver). In the trust game, the money transfer is typically tripled by the experimenter and the receiver is explicitly asked how much she wishes to send back to the sender. Variations of these games are used to parse out motives for giving. Perhaps closest to our approach is Gneezy et al. (2000), who use a sequence of trust games with varying constraints on the amount that can be repaid in the second round to show that individuals contribute more when large repayments are feasible. In a series of experiments with Harvard undergraduates, Do et al. (2009) distinguish altruistic giving from reciprocity by varying the condition of anonymity. Since giving to friends increases when sender's identity is made known to the receiver, they conclude that reciprocity underlies generosity to friends. In a related field experiment in Paraguay, Ligon and Schecter (2008) evaluate four motives for giving to others - benevolence, altruism, sanctions, and reciprocity - by varying information and anonymity in a standard dictator game, and find evidence of all four.[7]

While greater cooperation among friends is consistent with a model of economically gainful social interaction, pro-social behavior could, in theory, decrease with social distance simply because

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[7]Lab experiments that randomly vary continuation probabilities in repeated games also provide evidence on incentives to cooperate – e.g. Dal Bo (2005) shows higher cooperation in infinitely repeated laboratory games.

more cooperative individuals have more close friends. To the best of our knowledge, ours is the first study which addresses this concern by experimentally manipulating social interaction in a field setting and then examining its causal effect on cooperative behavior.[8] Unlike previous work, experimental estimates of the returns to social interactions are free from concerns of reverse causality and omitted variable bias.[9]

Another advantage over previous work is that our lottery provides a "natural field experiment" for eliciting social preferences. In contrast, all the above studies are "framed" or "artefactual" field experiments, in which subjects know that they are experiment participants whose behavior will be recorded and scrutinized. In a recent overview of this literature, Levitt and List (2009) suggest that the facts that individuals' pro-social behavior in framed experiments is likely to depend on the nature and degree of others' scrutiny, the context in which a decision is embedded and the selection of participants, can significantly limit the generalizability of these results.

3 Repayment Frequency and Client Interactions

3.1 Institutional Background

Our partner MFI 'Village Welfare Society' (VWS) started operations in the Indian state of West Bengal in 1982. At the start of our field experiments, VWS had eighteen branches and roughly 6.75 million dollars in outstanding loans to over 56,000 clients.

The VWS client base reflects typical micro-finance practices: it targets women with household income below two dollars a day. Most clients work in the informal sector – over 70% of households in our sample own a micro-enterprise –, face frequent health and income shocks, and report limited

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[8]Our approach is similar to peer effects studies that exploit random variation in living arrangements to examine how social interactions influence attitudes and behavior (Sacerdote, 2001; Kremer and Levy, 2008; **?**). We compliment these studies by examining how the frequency of interaction influences cooperation.

[9]In a similar spirit, Humphreys et al. (2009) randomize community development programs and show that they encourage prosocial behavior. However, they cannot evaluate the importance of social interactions per se.

access to financial services and formal insurance. In our baseline survey close to 30% reported significant health shocks in the twelve months prior to taking out a loan and less than a third had a savings account or formal insurance.

In creating loan groups, clients in a single neighborhood are trained in loan procedures and formed into a group with one member chosen as group leader (see Appendix for further details). The neighborhood-based approach that characterizes group lending implies that group members are typically acquainted with each other prior to joining a loan group. In our sample, 42% of clients knew their group members before joining the group, and at the first group meeting, 35% reported either having visited all their group members or having been visited by them in their homes.

After the loan is disbursed, the loan officer conducts weekly repayment meetings in the group leader's house. The first two weeks are for group nurturing and training. Loan repayment starts in the third week. During each meeting, which roughly lasts for half an hour, clients take an oath (in which they promise to repay regularly and observe joint liability: See Appendix) after which the loan officer collects payment from each member and marks passbooks. A client's repayment behavior is observable to other group members; although, in practice most clients socialize while awaiting their turn. The loan officer may also take the opportunity to discuss new initiatives or procedural changes at the bank, or answer questions from clients.

At any point after twenty weeks, clients can repay the remaining balance in a single installment. In our sample the median weekly VWS group met 37 times during a single loan cycle.[10]

3.2 Experimental Design

We randomized repayment meeting frequency across one hundred first-time borrower groups formed between April and September 2006. Loan officers aimed to form ten-member groups; in practice, group size ranged between eight and thirteen members, with 77% of the groups consisting of ten

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[10]If unable to make it to a meeting, then a client can repay at a branch. This occurred very rarely. However, once a majority of clients in a group have repaid their loan, VWS asks remaining clients to repay at the branch.

members. Each client received a Rs. 4000 (~$100) loan.

After finalizing group membership and loan terms (but before loan disbursal), we randomly assigned thirty groups to the standard weekly repayment schedule and seventy groups to a monthly repayment schedule.[11] No clients dropped out after their repayment schedule was announced.

Clients repaid their loans through 44 weekly installments of Rs. 100 if they were on the weekly repayment schedule (starting two weeks after loan disbursal) and eleven Rs. 400 installments if they were on a monthly repayment schedule (starting the second month after loan disbursal).

We administered a baseline survey to 99% of clients as soon as group formation was completed. In Table 1 we use these data to provide a randomization check, controlling for sampling strata. While group composition is endogenous, Panel A shows that monthly and weekly groups have similar characteristics on average. Panel B provides a client-level randomization check. Two covariates differ: First, none of the weekly clients but 7% of the monthly clients are Muslim. Second, monthly clients have lived in their current neighborhoods for slightly longer.[12] However, they were not more likely to know each other before joining the group (Panel C). Throughout we report regressions with the set of controls listed in Table 1, and discuss any cases where our results are sensitive to the inclusion of controls. We have also verified that our results are robust to excluding groups with Muslim clients.

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[11]We originally intended to have two monthly repayment treatment arms: One that met weekly and one that met monthly. In practice, weekly meetings among clients required to repay monthly broke down almost immediately, and clients ended up meeting on a monthly basis for most of their loan cycle. On average the weekly-monthly and monthly-monthly groups ended up meeting 10.13 and 10 times.

[12]Theoretically, the direction of bias, if any, is unclear. Those who have lived in the neighborhood longer may have better access to insurance arrangements and less likely to form new networks. On the other hand, these clients may have better information channels and therefore be more willing to enter such arrangements.

3.3 Effect of Meeting Frequency on Social Interactions

To gauge whether meeting frequency influenced clients' social networks, we examine its impact on clients' social interactions outside of meetings. To measure such interactions, at the end of each meeting loan officers asked every client four questions on her knowledge of and interactions outside of meetings with other group members. Since data were collected in a relatively public setting, clients were asked to aggregate their interactions across group members (so as to maintain a degree of anonymity).

Each client was asked whether all group members had visited her in her house, and whether she had visited all other group members in their homes. For both outcomes, we construct an indicator variable that equals one if the client responded in the affirmative at any group meeting. Since repayment meetings always occur at the group leaders' house, these two (highly correlated) outcomes capture the breadth of client interactions outside of these meetings. A second set of measures capture clients' knowledge of her group members. Each client was asked if she knew the names of her fellow group members' husbands and children and whether any of her group members had relatives visit in the last thirty days. For the first measure, we again construct an indicator variable that equals one if the client responded in the affirmative at any group meeting. For the second, we average across all responses for a client. To avoid inferences based on selected outcomes, we also report effects for a "Social Interactions Index" which averages across these four outcomes (?).[13]

While clients often repay early, no client repaid her loan before the sixth month. Hence, we restrict analysis to data from the first five months of the loan cycle.[14] To balance the number of observations per client across weekly and monthly clients, we randomly chose one meeting observation per month for weekly clients.

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[13]The index is the equally weighted average of the four variables, with each variable normalized by subtracting the mean for monthly clients and dividing by the standard deviation for these clients.

[14]Due to delays in starting the survey 1.9% of clients (20 clients) lack eight weeks of data, 4.8%(49 clients) lack data for 6 weeks and 7.8% (80 clients) lack four weeks of data.

