Asymmetric information

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All documents and calculators allowed

Mag2 and AMSE M1

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Adverse selection and credit!

The purpose of this problem is to show a way to mitigate adverse selection in credit allocation. One considers a bank that can lend an amount L to a business. For the bank, the cost of the loan (refinancing on the market) equals $(1+i)L$ where i is a given "market rate". With this loan, the company develops a project that can succeed (return equal to R) or fail (return equal to 0). The probability of success is p_H (high quality borrower) or p_L (low quality borrower). $0 \leq p_L \leq p_H \leq 1$. The a priori proportion of good borrowers is de noted byλ so that the average probability of success is $p_M \equiv \lambda p_H + (1-\lambda)p_L$. The bank proposes a credit only if the profit is positive.

One assumes that the bank cannot observe the individual probability of success.

Assume first that the bank cannot obtain a repayment in case of failure. Hence the contract proposed is the same for the two types and specifies a repayment T in case of success and a repayment 0 in case of failure.

Q1. Write the expected profit of the bank if she proposes the contract $(T, 0)$

Q2. At which condition on T this is positive

The borrower accepts the contract if it gives a postive expected surplus. Here this means $T \leq R$.

Q3. What happens if $p_L R \leq p_M R < (1+i)L \leq p_H R$

From now we assume the inequality of Q3

Q4. What Would happen if there were perfect information? Does L obtains credit?

Now, the bank is able to demand a collateral C: a sum pledged and payed by the borrower in case of default. That means that the borrower owns an asset, independent of the project. The bank proposes one contract (T, C) where T is the repayment in case of success and C the collateral, that is the repayment in case of failure. Notice that the net increase of surplus of the borrower of type i, if he accepts the contract writes $p_i(R-T) - (1-p_i)C$. If he refuses the contract he obtains 0. The bank wants to design a contract such that type H accepts and type L prefers not to borrow (and obtain 0 surplus) rather than the contract (T, C).

Q5. Write the incentive compatibility constraint (of type L)

Q6. Write the participation constraint (which is also the incentive compatibility constraint) of type H.

Q7. Write the condition under which the bank makes a positive profit

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We assume that competition leads to a zero profit for the bank, so that the condition of Q7 is an equality

Q8. Is the participation constraint fulfilled, is it binding?

Q9. What is hence the minimal collateral fulfilling the incentive compatibility constraint. Compute the associated T.

Q11. What is the role of the collateral

Questions

(4 lines maxi per answer)

Q1. In the standard moral hazard model, with risk averse agent, show that the optimal contract involves a negative payment in the case of bad result.

Q2 In the model of moral hazard, and when the agent is risk-averse, show that the objective of incentive forces the principal to offer an average payment greater than the one of complete information.