ARE 251/Econ 270A Elisabeth Sadoulet
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Micro-finance institutions

1. MFIs and their borrowers

1.1. The principles of group lending

- Grameen Bank
- Other MFIs
- The basic rules of micro-finance for the poor:
  - small loans at start and steep increase in loan size
  - no physical collateral
  - intensive screening and monitoring by agents
- The basic rules of group lending: same plus:
  - self-selection in groups (SS)
  - joint liability (JL)
- The usual arguments for group lending:
  - SS + JL $\Rightarrow$ eliminate bad borrowers (AS)
  - SS among people that know each other $\Rightarrow$ Social sanctions for enforcement $\Rightarrow$ limit MH in willingness to pay and in choice of projects.

  Both allow to maintain access to the poor and high repayment rates

1.2. The lending problem

- Moral hazard in repayment:
  Could be curtailed by either collateral or dynamic incentives. Hence not such an issue. The real problem is the need for insurance.

  Investment of 1 unit $\Rightarrow X$ with probability p and 0 with probability $(1-p)$.
  Assume no other resources to repay (hence necessary limited liability).
  Repayment r (includes principal).

			Returns:	Collateral	Future
$(1-p)$	Fails	Default	0	$-C$	0
p	Success	Repay	$X-r$	$X-r$	$X-r+F$
		Unwilling	X	$X-C$	X

  MH eliminated if $C > r$ (but then limited liability is de facto cancelled) or $F > r$.
  But this does not address the fundamental risk of a bad return, and the consequent loss of access to credit.

- Limited liability and adverse selection:
  Would need differentiated contracts. With asymmetric information, cross subsidization of risky borrowers by safe borrowers. Problem to keep safe borrowers.

  - 2 types of individual

R	X_R	p_R	μ	(μ proportion in population)
S	X_S	p_S	$(1-\mu)$	

  $p_S > p_R, X_S < X_R.$

  Bank: 0 profit, cost of money : ρ (including principal)

  - First best under perfect information is interest rate discrimination: $r_i = \rho / p_i$,
  - Under asymmetric information: pooling $\Rightarrow$ interest rate at an intermediate level.

  $$\mu p_R r + (1-\mu) p_S r = \rho$$

  $$\Rightarrow \quad r = \frac{\rho}{\mu p_R + (1-\mu) p_S} \qquad \text{Hence } r_S < r < r_R$$

  Cross-subsidization of risky loans by safe loans.
  Participation of borrower i for $p_i X_i \geq p_i r$
  If projects are just profitable, $p_S X_S = p_R X_R = \rho$, then S borrowers are driven out. (Lemons)

- Exercise: For reference, find an efficient separating contract.

1.3. Joint liability with a unique contract: produces interest rate discrimination, which improves efficiency and the pool of borrowers (Ghatak, EJ 2000)

- JL and SS induce assortative matching (homogenous groups)
  JL: payment of own share r if successful, and part of other's share c if other fails.
  Utility for i associated with j:
  $U_{ij} = p_i X_i - p_i\left(r + (1-p_j)c\right)$

  Loss to S for accepting R: $T_S = p_S(p_S - p_R)c$
  Gain to R for teaming with S: $B_R = p_R(p_S - p_R)c < T_S$

  Hence heterogenous groups are not possible, since R cannot compensate S.
  Notice: This model has no cost to loosing access to credit. Show that heterogenous groups are possible if there is future benefit in access to credit (Sadoulet, 2000)

- Hence interest rate discrimination:
  Payment by i: $P_i = p_i\left(r + (1-p_i)c\right)$
  Difference: $P_R - P_S = (p_S - p_R)\left((p_S + p_R - 1)c - r\right)$ increases with c.

As c increases, efficiency in allocation of resources improves.

P_R however remains lower than P_S for $c < \dfrac{r}{p_S + p_R - 1}$. Hence usually cannot reach full efficiency.