Figure 1 shows that the fraction of clients who visited all group members in their homes rose sharply in the first month, and then continued to increase gradually over the next five months (we observe very similar patterns for the fraction of clients visited by all group members, and who knew the names of family members of other group clients). The fraction of clients who knew whether their group members had been visited by relatives increased steadily from 2% to 10%. This suggests a "dose response" to mandatory meetings which, in turn, would imply that weekly groups should end up with higher levels of social interaction. To examine this in a regression framework we aggregate the social interaction data to the group level, (since client responses may be influenced by being asked in a group setting). For group g we estimate:

$$y_g = \beta_1 W_g + X_g \gamma_1 + \alpha_g + \phi_g + \epsilon_g \qquad (1)$$

where W_g is an indicator variable for whether the group met on a weekly schedule, ϕ_g is a month of group formation dummy, α_g is a loan officer fixed effect, X_g is the set of group-level controls (all regressions are robust to excluding these controls).

The results are in Table 2. In column (1) we see that over the first five months of the loan cycle, weekly clients met roughly thrice as often as the monthly clients. Column (2) shows that this was accompanied by a significant difference in social interactions. Moving from monthly to weekly repayment leads to a four standard deviation increase in social interactions. Columns (3)-(6) show the differences for each of the index components, where for ease of interpretation we consider the non-normalized group outcomes. In each case, the magnitude of the effect is strikingly large. On average, only 10% of monthly clients report visiting or being visited by their group members, while the corresponding number for weekly clients is close to 100% (columns (3) and (4)). In column (5) we observe a similar sized disparity for whether, on average, the client knows the names of her group members' husband and children. In column (6) we see that only 0.3% of monthly clients but 11% of weekly clients know whether their group members were visited by relatives. These patterns are almost identical when measured at the client level and for the lottery sub-sample (not shown).

3.4 Long Run Interactions and Trust

To test whether changes in social capital persisted beyond the experiment, we visited a random sample of 432 clients more than one year after they had repaid their loan. These clients entered the lottery experiment (the sampling strategy is described in Section 4.1) and subsequently completed a survey. The survey was conducted in the privacy of the client's home and collected data on her perceptions of the trustworthiness of their previous (first loan cycle) group members and current interactions with these members.

Column (1) of Table 3 examines a client's perception of her average group member's trustworthiness. Our regression specification is the individual level equivalent of equation (1). More than one year after repaying the loan and relative to their monthly counterparts, those who were on a weekly schedule rank average group member trustworthiness 0.23 points higher.[15]

In columns (2)-(7) we examine client's trust of, and interactions with, each of her group members. On average, we have nine observations per client, giving us a total of 4020 observations. For client i in group g reporting on interaction with member m we estimate

$$y_{gmi} = \beta_1 W_g + X_g \gamma_1 + X_{im} \gamma_2 + X_i \gamma_3 + \delta_1 D_g + \phi_g + \alpha_g + \epsilon_{gmi} \tag{2}$$

with variables defined as in equation (1). We include a control for number of days between loan disbursement and survey (D_g). Our additional controls are defined at the group-, pair- and individual-level (X_g, X_{im} and X_i respectively) and are listed in Table 1. We also control for being the group leader, and cluster standard errors at the group-level.

In column (2) the outcome variable is the client's responses to a hypothetical question on whether she believes that a particular group member would help her in the event of illness. Weekly

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[15] The client was described the following scenario: "Imagine a person walking down the street sees someone in front of him/her drop their wallet. Upon inspection, she finds that the wallet contains Rs 200 and the owner's name and phone number. The finder must decide whether to keep it or return it to its owner." She was asked to rank the likelihood that the finder would return the wallet if she was her average group member on a 1-5 scale described as follows: "1-Would not return the money. 2- Unless someone knows she has got the wallet, would not return it. 3-As likely to return as not. 4- Will return, but might take up to a week. 5- Will return immediately."

clients are 5 percentage points more likely to report that a fellow group member would provide assistance in such an emergency (this result is relatively noisy in that it is statistically insignificant without controls).

Columns (3)-(7) consider the long run social interaction measures analogous to the short-run measures in Table 2. If a client and her group member were both surveyed, then we randomly keep one observation. This gives us 3136 pairwise observations. More than a year after clients graduated from their first loan cycle, those who were in weekly groups remain significantly more likely to interact than their monthly counterparts. Moving from a monthly to weekly schedule leads to a significant 0.12 standard deviation increase in social interaction between a client and another group member (column 3). This effect is similar in magnitude but statistically insignificant without controls.

In columns (4)-(7) we examine each (non-normalized) component of the index. Two measures are comparable to the group meeting questions asked during the loan cycle – the number of times over the last thirty days the client had visited the group member in her house and been visited by her. We also asked whether the client still talks to the group member about family and whether they celebrated the main Bengali festival (Durga Puja) together.[16] Across all measures we observe greater social interactions among weekly clients relative to monthly clients, although the individual estimates are also relatively noisy. Overall, these results suggest that, while client interactions diminished after mandatory meetings ended, higher levels of trust and friendship among weekly clients persisted long after their loan cycle ended.

4   Do Repeat Interactions Increase Cooperation?

To measure cooperative behavior between group members we conducted a second field experiment in the form of a lottery more than a year after clients completed their first loan cycle (average

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[16]The last social capital measure was determined after numerous focus groups in which we asked clients the most important events for socializing in the community.

final repayment and survey dates were April 2007 and July 2008, respectively). Our lottery was designed, after extensive piloting, to elicit willingness to form risk-sharing arrangements in a field setting. We first describe the protocol and then the results.

4.1 Lottery Experiment: Protocol

Surveyors approached each selected client in her house and invited her to enter a promotional lottery for the new VWS retail store.[17] The lottery prize was 200 Rupees of gift vouchers redeemable at the VWS store (see Appendix for the script read out by a surveyor).[18] She was informed that the lottery included, in addition to her, ten clients from a different VWS branch (such that they are unlikely to know her). These other participants could not enter other individuals into the lottery. However, if she agreed to enter the draw (all clients agreed), then she could enter other members from her first VWS group into the draw.

To clarify that she was the only lottery participant who could influence the odds of winning, the client was shown detailed payoff matrices (see Figure 2a). It was explained that she could potentially increase the number of lottery participants from 11 to as many as 20, thereby increasing the fraction of group members in the draw from 9% to 50% while decreasing her individual probability of winning from 9% to 5%. Finally, she was told that any group member she entered into the lottery would receive a lottery ticket and be told who gave her the ticket.

A client could, to some degree, control the flow of information about her choices to other group members. If she did not give any tickets, then none of her group members would know (since, on average, only 40% of the clients in a group entered in the lottery other members could not guess whether she was entered in the lottery). However, if she gave out a ticket then her ticket giving choices were likely to be public – at least, to the subset of group members who received tickets.

A client belonging to a ten member group made nine pair-wise choices. Similar to trust and dictator games, a member who received a ticket was not required to share her winnings. In the

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[17]Importantly, the lottery protocol was conducted before the Table 4 survey data were collected.

[18]The voucher amount reflected VWS managers' view of what constituted an "appropriate" sized prize.

absence of any sharing arrangements, the Nash outcome is to not give any tickets. Ticket-giving can increase a client's expected payoff only if she trusts the recipient to share lottery earnings.

Given that the client has the option to give tickets to multiple members of her group, many different sharing arrangements among group members are feasible. For expositional ease, we describe the simple case of pairwise cooperation when the client (or sender) gives a single group member (receiver) a ticket. For this pair, expected joint earnings increase since their joint chances of winning the lottery rise from 9% to 17%. There are mutual gains from cooperation (if the receiver shares half her earnings, the sender's expected lottery earnings rise from 18 to 25 Rupees and the receiver's expected earnings rise from 0 to 8.3 Rupees), but costs to the sender if the receiver does not plan to share earnings with her (in which case the sender's expected lottery earnings fall since her individual probability of winning the lottery declines from 9% to 8% as the pool of lottery entrants rises to twelve). Figure 2b shows how a client's payoff changes as she gives more tickets. The top line shows her expected payoff when the sharing arrangement is such that the receiver shares half her winnings with the client (the bottom line shows the reduction in her payoff if no receiver shares). The figure also illustrates a key difference between our lottery and the trust game: Pairwise returns in the lottery depend on total tickets given. If the sender has the same level of trust towards all other group members then she would give equally to all group members. However, if trust of group members varies then recognition of this externality will act as an additional constraint on ticket-giving to less trusted group members.[19] While we do not explicitly ask the receiver whether she wishes to transfer resources back to the sender, the sender and receiver have frequent opportunities to meet and engage in reciprocal exchanges.

