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# Micro Finance

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# 1. Introduction

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- Because of information problems and transaction costs (adverse selection, moral hazard, monitoring and enforcement) credit markets are imperfect, and these problems are more severe in developing countries.
- The standard solution (in the absence of non-monetary punishments) is to use collateral.
- There are two problems associated with the use of collateral.
  - A large fraction of the population in developing countries is poor and do not own any assets.
    - Policy Implication: Credit subsidy; redistribution.
  - Even those who own assets do not necessarily have formal titles, and also foreclosing on collateral is costly because of inefficient judicial system.
    - Policy Implication: Titling; rewriting bankruptcy codes; legal reform.

- The evidence on subsidized lending is not very encouraging.
  - Low repayment rates: 30% in Pakistan, 41% in India, 51% in Bangladesh.
  - Debts are expected to be written off due to political reasons; subsidized credit is also captured by the rich.
- The evidence on titling is mixed.
  - Some studies find large effects on credit supply (for example, Feder and Feeny (1991) for land titling programme in Thailand);
  - while Field and Torero (2005) find moderate effects in urban housing titles in Peru.
- More generally, like asset redistribution (as we have seen in case of land reforms) titling involves significant political and administrative costs.

- Easier way out – convert “social capital” that exists in social networks in close-knit societies into “invisible” collateral.
  - Members of a community know more about one another than an outside institution such as a bank.
  - While a bank cannot apply financial or non-financial sanctions against poor people who default on a loan, their neighbours may be able to impose powerful non-financial sanctions at low cost.
  - An institution that gives poor people the proper incentives to use information on their neighbours and to apply non-financial sanctions to delinquent borrowers can out-perform a conventional bank.
    - Achieve goals of both efficiency and equity (conventional lending programmes being merely redistributive).

## 2. Micro Finance

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- The Grameen Bank of Bangladesh lends to about 2 million people, most of whom are rural, landless women; operates in 36,000 villages, or about half of all villages in the country.
- Worldwide 13 million clients were served in 2000 with other major Micro Finance organizations being FINCA (Bolivia), BANCOSOL (Bolivia), BRI (Indonesia), BKD (Indonesia), ACCION (Venezuela), and BRAC (Bangladesh).
- Small loans for self-employment projects (e.g., poultry, paddy husking, handloom weaving, grocery or tea shops, dairy farming).
- No collateral is charged; interest rates though high are less than those charged by local moneylenders.
- Borrowers organize themselves into self-selected groups of five people from the same village.
- Loans are given for individual project, but group is jointly liable for each other's loans – if any member of a group defaults, all members are ineligible for credit in the future.

- Micro finance stands out compared to conventional lending approaches in terms of (a) reaching target groups and (b) loan repayment.
  - In the Integrated Rural Development Programme (IRDP) in India, on average, percentage of ineligible beneficiaries is 15-26%, the highest reported being 50%. In contrast, for the Grameen Bank, only 5% borrowers were outside the target group.
  - The repayment rates in IRDP is around 41% for India as a whole. For the Grameen Bank, even according to conservative estimates (Morduch, 1999) it is 92%.
- Economists argue that joint liability induces borrowers to
  - monitor each other (“peer monitoring”),
  - put pressure on delinquent group members (“peer pressure”), and
  - induce better group selection (“peer selection”).

### 3. Peer Monitoring (Ghatak & Guinnane, 1999)

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- Ghatak and Guinnane (1999) provides an economic analysis of *joint-liability lending*, drawing on and extending recent research.
  - The joint-liability lending programmes ask borrowers to form a group in which all borrowers are jointly liable for each other's loans.
- Joint liability alleviates the four main problems faced by formal credit institutions that lend to poor borrowers who cannot offer much in the way of collateral:
  - adverse selection, moral hazard, costly audits and enforcement.
- We will use the simple model in Ghatak and Guinnane (1999) to illustrate how joint liability alleviates the moral hazard problem by inducing group members to influence the way other members select their projects.

## 3.1 The Set-up

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- Output  $Y$  takes two values, high ( $Y^H$ ) and low ( $Y^L$ ), with  $Y^L = 0$  (for simplicity).
- Output is high with probability  $p \in (0, 1)$ .
- Each project requires 1 unit of capital and the lender needs to be paid back an amount  $\rho > 1$  per loan, principal plus interest, on average.
  - We assume that the lender earns zero economic profits, either by design (because it is a not-for-profit organization) or through the forces of economic competition.
- Borrowers will borrow only if the payoff exceeds the opportunity cost of labor,  $\bar{u}$ .
- The project returns of different borrowers are assumed to be uncorrelated.
- We assume that all projects are socially profitable in the sense that the expected return from the project is greater than the opportunity costs of the capital and labor employed in the project:

$$pY^H > \rho + \bar{u}. \tag{A1}$$



- We refer to an outside lender as the ‘bank’.
  - This refers to an individual or an institution who has the resources to lend to a certain group of borrowers either on an individual basis or to a self-formed group.
- We also assume *limited liability*, in the sense that the lender can only seize assets that the borrower has specifically pledged as collateral for a loan.
- A standard loan contract specifies an interest rate  $r$  (this is a *gross* interest rate, namely, principal plus the *net* interest rate) which is the amount the borrower must repay to the bank.
  - This can be interpreted as the *individual liability* of the borrower.
- *Joint liability* is modelled in the following way:
  - if a borrower is willing and able to repay her own loan but her partner is unwilling or unable to repay her loan, then the former must pay an additional amount  $c$  to the bank.

