The Economics of Lending with Joint Liability: Theory and Practice

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Introduction

- ▶ We have looked at 3 kinds of problems in the credit markets: Adverse Selection, Moral Hazard and Strategic Default(or Enforcement)
- ▶ Joint Liability Lending Institutions can do better than conventional banks for two distinct reasons:
  - ▶ Members of a community may know more about one another(i.e. each other's types, actions and states) than an outside institution.
  - ▶ Banks cannot impose financial sanctions against poor people who default on a loan. Poor people's neighbours, however, may be able to impose powerful non-financial sanctions at low-cost.

Theory

- Output Y takes two values: high(Y^H) and low(Y^L) where $Y^H > Y^L \geq 0$
- Normalize Y^L to 0
- Output is high with probability $p\epsilon(0,1)$
- Each project requires 1 unit of capital
- Lender needs to be paid back $\rho > 1$ per loan, principal plus interest
- Borrowers borrow only if their payoff exceeds opportunity cost of labour, $\bar{u}$
- The project returns of different borrowers are assumed to be uncorrelated

- All projects are socially profitable–expected return is greater than the opportunity cost of capital and labour employed in the project: $pY^H > \rho + \bar{u}$
- Limited Liability: The lender can seize assets that the borrower has specifically pledged as collateral for a loan
- JLLIs operate in environments where borrowers do not have physical/financial assets to pledge as collateral–the lender has no recourse in case of default

- Individual Liability: A standard loan contract specifies an interest rate r (gross interest rate i.e. principal plus the net interest rate)

- Joint Liability: Borrower is willing and able to repay her own loan but her partner is unwilling or unable to repay her loan, then the former pays an additional amount c to the bank

Adverse Selection

- ▶ The typical method for separating good risks from bad risks is to ask the borrower to pledge collateral.
- ▶ Bank offers two different contracts–one with high interest rates and low collateral and the other with the opposite.
- ▶ Risky borrowers select the former, while the safe borrowers opt for latter.
- ▶ Poor people have no collateral. Hence, lenders have no way to effective way to seperate good risks from bad.
- ▶ Group lending deals with this by drawing on local information networks and using difference in loan terms to seperate good from bad borrowers.

Selection of Groups

- ▶ While all borrowers prefer safe partners(lower expected joint liability payments), safe borrowers value safe partners more than risky borrowers–more likely to realize the gain of having a safe partner.

- ▶ In equilibrium, borrowers end up with partners of the same type.

- ▶ Bank can screen borrowers by varying the degree of joint liability.

- ▶ Risky borrowers have risky partners. Hence, they will prefer a contract with less joint liability.

Model

- Borrowers are risk-neutral and of two types safe(a) and risky(b).
- Project of type i: output takes two values Y_i^H and 0. Probability of high output is p_i, $i = a, b$.
- $p_b < p_a$.
- If the bank does not know a borrower's type, then the bank has to offer loans to borrowers at the same interest rate. The presence of enough risky borrowers can push equilibrium interest rate high enough to drive safe borrowers away from the market (similar to Akerlof's Lemons Model).

Positive Assortative Matching

Expected payoff of type i when her partner is j under joint liability:

$$EU_{ij}(r, c) = p_i p_j (Y_i^H - r) + p_i(1 - p_j)(Y_i^H - r - c)$$

Net expected gain of a risky borrower from having a safe partner is:

$$EU_{ba}(r, c) - EU_{bb}(r, c) = p_b(p_a - p_b)c.........(1)$$

Net expected loss of a safe borrower from having a risky partner is:

$$EU_{aa}(r, c) - EU_{ab}(r, c) = p_a(p_a - p_b)c..........(2)$$

When $c > 0, (2) > (1)$

If the bank offers two contracts–one with high joint liability and low interest rates and the other with low joint liability and high interest rates, safe borrowers will select the former and risky the latter.

Moral Hazard

- Output takes two values and borrowers are risk-neutral.
- Output is Y^H with probability p and 0 otherwise.
- Borrower's choose actions which can be thought of as level of effort, $p \epsilon [0, 1]$.
- Disutility of $(1/2)\gamma p^2$ where $\gamma > 0$.

- Borrower's choice is unobservable to the bank.
- Social Surplus: $pY^H - (1/2)\gamma p^2$ maximized at $p = p^* = Y^H/\gamma$.
- Assume $Y^H < \gamma$ for an interior solution.
- With perfect information, the bank could specify that the borrower choose $p = p^*$ and interest rate $r = \rho/p^*$.
- When the choice of p is subject to moral hazard, then taking r as given, the borrower chooses p to maximize:

$$\hat{p}(r) \equiv argmax\, p(Y^H - r) - (1/2)\gamma p^2 = (Y^H - r)/\gamma$$

- r is like a tax on success–it has to be paid only when output is high.

