

MICROECONOMICS OF DEVELOPMENT
Assignment 2
Correlated risk in joint liability models

Consider two models of group lending capturing incentive for insurance and moral hazard problem, respectively.

1. Moral hazard in project choice

Each borrower can choose either a risky (R) or a safe (S) project. Project i ($i = R, S$) has a return Y_i with probability p_i , and 0 otherwise. We assume that the risky project has higher return when successful, but that the expected return is higher for the safe project: $Y_R > Y_S$, $p_R Y_R < p_S Y_S$.

- a) Consider first an individual loan contract with limited liability. The borrower pays a gross interest r if the project is successful, and nothing if it fails. For what range of interest rate r will the borrower choose the safe project?
- b) Consider now a joint liability contract with two borrowers. Assume independent returns between the two projects. Each borrower pays r if his project is successful and an additional q if his project is successful and the project of his partner has failed. Show that the borrowers will choose to coordinate on the same type of project. In what range of (r, q) will the borrowers choose safe projects?
- c) Now assume that the returns are correlated, and that the borrowers still coordinate in choosing the same risk level. The correlation of returns can be modeled by increasing the probability of symmetric events (success or failure) by ρp_i , and decreasing that of asymmetric events (success for one borrower and failure for the other) by the same amount. In what range of (r, q) will the borrowers choose safe projects.
- d) Interpret your results and give the intuition.

2. Incentive for insurance

There is only one type of project, which provides a return Y with probability p and 0 otherwise. Assume that $Y > 2r$ and that the Bank can impose a large penalty of $P > 2r$, the loss of future access to loans, if the loan is not repaid.

- a) Consider an individual loan contract, where the borrower pays a gross interest r if the project is successful, and nothing if it fails. What is the probability of repayment of an individual loan?
- b) Consider now a joint liability contract, where both borrowers are denied future access to loans if the Bank does not receive the full payment of $2r$. Assume independent returns between the two projects. What is the probability that the Bank will be fully repaid? partially repaid? not repaid at all?
- c) Now assume that the projects are correlated. As above add ρ to the probability of symmetric events (success or failure), and $-\rho$ to that of asymmetric event (success for one borrower and failure for the other). What is the probability that the Bank will be fully repaid? partially repaid? not repaid at all?

d) Interpret your results and give the intuition.

3. The two models above show contradictory result for the effect of correlation between project and the probability of repayment. Place yourself now in the real world of microfinance. You ask yourself whether the main role of joint liability is to give incentive to mutual insurance or whether on the contrary it induces moral hazard in risk taking.

What kind of empirical evidence would you provide to answer this question?

Think broadly in terms of the data you could use: administrative data from the MFI, survey from members of group, in cross section or over time, in one region or in contrasted region. You can even think of possible natural experiments, or even doing an experiment yourself. The only limit is that what you propose to do has to be feasible, i.e., do not imagine getting information from an MFI that is not available, asking questions to members that they would not answer, finding a natural experiment that is simply not likely to happen or to be observable, or devising an experiment that the MFI would not accept (because it hurts its own business or its clients) or that would not pass the Protection of Human Subject restrictions.

The empirical evidence needs not be one single well-identified regression. Although we always strive for rigorous tests, we have seen in class some interesting papers that fall short of that standard. You then need to provide evidence on a number of correlations, associations, possibly adding controls, possibly documenting mechanisms, which overall support your claim and contradict the most obvious alternative explanations for your main result.

I look forward to see the fruit of your imagination and research skills.