It is possible that ticket giving reflects altruism not implicit reciprocity. To disentangle these channels, we introduced a key client-level variation in the experimental protocol: For a randomly chosen half of the participants, the lottery prize took the form of one 200-Rupee voucher while for the other half it consisted of four 50-Rupee vouchers (Web Appendix Figure 1 provides pictures of

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[19]Here, sender's action and payoffs are stochastically related which also differentiates it from the classic trust game.

these vouchers). A voucher could only be redeemed by one client and all vouchers expired within two weeks. The idea was to introduce barriers to the divisibility of lottery earnings that make coordinating on, or enforcing, the cooperative strategy more difficult. If altruism motivates ticket-giving, then divisibility of the prize should not influence ticket giving. If ticket giving is motivated by expectations of reciprocity, then ticket giving should be higher under the more divisible option.

4.2 Lottery Experiment: Results

We selected a random sample of 450 clients for the lottery, among whom we were able to contact 432 spread across 98 groups, yielding a final sample of 129 weekly and 321 monthly clients.[20] Table 1 provides a randomization check for the lottery client sample using group-level (Panel A), client-level (Panel B) and pair-level (Panel C) variables. A comparison of columns (1) and (2) with columns (4) and (5) shows that the lottery sample is representative of the experimental population. Columns (7) and (8) show that our separate group and voucher randomizations are balanced.

For each member of a client's first loan group, we recorded whether the participant entered her into the lottery. Figure 3 shows that roughly 60% of participants gave a ticket, which is very similar to individual propensity to give in dictator games (Levitt and List, 2009). Roughly 10% of clients gave one ticket, and we observe similar percentages up to four tickets. After this, the number of tickets given declined significantly with a slight increase right at the end – roughly 5% of the clients gave tickets to all group members.

Appendix Figure 2 shows the network structure of ticket giving for a random sample of monthly and weekly groups - we observe significant variation in ticket giving behavior both across and within groups. In Table 4 we use a regression framework to provide some evidence on how different covariates predict ticket giving. Our outcome of interest y_{gmi} for lottery client i belonging

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[20]We piloted the lottery among 128 clients and then randomly drew a sample of 450 clients from the remaining 900 in which to conduct the final lottery. Of these, two had died and sixteen were away from the city.

to group g is whether she gave group-member m a ticket. Our estimation equation is of the form

$$y_{gmi} = X_i\gamma_1 + X_{im}\gamma_2 + X_m\gamma_3 + \phi_g + \alpha_g + \epsilon_{gmi} \tag{3}$$

All regressions include loan officer and month of group formation fixed effects. In column (1) we consider the pooled sample and examine the impact of sender characteristics (X_i) and receiver characteristics (X_m) as explanatory variables. In line with the existing social capital literature, education and income predict ticket giving and receipt. Client mobility and participation in community and political events positively predicts ticket giving but not ticket giving. Impatient clients are less likely to give tickets, where we measure impatience by whether the client stated a preference for Rs. 200 today rather than XX in the future. We also examine whether group member's loan repayment behavior predicts ticket receipt. At the time of the lottery clients had either completed two loan cycles (and were currently on their third loan cycle), or had dropped out. We create indicator variables for whether a client had either defaulted on her first or second loan, and for whether she had dropped out from VWS altogether. Both variables are significant negative predictors of ticket giving, which suggests that clients are less likely to trust those who had exhibited poor repayment behavior or had left VWS. Finally, both pairwise characteristics matter: A client is more likely to give a ticket to a group members who lives nearby (less than 100 meters away) and those she knew before the loan, which suggests that increased ability to monitor may influence pro-social behavior.[21] In Columns (2) and (3) we run separate regressions for the indivisible and divisible voucher options. We find that distance between households and whether the client has dropped out from VWS predict ticket giving only for the four 50 Rs. voucher option, which is suggestive evidence that monitoring opportunities mattered more for ticket giving when the voucher was more easily divisible.

In Table 5 we turn to examining the relationship between meeting frequency and ticket giving. Our estimation equation is of the form given by equation (2). Column (1) shows that, relative to

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[21]She is also more likely to give tickets to her group leader. Since she coordinates loan payments, it is unsurprising that she is perceived as trustworthy. Interestingly, the group leader does not reciprocate.

her monthly counterpart, a client in a weekly group is 6.5 percentage points more likely to give a ticket to a group member. In the pooled sample, the estimate is statistically significant at 10%, with or without controls. In column (2) we examine whether this effect differs by level of client impatience and find that the effect of more frequent meeting on ticket giving is concentrated among clients with a high discount rate. This is as predicted by theory.

Columns (3)-(6) examine whether the results differ by divisibility of the lottery prize. In column (3) we see that among clients randomly assigned to the four 50-Rupee voucher lottery, weekly clients are significantly more likely to give a ticket. The effect is stronger among more impatient clients, though the differential effect is statistically insignificant. Columns (5) and (6) show that there is no significant difference among weekly and monthly clients assigned to the one 200-Rupee voucher variation (column 3). The fact that ticket-giving is significantly higher among weekly clients when the lottery prize is easily divisible (i.e. four 50-Rupee voucher option) suggests that more frequent meetings increased ticket giving by strengthening client ties and increasing expectations of reciprocity.[22] If frequent meetings had only worked to increase directed altruism toward group members, then ticket-giving would be independent of voucher divisibility.

Six months after the lottery we surveyed 39 of the 47 clients who received a ticket from a group member and subsequently won a lottery. Although we do not observe explicit voucher sharing (the winners always redeemed their vouchers as opposed to giving them away), nearly all clients (85%) remembered who gave them their ticket, and a quarter reported increased post-lottery sharing with this group member. The most commonly shared goods were food and sarees. In two cases, winners reported lending money to the group member who had given them the ticket.

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[22]Anecdotal evidence from conversations with clients also suggested that they believed multiple vouchers increased the likelihood that those they gave tickets to would share any future winnings.

4.3 Channels of Influence: Learning versus Monitoring

As discussed in Section 2.1, more frequent interaction may encourage cooperative behavior by improving monitoring technology and thereby facilitating schemes to reward and punish opportunistic behavior. Alternatively, more interactions may improve information about client types. To disentangle these two channels, we exploit experimental variation in meeting frequency at two different points in time. In particular, at the time of our lottery, roughly a third of the clients (137 out of 432) were on a subsequent VWS loan cycle. Importantly, at the start of their current loan cycle, groups were re-randomized into weekly and monthly meetings. VWS has a preference for keeping clients in the same first loan group together across cycles. That said, due to drop-out, there are some new entrants – on average, 60% of a client's group members remained the same across loan cycles.

Using this sub-sample, we examine whether, conditional on initial meeting frequency, current meeting frequency matters. This allows us to observe whether forcing clients who already know each other well to continue interacting regularly *further* increases pro-social behavior. This allows us to rule out the possibility that forced interaction increases trust entirely through learning about types. If there is no role of monitoring technology, then pro-social behavior should be insensitive to the frequency of interactions once client type has been revealed.

For this subset of clients, we use the pairwise data on ticket giving to estimate

$$y_{gmi} = \beta_1 W1_g \times W2_g + \beta_2 M1_g \times W2_g + \beta_3 M1_g \times M2_g + \delta_1 \phi_g + \delta_2 D_g + \alpha_g + \epsilon_{gmi} \qquad (4)$$

where $W1_g$ ($M1_g$) and $W2_g$ ($M2_g$) are indicator variables for the client being on a weekly (monthly) repayment schedule in first and current loan cycles respectively. The other variables are as defined in equations (1) and (2). Given the reduced sample size we report regressions without individual controls (we observe similar but noisier estimates with controls).

Because clients on weekly and monthly schedules in their first loan cycle may have different propensities to enter the current loan cycle, causal inferences can only be drawn by comparing across clients on the same meeting schedule in their first cycle but randomly assigned to different

schedules in the current cycle. For clients who were on the weekly schedule in the first cycle, this is given by the β_1 parameter. For those on the monthly schedule in the first cycle, this implies testing whether $\beta_2 = \beta_3$. Finally, we also report the difference-in-difference estimate, which tests whether the observed difference among first time weekly clients exceeds that for monthly clients (whether β_1-$(\beta_2 - \beta_3)$ is different from zero).