- $p^* = \hat{p}(0) > \hat{p}(r)$: The higher the r, the lower the p.
- Substituting the solution above into bank's zero profit condition ($pr = \rho$), we get $\gamma p^2 - Y^H p + \rho = 0$.
- This is a quadratic–there are two solutions for p–the higher one ($p = (Y^H + \sqrt{(Y^H)^2 - 4\rho\gamma})/(2\gamma)$) is chosen since the bank is indifferent and the borrower is strictly better off.

Joint Liability

- Let the partner choose an action p'. The payoff fucntion for the borrower who chooses p:

$$\max_p pY^h - rp - cp(1 - p') - (1/2)\gamma p^2$$

- Taking p' as given, the best response function is:

$$p = (Y^H - r - c)/\gamma + (c/\gamma)p'$$

- Safer the partner's project choice, safer the borrower's project choice.

- Symmetric Nash Equilibrium: $p = p' = (Y^H - r - c)/\gamma - c$

- ▶ Bank's zero profit condition: $rp + cp(1-p) = \rho$
- ▶ Substituting F.O.C., we get: $\gamma p^2 - Y^H p + \rho = 0$
- ▶ Borrower's equilibrium project choice is the same: Mere joint liability does not alleviate the problem.
- ▶ The borrower is not internalizing the effect of her action on her partner's choice of action.

Deciding on Project-Choice Cooperatively

- $\tilde{p}(r, c) \equiv \underset{p}{\operatorname{argmax}} \, pY^H - rp - cp(1 - p) - (1/2)\gamma p^2 = (Y^H - r - c)/(\gamma - 2c)$

- Using bank's zero profit condition, we get: $(\gamma - c)p^2 - Y^H p + \rho$

- This gives: $p = (Y^H + \sqrt{(Y^H)^2 - 4\rho(\gamma - c)})/2(\gamma - c)$

- We had $\gamma > Y^H$. Since the borrower cannot pay more than what his project yields , $c < \gamma$.

- Therefore, for $c\epsilon(0, \gamma)$, equilibrium value of p and hence repayment rate is higher than under individual liability.

- ▶ The above formulation assumes that the borrowers can observe each other's actions perfectly and enforce any agreement.
- ▶ However, monitoring is costly and borrowers must be given incentives to monitor.
- ▶ Suppose the borrower chooses the level of monitoring, a. With probability a she can observe the true action of her partner and with probability $1 - a$, she receives an uninformative signal.
- ▶ Non-monetary punishment, S, if the observed action is different from that agreed on.
- ▶ Cost of monitoring: Increasing and convex function $M(a)$.

- $p^D(r, c)$ is the individual best response given the partner chooses $\tilde{p}(r, c)$. Then,
$$p^D(r, c) = (Y^H - r - c)/\gamma + (c/\gamma)\tilde{p}(r, c) =$$
$$(1 - (c/\gamma))\tilde{p}(r, c) < \tilde{p}(r, c)$$

- ICC:
$$\tilde{p}(Y^H - r) - \tilde{p}(1 - \tilde{p})c - (1/2)\gamma\tilde{p}^2 \geq$$
$$p^D(Y^H - r) - p^D(1 - \tilde{p})c - (1/2)\gamma p^2 - aS$$

- Minimum level of monitoring consistent with the ICC will be chosen: $\tilde{a}(r, c)$

- Borrower's incentive constraint:
$$\tilde{p}(Y^H - r) - \tilde{p}(1 - \tilde{p})c - (1/2)\gamma\tilde{p}^2 - M(\tilde{a}) \geq$$
$$\tilde{p}(Y^H - r) - \tilde{p}(1 - p^D)c - (1/2)\gamma\tilde{p}^2$$

- JLL will improve repayment rates through peer-monitoring as long as S is large enough or $M(\tilde{a})$ are low enough.

Enforcement

Group-lending has two opposing effects on repayment rates:

- ▶ Allows a member whose project does well to pay off the loan of a partner whose project does badly.

- ▶ A borrower may default on her own loan because of the burden of her partner's loan.

If social ties are sufficiently strong, the net effect is positive.

Model

- ▶ Borrowers are risk averse.
- ▶ Only departure from fisrt best is when borrowers default intentionally even when they are capable of repaying.
- ▶ The punishment a bank imposes consists of never lending to her again.
- ▶ $Y \geq r$
- ▶ Repays only if:

$$u(Y) - u(Y - r) \leq \bar{B}$$

- ▶ $\bar{B}$ reflects present value of the net benefit from having continued access to loans.

- $\bar{B}$ may depend on r (it is expected to be decreasing in r).
- There exists some critical $Y(r)$ s.t. borrower repays when $Y \geq Y(r)$.
- Let $Y(r)$ be the critical level of income s.t. the above condition holds with equality.
- Diminishing MU of income(for a given r) implies the borrower repays only if $Y \geq Y(r)$.

