Microfinance, roscas, social capital and inequality

Social exclusion and enforcement in group lending

- Ex post moral hazard and the 'enforcement' problem: Why should a borrower repay at all?

- Important result here: Bulow and Rogoff (AER 1989)
  - In general, the promise of future loans is NOT a sufficient tool to enforce repayments of debt (unless risk, increasing loan sizes). Extra sanctions are needed.
  - Also true for ROSCAS: absent social sanctions, enforcement is a serious issue (see below).

Social exclusion and enforcement in group lending

- Besley Coate 1995
  - Investigate the ex post moral hazard issue under joint liability
  - Joint liability has an ambiguous effect since successful borrowers have to pay for the unsuccessful ones:
    - Repayment rates may increase (mechanically)
    - But the total amount they have to pay in case of success is also higher, which reduces repayment rates.
  - Social sanctions between borrowers increase repayment

Social exclusion and enforcement in group lending

- The empirical evidence is ambiguous:
  - Karlan (2002): groups of 30 borrowers formed 'randomly' by FINCA in Peru: repayment rates are higher when members are 'culturally similar' (similar family names)
  - Ahlin and Townsend (2003): for joint liability groups in Thailand, repayment rate is non monotonic, and falls when a large fraction of group members have close relatives within the group.

- Karlan and Zinman 2012: RCT with differential sanctions, ex post moral hazard really matters.

- Gine and Karlan in the Philippines (2007…): RCT with joint and individual liability. No real differences (but repayments were high anyway).

Social exclusion and enforcement in group lending

- Social sanctions are costly:
  - Sanctions are fundamentally bilateral: they change the relationship between i and j, and is costly to both i and j. For instance, a sanction for j is to stop all future transactions with i. If imposing 'social sanctions' is of that nature, it must be costly for both the punished and the punisher.
  - When they are costly for both, sanctions from i to j cannot be rational and are not credible.

- If credible, if group members can credibly threaten each other with social sanctions, then why not use them for other things, such as colluding against the bank?

Sanctions and loss of reputation

with R Somanathan and Z Wahhaj

- We approach here sanctions as the 'exclusion' of an individual from an economic collective activity.

- When? By his behavior, the agent reveals information that can be interpreted by others as a measure of his interest/productivity in the group activity: his reputation is 'lost'…
  - In this manner, sanctions may become credible,
  - But they may be costly if the group tries to exclude a productive agent who contributes a lot.

Sanctions and loss of reputation

- Take a community of size n with homogenous household wealth w_i.
- Each household can either:
  - Choose to invest in a project which requires an indivisible investment S and yields a return ρ with probability π and zero otherwize.
  - Or receive a risk-free return r on their wealth.
- By assumption, $\pi\rho > r$, $w_i < S$ and households are risk neutral.

Sanctions and loss of reputation

- Banks:
  - Face a cost of capital equal to r. The banking sector is competitive.
  - Cannot observe project success or failures, therefore this cannot be included in the terms of the contract.
  - Observe default and can break off future relations, which costs K to the agent (see Ghatak and Guinnane, JDE 1999).

Sanctions and loss of reputation

- Group activity: use a very simple model:
  - Value of the activity for agent i is given by:

    $$\theta_i \, g(n, \Theta)$$

    where θ_i is the type of agent i, and Θ is the average type in the group: $g'_1 > 0$, $g'_2 > 0$.
  - θ_i is private information, but the distribution of θ, given by $H(\theta)$ is public knowledge and continuous over $(\theta_{min}, \theta_{max})$.
  - Social sanctions take the form of excluding individuals from group activities. The value of group activities may go up if members with low contributions are excluded.

Sanctions and loss of reputation

$\theta_i\, g(n, \Theta)$ is a general function. For instance, consider that each agent, after loan is repaid, is paired once with another agent, and makes a transaction with him at fixed cost c. The value for agent i of that particular transaction is:

$$\theta_i\, \theta_j - c$$

which is negative if θ_i is small.

Sanctions and loss of reputation

- Individual loans:
  - Consider the following contract: Bank lends (s-w) to an agent at gross interest rate $(1+r_b)=(1+r)/\pi$.
  - An agent repays iff the amount to be repaid is lower than the sanction by the bank:

$$(s-w)\,(1+r_b) \leq K$$

  - The highest level of wealth compatible with reimbursement is thus:

$$w^* = s-K/(1+r_b) = s-\pi K/(1+r)$$

Sanctions and loss of reputation

- Can households with wealth levels below w* have access to credit? This is possible with joint liability and social sanctions.

- Timing of events for the joint liability loan:
  1. Each household receives a loan and invests.
  2. Once returns are realized, members announce simultaneously the maximum contribution they are willing to make to group repayment.
  3. If the sum of contributions is enough, the bank is repaid. Otherwize, bank sanctions each member by K.
  4. Members making positive contributions decide which members to exclude from collective activity (e.g. they have a veto power).

Sanctions and loss of reputation

- Collective loans: the Pooling equilibrium
  - If it is worthwhile to exclude low θ types from the group, there is an equilibrium where all successful agents pool together to repay the entire group loan, with the supporting belief that, if a successful agents defaults, he must be of the low type θ_{min}.
  - The smallest wealth level w_{PE} for which such an equilibrium exists is given by:

$$(s- w_{PE})\ (1+r_b) \leq K+ \theta_{min}\ g(n,\Theta)$$

$$\text{and } w_{PE} < w^*$$

Sanctions and loss of reputation

- Separating equilibrium: Can social sanctions help groups below w_{PE} to obtain credit?
  - Clearly not in a pooling scheme by successful members because the lowest types would prefer to default.
  - However, if excluding these members raise the value of group activity for those who remain, a separating equilibrium where successful members of a high enough type repay the entire bank loan is possible.

Sanctions and loss of reputation

- Existence of a separating equilibrium:

There always exists a separating equilibrium where households with wealth below w^{PE} receive group loans, if output from the group activity is sufficiently sensitive to the quality of the participants compared to the quantity.

Successful households of type θ_s and above repay the full loan, while those below default and may be excluded from the group activity.

Sanctions and loss of reputation

- We now argue that 'norms' and 'beliefs' are critical to sustain this equilibrium: it relies on a social norm that ***'proper behavior' is to repay the loan***: successful members who voluntarily default reveal their low type and hence are excluded from the group activity.

- There are other competing norms: proper behavior may be ***to cheat the bank and make gifts*** to fellow members whose project failed (and who also get punished by the bank). Beliefs about types θ depend on that.

- The threat of social sanctions can for instance be used to induce all members of the group to default collectively, with the appropriate 'norm'.

Sanctions and loss of reputation

Given a pooling equilibrium where the bank is fully repaid, there always exists an alternative equilibrium where the group defaults and successful agents make compensating transfers to unsuccessful ones.

Sanctions and loss of reputation

With collective default, all members achieve higher welfare than with group repayment if and only if it is collectively rational to do so: n(s-w)(1+r) > nK

Intuition:

Sanctions are such that

$$(s- w)\ (1+r)/\pi \leq K+ \theta_{min}\ g(n,\Theta)$$

➔ $$\theta_{min}\ g(n,\Theta) > (s- w)\ (1+r)/\pi - K$$

Sanctions are greater than the surplus of the successful defaulters. They are therefore large enough to force him to compensate unsuccessful members for bank sanctions. And, even if he does so, he still earns a positive surplus if n(s-w)(1+r) > nK.

Sanctions and loss of reputation

Given a separating equilibrium where the bank is fully repaid, there is an alternative equilibrium where the group defaults and successful members above a threshold type make transfers to the unsuccessful ones. With the exception of successful agents below the minimum type (who get punished by the bank), the group generally achieves higher welfare in this scheme whenever individual loans are not feasible.

Sanctions and loss of reputation

- Repeated interactions:
  - This analysis extends easily to a setting where agents interact repeatedly. Bank sanctions can then be interpreted as refusing to finance future projects.
  - An important difference between the one shot and the repeated game is that the community may have the possibility of financing future projects with its own funds: collective default becomes even more likely.
  - Under some conditions, social sanctions will worsen compliance, as the community has an improved capacity to use local funds.

Sanctions and loss of reputation

- Conclusion:
  1. The use of social sanctions to support a particular equilibrium depends on the social norms that underlie the beliefs.
  2. With social sanctions, equilibria with repayment to the bank are dominated by equilibria with group collusion against the bank, whenever the collective surplus is positive.

Social sanctions, outreach and efficiency for group loans

(with R Somanathan and Z Wahhaj)

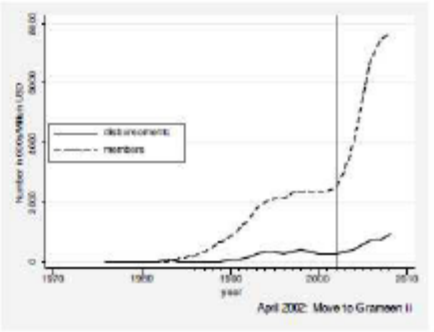
The expansion in group lending

Microcredit, mainly in the form of group loans, has expanded enormously.

- Grameen membership went from 58,000 to 8 mln between 1983 and 2008
- current loan disbursements nearly a billion USD annually

BUT.. limitations in outreach. Morduch (1998) finds:

- 30% of Grameen members own more land than the half-acre eligibility cut-off
- Fraction of borrowers twice as high for the above half-acre group relative to below half-acre (63% versus 34% for Grameen, BRAC and BRDP)



Recent trends in contractual structure

Several MFIs have abandoned joint liability:

- Banco Sol in Bolivia has largely switched to individual liability
- Grameen II eliminated group funds in 2002, uses groups for solidarity and offers the very poor individual contracts, membership has increased from 2.5 to 8 million
  "A destitute person does not have to belong to a group...Bringing a destitute woman to a level where she can become a regular member of a group will be considered as a great achievement of a group." (www.grameen-info.org)

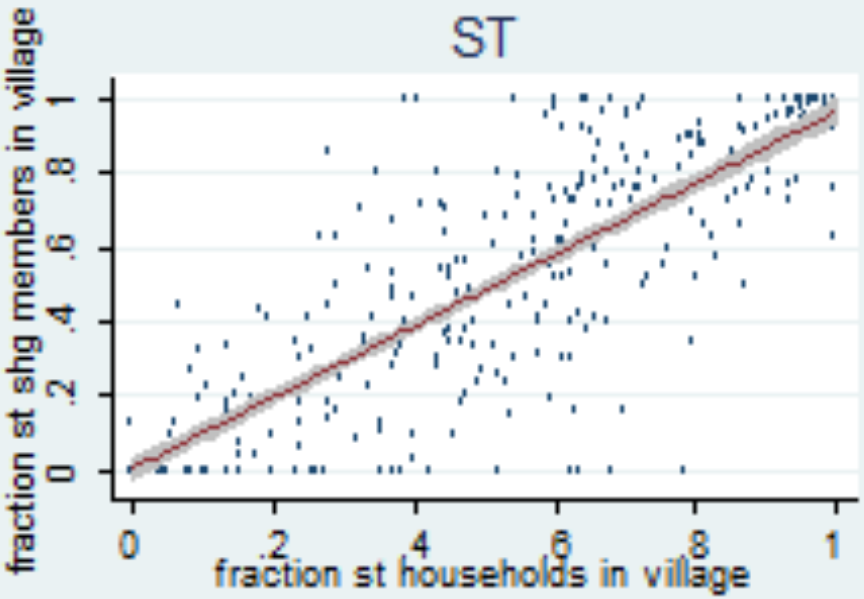
This trend is not universal however: SHGs in India strictly adhere to joint liability

Indian microfinance

- Indian *Self-Help Groups* and MFIs cover an estimated 50 million households and rely on joint-liability.
- SHGs: 75% of sector and RBI reports 3.5 million of these had been linked to commercial banks by 2008

BUT...poorer members are less likely to be members of groups and more likely to leave them. Within three years of a group being formed:

- over a quarter of those with no education left their groups (10% with some primary schooling)
- between a quarter and a third of members from socially disadvantages castes and tribes (8% from less backward castes)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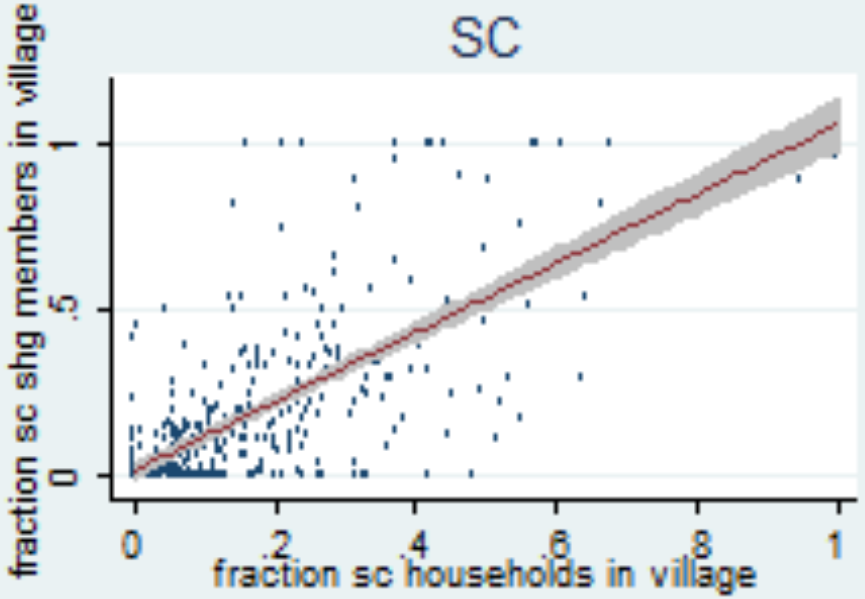
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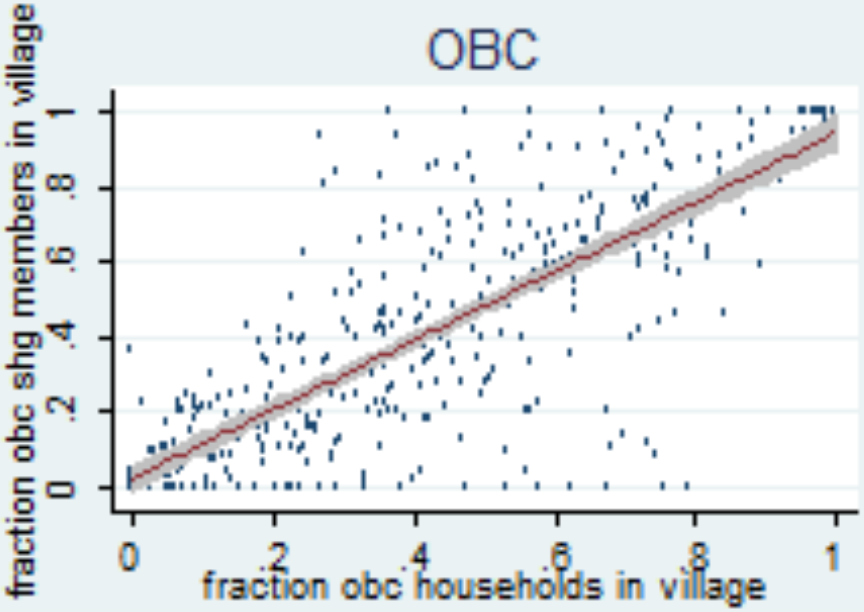
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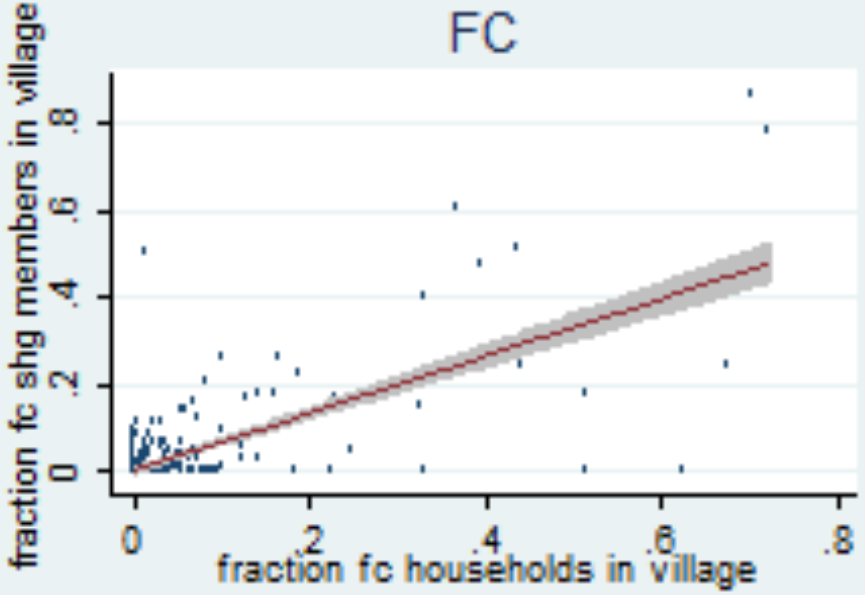
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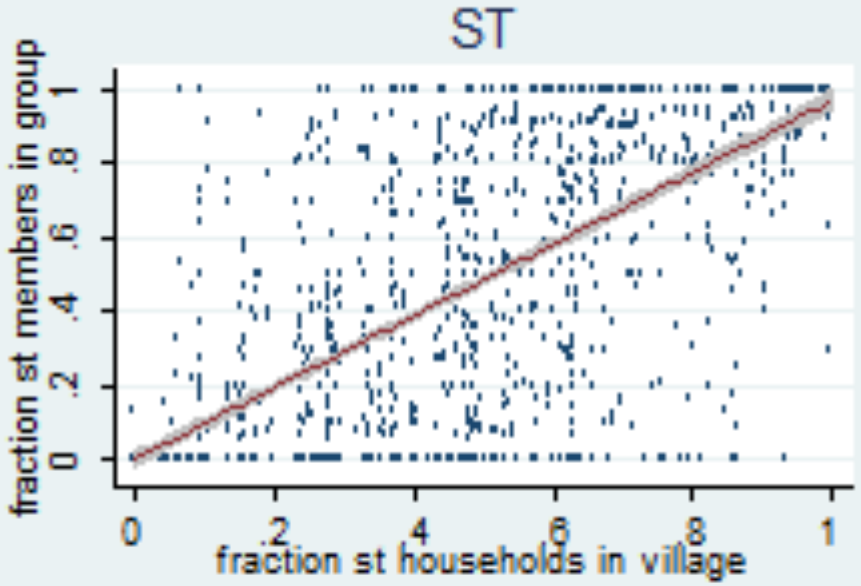
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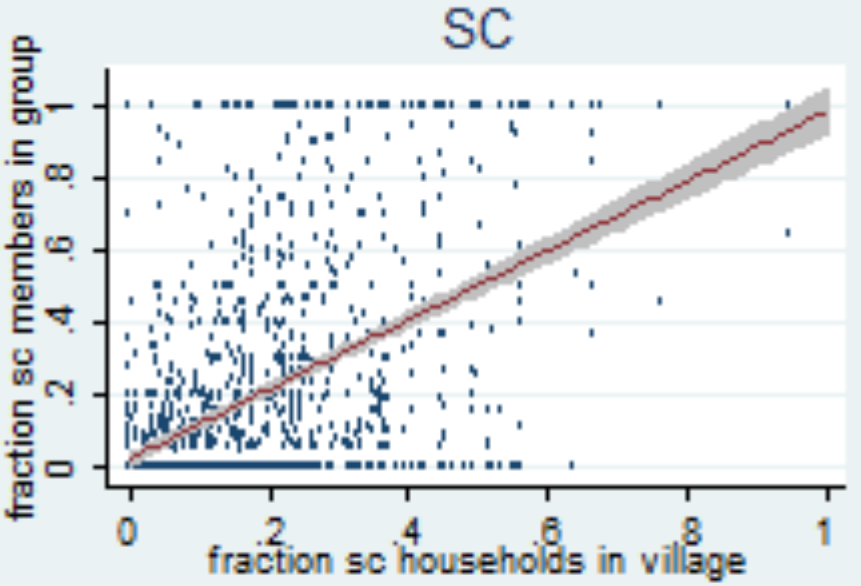
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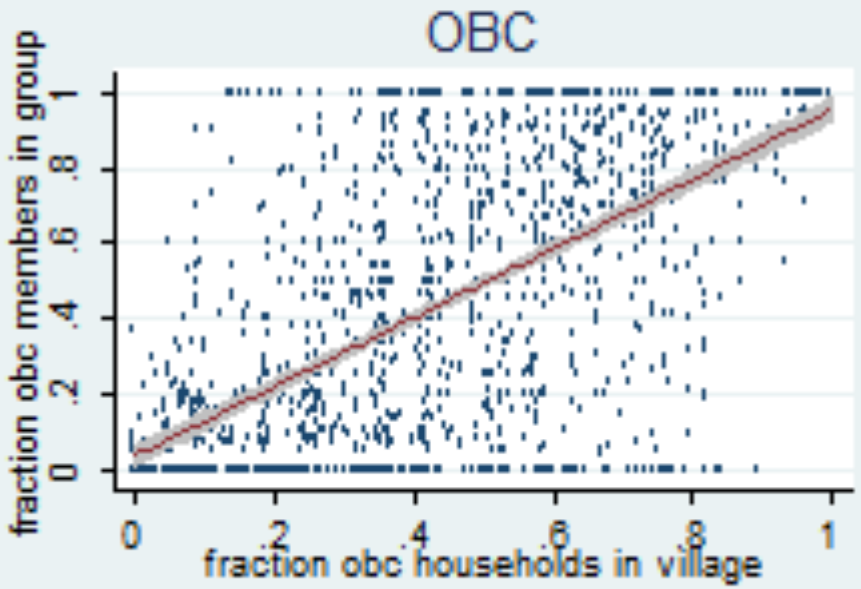
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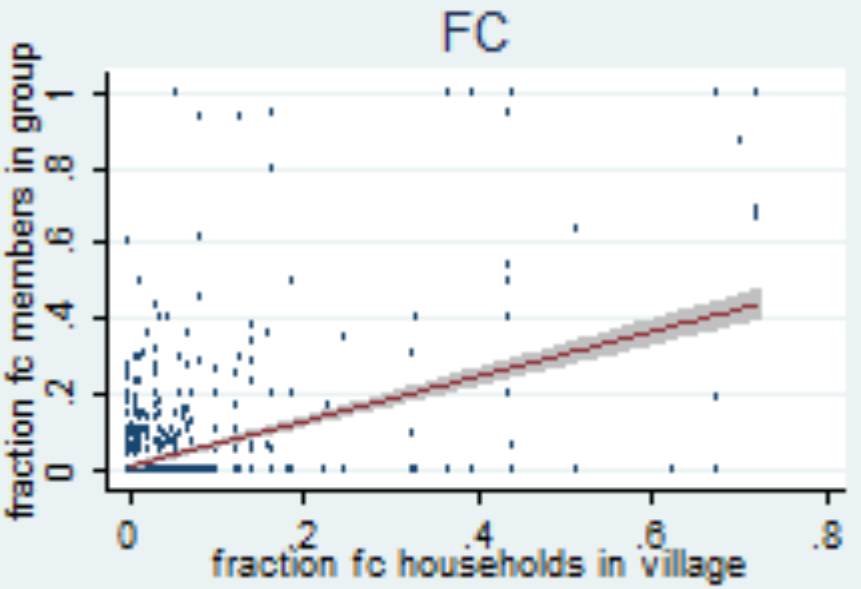
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Group lending and credit outreach

- Theory: group loans can use joint liability and social sanctions to improve
  - borrower quality through assortative matching -Ghatak(1999; 2000), N'Guessan and Laffont (2000), and Sadoulet (2000).
  - project and effort choices through monitoring -Stiglitz (1990), Banerjee, Besley, Guinnane (1994) and Laffont and Rey (2000)
  - repayment incentives through social sanctions -Besley and Coate (1996).

    The impact of joint liability is however ambiguous as
    - successful borrowers can subsidize the failures
    - but the total amount to be repaid is also larger
- Gine and Karlan (2009) use randomized trials in the Philippines providing some group members individual contracts and find no systematic difference in default rates.

Our paper

- We use a simple investment game and compare individual contracts with group lending. We focus on:
  - how joint liability affects repayment incentives in the presence of ex-post moral hazard
  - the implications of both types of contracts for outreach and welfare
- Main results:
  - In the absence of social sanctions, joint liability does not increase outreach. Smaller group loans get more attractive contracts, which benefits wealthier borrowers. There are net welfare gains associated with group lending.
  - Bank sanctions are more effective in increasing outreach. Social sanctions are more effective in raising welfare of the infra-marginal borrowers.
  - The effects of group size are non-monotonic and depend on the amount of the loan.

Investment projects and the credit market

- Households are risk-neutral and live in communities of homogenous wealth w.
- There is a single investment project available:
  - it requires one unit of capital and
  - it yields a gross return ρ with probability π and zero otherwise
- r is the risk-free interest rate
- Households with inadequate wealth for investment can borrow from banks either individually or as a member of a group of size n
- The banking sector is competitive. Banks
  - do not observe project success
  - offer individual loans or group loans under joint liability
  - can impose a non-pecuniary sanction K on a defaulting individual or on each member of a defaulting group

The repayment game

- individuals borrow L=(1-w) under individual or group lending contracts
- project returns are realized
- for *individual contracts*, each successful borrower decides whether or not to repay
- for *group contracts*, each member observes the successes in the group, decides on a contribution independently. Repayment occurs if the sum of contributions is large enough
- banks sanction defaulters (K) and groups may, in addition, sanction successful members who do not contribute (γ).

Individual loans

- What is the minimum project return for which it is individually rational to invest? Under an individual contract, expected returns equal costs when

$$\pi\bar{\rho} = (1-\pi)K + r \quad \text{or} \quad \bar{\rho} = \frac{1-\pi}{\pi}K + \frac{r}{\pi}$$

  We therefore assume $\rho \geq \bar{\rho}$

- What is the largest loan under an individual contract?
  - if all successful borrowers repay, banks break even charging $\frac{r}{\pi}$.
  - successful borrowers repay a loan of size L if $\frac{r}{\pi}L \leq K$.
  - The largest individual loan is given by

$$L_i = \frac{\pi K}{r}$$

  - Expected utility: $U_i = \pi\rho - (1-\pi)K - r$

Group loans with no social sanctions

Lots of equilibria - we focus on the symmetric repayment equilibrium which involves contributions by each successful member.