Columns (1) and (2) of Table 6 show results from the ticket-giving regressions for clients offered the divisible and indivisible voucher options. A client randomly assigned to the weekly schedule in both her first and current loan cycle ("weekly-weekly") is 33% more likely to engage in pro-social behavior than a client initially on the weekly schedule but later assigned to the monthly schedule. The difference in ticket giving among clients assigned to the monthly schedule in the first cycle but then assigned to weekly versus monthly to monthly is insignificant. The difference-in-difference F-test combines these two estimates to show that weekly-weekly clients give significantly more tickets than other clients. As before, we find no evidence of significant giving for the indivisible voucher option.[23]

We interpret the significant difference for weekly-weekly clients in column (1) as *prima facie* evidence that monitoring matters. The fact that the difference-in-difference estimate is significant suggests that frequent interactions at initial stages also play a role in helping clients broaden their social networks. To gather further evidence, in columns (3) to (5) we examine whether differences in intervention schedules predict knowledge about other clients and availability of monitoring opportunities. Column (3) uses data from the first group meeting of the current loan cycle. The average client assigned to the weekly schedule in her first cycle and monthly in her current loan cycle knew the names of the children of 3.6 out of her 4 current group members. This high level of knowledge about fellow group members is statistically similar across repayment schedules, which indicates that clients get to know each other fairly well by the end of the first loan cycle even when they are assigned meet infrequently.

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[23]We also verify that the likelihood of a client having group members from the first loan in her current group is independent of repayment frequency (unreported)

In contrast, we do observe significant differences in the frequency of client interaction, not only with respect to the required meetings (column 4) but also with respect to social interactions outside of meetings.[24] In column (6) group meeting data from the *current* loan cycle are used to define the social interaction index in the same manner as the index in Table 2. Relative to clients on the weekly-monthly schedule, social interactions for clients on the weekly-weekly schedule are 0.92 standard deviations higher. While not statistically significant, the point estimate on the difference between clients on the monthly-weekly schedule and those on the monthly-monthly schedule also suggests that more frequent repayment meetings increase social interactions.

5   Social Capital and Client Default

Our findings have potentially important implications for the design of microcredit contracts. Numerous studies suggest that social capital improves the financial performance of MFI clients.[25] As discussed in Section 2.1, social capital generated through frequent interactions can reduce client default by helping clients insure each other against income shocks. Also, if clients interpreted meeting and repaying in a group setting as indicative of joint liability then they may have incentives to monitor each other's investment behavior. In this case more frequent interactions could also reduce ex-post moral hazard (Besley and Coate, 1995).

To examine the link between frequency of interactions and loan default, we compiled data on default outcomes of the 1026 clients who entered our original repayment frequency experiment. At the end of our experiment, 69% of clients took out a second loan with VWS, which was on average 35% larger than the first loan. The repayment schedule of these clients was, typically, fortnightly

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[24]In column (4) the dependent variable is the total number of required MFI meetings across the first and current intervention (at the time of the survey). At the time of the lottery, a client on the weekly schedule in the first and monthly in the second had met, on average, 41 times while a client on the weekly cycle in both cycles had met roughly 15% more often.

[25]For instance, MFI clients in Peru who are more trustworthy in a trust game are less likely to default, and group-level default is lower in groups where clients have stronger social connections (Karlan, 2005, 2007).

with some variations. However, the likelihood of being on a particular repayment schedule was independent of their first loan cycle schedule.[26] We use VWS transactions data to track the default outcomes of clients' first and second loan cycles. We choose a conservative definition of default: a client has defaulted if, she failed to repay 44 weeks after the loan cycle ended (this is roughly the length of a loan cycle).[27] We estimate OLS regressions of the form

$$y_{gli} = \beta_1 W_g + X_g \gamma_1 + X_i \gamma_2 + \delta_1 \phi_{gl} + \alpha_{gl} + \epsilon_{gmi} \tag{5}$$

where l denotes loan cycle (first or second). These results are presented in Table 7. In column (1) we observe that repayment schedule does not predict default in the first loan cycle. It is worth noting that overall default is extremely low in the first loan cycle at 1.5%. In Column (2) we examine whether repayment schedule during the first loan cycle predicts propensity to continue to the next loan cycle. On average, a similar fraction of clients (31%) in weekly and monthly schedules take out a second loan, consistent with the low overall rates of delinquency in the first loan cycle. In column (3) we examine default behavior in the second loan cycle. During this loan cycle, clients assigned to monthly meetings for their *first* loan are roughly 8% more likely to default on their second loan relative to clients assigned to weekly meetings for their first loan, and the difference is statistically significant. In column (4) we consider an alternative definition of default - amount outstanding 44 weeks after the conclusion of the loan cycle, and find very similar effects.

Overall, the results in Table 7 suggest that weekly clients' greater willingness to form informal cooperative arrangements (see Table 5) and insure each other against shocks (see Table 3) have long run implications for default risk.

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[26]Add details

[27]We get qualitatively similar results if we define default over shorter time periods since conclusion of the relevant loan cycle.

6 Group Interactions versus Repayment Frequency

Our experiment not only varied the frequency with which clients interacted, but also the frequency with which they made loan payments. If the latter had a direct effect on client income, we cannot disentangle the effect of interaction from the effect of higher income on ticket-giving and default. Repayment frequency could have influenced client income either through small differences in interest rates (weekly clients faced slightly higher implicit interest rates since they had to repay faster) or through changes in savings behavior (weekly clients may have developed better savings habits). Table 8 provides some evidence on this.

The first channel yields opposite predictions to what we find (weekly clients are more generous and default less). With respect to the second channel, several pieces of evidence indicate that differences in savings behavior is not a valid explanation for our findings. First, repayment frequency in the first loan cycle did not appear to have any effect on clients' ability to make payments: Group meeting data show that weekly and monthly clients were not only equally likely to default on the first loan, but also as likely to repay at meetings during the first loan cycle. This is not surprising since loan amounts in the first cycle were well below clients' demand for credit, and as a result we observe extremely few cases of either default or delinquency. Installment amounts for both monthly and weekly clients were well below what the average client earns in a day, and in survey data 95% of clients report collecting money for their loan installment from household earnings the day before the meeting. Likewise, in survey data, only a handful of clients report ever having had difficulty making a payment.

Second, both ticket-giving and default are measured when clients are no longer on their initial repayment schedule. Hence, it is not the case that, at the time of the lottery, clients in the monthly treatment are struggling to make larger payments, which could explain their reluctance to give tickets. Similarly, the fact that default differences according to first loan meeting frequency show up in the second loan cycle and *not* the first suggests that the difference is not a direct effect of meeting frequency on short-run changes in client income.

Finally, while we cannot directly rule out the possibility that meeting frequency in the first loan cycle influenced client income in the long run (for instance, by teaching them greater "fiscal discipline"), this channel alone cannot account for the fact that ticket-giving varies with voucher divisibility.

7   Conclusions

A key assumption in the social capital literature has been that social interactions encourage norms of reciprocity and trustworthiness. In fact, participation in groups is often used to measure an individual's or community's social capital (see, for instance, Narayan and Pritchett, 1999). However, in this literature, whether the observed correlation between social distance and trust reflects the causal effect of interaction on cooperative behavior is unclear. Using field experiments we provide causal evidence that repeat interactions facilitate cooperative behavior by enabling individuals to better implement schemes of punishments and rewards that mitigate opportunistic behavior. Further, our results demonstrate that small policy-induced variations in group participation can increase trust in a strikingly short amount of time. Finally, these increases in social capital are economically meaningful and translate into improved financial outcomes for clients and micro-finance institutions.

We also make a methodological contribution to the experimental literature on measuring social preferences. We develop a lottery protocol which allows us to identify social preferences and distinguish the role of altruism and reciprocity in affecting such behavior.