Joint Liability

- All members are considered to be in default unless every loan is repaid and in the event of default no one gets a loan in the future.
- A borrower repays if her partner defaults if:
$$u(Y) - u(Y - 2r) \leq \bar{B}$$
- $Y < Y(2r)$: she will default on both.
- $Y(2r) > Y(r)$
- Assume $Y(r) > r$ and if both members have $Y > Y(r)$ then they repay under JL.

Two Cases:

- One member is unable/unwilling to repay (i.e. $Y \leq Y(r)$) and the other is willing to repay (i.e. $Y \geq Y(r)$). JL is better than individial liability.

- One member is unable/unwilling to repay her own debt (i.e. $Y \leq Y(r)$) and her partner is willing to repay her own but not her partner's (i.e. $Y(r) < Y < Y(2r)$). IL better than JL.

Social Sanctions

Joint liability may do better or worse than individual liability. However, social sanctions alter the repayment condition under joint liability. Social sanctions reduce the attractiveness of the payoff stream when one party defaults intentionally ($r < Y < Y(r)$) and the other repays her own loan but not her partner's ($Y(r) < Y < (Y(2r))$). In this case, repayment would definitely be higher under JL.

Case Studies: German Credit Cooperatives

- ► Long-term loans (10 years or more) and financed them from local deposits.
- ► Most loans were secured by a co-signer who was held responsible for any loan the borrower did not repay.
- ► Their claim to fame was their ability to make and obtain repayment on very small loans from people who had no assets accepatble to a commercial lender.
- ► The urban cooperatives resembled commercial lenders in their policies since the social ties in urban areas were weak.

The Grameen Bank

- ▶ Borrowers organize themselves into self-selected groups of 5 people, all of whom, must be from the same village.
- ▶ After group formation, members receive training from bank employees and begin weekly meetings.
- ▶ Each member makes small, weekly deposits.
- ▶ Several weeks after the group is formed, 2 members receive a loan.
- ▶ If the initial borrowers make their required weekly payments and members adhere to the rules of the bank, two more members receive a loan, and so on.
- ▶ Loans are small–must be repaid in weekly installments over a course of a year.
- ▶ If any member defaults, all members are ineligible for credit in the future.

- ▶ Borrowing groups are combined into Centers which manage two important funds: Group Fund (compulsory savings deposits+any fines) and the Emergency Fund (compulsory surcharges on borrower interest).
- ▶ Group Fund can be used to cover emergency consumption needs while the Emergency Fund provides insurance coverage for events such as natural disaster, death or default.
- ▶ It's a margin of safety against default of a borrower.
- ▶ Also, it is the only financial connection between groups within a Center.

Differences Between The Two Institutions

- German cooperatives got their loan funds from external financial institutions+local funds while the Grameen Bank get most of their funds from external institutions.
- In the cooperatives, the first level (borrower+co-signer) exists for the life of a loan while the second (cooperative membership) exists independent of any loan.
- In the Grameen Bank, a borrowing group exists only for the purposes of a loan.

Problems with JL: Group Formation and Size

Group size can have two effects:

- ▶ Project returns are uncorrelated–increase in group size, increases the number of states of the world–increase in group size improves the effectiveness of JL

- ▶ Group members have superior information about one another. With large groups, however, there may be free-riding in the provision of some activities which have the character of public goods, such as monitoring and auditing.

- ▶ German Cooperatives: The first level has two members and the second a much larger number.
- ▶ Grameen Bank: Five persons–arrived at through a process of trial and error.
- ▶ The Group Funds achieve insurance benefits of pooled risk without robbing the groups of their power to screen, monitor and so forth.

- Screening while forming groups: Fundacion Integral Campesina(FINCA) groups that directly screened members according to their reputation had fewer problems with loan delinquency.In the Credit and Education lending program of Burkina Faso, the groups were formed by the officials and there was confusion over who bore the liability.

- Another issue is the degree to which group members know each other and interact on a regular basis. For example, in Grameen, group members meet regularly to pledge adherance to Grameen's 16 decisions and receive training–helps strengthen group solidarity.

Problems with JL: Social Ties

- ▶ The Good Faith Fund has adopted most aspects of Grameen. However, it does not work in Arkansas as it works in Bangladesh.

- ▶ Individuals involved maybe unwilling to put pressure on delinquent borrowers. Example: Irish cooperatives.

- ▶ There can be negative implications of peer pressure: violence on not repaying the loan.

- ▶ Two implications: First, To create effects described in theory, there has to be pressure of this kind. Second, Aggressive action may rupture other, more important social ties.

Problems with JL: Dynamic Incentives

▶ The threat to cut-off all future loans must be credible. This is why most JLLIs today are NGOs/private institutions. For political reasons, governments have a difficult time carrying out on threats to impose sanctions on poor borrowers.

▶ JLLIs, sometimes, adopt policies that undermine dynamic incentives. For example, announcing that a particular loan will be the last loan.

▶ Competition among JLLIs leads them to undermine repayment incentives for each other's borrowers.