- Equilibrium contract:
  Zero profit for bank: $\mu p_R\left(r + (1-p_R)c\right) + (1-\mu)p_S\left(r + (1-p_S)c\right) = \rho$
  $\Rightarrow r = \dfrac{\rho}{\bar{p}} + c\left(\dfrac{\mu p_R^2 + (1-\mu)p_S^2}{\bar{p}} - 1\right)$, where $\bar{p} = \mu p_R + (1-\mu)p_S$

- Pool of borrowers:
  Payment by i: $P_i = \rho\dfrac{p_i}{\bar{p}} - c\dfrac{p_S p_R}{\bar{p}}\left(p_i - \bar{p}\right)$
  Participation constraint : $P_i \le p_i X_i$

  Hence c lowers the participation constraint for S and raises it for R
  $\Rightarrow$ improves efficiency in allocation of funds.

1.4. Joint liability as a screening device, with a menu of contracts (Ghatak, EJ 2000)

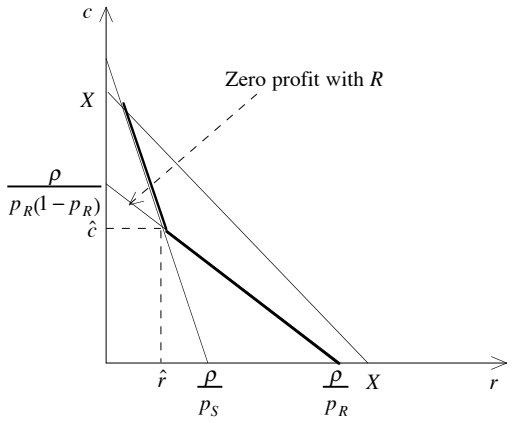
- The contract:
  Bank offers a menu $\left\{(r_S, c_S), (r_R, c_R)\right\}$
  $U_{ij}(k) = p_i X_i - p_i\left(r_k + (1-p_j)c_k\right)$, utility to i, associated with j, in contract (r_k, c_k)
  Constraints:
  - zero-profit on each type of loan: $p_i\left(r_i + (1-p_i)c_i\right) = \rho$
  - participation constraint: $U_{ii}(i) = p_i X_i - p_i\left(r_i + (1-p_i)c_i\right) \ge 0$
  - incentive compatibility: $U_{ii}(i) \ge U_{ii}(j)$
  - limited liability constraint: $r_i + c_i \le X_i$

- Incentive compatibility constraint $\Rightarrow$ assortative matching:
  $U_{SS}(S) - U_{SR}(S) > U_{RS}(S) - U_{RR}(R)$

- Optimal contract:
  Let $(\hat{r}, \hat{c})$ be the efficient pooling contract solution of 1.3 above:
  $\hat{c} = \dfrac{\hat{r}}{p_S + p_R - 1}$ and $\hat{r}\dfrac{p_S p_R}{p_S + p_R - 1} = \rho$, (which satisfy: $p_i\left(\hat{r} + (1-p_i)\hat{c}\right) = \rho$)

  Then there exists a separating contract $\left\{(r_S, c_S), (r_R, c_R)\right\}$, in which:
  $r_S < \hat{r} < r_R$ and $c_R < \hat{c} < c_S$

Notice, however, that in this contract, $\hat{c} > \hat{r}$, and henceforth $c_S > r_S$



1.5. Joint liability induces the choice of safer projects (Ghatak & Guinnane, JDE 99)

One type of borrower : X with probability p, and 0 with probability (1-p)
Borrower/agent can choose p, at cost $\frac{1}{2}\gamma p^2$
Bank/principal sets the interest rate for 0 profit.

- Individual loan without limited liability (first best):
  $p = \arg\max\left(pX - r - \frac{1}{2}\gamma p^2\right) = \frac{X}{\gamma}$ and bank sets $r = \rho$

- Individual loan with limited liability:
  $p = \arg\max\left(p(X-r) - \frac{1}{2}\gamma p^2\right) = \frac{X-r}{\gamma} < \frac{X}{\gamma}$
  Bank's zero profit: $pr = \rho \Rightarrow p^*$ solution of $\gamma p^2 - pX + \rho = 0$.