Our findings are consistent with the idea that a combination of positive externalities and inherent complementarities in social capital creates the possibility for multiple equilibria and, as a result, underinvestment in social capital (Glaeser et al., 2002). There are potentially large gains from policies which facilitate interaction and help coordinate investment, especially in low income countries where formal institutions are often weak. The presumed importance of social interactions in sustaining social capital also underlies scholars' concern over recent declines in community

membership in the United States (Putnam, 1995) and some low-income countries (Olken, 2009).

In the case of group lending, by broadening and deepening social networks, microfinance institutions may have an important influence on the growth potential of poor communities and the empowerment of women above and beyond the role of credit provision. In light of our findings, an important question is in what settings can we expect MFI lending activity to enhance social capital formation. One striking finding is the low initial level of social capital among women in our study - a large number of neighbors from similar socio-economic backgrounds get to know each other well enough to cooperate only with the outside stimulus of microfinance. Previous work on the determinants of social capital formation suggests low network density in settings characterized by high mobility, ethnic or linguistic fractionalization and low social status (Alesina and Ferrara, 2002; Glaeser et al., 2002, 2000; Sampson et al., 1999). Hence, our findings are likely to be most readily applicable to the fast-growing urban and peri-urban areas of cities in developing countries (such as Kolkata) where there is an increasing microfinance presence.

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8   Appendix

VWS Group Formation Protocol: The loan officer surveys the demographic make-up of a potential neighborhood. If appropriate, then s/he conducts a meeting to inform potential clients about the VWS loan product and invites them to a five-day Continuous Group Training (CGT) program. The program runs an hour each day, and introduces clients to the benefits and responsibilities associated with the loan product. Each potential loan group is assigned a separate CGT program. At the end of the CGT, the loan officer forms women who were considered sufficiently informed and interested into a group, identifies (with group members) a group leader and offers each member of the group a loan.[28]

VWS Oath The following oath is read out by members in each meeting, "1. We will abide by the rules and regulation of VWS and try to sort out the problems/ disturbance in our locality. 2. We will send all our children to school. 3. We will maintain good health and keep our houses always neat and clean. 4. We will neither accept nor give any dowry. 5. We will lead a simple

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[28]Group leader selection criteria include: (i) communicates well with group members and VWS staff; (ii) is responsible and well accepted by group members; (iii) has a house or place to organize group meeting.

life, will avoid unnecessary expenses. 6. We will attend the group meeting in time, will act as joint liability group 7. We will use the loan amount for right purpose".

Probability Script for Main Lottery: In the lottery, you and ten other VWS clients will receive a ticket. Additionally, you have the option of selecting additional members of your VWS loan group that you would like us to give tickets to. You can tell us not to give anybody else in your VWS loan group a ticket, you can tell us to give each person in your group a ticket, or you can tell us which specific members you would like us to give tickets to.

We will review the effect giving out tickets has on chances of winning. In picture 1 in which you dont give out any tickets to members of your VWS group, you would have a 1 in 11 chance of winning. In picture 2, you choose give a ticket to four other members of your VWS group and there are 15 tickets total. In that case, you would have a 1 in 15 chance of winning and each of the members of your VWS group you gave a ticket to would have a 1 in 15 chance of winning. In picture 3, you give a ticket to nine other members of your VWS group and there are 20 tickets total. In that case, you have a 1 in 20 chance of winning and each of the members of your VWS group you gave a ticket to has a 1 in 20 chance of winning.

These are only a few examples of what odds of winning you may have after you decide how many tickets to give out. Remember that whether or not you give out tickets to other members of your first VWS loan group, you keep the lottery ticket we have given you. Now, before we continue, do you have any questions about how the lottery will work?

Additional Script for one 200 Rs. voucher: If you win the lottery, you will receive a single 200 Rs. voucher redeemable at the VWS village bazaar. You can use the voucher yourself or to give it to someone in your first VWS group. Either way, the voucher must be used within two weeks. Additionally, only one person can redeem the voucher at the VWS store and the entire value of the voucher must be used when the voucher is redeemed (so, for example, you cannot use 100 Rs. one day and save 100 Rs. for another day). To summarize, if you win the lottery, you will be asked to sign the 200 Rs. voucher when you receive it. However, you are still free to decide whether to keep or give away the voucher that you receive.

Additional Script for four 50 Rs. vouchers: If you win the lottery, you will receive four 50 Rs. vouchers redeemable at the VWS village bazaar. You may choose to use all four vouchers yourself, to give away 1-3 of the vouchers to members of your first VWS group and keep the rest for yourself, or to give away all of the vouchers to members of your first VWS group. In any case, the vouchers must be used within two weeks. Additionally, the entire value of each of the vouchers must be used when the voucher is redeemed (so, for example, you cannot use 25 Rs. of a 50 Rs. voucher one day and save 25 Rs. for another day). To summarize, if you win the lottery, you will be asked to sign each of the 50 Rs. vouchers when you receive them. However, you are still free to decide whether to give away or keep each of the four vouchers that you receive.

Table 1. Group, Client-level, and Pair-level Randomization Check

	All Clients			Lottery Clients			Diff: 4-50 Rs. Voucher	Diff: 1-200 Rs. Voucher
	Weekly	Monthly	Diff: (1) and (2)	Weekly	Monthly	Diff: (4) and (5)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Group-level								
Number of Clients	10.233	10.300	-0.137	10.241	10.304	-0.141		
	[0.689]	[0.709]	(0.131)	[0.689]	[0.713]	(0.135)		
Month of Formation	5.667	5.657	-0.236	5.724	5.681	-0.219		
	[1.561]	[1.371]	(0.284)	[1.556]	[1.367]	(0.293)		
Fraction of Group Members Known before Loan	0.740	0.724	0.025	0.715	0.688	0.052		
	[0.196]	[0.192]	(0.044)	[0.244]	[0.236]	(0.053)		
Fraction of Group Members who are Family	0.02628	0.028	0.000	0.030	0.026	0.005		
	[0.037]	[0.035]	(0.008)	[0.039]	[0.039]	(0.009)		
Fraction Muslim	0.000	0.077	-0.073	0.000	0.079	-0.073		
	[0.000]	[0.192]	(0.045)	[0.000]	[0.246]	(0.047)		
Age Dispersion	7.947	8.058	-0.067	7.857	8.068	-0.188		
	[1.857]	[1.447]	(0.356)	[1.823]	[1.455]	(0.363)		
Fraction of Clients Surveyed				0.424	0.432	-0.009		
				[0.162]	[0.176]	(0.039)		
N	30	70		29	69			
Panel B: Client-level								
Age	33.376	33.461	0.280	32.736	33.792	-0.547	-1.390	0.309
	[8.330]	[8.387]	(0.683)	[7.789]	[8.421]	(0.743)	(1.165)	(1.384)
Literate	0.853	0.838	0.000	0.872	0.851	0.004	0.011	-0.001
	[0.355]	[0.369]	(0.033)	[0.335]	[0.356]	(0.049)	(0.063)	(0.063)
Married	0.876	0.865	0.006	0.880	0.891	-0.019	-0.044	0.006
	[0.330]	[0.342]	(0.026)	[0.326]	[0.312]	(0.033)	(0.050)	(0.052)
Household Size	3.974	3.915	0.061	4.072	4.013	0.100	0.331	-0.189
	[1.148]	[1.410]	(0.100)	[1.144]	[1.474]	(0.144)	(0.201)	(0.186)
Muslim	0.000	0.077	-0.098	0.000	0.109	-0.121	-0.139	-0.101
	[0.000]	[0.268]	(0.036)	[0.000]	[0.312]	(0.050)	(0.056)	(0.048)
Own Enterprise	0.755	0.680	-0.005	0.800	0.653	0.057	0.043	0.033
	[0.431]	[0.467]	(0.036)	[0.402]	[0.477]	(0.053)	(0.071)	(0.069)
Can Visit Parents	0.880	0.868	0.027	0.810	0.862	-0.020	-0.009	-0.043
	[0.326]	[0.338]	(0.025)	[0.394]	[0.345]	(0.042)	(0.062)	(0.064)
Household Savings	0.255	0.266	0.045	0.224	0.264	0.024	-0.057	0.117
	[0.437]	[0.442]	(0.045)	[0.419]	[0.442]	(0.055)	(0.077)	(0.073)
Value of Assets (Rs.)	10704	9038	2549	10020	9474	1162	3600	-2581
	[27016]	[21923]	(2209)	[19315]	[22119]	(2285)	(4247)	(1953)
Years Living in Neighborhood	15.327	16.997	-1.786	14.840	17.475	-2.635	-3.326	-0.095
	[10.275]	[10.152]	(0.703)	[10.175]	[10.381]	(0.985)	(1.320)	(0.038)
Impatient	0.438	0.454	0.062	0.424	0.459	0.038	-0.053	0.122
	[0.497]	[0.498]	(0.049)	[0.496]	[0.499]	(0.062)	(0.084)	(0.082)
N	306	710		125	303			

