

**Solutions to Exercises in
Economics of Banking
Chapter 5**

1. This problem is about the design of the loan contract as described in the several sections of this chapter. In the initial situation we have an investment, the payoff of which can be observed by the lender, so that there is no asymmetric information. In this case the optimal contract will deal only with risk sharing, so that it reflects the degree of risk aversion of the lender and the borrower (and typically, it will not be the standard contract).

In the subsequent situation there is more informational uncertainty about the payoff to the borrower of the investment, so that other aspects have to be taken into consideration when the loan contract is set up, in particular with regard to the part of the investment which does not go into securities. The precise form of the contract will depend on lenders possibilities for collecting information about the payoff of the investment. If such information can be obtained, even if at a cost, one can use the standard contract, and if it cannot be obtained, the contractual relationship will have to be short term, with possibility of renewal depending on satisfactory past performance.

2. We are here dealing with a standard contract, for which we have to determine the size of R . Since outcome has an exponential distribution, we have that

$$P\{y \leq R\} = 1 - e^{-0.5R}.$$

Assuming for simplicity that the market interest rate is 1, the bank which should earn no profits must recover the amount €1.5 million from expected repayment, which is

$$\int_0^R y 0.5e^{-0.5y} dy - (1 - e^{-0.5R})0.1 + e^{-0.5R}R,$$

since for $y \leq R$, the bank gets y but must pay €0.1 million, and for $y > R$ it gets R and has no inspection cost.

R can now be found from solving the equation

$$\int_0^R y 0.5e^{-0.5y} dy - (1 - e^{-0.5R})0.1 + e^{-0.5R}R = 1.5.$$

3. The basic problem here is not hidden information, rather it is the lack of competence of some of the entrepreneurs, combined with reluctance to improve on their competences. The theoretical model, which is relevant for this situation, is the one of Section 5.4. It is assumed

that the bank can observe the qualifications of the borrowers when signing the loan contract, so less qualified are given a contract with incentives to improve their performance. This is achieved by demanding a collateral from these borrowers; the incentive part of the contract makes sure that the borrowers are better off taking the courses than not taking them, since without the courses the probability of defaulting and losing the collateral are too high.

4. The initial part of the problem pertains to availability of credits. It can be seen, that the repayment rates in the sector are very high, and this points to an explanation of the credit rationing based on the moral hazard problem from Section 1.3.2: Due to the high repayment rates, borrowers are forced into the most risky forms of business in their area, something that the lenders would not have agreed upon if they knew it, and this will result in many defaults and unpaid credits.

The new technology allows for almost complete monitoring of the borrowers' activities, and thereby it reduces the credit problem to one of risk sharing. The lender knows exactly what the borrower has done and how much she has earned, and in such cases of full information the efficient contract between lender and borrower will depend on their respective attitudes towards risk. Assuming as usual that banks are risk neutral (if not for other reasons, then since they have many customers with identical and independent risk, so that average risk disappears), we get that the borrowers should be secured a fixed income from their business, leaving all risk (losses *and* gains) to the bank.

5. It is straightforward that if outcome is not observable to the bank, which knows only its distribution, then the bank must accept that the borrower reports as low as possible subject to the risk that the bank finds the reported outcome unreasonably low (smaller than some small fractile of the distribution), in which case it may choose some unwanted action).

If the bank has an option of buy the assets of the firm at an exercise price corresponding to the agreed repayment R , unless the borrower pays back this amount R , then the situation for the bank has improved considerably since it will get the value of the assets independent of the reported outcome as soon as this is lower than R , and it may threaten to exercise the option if outcome is below a certain limit set by the bank. This differs from the situation before where the borrower had no constraints in reporting outcome arbitrarily low.

It should however be added that such a contract may be legally unacceptable since it favors a particular creditor (the bank) who gets all assets, leaving the firm with liabilities only, so it would correspond to a bankruptcy with one creditor being treated better than the others.

6. There are several possible ways in which to assess this situation. From the description of the prehistory, it seems that the problem is connected with asymmetric information in the form of untruthful reporting of the outcome. The standard approach in such situations would be to introduce monitoring, even though this may represent an additional cost to the bank. Monitoring would in this case mean that not only should the bank be able to check the size of the auditories, but it should also control the additional features as outlined in the text.

Since a thorough monitoring may indeed turn out to be rather costly, it might be worthwhile to consider alternatives, and given that the problem occurs in the context of arts and performances, the approach in Section 5.3.5 suggests itself. The loan contract should be re-organized so that (almost) all the earnings from the performances are repaid to the bank, as long as these earnings do not exceed a certain (rather large) limit, after which nothing at all

is repaid. This type of contract will give the borrower an incentive to go for large incomes collected at concerts, since this income, if large enough, may free the borrower from repaying the debt.

It should be added that some critics could be raised against this solution, since it still relies on the borrower's reporting of outcome, even if there is an incentive for reporting a high level. Clearly, the contract is only feasible if the outcome is observable, and this was a problem already from the beginning. However, the new contract gives the borrower an incentive to perform in a way as to obtain the largest possible outcome, and this may rule out some of the previous difficulties.