- Repayment depends on the number of successes in the group. If a loan requires a minimum of j successes in the group for repayment, groups succeed with probability $B(n, j, \pi)$, the probability of j or more successes in n Bernoulli trials. Banks therefore charge $\frac{r}{B(n,j,\pi)}$
- Each successful member must contribute $\frac{n}{j} L \frac{r}{B(j)}$. Incentive compatibility under joint liability is satisfied as long as

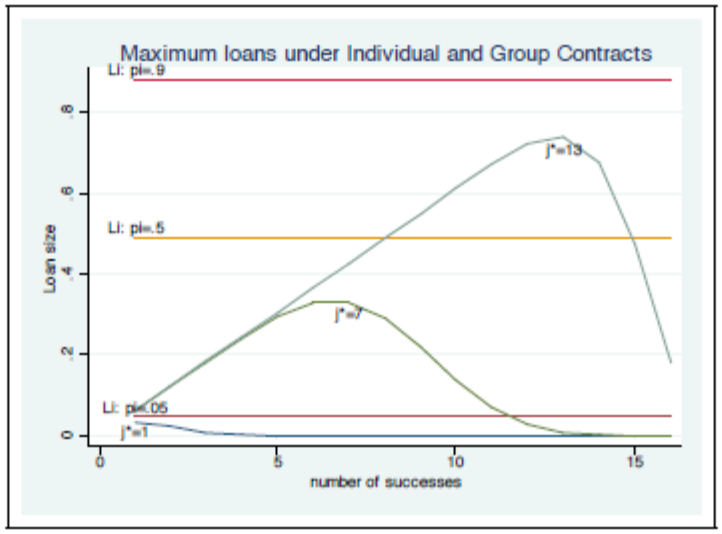
$$\frac{n}{j} L \frac{r}{B(j)} \leq K$$

- The largest feasible group loan is proportional to $jB(j)$:

$$L_g = \frac{jB(j)}{rn} K$$

Group loans with no social sanctions

- The largest feasible group loan is proportional to $jB(j)$: $L_g = \frac{jB(j)}{rn}K$. The function $jB(j)$ is inverted-U.



Banks offer a menu of contracts depending on loan size, with smaller loans being charged lower interest rates.

Can group lending increase outreach?

Proposition 1: *In the absence of social sanctions, the largest loan available in a group lending contract is strictly smaller than in an individual contract:* $L_i > L_g$

Proof: $L_i = \frac{\pi K}{r}$ is not a feasible group loan if $\frac{n}{j}\frac{r}{B(j)}L_i > K$ or

$$n\pi > jB(j)$$

But $n\pi = \sum_{k=0}^{n} k\pi_k > \sum_{k=j}^{n} k\pi_k > j\sum_{k=j}^{n} \pi_k = jB(j)$

Intuition: Two sources of leakages in group lending: successes in successful groups do not repay as much and successes in failed groups do not repay. The real interest charged on successes is therefore higher.

Social sanctions and outreach

Assume groups can impose sanction γ on defaulting members. The new IC condition is now

$$\frac{n}{j} L \frac{r}{B(j)} \leq min(K + \gamma, \rho)$$

Proposition 2a: *Let the level of social sanctions γ be large. If (i) n=2 or (ii) $\pi \leq \frac{1}{2}$ and $n\pi$ is an integer, anyone receiving an individual loan is also eligible for a group loan of the same size.*

Proposition 2b: *If $\pi \geq \frac{n(n-1)}{1+n(n-1)}$, even arbitrarily large social sanctions may not allow group loans to be larger than L_i, the largest loan available under an individual contract.*

Intuition: risky projects must have high returns when successful and high social sanctions allow these to be extracted from successful members

Social sanctions can improve outreach

Idea of the proof for 2.2: Let us consider the contract for which $j = m = n\pi$. The maximum repayments per successful borrower at L_i are given by

$$\frac{nr}{jB(j)}L_i = \frac{n\pi}{jB(j)}K = \frac{K}{B(m)}$$

and earnings are at least

$$\bar{\rho} = \frac{1-\pi}{\pi}K + \frac{r}{\pi} \geq \frac{1-\pi}{\pi}K + \frac{r}{\pi}L_i = \frac{K}{\pi}$$

When $\pi \leq \frac{1}{2}$, $B(m) \geq \pi$ and with high enough social sanctions all of these earnings can be extracted for repayment.

Benefits from group loans

Proposition 3: *The benefits from group contracts are decreasing in loan size. Group loans are preferred to individual loans if the probability of group repayment is greater than π.*

Utility from group loans is given by

$$U_g(j^*) = \sum_{k=0}^{j^*-1} \pi_k \left(\frac{k}{n}\rho - K \right) + \sum_{k=j^*}^{n} \pi_k \left(\frac{k}{n}\rho - \frac{rL}{B(j^*)} \right) - r(1-L)$$

$$U_g(j^*) = \pi\rho - r - (1 - B(j^*))K$$

and from individual loans is

$$U_i = \pi\rho - r - (1-\pi)K$$

The net gain from groups loans is:

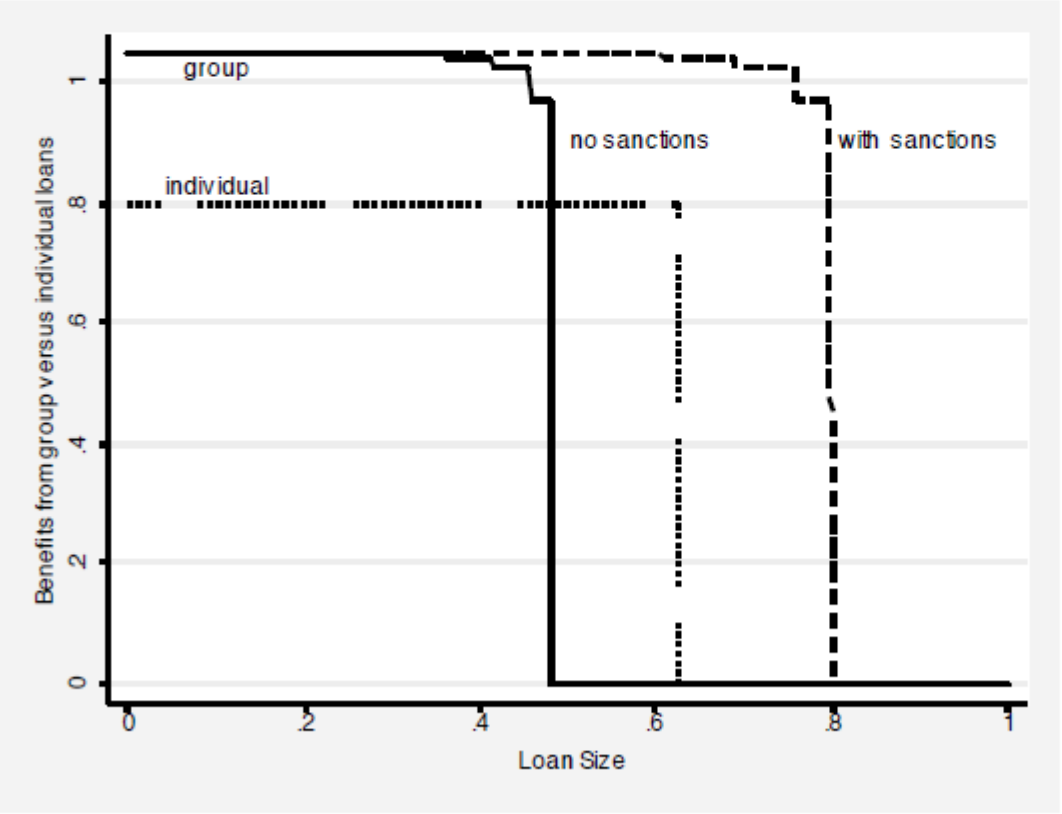
$$U_g - U_i = [B(j^*) - \pi]K > 0 \text{ or if } B(j^*) > \pi$$

Benefits from group loans

- Consequence 1: Groups with small loans repay more often because the probability of getting sanctioned is lower. Wealthier borrowers are better off.
- Consequence 2: Loans requiring only one success are always preferred as $B(1, n, \pi) > \pi$.

Equilibrium configuration

Consider two situations: one with no social sanctions and one with large social sanctions.



Sanctions and outreach

Suppose we can compare K and γ. Do they differentially affect outreach?

Proposition 4a: *Social sanctions are never more effective in increasing outreach. If $L_i \geq L_g$, maximum outreach is achieved through bank sanctions on individual loans.*

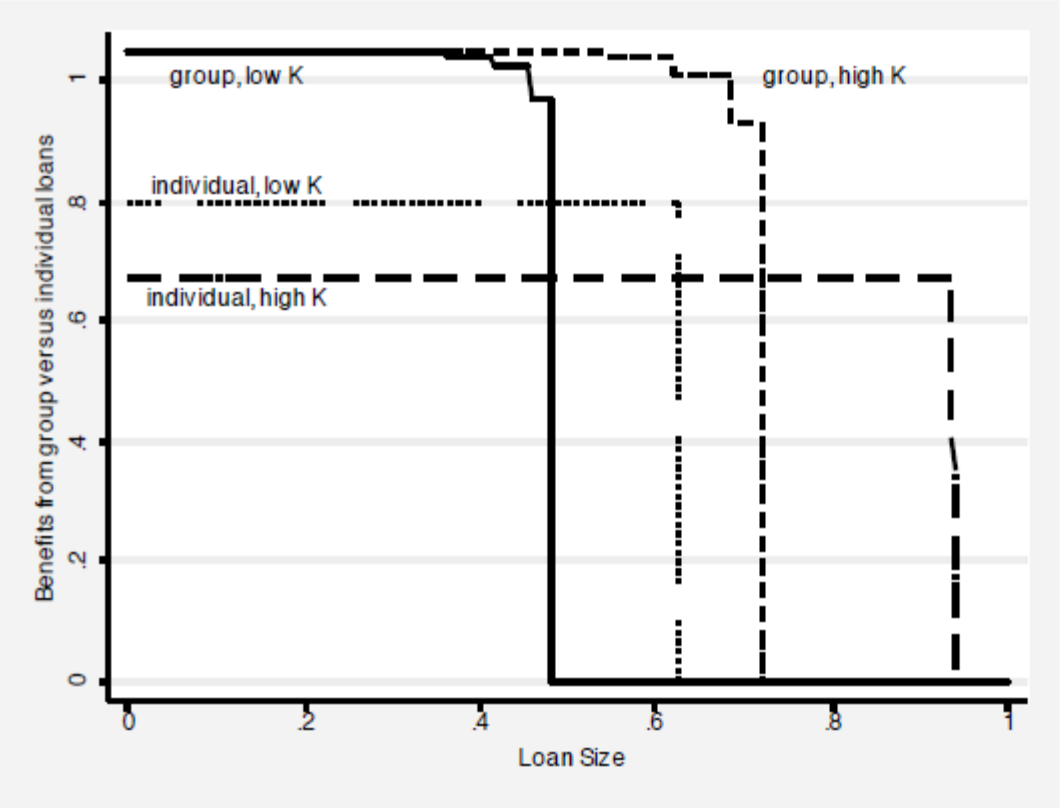
Proof: Consider the maximum loan sizes given by the IC constraints:

$$L_i = \frac{\pi K}{r} \quad \text{and} \quad L_g = \frac{jB(j)}{nr}(K + \gamma)$$

provided social sanctions are effective. The marginal effect of an increase in K on L_i is $\frac{\pi}{r}$ and on L_g it is $\frac{jB(j)}{nr}$. But since $n\pi > jB(j)$, the latter effect is smaller.

Policy instruments and welfare

Proposition 4b: *For borrowers choosing group loans, higher social sanctions always increase welfare. Bank sanctions can sometimes raise welfare, but to a lesser extent. For individual loans, higher bank sanctions always lower welfare.*



On group size

For sufficiently small loan sizes, a fall in group size lowers welfare and 2-member groups are never optimal. the gains from group lending is decreasing when group size falls.

Intuition: For groups with L close to 0, only one success is needed for repayment and since $B(n, 1, \pi)$ is increasing in n, these groups would decrease total utility by decreasing size.

For the largest group loan, borrower welfare is always decreasing in group size if π is large.

Intuition: Consider a group that requires n successes, with a loan that exceeds L_i. Decreasing group size reduces the probability of group failure, while still benefiting from group sanctions.

For intermediate loan sizes, borrower welfare can either increase or decrease in group size.

Intuition: Risk-pooling but integer problem.