## 3.2 Moral Hazard

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- Once a borrower has taken a loan, the project's payoff depends in part on the borrower's actions, including levels of labour and other inputs.
  - With asymmetric information and in the absence of collateral, the lender and borrower do not have the same objectives because the borrower does not fully internalize the cost of project failure.
  - Moreover, the lender cannot stipulate perfectly how the borrower should run the project, in part, because some of the borrower's actions are not costlessly observable.

- Theories of peer monitoring are motivated by the fact that group members have an incentive to take remedial action against a partner who mis-uses her loan because of joint liability.
  - With group lending, individual borrowers are made to bear liability for themselves and for others in their group.
  - The savings in the form of better project choice allows the bank to pass on some benefits to the borrowers in the form of reduced interest rates.
  - Thus, group lending increases welfare and repayment rates.
- We illustrate this idea with the following simple model.

- Output  $Y$  takes two values, high ( $Y^H$ ) and low  $Y^L = 0$ .
- Borrowers are risk-neutral.
- The borrower's actions determine the probability of success.
  - Output is  $Y^H$  with probability  $p$  and 0 otherwise.
- Borrowers choose actions, which can be thought of as a level of effort  $p \in [0, 1]$ , for which they incur a disutility cost of  $\frac{1}{2}\gamma p^2$ , where  $\gamma > 0$ .
  - The borrower's choice is unobservable to the bank.
- Notice that social surplus  $pY^H - \frac{1}{2}\gamma p^2$  is maximized if  $p = p^* = \frac{Y^H}{\gamma}$ .
  - We assume that

$$Y^H < \gamma \tag{A2}$$

so that we have an interior solution.

● **Effort Choice under Individual Liability:**

- Since the choice of  $p$  is subject to moral hazard, taking the interest rate  $r$  as given, the borrower chooses  $p$  to maximize her private profits:

$$\hat{p}(r) \equiv \arg \max_p \left\{ p(Y^H - r) - \frac{1}{2}\gamma p^2 \right\} = \frac{Y^H - r}{\gamma}.$$

- The interest rate is like a tax on success since it has to be paid only when output is high.
  - Hence,  $p^* = \hat{p}(0) > \hat{p}(r)$ , and the higher the interest rate, the lower is  $p$ .
- Bank's expected profit is  $pr - \rho$ , so that bank's zero-profit condition is

$$pr = \rho.$$

- Substituting  $p = \frac{Y^H - r}{\gamma}$  in the bank's zero-profit condition we get

$$\gamma p^2 - Y^H p + \rho = 0.$$

- This is a quadratic equation in  $p$  which means there are two values of  $p$  consistent with equilibrium.
- We assume that the equilibrium with the higher value of  $p$  is chosen since the bank is indifferent and the borrower is strictly better off. That is, the effort choice under individual liability is:

$$p = \frac{Y^H + \sqrt{(Y^H)^2 - 4\rho\gamma}}{2\gamma}.$$

- **Effort Choice under Joint Liability:**

- Under joint liability, when the borrower's project fails her partner is liable for the amount  $c$ .
  - If a borrower's partner chooses an action  $p'$ , then the individual payoff of a borrower who chooses an action  $p$  is

$$pY^H - rp - cp(1 - p') - \frac{1}{2}\gamma p^2.$$

– Suppose the borrower chooses  $p$  to maximize her individual payoff taking the partner's action  $p'$  as given.

○ Then her best response function is given by:

$$p = \frac{Y^H - r - c}{\gamma} + \left(\frac{c}{\gamma}\right) p'.$$

○ That is, the safer the partner's project choice, the safer the project choice of a borrower.

- If a borrower chooses a risky project, this choice reduces the attractiveness of high returns to her partner because of expected joint-liability payments. Thus, the borrower also chooses a more risky project.

– If borrowers take decisions about project-choice *non-cooperatively*, then in the *symmetric Nash equilibrium*,

$$p = p' = \frac{Y^H - r - c}{\gamma - c}.$$

– The bank's zero-profit condition under joint liability is

$$rp + cp(1 - p) = \rho.$$

– Substituting  $r = Y^H - c - p(\gamma - c)$  (from the Nash equilibrium) into this bank's zero-profit condition we again get

$$\gamma p^2 - Y^H p + \rho = 0,$$

the same quadratic equation in  $p$  as under individual liability.

○ Hence, a borrower's equilibrium effort choice will be the same as with individual liability: mere joint liability does not alleviate moral hazard in this model.

- This result occurs because a borrower does not take into account her action's effect on her partner's choice of action.

– If instead borrowers decide on project-choice cooperatively, then they choose:

$$\tilde{p}(r, c) \equiv \arg \max_p \left\{ pY^H - rp - cp(1 - p) - \frac{1}{2}\gamma p^2 \right\} = \frac{Y^H - r - c}{\gamma - 2c}.$$



- Substituting this expression in the bank's zero-profit condition, we get:

$$(\gamma - c)p^2 - Y^H p + \rho = 0.$$

- This yields (again choosing the higher root),

$$p = \frac{Y^H + \sqrt{(Y^H)^2 - 4\rho(\gamma - c)}}{2(\gamma - c)}.$$

- Recall that by (A2)  $\gamma > Y^H$  and since the borrower cannot pay more than what his project yields, it must be the case that  $c < \gamma$ .
- For  $c \in (0, \gamma)$ , the numerator of the expression for the equilibrium value of  $p$  under joint liability is higher than the corresponding expression under individual liability, while the denominator of the former expression is lower than that of the latter.
  - The equilibrium value of  $p$  and, hence, the repayment rate, is therefore higher under joint-liability lending when borrowers choose  $p$  cooperatively compared to individual-liability lending.

## 4. References

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