- Non-cooperative group playing Nash:

  Reaction function:
  $$p_i = \arg\max\left(p_i(X-r) - p_i(1-p_j)c - \frac{1}{2}\gamma p_i^2\right) = \frac{X-r-c}{\gamma} + p_j\frac{c}{\gamma}$$
  Nash non-coop solution: $p_i = \frac{X-r-c}{\gamma - c}$
  Bank's zero profit: $pr + p(1-p)c = \rho$
  $\Rightarrow p^*$ solution of $\gamma p^2 - pX + \rho = 0$, same as individual.

- Cooperative group:

  Joint maximization:

$$p_i = \arg\max\left(p(X-r) - p(1-p)c - \tfrac{1}{2}\gamma p^2\right) = \frac{X-r-c}{\gamma - 2c}$$

Bank's zero profit: $pr + p(1-p)c = \rho$

$\Rightarrow$ p^{**} solution of $(\gamma - c)p^2 - pX + \rho = 0$.

$p^{**} > p^*$ and repayment rate of each individual is higher than under individual loans.

Conclusion: Group credit creates a mechanism for mutual insurance $\Rightarrow$ improves efficiency in resource allocation towards safer borrowers and safer projects.
However: transfers insurance from (risk-neutral) Bank to (risk-averse) borrowers

2. New challenges faced by MFI

2.1. Alternative models of MFI

Village banks (FINCA model)

MFI can not only give loans, but also offer savings services.

Safe and profitable savings services are important for consumption smoothing: self-insurance (risk coping) and life cycle (retirement).

Rules:

- Managed by members (20 to 200 members, elected committee)
- All members have saving deposits. Some external grants/loans in addition.
- Only few borrowers.
- Committee decides on selection of borrowers and terms of loans.

Advantages:

- Mobilize savings profitably and safely (vs. jewelry, food stocks, animals).
- Give access to loans for selected members: village bank can avoid AS and MH based on local information.
- Can insure based on local information and social capital: give limited liability on loans if genuine failure.

Disadvantages:

- Assumes that members have banking management ability.
- Risk of loss of savings: theft, mismanagement. Hence, need legal regulatory framework. But often too rigid and demanding if regulated by government (e.g., Mexico).
- AS and MH may occur due to large size of group.
- Highly conservative management if depositors who do not borrow are more numerous than depositors who borrow: high interest rates charged, demanding conditions for borrowing that may exclude the poorest members.

MFI with individual loans

Often by profit-oriented MFIs in the activity of microfinance to capture a market niche which commercial banks are unable to penetrate. Huge market of small loans for the microentreprise sector, very profitable, as long as there is little competition. (Bank Ryat of Indonesia)

2.2. Challenges

- Credibility of sanctions
  Culture of grants: clients used not to repay. NGO not used to be tough.

- Financial survival of MFI
  Culture of failure/non-sustainability of NGOs: clients don't repay ⇒ self-fulfilling failure
  Group lending sustainable and replicable only if linked to commercial bank, not dependent on donations/grants for capital. Donations/grants only for start-up costs and learning period.
  Best practice for lending not established: optimum group formation, product development.

- Competition from other MFI
  Willingness to repay based on being the best alternative. Needs monopoly.
  Cross-subsidization of more expensive borrowers (poor, rural, small loans, etc) by more profitable clients (several years in the program, more entrepeneurship, successful, etc.). However, with current competition, need to offer better clients better terms ⇒ less funds for reaching the poor ⇒ drift in clientele.
  ➔Competition may break the MFI system: gives alternative for the "bad" borrowers; draws out "good" borrowers and agents; encourages excessive debt as borrowers have access to multiple sources.
  ➔ Role of credit bureaus

- Incentive contract for the agents that may not share the goals of financial sustainability and social inclusion of the MFI)
  MFIs initially based on little financial constraint and agents motivated by a mystique (to reach the poor). With maturity and size, need to formalize the personnel management system.
  Need to design a contract. Profit sharing for financial sustainability and random audit for social inclusion?