Effects of group size

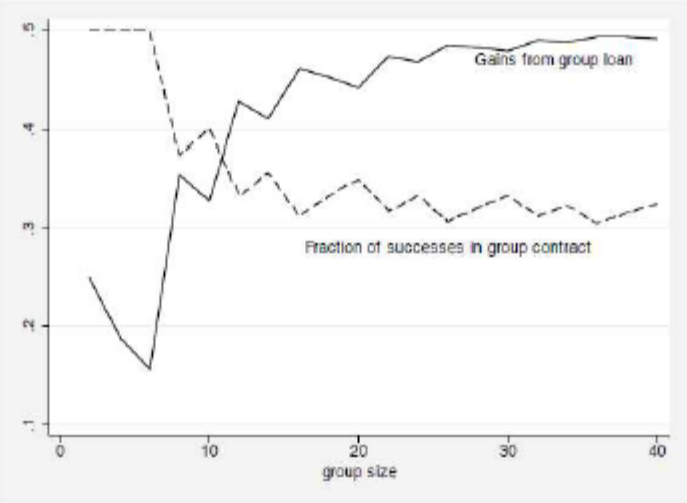


Figure 3: Group size effects ($\pi = .5$, $L = .25$, $K + \gamma = 1$, $r = 1.2$)

Discussion

- Implications:
  - Joint liability improves welfare for households with access to individual loans but cannot *per se* increase outreach
  - Two mechanisms are in favor of group lending: risk pooling and social sanctions.
  - When project uncertainty is large, risk pooling matters, and group lending has the greatest potential. Larger groups are preferred.
  - When project uncertainty is small, risk pooling hardly matters, and group lending may not increase outreach, even with large social sanctions.
- Where individual contracts are most effective for outreach, policies focussing on group loans may be misdirected.

Discussion

Four remaining issues:

- Partial repayment: offering reduced sanctions for groups with less successes is not implementable: successful groups will always try to imitate. (Sanction is lowered on all group members, but amounts to be paid can be shared among more successes.)
- Continuous returns: not much changes on the results.
- Correlated returns: with perfect correlation among projects, group lending is as effective as individual lending in the absence of social sanctions. But Proposition 1 holds under imperfect correlation.
- Group default: interestingly, group default is payoff-dominating iff $B(j^*) < \pi$. (Investigated in a related paper.)

Research avenues

1. De Quidt, Fetzer and Ghatak (2011): why should we drop joint liability and maintain groups? There might be some implicit joint liability where participants agree voluntarily (not by contract!) to contribute to failed projects.

2. De Quidt, Fetzer and Ghatak (2012): with strong social capital, shouldn't a for profit MFI take advantage of this? Social capital allows better enforcement, hence for a monopolist higher rates and repayments. But they show that still, social capital will make borrowers strictly better off as the lender has to give up some of the surplus to the borrowers. Moreover, a monopolist lender has incentives to 'create' social capital.

3. Enforcement issues can partly be adressed by using cross monitoring between agents: Rai and Sjortstrom RES 2004.

4. Spill-over effects on residual lenders and borrowers (Ghatak 1999, Dumont 2011). Interactions between non profit MFI and profit informal lenders (Casini 2008, Madestam 2007).

5. Fisher and Ghatak 2009: repayment frequencies matter for time inconsistent borrowers. Barboni 2012: explores adverse selection with the possibility of grace periods in repeated repayment schedules.

Pretending to be poor: borowing to escape forced solidarity in credit cooperatives in Cameroon

(with C Guirkinger and C Mali)

The puzzle

Striking fact: In credit cooperatives in Cameroon 20% of loans are fully collateralized by liquid saving.

Yearly interest on savings: 3.6% to 6%.

Yearly interest on credit: 24% to 36%.

$\Rightarrow$ Net cost: 20%.

These borrowers could have saved on interest payment by financing their project with their savings instead of borrowing.

The facts

Data:

- Survey of four credit cooperatives in Cameroon (Information on 1427 loans).
- Interviews with 23 members and several loan officers.

Prevalence of excess borrowing

	All loans	$B \leq S$	$B > S$
Number of loans	1427	272	1155
Percent	100.0	19.1	80.9
Loan amount, B (1000 CFA)			
mean	309.3	88.1	361.3
median	100.0	40.0	150.0
std dev	652.1	196.1	708.6
Borrower's liquid savings, S (1000 CFA)			
mean	111.7	230.4	83.7
median	45.9	106.1	23.0
std dev	256.2	413.7	191.9
B / S (median)	2.9	0.5	3.8

The facts

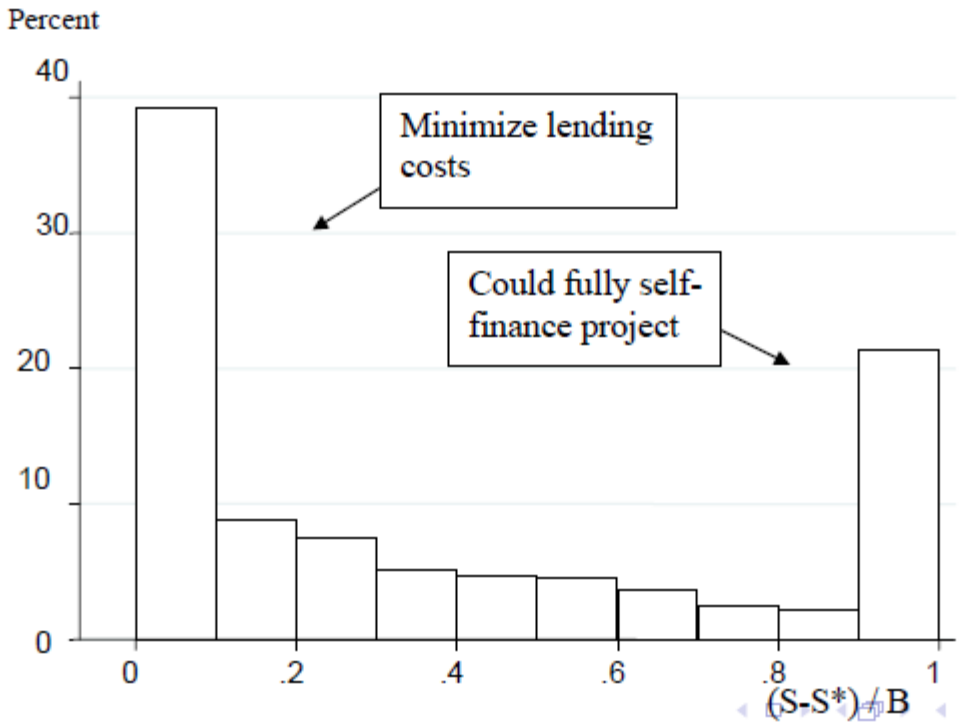
Key loan characteristics:

- The total collateral value (savings, land titles, cosigners) has to be equal to the loan amount.
- At least 1/5 to 1/3 of the loan amount has to be collateralized by savings. Savings thus defines a borrower's credit line (= 3 to 5 times his savings amount)

$\Rightarrow$ To minimize interest payments, members should always exhaust their credit line.

The facts

Cost-minimizing reduction in savings (over loan size)



Solving the puzzle

Potential explanations:

- Maintaining a credit line?

  No, because no refinancing is allowed.

- Self-commitment device in order to protect savings (with time-inconsistent preferences)?

  No, because savings can be used to pay back loan.

- Risk-coping strategy?

  No, because savings are used as collateral and are then illiquid.

Solving the puzzle

Our explanation:

Credit is used to signal financial difficulties to their relatives in search of financial help.

Interviews with 18 respondents with $B < S$: major reason for 17 of them.

Solving the puzzle

"When I take a loan from my savings, my children and my wife think I have no money. I do it on purpose. If I simply withdraw my money, it will end, so I tell them that I borrowed. Then, when one complains he has a problem, I say I have to pay back my loan. It protects me from my children's demands"

Solving the puzzle

Social pressure is an impediment to save:

> *"There is one thing in Africa: we have a family. The family is elastic. There is the little brother of your father, of your mother... Everyone with a problem, you are condemned to help. Savings is difficult because there are always problems. You have to squeeze your heart before putting money on your savings account."*

Savings are secret:

> *"Money is a terrible thing. Nobody should know what you have in your pocket. If my wives knew what I have, they would create new problems to force me to spend my money."*

Solving the puzzle

Credit is a credible excuse to avoid demands:

> *"Sometimes when somebody comes crying for help, I say I have nothing. The loan is a good excuse not to be bothered."*

Solving the puzzle

Credit as a signal for poverty: model

- Game between members of a cooperatives and a demander soliciting financial help.
- Members live for two periods. In the first they earn a certain income taking one of three values $\{y - 2\gamma, y, y + 2\gamma\}$ In the second they earn y.
- Members may save and borrow. savings earn no interest, but there is an interest rate on credit $r > 0$.
- The demander has a cash need D. He observes credit but not saving. He makes one demand and maximizes the probability of getting his request accepted.

Solving the puzzle

Credit as a signal for poverty: model

- Donating reduces consumption by D but provides a joy of giving, β, while refusing has a utility cost α.
- Without demand: The poor borrows, the middle-class neither saves nor borrows, the rich saves.
- With a demand: We assume that the poor always refuses to donate. For the rich β compensates the loss of D so that she always donates. If asked the middle class donates (to avoid α) but prefers not to be asked, as β does not compensate for the loss of D.
- The middle class have an incentive to borrow and mimic the poor to avoid being asked for a donation.

Solving the puzzle

Credit as a signal for poverty: model

- We show that there is an equilibrium where all middle-class take a loan and thereby avoid demand. It occurs if the proportion of rich is small, so that the probability of being asked for donation is large for those who do not borrow.
- Other equilibria arise, depending on the relative proportion of rich and middle class.

Conclusion

- A substantial number of members of credit cooperatives in Cameroon take a loan even though they have enough saving.
- They could avoid interest payments (on average 13% of the loan amount) if they would use their savings instead of borrowing.
- They chose to take a loan because credit is a way to signal they are too poor to give money to relatives.
- This strategy does not seem to be specific to a particular gender.

Informal savings institutions: the Roscas

- The economics of Roscas and intra-household resource allocation (Anderson and Baland 2002)

- Definition of a Rosca : Rotating savings and credit associations
  - Group of individuals gather for series of meetings
  - At each meeting : contribute to 'pot' a fixed amount
  - Pot allocated to one member each meeting
  - Random, fixed or bidding order

Roscas in Kenya

Very widespread phenomenon :

- Africa, Asia, South America, Caribbean, Middle East, early Europe, immigrant groups in U.S. and U.K.
- Membership= 50 – 95% in Republic of Congo, Cameroon, Gambia, Liberia, Ivory Coast, Togo, Nigeria
- Often sole saving and credit institution in rural areas
- Annual sums mobilized :
  - 8 to 10 % of GDP in Ethiopia
  - 2 X credit organized in banking sector in Kerala, India

Roscas in Kenya

- In Kenya, in the slum of Kibera, lot of roscas, and informal groups. Participation rates in roscas is 57% per household. Some roscas are embedded within larger informal groups.

- For rosca members, contributions represent 20% of their income, and 14% of their households' incomes. They also represent 5% of all income of all households.
-
- Question ? Why choose to save through a rosca instead of individually accumulating savings since :
  - No interest to be earned
  - Rigidity in the saving pattern

Roscas in Kenya

Besley, Coate and Loury (1993 and 1994)

- ROSCAS = way to save up for the purchase of indivisible durable goods when little or no access to formal credit markets

- On average, roscas allow individuals to receive the pot, and hence to buy the indivisible good, earlier than through individual savings.

- Ex ante, all individuals are better off. The member who receives the pot last is ex post worse off (the rosca saving rate is feasible for this individual, but typically not-optimal)

Roscas in Kenya

Motivation :

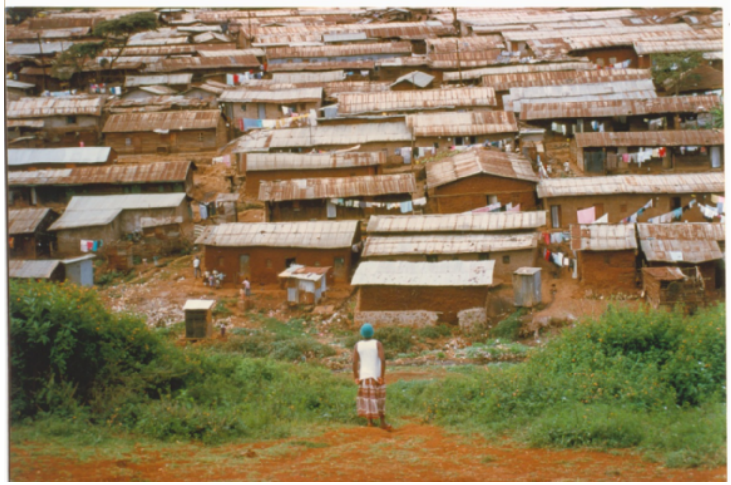
- Evidence from 520 households in a Kenyan slum (Kibera, Nairobi): household survey.

- Open interviews with 44 governing bodies of informal groups.

- 620 informal groups : 385 roscas, with sometimes mixed functions.

Roscas in Kenya

Roscas in Kenya



RULES GUIDING THE GARDEN WOMEN GROUP -

KIBERA - KIANDA (NAIROBI)

1. Registration for each member is 20/= each year.
2. Weekly meeting every Saturday at exactly 2 P.M.
3. Fine for lateness is 10/= up to 3 P.M. but coming to the meeting after 3 P.M. is 20/=.
4. Contribution for each house (Mary-go-Round) is 50/= for each member.
5. Contribution for buying households is 200/= every month each member.
6. Emergency Account is funded by each member by paying 50/= every month.
7. Contribution towards each member's Account is open but should not be less than 10/= each meeting.
8. There should be no exchange of words or fighting within members when we are in the meeting.
9. Members should not wear trousers during the meetings.
10. No member should come to the meeting when drunk.
11. Help Towards Death
    a. Death of a member or a member's husband is 300/= each member.
    b. Death of a member's child is 200/= each member.
    c. Death of a member's mother or father is 2,000/= 2. given to a member on the spot when she is going home for the burial. This amount is shared among members

12. Borrowing Money

Each member is to borrow 200/= every month payable after every month with an interest of 40/=.