Panel C: Pair-level

Age Difference	8.985	9.549	-0.636	-0.621	-0.739
	[6.666]	[6.822]	(0.570)	(0.617)	(0.681)
Value of Assets Difference (Rs.)	11950	11087	863	3523	-1907
	[26882]	[27668]	(3031)	(4611)	(2163)
Education Level Difference	0.425	0.439	-0.030	-0.057	-0.021
	[0.495]	[0.496]	(0.035)	(0.046)	(0.041)
Religion Difference	0.000	0.033	-0.033	-0.053	-0.019
	[0.000]	[0.180]	(0.016)	(0.028)	(0.011)
Pair Member Known before Loan Group Formation	0.707	0.696	0.027	0.061	-0.012
	[0.455]	[0.460]	(0.052)	(0.052)	(0.073)
N	1172	2848			

Notes

1 Month of Formation refers to calendar month of group formation ("4" for groups formed in April, 2006, and so on). Age Dispersion is the group-level standard deviation of client age. Can Visit Parents is an indicator variable for whether client can go unescorted to her parents' house. Household Savings is an indicator variable for whether a household has a savings account. Impatient is the indicator variable for whether client prefers "200 Rs. now" over "250 Rs. in one week." The pair-level variables are the absolute values of the respective differences between the surveyed lottery client and each of her group members. Education Level Difference is based on an indicator variable for whether client completed class 8 or above.

2 Panel A-C differences are based on regressions with loan officer and month of group formation fixed effects.

Table 2. Meeting Frequency and Social Interaction: Short Run (Group-level)

	Number of MFI Meetings (Months 1-5 of Loan Cycle)	Social Interaction Index (Short Run)	All Members Visited Me in My Home	I Visited All Members in Their Homes	Know Names of Family Members	Know if Relatives Visited
	(1)	(2)	(3)	(4)	(5)	(6)
Weekly	13.718	4.607	0.929	0.924	0.930	0.106
	(0.361)	(0.253)	(0.037)	(0.037)	(0.037)	(0.014)
Mean of	5.114		0.101	0.105	0.100	0.003
Monthly	[0.498]		[0.246]	[0.246]	[0.244]	[0.015]
N	100	100	100	100	100	100

Notes:

1 Dependent variables in Columns (3)-(6) are constructed from client indicator variables which equal one if the client responded "Yes" to the questions, "Have all of your group members visited your house?", "Have you ever visited houses of all group members?", "Do you know the names of the family members of your group members?", and "Do you know if any of your group members had relatives come over in last 30 days?", respectively. The dependent variables in Columns (3)-(5) are the group averages of the maximum value for a client (across all meetings); in Column (6) the dependent variable is the group average of the average client response. The Social Interaction Index is the average of the normalized versions of the Columns (3)-(6) variables.

2 Mean of monthly is the average value of the dependent variable for monthly groups with standard deviations in brackets.

3 All regressions include (i) loan officer fixed effects, and (ii) group-level variables listed in Table 1, Panel A.

Table 3. Meeting Frequency and Social Interaction/ Trust Measures: Long Run

	Trust Measures		Interaction Measures				
	Trust Group Member	Would Help if Sick	Social Interaction Index (Long Run)	Number of Times Met		Talk Family	Attend Durga Puja Together
				Her House	My House		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Weekly	0.246	0.062	0.139	0.053	0.040	0.056	0.069
	(0.124)	(0.028)	(0.056)	(0.029)	(0.029)	(0.029)	(0.035)
Mean of Monthly	4.327	0.225		3.212	3.257	0.181	0.161
	[1.130]	[0.418]		[8.165]	[8.198]	[0.386]	[0.367]
N	432	4020	3136	3136	3136	3136	3136

Notes

1 Trust Group Member is the client response on a scale of 1 and 5, which is increasing in the likelihood that the average group member would return a wallet with 200 Rs. that was found on the street. Would Help if Sick is the indicator variable "If you had a sick family member and had to leave your house for a few hours for an emergency, would you ask X to come to your home and look after him/her?" Number Times Met in Her House and Number of Times Met in My House refer to the past 30 days, with values top coded at "30". Talk Family is the indicator variable "Do you still talk to X about her family." Attend Durga Puja Together is the indicator variable "During the most recent Durga Puja, did you attend any part of the festival with X?" Client-level Social Interaction Index is the average of the normalized versions of the four Columns (4)-(7) variables.

2 Column (1) regression has one observation per client, while Columns (2)-(7) regressions include pairwise responses for a client and each of her group members. All regressions include (i) loan officer fixed effects, (ii) a control for days between loan disbursement and lottery survey, and (iii) a control for loan group leader. Columns (1)-(7) regressions include group-level and client-level controls (Panels A and B), and a control for whether group members knew each other before loan. Standard errors are clustered at the group-level.

Table 4. Determinants of Ticket Giving

	Gave Ticket
	(1)
Sender Characteristics	
Literate	0.064
	(0.019)
Value of Assets (10000 Rs.)	0.005
	(0.003)
Mobility Index	0.031
	(0.009)
I am Group Leader	0.006
	(0.024)
Time Spent on Political Activity/ Community	0.156
Meetings	(0.046)
Receiver Characteristics	
Literate	0.040
	(0.018)
Value of Assets (10000 Rs.)	0.007
	(0.003)
Mobility Index	0.006
	(0.009)
Member is Group Leader	0.078
	(0.022)
Time Spent on Political Activity/ Community	-0.048
Meetings	(0.043)
Defaulted on Loan	-0.177
	(0.057)
Pairwise Characteristics	
Distance between Households less than 100 m	0.016
	(0.015)
Knew Group Member before Loan	0.158
	(0.015)
	-0.073
Both Members Stopped Borrowing after First Loan	(0.014)
Both Members are Impatient	0.027
	(0.014)
N	4020

Notes

1 For each client in the sample we have (on average) nine observations, one for each group member. The dependent variable "Gave Ticket" equals one for a group member if the client gave her a ticket. Mobility Index is the average of the normalized versions of (1) Can Visit Parents (defined in Table 1), and (2) Number of Buses Taken in Past 7 Days. Time Spent on Political Activity/ Community Meetings is the indicator variable "Did you spend any time on political activities / attending community meetings in the last 24 hours?" A client has defaulted on loan if she has not repaid within forty-four weeks after due date (the average loan cycle duration). The remaining variables are as defined in Table 1.

2 We report OLS regression results which include loan officer and month of group formation fixed effects.

Table 5. Meeting Frequency and Pro-Social Behavior

	Gave Ticket					
	All Lotteries		Four 50 Rs. Vouchers		One 200 Rs. Voucher	
	(1)	(2)	(3)	(4)	(5)	(6)
Weekly	0.061	0.010	0.134	0.070	0.013	-0.015
	(0.039)	(0.042)	(0.054)	(0.059)	(0.053)	(0.065)
Impatient		-0.001		0.005		-0.005
		(0.028)		(0.034)		(0.033)
Weekly*Impatient		0.084		0.117		0.045
		(0.047)		(0.057)		(0.056)
Mean of monthly	0.218		0.196		0.241	
	[0.413]		[0.397]		[0.428]	
N	4020	4020	2029		1991	

Notes

1 For each client in the sample we have (on average) nine observations, one for each group member. Gave Ticket is as defined in notes to Table 4.

2 All regressions include (i) loan officer fixed effects, (ii) a control for days between loan disbursement and lottery survey, and (iii) controls for the variables in Table 1, Panels A-B. Regressions also include controls for loan group leader and for whether clients knew each other before loan. Standard errors are clustered at the group level.