  Observations: Incentives for financial performance are progressively put into place (bonus based on number of clients, volume of portfolio, and repayment rate; either individual or at the branch level). Not for social inclusion yet.

3. Empirical analysis on MFI

- Test of theories
  - Homogeneity of groups?

  Theory of matching? Need more than dichotomy of borrowers
  Empirical analysis of group formation?
  Suppose the characterization of all potential borrowers
  (Sadoulet and Carpenter, 2001)

  - Group functionning: Insurance? Repayment?

  Cannot use the characteristics of the group, because endogenous (Werner [JDS 95], Sharma and Zeller [WD 97], Zeller [EDCC 98])

- Access to credit
  There are some descriptive statistics on participants/non-participants, Probit estimation of participation (Zeller, WD 94). Using characteristics of the population in 92, before the entry of the MFI in 95, Amin, Rai, and Topa analyze the targeting of the MFI on poor and vulnerable. (JDE, 2003)
  Do not answer: Who gained access to credit? Who remains excluded (among "good" borrowers, with profitable projects).

- Impact on the clientele (Pitt and Khandker, JPE 98; Morduch, 98)
  Observations in 24 random districts with MFI programs (*T*) and 5 districts without MFI programs (*C*), in Bangladesh.

  Note: c_{iv}, y_{iv} credit received and outcome for household *i* in village *v*,
  X_{iv} household characteristics that affect *c* and *y*,
  Z_{iv} household characteristics that affect *c* but not *y*,
  $\mu_v^c, \mu_v^y, \varepsilon_{iv}^c, \varepsilon_{iv}^y$ error terms.

  $$c_{iv} = X_{iv}\beta^c + Z_{iv}\gamma + \mu_v^c + \varepsilon_{iv}^c$$
  $$y_{iv} = X_{iv}\beta^y + c_{iv}\delta + \mu_v^y + \varepsilon_{iv}^y$$

  Potential problems due to program placement, i.e., $\text{cor}\left(\mu_v^c, \mu_v^y\right) \neq 0$

  Potential problems due to endogenous participation, i.e., $\text{cor}\left(\varepsilon_{iv}^c, \varepsilon_{iv}^y\right) \neq 0$

  Morduch: Estimation of average treatment effect (eligibility to credit, rather than amount of credit) with method of double difference.
  Assumption: $E\left(y_{ev} - y_{nv} \mid \text{no MFI}\right) = E\left(y_{ev'} - y_{nv'} \mid \text{no MFI}\right), \forall v, v'$, *e* for eligible household, and *n* for non-eligible household.

  Hence : Av. Impact = $E\left(y_{ev} - y_{nv} \mid v \in T\right) - E\left(y_{ev'} - y_{nv'} \mid v' \in C\right)$.

Pitt and Khandker: Simultaneous estimation of credit received and outcome. Use fixed village effect to control for program placement and eligibility as an identifying variable for credit received (~Z characteristic):

$$c_{iv} = X_{iv}\beta^c + \mu_v^c + \varepsilon_{iv}^c, \text{ for } i \in \text{eligibles} \qquad \text{(Tobit)}$$
$$c_{iv} = 0, \text{ for } i \in \text{non} - \text{eligibles}$$
$$y_{iv} = X_{iv}\beta^y + c_{iv}\delta + \mu_v^y + \varepsilon_{iv}^y$$

- Analysis of best practice
  Choice of products: McIntosh, with an experimental design

- Competition
  How rising competition from new MFI affects the incumbent MFI, in terms of entry and exit of clientele, and performance of clientele. Which clients are most affected? McIntosh, Sadoulet, and de Janvry. Difficulty here is the endogenous placement of competitor. Impact on branches is identified with panel data, heterogeneity of impact on client with interaction effects.

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