13. End of Year Party

a. Every member is to attend this party during which we utilize the funds collected from the Fines' Account for buying sodas.

b. Each member gets her share plus any interest that might be available.

c. Every member should make use of her money wisely, the first priority being buying books, uniforms etc. for our school children.

AGNES OMUNDO NYANDIEGI
Chairperson
GARDEN WOMEN GROUP

JACQUELINE ATIENO OTIENO
Secretary
GARDEN WOMEN GROUP

IDDAH AKELO OKUMU
Treasurer
GARDEN WOMEN GROUP

4TH JANUARY, 1997.

KIBERA NYAKWERIGERIA GROUP

MOTTO: FORWARD EVER, BACKWARD NEVER.

INTRODUCTION: The vision of the forming the group came on the 8th day of October 1995, when a team of group members sat down with a main theme of:

FORMING NYAKWERIGERIA GROUP SO AS TO UPLIFT THE STANDARD OF LIVING BY EACH MEMBER CONTRIBUTING KSHS. 500 TO ONE MEMBER ON EVERY SUNDAY OF THE WEEK IN A STYLE OF MERRY-GO- ROUND, AND A MONTHLY CONTRIBUTION OF KSHS. 200 FROM EVERY MEMBER TOWARDS THE GROUP TO BE PUT IN AN INTEREST EARNING ACCOUNT WITH A VIEW TO COMMENCING PROJECTS OF THE GROUP.

For the mutual welfare and successfully running of our group, the following RULES AND REGULATIONS were set down:

1. On every sunday of every week, the programme will start at exactly 2.30 p.m with a prayer and the meeting will close down at exactly 3.30 p.m with a vote of thanks from the chairman.

2. Every member must attend all the Sunday meetings and absenteeism will be only accepted with apology.

3. If a member misses to attend a meeting and without even sending his /her contribution, committee members must the establish the cause of her/his absence with immediate effect.

4. No member or anybody from outside is allowed to bring another member's contribution when he/she is absent. For members who are parents, a son or daughter is allowed to bring the contribution and for bachelors and spinsters, a close relative can be allowed to attend and contribute.

5. Late comers will pay a fine of kshs 50.

6 If any member misses for three consecutive meetings without any proper reason he/she will be expelled from our group.

7. Any office bearer who goes contrary to the rules and regulation of the group will be put off.

Roscas in Kenya

- Most of the roscas do not have a random or a bidding order : 69.2% do not change their order after one cycle. (with a median # cycles equal to 3.2)

- 84% of members are women. (regular phenomenon)

Roscas in Kenya

- Why ? argument based on intra-household conflict : women use roscas to accumulate forced savings for the household, to make money temporarily illiquid to their husband.

- Alternative and important line of research: Gugerty (2007). Roscas are used by time inconsistent individuals to commit themselves to a particular saving stream. (see however Andreoni's critique)

- Facts :

  Confidentiality of discussion and procedures is generalized (to protect members against theft or malfeasance, but also to ensure freedom of speech during the meetings, and to avoid formation of hidden alliances outside the group meetings). 6 out of 44 groups have explicit written rules punishing leaks.

Roscas in Kenya

- Interviews :
  - " Joining a merry-go-round (i.e., a local rosca) is the only way to save some money. If I leave it at home, it will disappear.'‘
  - "In our group, we have secret meetings. Members cannot talk outside. There are bad husbands who take the money, and do not provide their wives with food and basic goods ... People quarrel a lot.'‘
  - "We wanted only women in the group, we are more free, and we can talk and laugh. Men always want to take the lead. They are like children ... They are not interested in improving the situation of the family.'‘
  - "You cannot trust your husband. If you leave money at home, he will take it.''

- Krahnen and Schmidt (1994) point out : ‘in many countries and cultures the participation by individuals in such groups creates a senior claim of the participant on resources that otherwise would have been absorbed by the `sponge' of family needs.’

Roscas in Kenya

In Kibera, the probability that a woman (18 years and older) participates in a rosca is 49%.

If a woman is working, her participation rate increases to 68%,

and to 74 % if she also lives in a couple

against 55% if working but not in a couple.

For men, 10%, 12% and 10%.

Also, 7% of the roscas directly purchase goods for its members, and others control purchases

Roscas in Kenya

The model with joint decision making

The household composed of two individuals : husband and wife. Borrowing by either member of the household is not possible.

Problem : joint decision to save for an indivisible good, for which women always have a larger preference.

Gender specific preferences for children and school fees, men are more subject to social pressure to help relatives (?) or to reveal status by conspicuous consumption, … with strong empirical support.

In a joint decision making, woman is forced to choose a savings rate lower than her optimum. If she saves in a rosca, her savings become illiquid for the husband. (social sanctions on reneging, fines on non-payments, …).

But what happens to the pot when it is taken home ?

Roscas in Kenya

Goal: To describe the conditions under which a man is ex post in accordance with her plan to purchase the good (of cost equal to one), even though he is ex ante worse off.

Assumptions:

- 2 periods and three goods.
- the household, if in a rosca, receives the pot at the second period.

The utility of the wife is:

$$U_w = u(c_1) + u(c_2) + \delta D$$

The utility of the husband is:

$$U_h = u(c_1) + u(c_2)$$

Roscas in Kenya

Household decision making is joint: it maximizes:

$$\Omega = (1-\gamma)U_h + \gamma U_w$$

$$with \quad 0 < \gamma < 1$$

subject to the following constraints:

$$s \geq 0$$

$$Y \geq c_1 + s$$

$$Y + s \geq c_2 + D$$

Roscas in Kenya

We assume that the wife has always an incentive to save to buy the durable good. We also assume that she has access to enough income to purchase the durable good. Her optimal saving scheme is 1/2 at each period. As a result:

$$u(Y) + u(Y) < u(Y - 1/2) + u(Y - 1/2) + \delta$$

The household does not want to purchase the good iff:

$$u(Y) + u(Y) > u(Y - 1/2) + u(Y - 1/2) + \gamma\delta$$

If γ is close to one, there is no conflict, and therefore no need to go to a rosca.

Roscas in Kenya

- It costs the wife a fixed cost T, T>0, to save through a rosca:
  - meeting attendance
  - social obligations
  - rigid pattern: non-contingent constant contributions

- We assume that T occurs in the first period and is always small enough, so that the wife still prefers to join the rosca than not saving at all:

$$u(Y)+u(Y)<u(Y-1/2)+u(Y-1/2)+\delta-T$$

Roscas in Kenya

Since the wife wants to save, and *u(.)* is concave, we know that there exists a value of δ such that:

$$u(Y+1/2) < u(Y-1/2) + \gamma\delta$$

Proposition: Joining a rosca is optimal (subgame perfect) for the wife for intermediate values of her bargaining power, γ. For high and low values, she does not join the rosca.

Roscas in Kenya

Intuition:

if γ is very low, even when she comes with the pot, the household prefers to spend on current consumption than on good D.

$$u(Y + 1/2) > u(Y - 1/2) + \gamma\delta$$

If γ is high, she does not need to go to the rosca to accumulate savings.

This general intuition is robust in more general settings (infinite horizon, savings and durable good benefits extend for more than one period, more than one indivisible good).

Roscas in Kenya

Welfare implications:

if she joins a rosca, wife is better off, husband worse off. But, in random roscas, if the household is among the first to get the pot, both may be better off.

Roscas in Kenya

Empirical predictions

Four tests :

1. Take a proxy for the wife's bargaining power: her share in household income. Controlling for household income, female rosca participation is an inverted-U of her share in household income.
2. Propensity to participate is higher for women who are married and live with their husband.

Roscas in Kenya

3. Regarding the amounts of the contributions, no strong predictions. There are different effects playing a role:
   - income constraint: if her income is very low, she can only save very little through the rosca.
   - voluntary savings by the household: realizing that in the near future, it might be in a position to buy the durable good, the household may decide to save on its own, thus reducing the need to resort to the rosca.
   - if women's relative power increases, total expenditures on indivisible goods may increase, and therefore the need to resort to roscas...

4. Total income may matter for the amounts contributed, but less for the participation

Roscas in Kenya

TABLE I
BASIC INFORMATION ON ROSCAS[40]

Variable	All roscas	Women only	Mixed
Number of members (median)	13	12	17
Months existed (median)	24	24	24
Contribute every day (proportion of roscas)	0.10	0.13	0.06
Contribute every week	0.35	0.36	0.30
Contribute every 2 weeks	0.06	0.09	0.01
Contribute every month	0.49	0.43	0.62
Monthly contribution (mean)	588.64	531.18	701.20
Length of cycle (median, in months)	6.07	5.83	11.33
Number of cycles (median, in lifetime of rosca)	3.21	3.67	2.57
Group comprises only women (proportion of roscas)	0.65	1.00	0
Group comprises only men	0.06	0	0
Group comprises both men and women	0.30	0	1.00
All members are same ethnicity	0.37	0.36	0.38
Order is unchanged each cycle	0.69	0.75	0.57
Started group with friends/relatives/neighbors	0.85	0.86	0.77
Group has secondary role (investment/insurance)	0.25	0.28	0.23
Number of Observations	385	258	108

[40] Information in this table uses only the data collected on the rosca groups in our sample. A single individual responded for each rosca group.