Table 6. Meeting Frequency across Loan Cycles and Pro-Social Behavior

	Gave Ticket		Members' Children Known	Number of Pre-Lottery MFI Meetings Attended	Social Interaction Index (Current Loan Group Meeting)
	Four 50 Rs. Vouchers	One 200 Rs. Voucher			
	(1)	(2)	(3)	(4)	(5)
Weekly in First Loan, Weekly in Current Loan	0.336	0.104	0.347	7.352	0.916
	(0.084)	(0.132)	(0.342)	(2.672)	(0.369)
Monthly in First Loan, Weekly in Current Loan	0.123	-0.044	0.461	-19.999	0.668
	(0.103)	(0.123)	(0.310)	(1.947)	(0.211)
Monthly in First Loan, Monthly in Current Loan	0.216	0.001	0.428	-29.889	0.278
	(0.086)	(0.105)	(0.357)	(1.363)	(0.221)
Mean of Weekly in First Loan, Monthly in Current Loan	0.126	0.281	3.600	41.388	
	[0.333]	[0.451]	[1.000]	[4.220]	
F-statistic	*17.700*	*0.960*	*0.560*	*0.570*	*1.440*
p-value	*[0.001]*	*[0.332]*	*[0.457]*	*[0.453]*	*[0.236]*
Specification	Pairwise			Client-level	
N	685	579	126	137	133

Notes

1 The sample is only lottery clients who had a VWS loan at the time of lottery. Gave Ticket is as defined in notes to Table 4. Members' Children Known is the client response to the group meeting question "For how many clients do you know the names of all their children?" Number of Pre-Lottery MFI Meetings is the total number of times the client's First Loan and Current Loan group met to repay before the client was surveyed for lottery. Social Interaction Index is the average of the normalized versions of five Current Loan group meeting variables: "For how many members of your group do you know whether there is a marriage ceremony in the family in the coming 30 days?", "How many group members have you visited in their houses in the last 2 weeks?", "How many group members have visited you in your house in the last 2 weeks?", "How many people in the group did you talk to about business matters in the last 2 weeks?", and "How many people in the group did you talk to about personal matters in the last 2 weeks?" Each of these variables is the client-level average generated from all observations before month 4 of the loan cycle (when the average client was surveyed for the lottery).

2 Regressions include (i) First and Current Loan loan officer fixed effects, and (ii) month of First Loan group formation fixed effects. Standard errors are clustered at the First Loan group-level. The F-statistic is the differences-in-differences test for whether ("Weekly in First Loan, Weekly in Current Loan" - "Weekly in First Loan, Monthly in Current Loan") - ("Monthly in First Loan, Weekly in Current Loan" - "Monthly in First Loan, Monthly in Current Loan") is equal to 0.

Table 7. Meeting Frequency and Financial Outcomes

	First Loan Default	First Loan Dropout	Second Loan Default
	(1)	(2)	(3)
Weekly	-0.016	0.026	-0.075
	(0.015)	(0.051)	(0.038)
Mean of monthly	0.015	0.311	0.079
	[0.123]	[0.463]	[0.270]
N	1026	1026	707

Notes:

1 For each loan, a client is defined as defaulted if she has not repaid the total loan amount within forty-four weeks after due date. First Loan Dropout is an indicator variable for whether client took out a second loan with VWS.

2 We report OLS regression results. Regressions include loan officer and month of loan group formation fixed effects. Regressions also include the variables in Table 1, Panels A-B, and a control for loan group leader. Standard errors are clustered at the group-level.

Table 8. Meeting Frequency and Financial Behavior Measures

|	Value of Assets	Health Spending	Education Spending	Savings Account Balance (Rs.)	Borrowed from Group Member
	(1)	(2)	(3)	(4)	(5)
Weekly	1200	-326	-38	1965	-0.049
	(1250)	(691)	(83)	(1708)	(0.048)
Mean of monthly	7223	2724	649	2396	0.082
	[18185]	[13179]	[1917]	[12075]	[0.273]
N	952	952	952	952	708

Notes

[1] Health Spending is defined as total household spending on illnesses in past 12 months. Education Spending is defined as total annual school fees paid by household. Borrowed from Group Member is the fraction of loan group meetings at which client borrowed from group member for loan repayment.

2 All regressions include (i) loan officer fixed effects, and (ii) controls for the variables in Table 1, Panels A-B and for loan group leader. Standard errors are clustered at the group level.

