

## EE431/438 Economics of Financial Markets and Institutions

## Exercise 6 : Theory of Financial Intermediation

Consider an economy in which  $n$  identical firms seek to finance projects.

- Each entrepreneur owns a firm and each firm requires an investment of  $m = 100$  units of capital.
- The returns of each firm are identically independently distributed.
- The total number of lenders is  $100n$ , each lender owns 1 unit of capital to lend out.
- The project's realized value is a random variable with realization denoted by  $Y$ .
- $Y = 160$  with probability 0.75 and 80 with probability 0.25.
- The distribution of  $Y$  is known to all borrowers and lenders
- The realization of  $Y$  is observed freely by the owner of the firm.
- The other cannot observe the total output of the project without paying a cost.
- $L$  is total loan repayment(principal + interest) promised by each firm.

Answer the following questions.

1. Is an entrepreneur willing to speak the truth about the outcome of his/her project? Describe the moral hazard problem in this economy.
2. If we impose a punishment system such that the borrower will be forced liquidation if he/she pay equal to or lower than a specified amount. Assume that liquidating gives no proceeds to the lenders and the borrower. Each lender needs a repayment of at least 1.05. What should be the value of  $L$ ?
3. Describe how the punishment system in question 2 helps solving the moral hazard problem.
4. How many entrepreneurs we have to punish?
5. Let the cost of punishment is equal to  $P$  per one entrepreneurs.  $\pi$  is the probability of borrower default. Define the value of  $\pi$  and calculate total punishment cost of this economy for the two financial system (i) direct finance and (ii) indirect finance.
6. Suppose that a lender observe the entrepreneur's output by paying a monitoring cost. Then, in stead of liquidating when less than  $L$  is paid, the lender who monitors can use the threat of liquidation and offer to refrain from liquidation as long as the borrower repays as much as possible. Monitoring cost is paid ex ante. Lenders must learn in advance about the borrower's business to properly interpret any data about the project returns. Let  $K$  be the cost of monitoring a borrower's project and  $K = 0.1$ . The lenders then can verify the true outcome of the project. Calculate total cost of monitoring entrepreneurs in this economy for the two financial system (i) direct finance and (ii) indirect finance.
7. Assume that the number of borrowers  $n$  is large enough. The law of large numbers (LLN) can be used.  $L = 140$ . What is the maximum deposit rate the bank can offer to its depositors?
8. Discuss the economies of scale and the benefits of diversification in the banking sector.