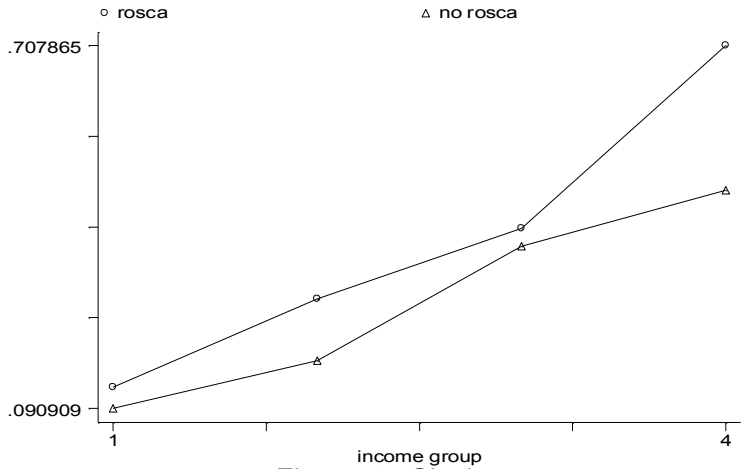


Figure 4 - Clock

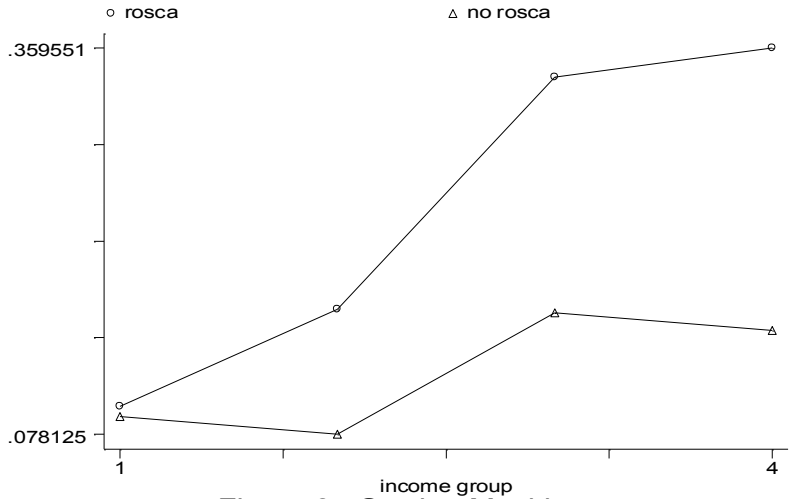


Figure 3 - Sewing Machine

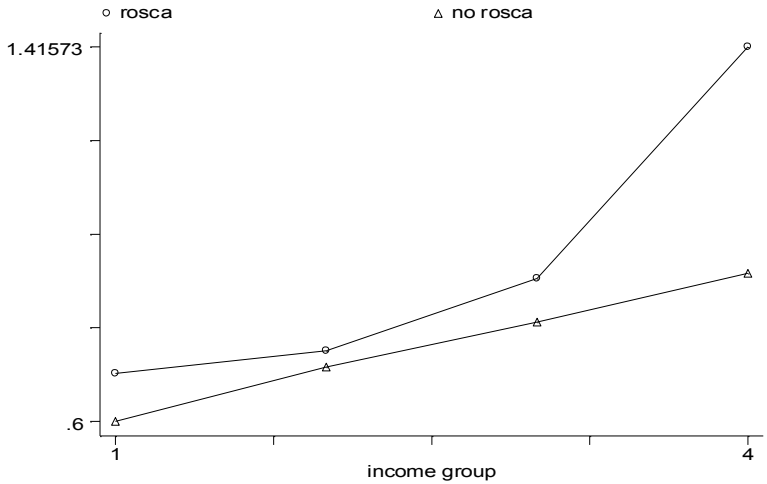


Figure 5 - Kerosene Latern

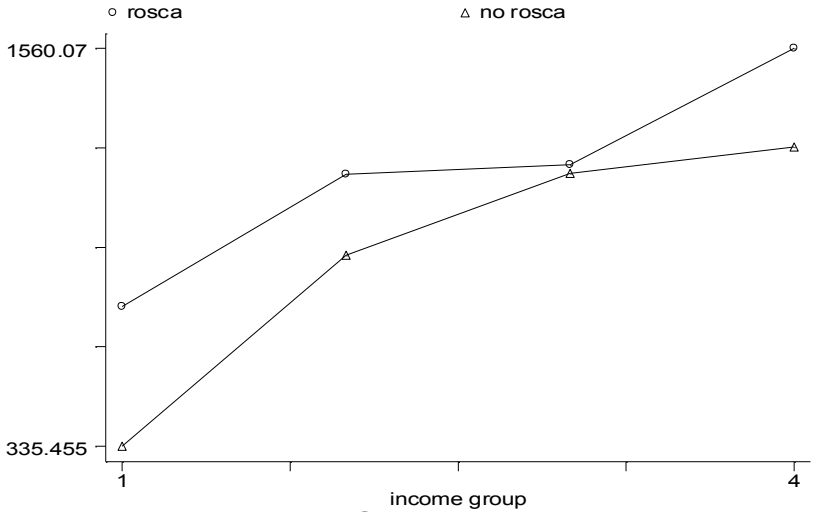


Figure 2 - Clothing Expenses

Roscas in Kenya

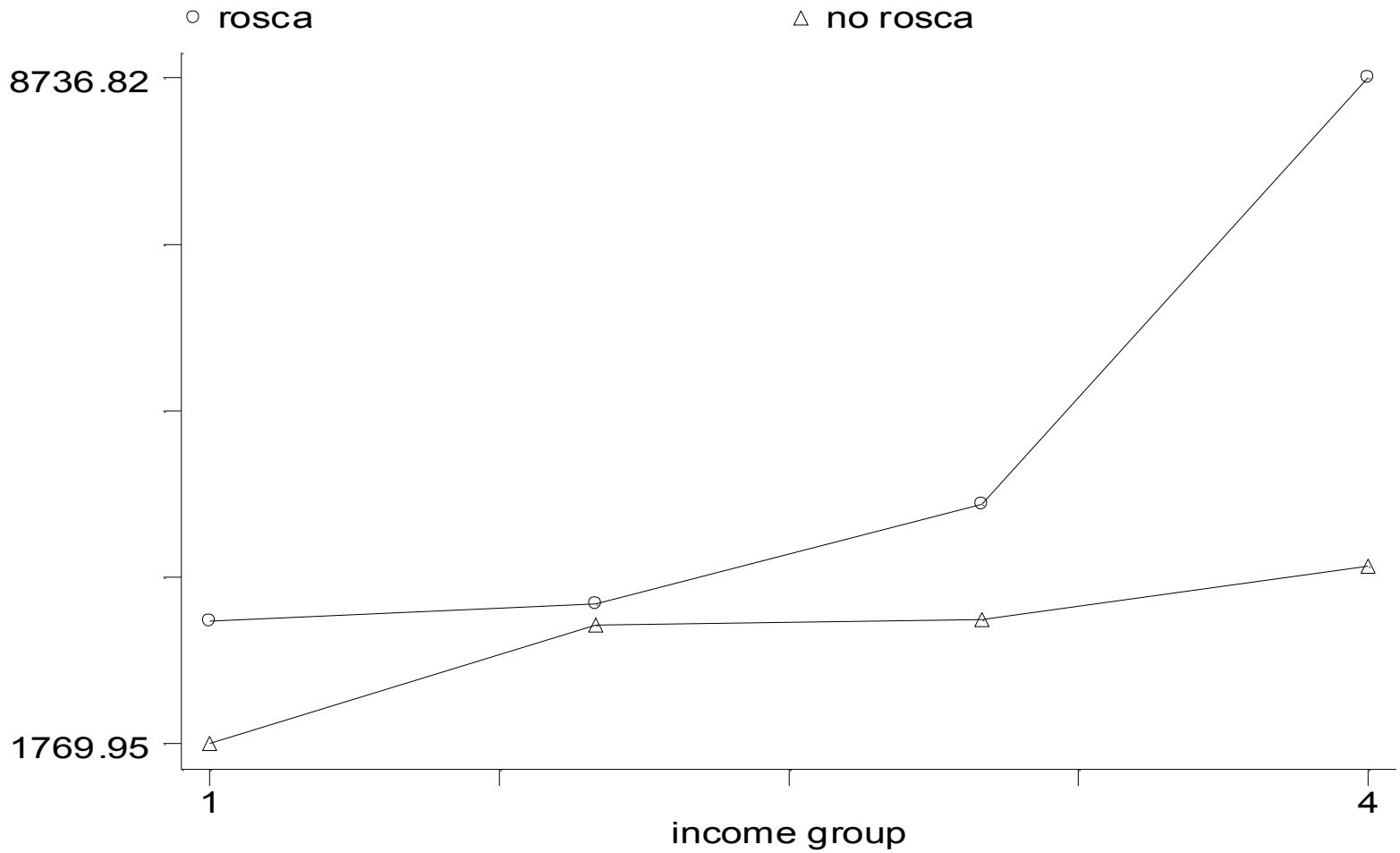


Figure 1 - School Expenses

TABLE II

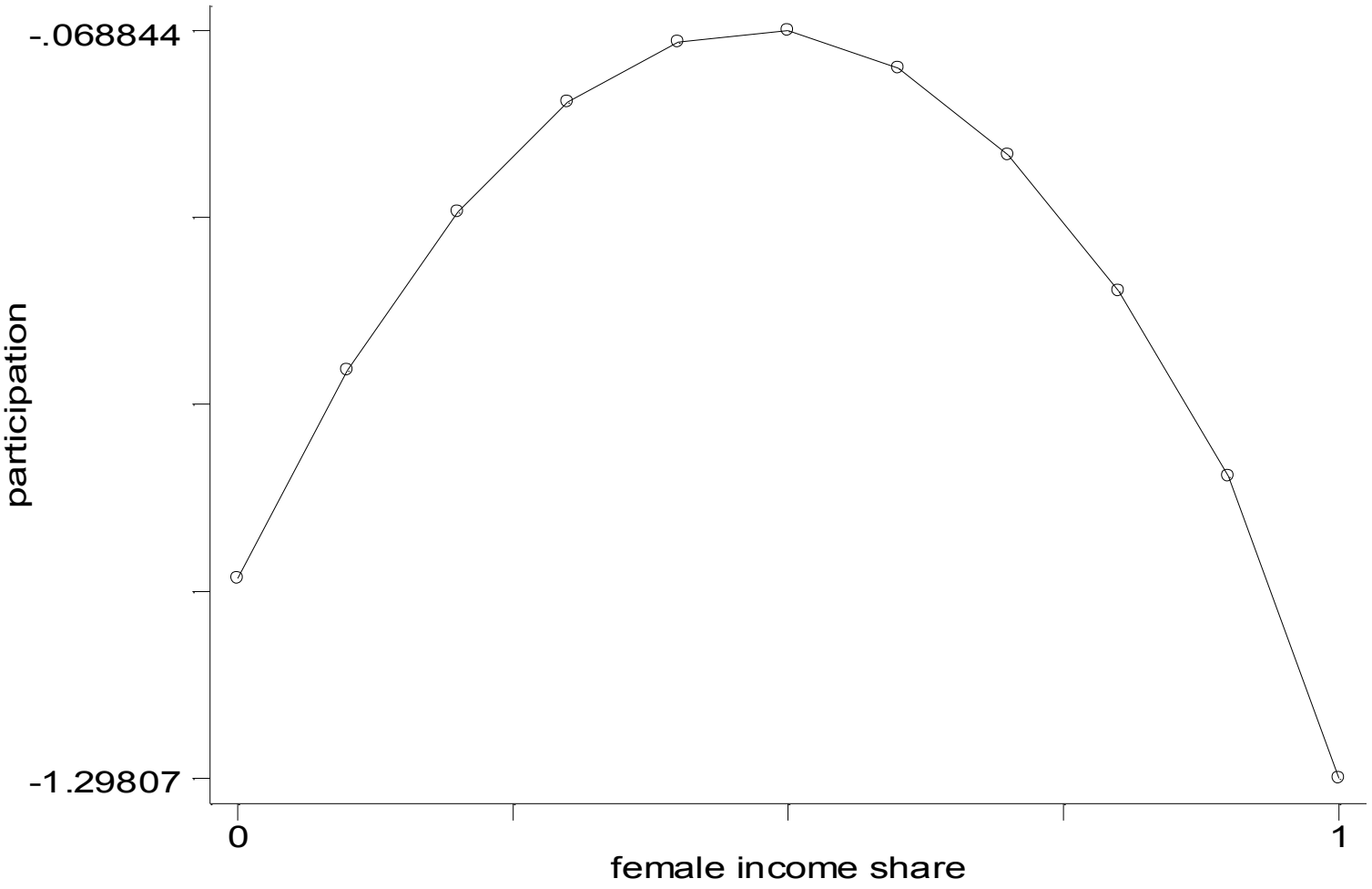
MEANS AND STANDARD DEVIATIONS OF CHARACTERISTICS OF POPULATION AND ROSCA PARTICIPANTS: TOTAL SAMPLE AND WOMEN LIVING IN COUPLES[36]

	TOTAL SAMPLE		WOMEN IN COUPLES	
Variable	All	Rosca members	All	Rosca members
Participates in a rosca	0.25 (0.44)	1 (0)	0.53 (0.50)	1 (0)
Total monthly rosca contribution	178 (514)	702 (821)	369 (721)	699 (870)
Female	0.53 (0.50)	0.84 (0.37)	1 (0)	1 (0)
Age	29.4 (9.6)	32.5 (8.4)	28.9 (6.5)	30.5 (6.5)
Married	0.59 (0.49)	0.71 (0.46)	1 (0)	1 (0)
Earns labor income	0.58 (0.49)	0.76 (0.43)	0.49 (0.50)	0.65 (0.48)
Has at least primary school	0.57 (0.49)	0.47 (0.50)	0.45 (0.50)	0.46 (0.50)
Monthly individual income	3141 (4909)	4001 (6252)	2457 (5860)	3599 (7471)
Female share in couple income	0.05 (0.16)	0.15 (0.22)	0.20 (0.25)	0.26 (0.25)
Female income share = 0	0.87 (0.34)	0.63 (0.48)	0.51 (0.50)	0.35 (0.48)
Female income share □0 & · 25%	0.03 (0.16)	0.07 (0.26)	0.10 (0.30)	0.13 (0.34)
Female income share □25 & · 50%	0.08 (0.27)	0.22 (0.41)	0.29 (0.46)	0.39 (0.49)
Female income share □50 & · 75%	0.01 (0.12)	0.05 (0.21)	0.05 (0.22)	0.08 (0.28)
Female income share □75 & · 100%	0.01 (0.11)	0.03 (0.16)	0.05 (0.21)	0.05 (0.22)
Household monthly income	8009 (9207)	8370 (9456)	7860 (9329)	9515 (9927)
Monthly food expenditures	5250 (3031)	4976 (2761)	5081 (2547)	5351 (2830)
Monthly luxury expenditures	368 (723)	367 (700)	343 (708)	349 (663)
Monthly children expenditures	1761 (2550)	1862 (2902)	1413 (2273)	1880 (2762)
Household size	5.05 (2.14)	4.8 (2.1)	4.96 (1.90)	5.38 (1.90)
Number of children	2.21 (1.63)	2.3 (1.6)	2.42 (1.58)	2.74 (1.55)
Years in Kibera	7.60 (6.19)	7.96 (5.84)	6.63 (5.04)	7.75 (5.32)
Native language: kikuyu	0.23 (0.42)	0.24 (0.43)	0.19 (0.40)	0.24 (0.43)
Native language: luhya	0.18 (0.39)	0.17 (0.38)	0.17 (0.37)	0.15 (0.36)
Native language: luo	0.40 (0.49)	0.38 (0.49)	0.44 (0.50)	0.43 (0.50)
Native language: kamba	0.06 (0.23)	0.07 (0.26)	0.06 (0.23)	0.07 (0.25)
Native language: kisii	0.10 (0.30)	0.10 (0.29)	0.10 (0.30)	0.08 (0.28)
Number of observations	1269	324	344	182

[36] Information in this table is from the individual and household level data we collected from our random household survey. It includes only individuals 16 years and older. Standard deviations are shown in parentheses.