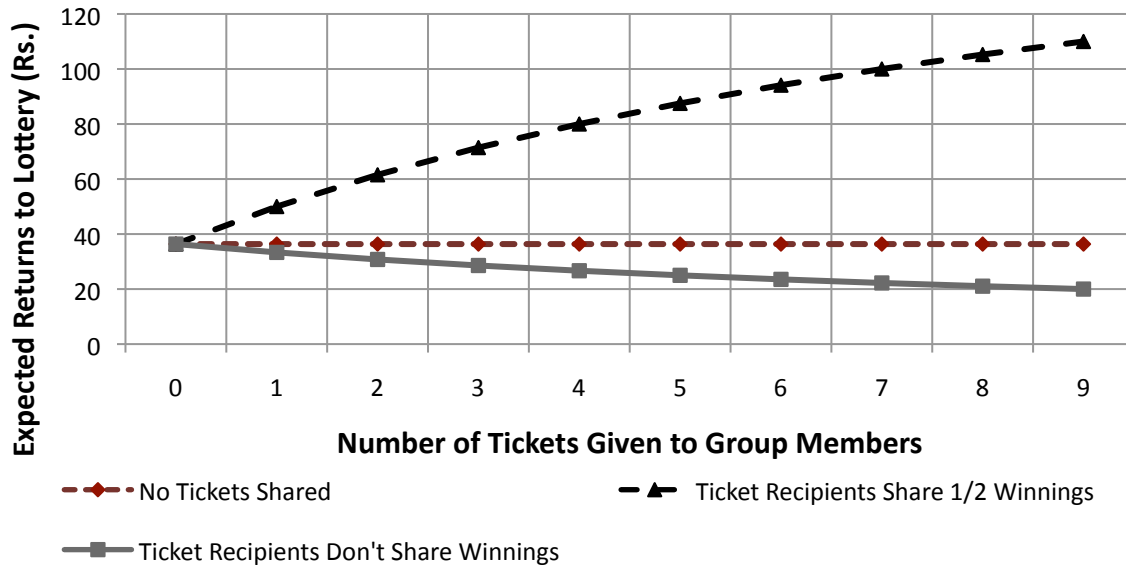# Figure 1. Loan Group Social Capital Development by Number of Months after Initial Meeting
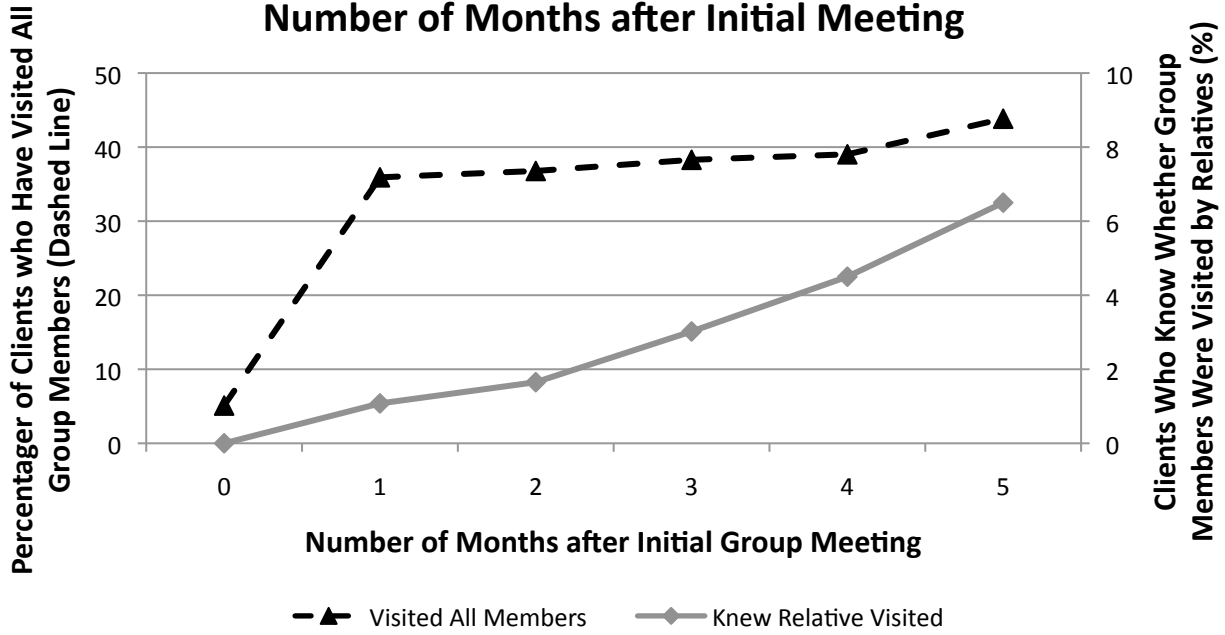
Figure 2a. Winning Probabilities
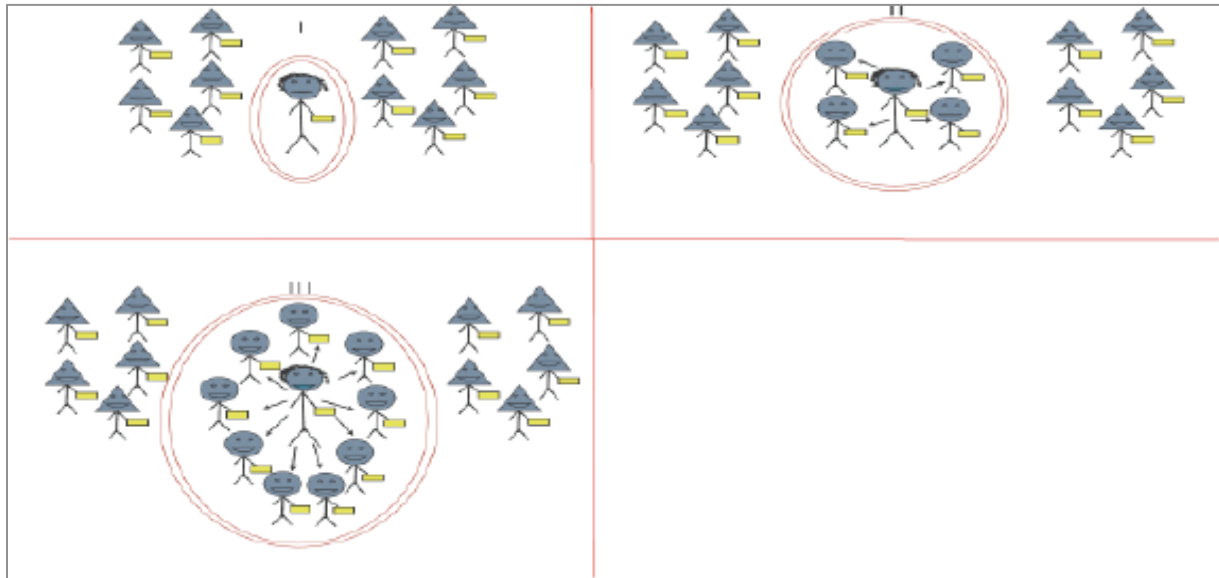
Notes:
This picture was used to explain how ticket-giving affected lottery probabilities. The explanation provided was "In Picture 1 in which you don't give out any tickets to members of your VWS group, you have a 1 in 11 chance of winning.
In Picture 2, you choose to have us give a ticket to four other members of your VWS group and there are 15 tickets total. In that case, you would have a 1 in 15 chance of winning and each of the members of your VWS group you gave a ticket
In Picture 3, you choose to have us give a ticket to nine other members of your VWS group and there are 20 tickets total. In that case, you would have a 1 in 20 chance of winning and each of the members of your VWS group you gave a ticket to would have a 1 in 20 chance of winning."
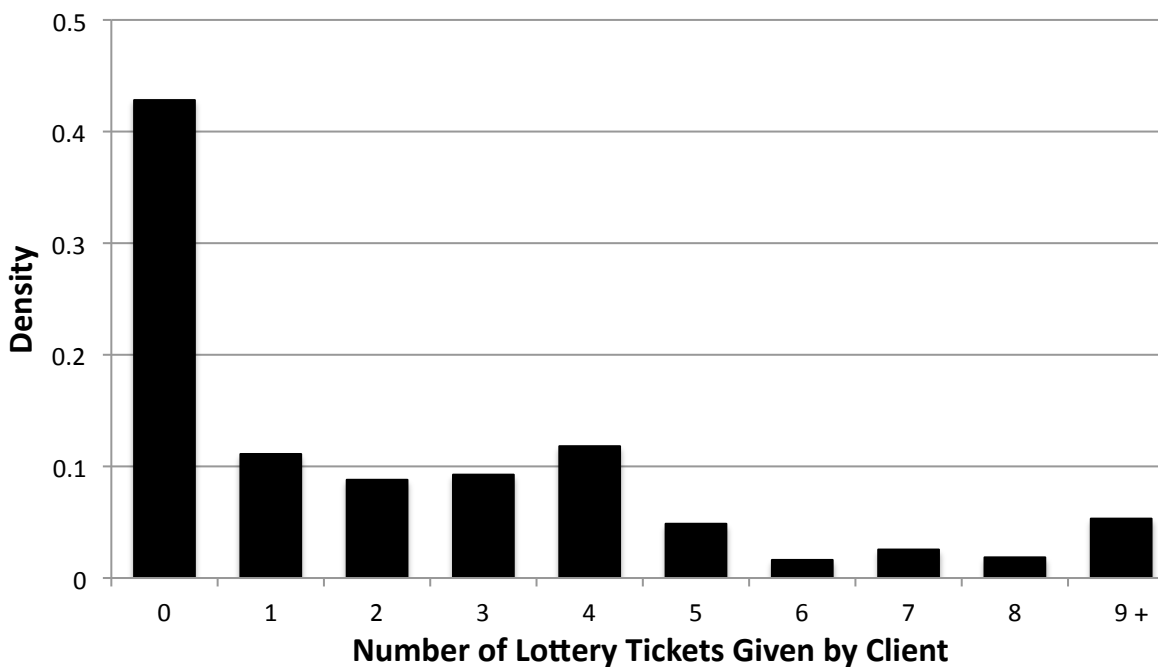
Figure 2b. Expected Returns to Lottery by Ticket-Giving Decision

Expected Returns to Lottery (Rs.) vs. Number of Tickets Given to Group Members

Legend:
- No Tickets Shared
- Ticket Recipients Share 1/2 Winnings
- Ticket Recipients Don't Share Winnings

Notes:
Figure 2b shows the expected returns to the lottery based on ticket-giving decision, and extent of reciprocal behavior by ticket recipient.

Figure 3. Client-level Distribution of Lottery Tickets

Density vs. Number of Lottery Tickets Given by Client

Appendix Figure 1. Lottery Vouchers

VILLAGE WELFARE SOCIETY   **VILLAGE MICRO CREDIT SERVICES**
TOGETHER TOWARDS PROSPERITY

Rs. 50 Voucher
Single Use Only

Whoever reclaims this voucher must bring their VWS passbook with them to the VWS village bazaar when making their purchase. If the claimant is no longer a VWS client, they should bring their voter identification card.

Date of Lottery: _____   Deadline to Claim: _____
Group Name: _____   Name of Claimant: _____
Name of Winner: _____   Signature of Claimant: _____
Signature of Winner: _____

VILLAGE WELFARE SOCIETY   **VILLAGE MICRO CREDIT SERVICES**
TOGETHER TOWARDS PROSPERITY

Rs. 200 Voucher
Single Use Only

Whoever reclaims this voucher must bring their VWS passbook with them to the VWS village bazaar when making their purchase. If the claimant is no longer a VWS client, they should bring their voter identification card.

Date of Lottery: _____   Deadline to Claim: _____
Group Name: _____   Name of Claimant: _____
Name of Winner: _____   Signature of Claimant: _____
Signature of Winner: _____

Note:
Clients were randomly offered the choice of joining the 200 Rs. Voucher or the 4-50 Rs. voucher lottery. This figure shows the final vouchers which were given to the winner of the two lotteries.