TABLE III
PROBIT ESTIMATION OF ROSCA PARTICIPATION[42]

Variable	All Sample (1)	All Sample (2)	Females in couples (3)	Females in couples (4)
Female	0.226** (0.040)	0.226**(0.040)		
Couple	-0.119** (0.050)	-0.120** (0.050)		
Female × Couple	0.178** (0.073)	0.174** (0.073)		
Household income	9.36e-07 (1.69e-06)	9.59e-07 (1.69e-06)	4.48e-06 (5.31e-06)	4.87e-06 (5.30e-06)
(Household income)^2	-2.13e-11 (4.14e-11)	-2.19e-11 (4.14e-11)	-2.53e-11 (1.12e-10)	-2.99e-11 (1.12e-10)
Female share of Couple Income	1.015** (0.199)		1.49** (0.294)	
(Female share of Couple Income)^2	-1.066** (0.243)		-1.52** (0.360)	
Lived in Kibera for at most 2 years	-0.086** (0.030)	-0.087** (0.030)	-0.115 (0.089)	-0.121 (0.090)
Number of children	-0.016* (0.008)	-0.016* (0.008)	0.033 (0.021)	0.033 (0.022)
Primary school degree	-0.034 (0.026)	-0.034 (0.026)	-0.012 (0.061)	-0.012 (0.062)
Age	0.055** (0.008)	0.056** (0.008)	-0.002 (0.036)	0.002 (0.036)
(Age)^2	-6.4e-04** (1.1e-04)	-6.4e-04** (1.1e-04)	2.03e-04 (5.75e-04)	1.4e-04 (5.7e-04)
Kikuyu	-1.6e-04 (0.042)	-8.4e-05 (0.042)	0.171* (0.099)	0.179* (0.099)
Luhya	0.028 (0.046)	0.026 (0.045)	0.111 (0.102)	0.109 (0.102)
Luo	0.007 (0.038)	0.006 (0.038)	0.134 (0.089)	0.137 (0.089)
Kamba	0.199** (0.077)	0.201** (0.077)	0.283** (0.105)	0.291** (0.103)
Female income share >0 & $\leq 20\%$		0.162 (0.128)		0.124 (0.126)
Female income share >20 & $\leq 40\%$		0.274** (0.071)		0.310** (0.062)
Female income share >40 & $\leq 60\%$		0.293** (0.085)		0.307** (0.069)
Female income share >80 & $\leq 100\%$		-0.043 (0.086)		-0.032 (0.151)
Number of Observations	1267	1267	344	344
Pseudo R^2	0.28	0.29	0.14	0.15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participation
-1.29807
0
1
female income share

ESTIMATION OF ROSCA CONTRIBUTIONS[43]

Variable	All sample (1)	All sample (2)	Women in couples (3)	Women in couples (4)
Female	210.3 (282.5)	180.8 (281.7)		
Couple	68.0 (318.3)	107.3 (317.6)		
Female × Couple	-209.7 (374.3)	-219.5 (371.3)		
Household Income	.009 (0.007)	.009 (0.007)	0.029** (0.013)	0.028** (0.013)
(Household Income)^2	-6.19 e-08 (1.51 e-07)	-3.20 e-08 (1.52 e-07)	-3.86e-07 (2.55e-07)	-3.28e-07 (2.56e-07)
Female share of Couple Income	2294.6** (998.3)		1149.3* (667.3)	
(Female share of Couple Income)^2	-2026.0* (1099.0)		-868.4 (831.0)	
Number of children	-34.3 (35.8)	-33.5 (35.9)	-24.20 (44.22)	-26.6 (44.5)
Primary school degree	-38.0 (100.0)	-42.7 (100.6)	-43.17 (128.8)	-65.9 (131.1)
Age	109.9* (65.2)	104.3 (64.7)	60.95 (78.10)	68.5 (78.0)
(Age)^2	-1.33* (0.80)	-1.27 (0.80)	-0.707 (1.21)	-0.798 (1.21)
Inverse Mill's ratio	-387.1 (400.0)	-318.9 (395.5)		
Female income share >0 & $\leq 20\%$		194.2 (315.7)		40.23 (306.0)
Female income share >20 & $\leq 40\%$		378.6 (232.1)		173.3 (160.3)
Female income share >40 & $\leq 80\%$		630.6** (252.4)		380.4** (182.3)
Female income share >80 & $\leq 100\%$		19.74 (345.3)		-22.38 (369.9)
Constant	-1985.9 (1713.4)	-1777.7 (1695.8)	-778.3 (1180.5)	-858.9 (1180.2)
Number of Observations	321	321	181	181
$\overline{R}^2$	0.04	0.03	0.074	0.065

Roscas in Kenya

SUSTAINABILITY AND INSTITUTIONAL DESIGN IN INFORMAL GROUPS : SOME EVIDENCE FROM KENYAN ROSCAS (Anderson, Baland and Moene, 2008)

Informal credit groups :

- participation is voluntary
- no external enforcement

Enforcement mechanisms ? Rotational structure of roscas → incentive to default on later contributions

Two main problems:

- members do not regularly pay their contributions
- stop contributing once received the pot

Roscas in Kenya

Interviews from Kibera:

"the usual form of cheating is for a new member to come to a merry-go-round (local rosca), and ask for number 1 or 2 because they have an emergency… And then, they stop contributing. (…) There are many cheaters like that, about half of the population! Some of them are well known, and still, some groups fail due to cheating, but more often because members lack money to contribute."

Threat of social sanctions deter defection [Besley, Coate, and Loury (1993), Handa and Kirton (1999)]

Roscas in Kenya

What do we do?

1. Most severe sanction = exclusion from future roscas [Ardener 1964]. We examine how exclusion can be used to deter defaulting.

2. Examine how institutional structure of roscas can be designed to minimize enforcement problems. In particular, we shall argue that enforcement problems are lower when turns are not redrawn between cycles.

   in the Kibera Nyakwageria group ``*at the beginning, numbers were drawn by lottery (i.e. random allocation of ranks), to decide who will host the group in her house and get the pot (...) We dropped the lottery, and the executive committee decides the order. If attendance was found to be no good, then you will be given a late number.*''

3. Investigate predictions with data we collected on rosca groups in a Kenyan slum

Roscas in Kenya

Analyse problem of default → extend usual framework to consider multiple rosca cycles, as we want to explicitly model the utility losses that exclusion from all future roscas involves.

There are two main motives to join a rosca:

- *the early pot motive:* seminal work of Besley et al (1993). Roscas = way to save for purchase of indivisible durable goods when have no access to formal credit markets.
- *the household conflict motive:* way for women to commit their households to a particular saving pattern (Anderson and Baland (2002))

We focus here on enforcement issue, assuming that everything is observable.

Roscas in Kenya

Model rosca institutional structure with 2 major features:

- allocation of ranks
- membership fee

Three potential allocations of ranks: fixed, random, bidding. Here, the focus will be on fixed vs. random

Previous literature: random vs. bidding [Besley, Coate, and Loury (1993 and 1994), Kovsted and Lyk-Jensen (1999), Klonner (2002)])

In this presentation, we focus on the early pot motive, but everything extends easily to the household conflict motive

Roscas in Kenya

Basic Setting

- *n* members contributes *P/n* to common pot
- the pot buys one unit of indivisible good which costs *P*
- indivisible good lasts one period
- time is discrete, time between meetings is one unit: duration of cycle = *n*
- individuals are infinitely lived

Roscas in Kenya

Lifetime utility:

$$U(c_t) = \sum_{t=1}^{\infty} \delta^t u(c_t, D_t)$$

Budget constraint:

$$y = c_t + s_t$$

c_t = expenditures on other goods

D_t = consumption of indivisible good (0 or 1)

$\delta < 1$ = discount factor

no access to capital markets: $s_t >= 0$

Let c_t^*= optimal consumption flow

Motive to save: $c_t^* < y$

Roscas in Kenya

Rosca contribution: $s_R = s_t = \frac{P}{n}$ for all *t*

Consumption: $c_t = c_R = y - s_R$ for all *t*

At each cycle, each member has probability *1/n* of receiving a particular rank. Expected Utility in a random rosca:

$$EU^{ra}(c_R) = \sum_{t=1}^{\infty} \delta^t u(c_R,0) + \frac{1}{n} \sum_{t=1}^{\infty} \delta^t (u(c_R,1) - u(c_R,0))$$

$$= \frac{\delta}{1-\delta} u(c_R,0) + \frac{\delta}{1-\delta} \frac{1}{n} (u(c_R,1) - u(c_R,0))$$

Roscas in Kenya

- In a fixed rosca, for rank *l*:

$$EU^{fi}(c_R) = \sum_{t=1}^{\infty} \delta^t u(c_R,0)$$

$$+(\delta^l + \delta^{l+n} + \delta^{l+2n} + \ldots)(u(c_R,1) - u(c_R,0))$$

$$= \frac{\delta}{1-\delta} u(c_R,0) + \frac{\delta^l}{1-\delta^n} (u(c_R,1) - u(c_R,0))$$

Roscas in Kenya

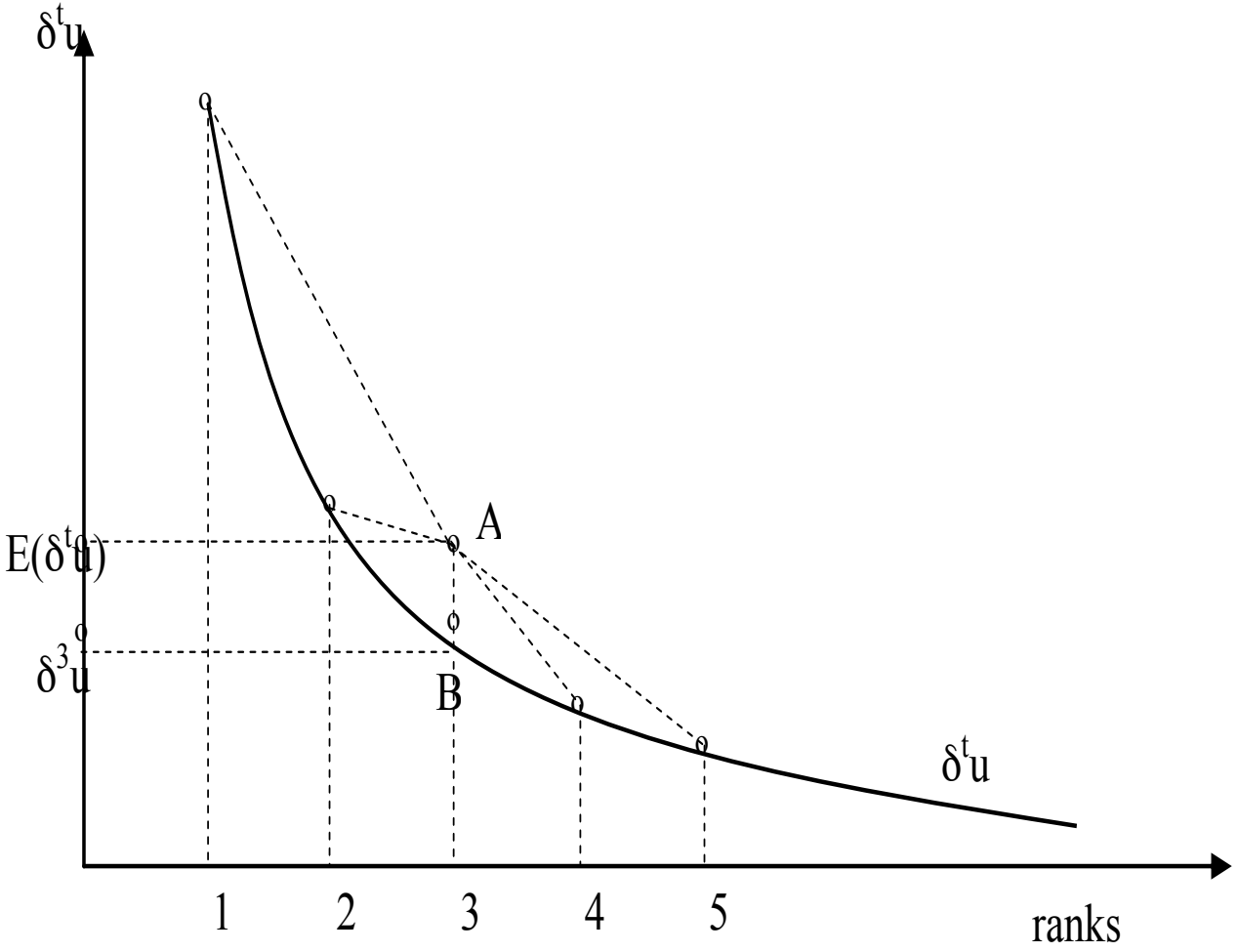
Institutional design

We focus on the allocation of ranks. There are two main systems of allocation: fixed ranks, or ranks randomly drawn at each cycle.

Proposition 1: The median member strictly prefers the random to the fixed allocation of ranks.

Intuition: follows directly from the way (multiplicative) discounting operates, that is, the discounted value gets smaller at a decreasing rate with time: the average of the discounted values at different points in time is always greater than the discounted value at the average of these points in time (i.e., median rank).

Roscas in Kenya



Roscas in Kenya

- Implication: given any initial allocation of ranks in the first cycle, in each subsequent cycle, there is always a majority of members who prefer ranks to be re-drawn randomly at the beginning of each cycle.

- So, if the game is: group meets, decides allocation of ranks, then cycle takes place, then again group meets, decides allocation of ranks for next cycle, then cycle starts…
  - There is always a majority of members who opt against the fixed allocation of ranks.
  - This is not true if there is a choice among many other allocations (2 can decide to share ½ chances of being first or second, and then let the 3d to remain 3d with certainty).
  - It suggests that no group will ever stick to a given allocation of ranks
- Ideally, one would prefer lottery, or at least ranks to be revealed within a cycle.

Roscas in Kenya

- Moreover: random perceived as more fair: each member should be given a chance of getting a good rank. Utilitarianism under uncertainty suggests that some weight should be given to the ex post distribution of welfare (see Diamond, Hammond, Mookherjee,…): this implies that ex post, random roscas are better than fixed roscas.

Roscas in Kenya

Rosca Sustainability

Two enforcement problems:

(1) Leave rosca once receive pot
(2) Leave rosca if receive unfavorable rank

First problem most severe for first ranked member
Second problem most severe for last ranked member

We distinguish between two punishments: exclusion from all roscas forever, and social sanctions. We let s_i represent the cost of extra social sanctions that can be inflicted on individual i.

Roscas in Kenya

Proposition 2: ***In the absence of social sanctions, roscas are not sustainable. The member who is the first to receive the pot is always tempted to leave and defect, even if she is excluded from all future cycles.***

Net gain from leaving rosca is always strictly positive for first ranked

First member can always do better by leaving group and saving on own → at least replicate best rosca (fixed order)

Compared to random rosca: at home guaranteed first rank in each cycle

Compared to fixed rosca: rosca imposes a sub-optimal savings rate

nb: a fortiori true for household motive as social sanctions are used to commit the household

Roscas in Kenya

Proposition 3: ***The enforcement problems of the last ranked member are always less severe than those of the first ranked member.***

In a fixed order rosca, they face exactly the same incentive problem: they have to wait a full cycle before receiving the next pot.

In a random order rosca, first member has more incentives to leave:

last ranked member can expect an earlier rank

first ranked member can expect a later rank

Roscas in Kenya

Allocation of ranks:

Proposition 4: ***For a given s_i , enforcement problems are less severe in a fixed-order than in a random-order rosca.***

Enforcement problems are most severe for the first ranked member in a random rosca

Fixed-order roscas are more favorable to first ranked member

The incentives to defect can thus be strictly ordered (by increasing order):

1. last member, random order
2. last member, fixed order & first member, fixed order
3. first member, random order

Roscas in Kenya

Membership Fee

Membership fee cannot solve enforcement problems

The fee kept for lifetime of rosca = sunk cost in a fixed rosca. The fee does not help.

In a random rosca, argument a bit more complex, but basically, max fee for average member is equal to the average gain one gets from joining, which is not large enough to deter first ranked member who has to wait a full cycle before becoming an 'average' member only after a full cycle.

Success of roscas: avoid accumulated savings and money management issues

Roscas in Kenya

Number of members

Other features are: number of members, size of pot, cycle length, frequency of meetings, contribution.

contribution=pot/members

frequency of meetings=cycle length/members

and we assume:

size of pot is exogenous (predetermined motive to save, price of indivisible good is exogenous)

membership size = cycle length

→ only one choice variable left here, say membership.

Cannot sign relationship to enforcement

Roscas in Kenya

EMPIRICAL PREDICTIONS

Enforcement constraint: gains to default < costs of sanctions

Main hypothesis: fixed roscas are better able to solve enforcement problems than random ones

Problem: we do not have data on roscas with exogenous ability to impose sanctions.

Roscas in Kenya

- The data we have is how participants to different types of roscas vary by individual characteristics.
- We have that a majority of members, irrelevant of their type, prefer random roscas to fixed. As a result, if different roscas do systematically vary by the characteristics of their members, it can be an indirect test of Proposition 4.
- Vulnerability to social sanctions, si, is high when individuals are less mobile (own their dwellings, live in a large family), have greater social networks (spent more years in the slum), have permanent employment (possibly in the formal sector), and have more visible wealth and objects of value.
- We expect that individuals with a higher si to be more likely to belong to a random rosca.

Roscas in Kenya

ETHNOGRAPHIC EVIDENCE

Open interviews with 50 informal groups

Groups certainly invest time and resources in addressing enforcement problems.

1. When a member fails to contribute regularly, groups generally resort to a system of progressive sanctions. They visit the member at his home, or send warning letters. In the absence of a satisfactory reaction, they discuss the matter at a general meeting. Fines are also regularly imposed.

Roscas in Kenya

2. More importantly, many roscas also attempt to retrieve the amounts due. For instance, when one member left with the pot, the Arahuka group went to the home of the person and appropriated a radio set to compensate for the loss. (In all groups, the acceptance of new members is subject to his being well-known in the group: ''The group knows where everybody has his house. So, if someone cheats us, group members go to his house and take away things to repay themselves.'')

3. Ultimately, defecting members may be expelled.(In our sample of 374 roscas, 10% have explicitly expelled members.) The group may also complain to the police station or the KANU (the dominant political party) local office.

4. More frequently, social pressure may take the form of giving the defaulting member a `bad name', to reduce his chances in becoming a member of another group.

Roscas in Kenya

5. But groups also resort to more diffuse social threats and pressures. Thus, in a letter to a member ``refusing to take the appropriate action'', the chairman of the Kibera Kianda Self Help Group writes: ``So, you have been given ample time and you have yourself to blame if all goes worse. The ball is in your pocket!'' Even more explicitly, in a meeting of the same group, ``the chairman cautioned committee against irregularities and misuse of money. He reminded members of a deadly Kikuyu curse, known as `kirumi', which could be used if one squanders others' money. He gave example of what has befallen some members of (another group).''

In the data, membership fees are rarely used: only 29% of roscas, and fees are extremely low (about 25% of monthly contribution), most likely to finance formalization costs.

	All Roscas	Fixed Order	Random Order	Equivalence of Means Fixed versus Random
Fixed	0.71	1	0	
	(0.46)	(0)	(0)	
Random	0.29	0	1	
	(0.46)	(0)	(0)	
Members	16.04	15.61	17.10	-1.49
	(11.44)	(10.58)	(13.27)	(1.30)
Cycle Length	250.27	209.90	347.18	-137.28***
	(255.86)	(219.12)	(307.81)	(28.19)
Pot	4123.10	3199.91	6338.77	-3138.87***
	(5706.44)	(4121.25)	(7964.47)	(627.71)
Years existed	2.40	2.30	2.66	-0.29
	(2.98)	(2.30)	(4.19)	(0.79)
Number Past Cycles	9.45	10.94	5.91	5.84**
	(23.12)	(26.43)	(11.35)	(2.78)
Contrib.	321.20	294.97	384.14	-89.16*
	(452.25)	(475.36)	(386.02)	(51.18)
Membership Fee	0.29	0.32	0.21	0.11**
	(0.45)	(0.47)	(0.41)	(0.05)
Women only	0.67	0.73	0.58	0.05
	(0.47)	(0.45)	(0.49)	(0.06)
Same ethnic	0.37	0.34	0.45	-0.12**
	(0.48)	(0.47)	(0.50)	(0.05)
Friends	0.56	0.48	0.74	-0.25***
	(0.50)	(0.50)	(0.44)	(0.05)
Relatives	0.09	0.10	0.05	0.04
	(0.28)	(0.30)	(0.23)	(0.03)
Neighbors	0.21	0.26	0.10	0.16***
	(0.41)	(0.44)	(0.30)	(0.05)
No.Obs.	374	264	110	374

Table 1: Rosca Characteristics[32]

	No Rosca	All Roscas	Fixed Order	Random Order	Equivalence of Means Fixed versus Random
Female	0.40	0.86	0.86	0.84	0.03
	(0.49)	(0.35)	(0.34)	(0.37)	(0.04)
Married	0.56	0.66	0.67	0.64	0.03
	(0.50)	(0.47)	(0.47)	(0.48)	(0.05)
Age	29.65	32.86	32.28	34.24	-1.95**
	(9.34)	(8.33)	(8.38)	(8.08)	(0.94)
At least Primary School	0.62	0.48	0.47	0.48	-0.01
	(0.49)	(0.50)	(0.50)	(0.50)	(0.06)
Permanent. work	0.37	0.60	0.53	0.75	-0.22***
	(0.48)	(0.49)	(0.50)	(0.43)	(0.05)
Formal sector	0.28	0.19	0.11	0.38	-0.27***
	(0.45)	(0.39)	(0.31)	(0.49)	(0.04)
Years in Slum	7.43	8.15	7.86	8.84	-1.00
	(6.37)	(5.93)	(5.69)	(6.45)	(0.67)
Household Income	8028.84	9188.81	7977.69	12067.55	-4089.86***
	(7482.10)	(9762.93)	(9272.73)	(10330.35)	(1089.56)
Household Size	4.98	4.86	4.67	5.33	-0.66***
	(2.13)	(2.08)	(2.05)	(2.11)	(0.23)
Own room	0.19	0.21	0.10	0.47	-0.37***
	(0.39)	(0.41)	(0.30)	(0.50)	(0.04)
No. Objects of Value	4.11	4.43	4.01	5.44	-1.44***
	(2.83)	(2.86)	(2.43)	(3.52)	(0.32)
Kikuyu	0.21	0.24	0.12	0.52	-0.39***
	(0.41)	(0.43)	(0.33)	(0.50)	(0.04)
Luhya	0.19	0.18	0.22	0.08	0.14***
	(0.39)	(0.38)	(0.41)	(0.27)	(0.04)
Luo	0.41	0.38	0.46	0.18	0.28***
	(0.49)	(0.49)	(0.50)	(0.39)	(0.05)
Previous Roscas	0	0.50	0.39	0.77	-0.52***
	(0)	(0.50)	(0.49)	(0.42)	(0.10)
Other Group Membership	0.66	0.60	0.56	0.72	-0.16***
	(0.47)	(0.49)	(0.50)	(0.45)	(0.06)
Number. Observations	848	374	264	110	374

Table 2: Individual and Household Characteristics[34]

Roscas in Kenya

Estimate random versus fixed order rosca as a function of individual characteristics, in order to test the conjectures.

Use two-step procedure :

First stage : estimate probability individual joins a rosca (gender and marital status used as instruments)

Second stage : estimate structural features independently

	Random	Random	Random	Random
	(1)	(2)	(3)	(4)
Age	-0.014 (0.008)	-0.011 (0.01)	-0.006 (0.01)	-0.016 (0.011)
At least Primary	-0.22 (0.15)	-0.34 (0.17)**	0.05 (0.16)	-0.14 (0.18)
Household Income	1.4e-5 (8.6e-6)*	1.6e-5 (6.5e-6)**	1.4e-5 (6.9e-6)**	1.6e-5 (8.3e-6)
Household Size	0.045 (0.038)	0.066 (0.038)*	0.11 (0.04)***	0.12 (0.04)***
$\leq$ 1 yrs in kibera			-0.24 (0.31)	-0.15 (0.32)
Kikuyu			1.07 (0.17)***	0.74 (0.19)***
Permanent Employment		0.38 (0.16)**		0.28 (0.17)*
Formal Sector		0.77 (0.21)***		0.65 (0.22)***
Own room		1.10 (0.18)***		0.70 (0.21)***
No. Objects of Value	0.08 (0.03)***			-0.03 (0.04)
Previous Roscas			0.95 (0.16)***	0.85 (0.16)***
Group Membership			0.27 (0.17)**	0.19 (0.17)
Constant	-2.79 (0.65)***	-1.39 (0.40)***	-2.26 (0.43)***	-2.05 (0.45)***
Log likelihood	-733.47	-700.62	-691.39	-679.03
No. Obs	373	373	373	373

Table 3 - Estimations of whether individual select into random or fixed order roscas[36]

Roscas in Kenya

The issue of large pots

Random roscas have larger pots... (We ran same estimates controlling for pot size, biases, but robust)

Table 4: pot size and random allocation of ranks.

Pot size	(0,900)	[900,2100)	[2100,5000)	[5000,40000)
Proportion with random order	0.22	0.22	0.31	0.42
No. observations	92	94	88	100

Table 4 - Pot size and random allocation of ranks

- But the incentives to default are higher the larger the pot. Given the superior enforcing property of fixed roscas, for a given si, we expect roscas with larger pots to resort more to a fixed order of ranks ??

Roscas in Kenya

- Generalized model with varying pot size. The key issue is to what extent vulnerability is related to income. If we accept the idea that richer people want larger pots, but are more vulnerable, then an equilibrium where rich go in large pot random roscas, while poor go in small pot fixed rosca is perfectly conceivable.

- Note that, where pot is larger, enforcement is more difficult, so that the switch to random occur for higher values of si.

	Poor agent	Rich agent
Very low si	No rosca	No rosca
Low si	Fixed rosca	Fixed rosca
High si	Random rosca	Fixed rosca
Very high si	Random rosca	Random rosca

Roscas in Kenya

CONCLUSIONS

Some evidence that institutional features may solve enforcement problems since more reliable individuals tend to participate in random roscas. Interpretation: roscas with more reliable members can choose a random allocation of ranks.

Random roscas seem to rely not only on job stability and permanence in slum, but also house ownership, which also impairs their mobility. They may rely on social sanctions but it is distinct from expulsion of group as punishment

Constrasts with previous literature :

theoretically we show that expulsion from group is never a sufficient deterrent

empirically when rosca groups did suffer problems, very few (10%) turned to expulsion measures.

Still, our empirical strategy is not entirely convincing.