Lecture 5:
The loan contract

One of the central topics of the (newer) banking theory is the contract between lender and borrower. On the face of it, there is nothing to discuss – a contract just stipulates how much should be paid back and when. And if the borrower cannot pay the full sum we let him pay what he has.

As a beginning, we look closer at the ideal case where there are no complications in the form of asymmetric information.It tells us that the slope of the repayment function depends on the second derivatives of the utility functions of borrower and lender, respectively. This second derivative expresses the attitude towards risk. The particular case where it is zero occurs when the individual is risk neutral, and this could happen if the lender is a bank with many borrowers. If the slope is 1, then any increase in outcome will result in the same increase in repayment, so that the borrower delivers everything to the lender except possibly for a constant sum which is independent of the outcome. If the lender is risk averse as well, the contract is one of risk-sharing where any increase in outcome is divided between borrower and lender in a way which depends on the degree of risk aversion.

We then turn to the case of asymmetric information, which as always has two different forms, namely

(1) hidden information,

(2) hidden action.

In (1) the lender cannot observe the true outcome for the borrower. If no information whatsoever can be obtained, then there is little the lender can do to get any repayment at all, and consequently there would be no loan contract in the first place. We therefore look at several special circumstances under which contracting is nevertheless possible.

The first of the is the case of *costly monitoring:* The lender can inspect the outcome if desired, however this inspection is costly to the lender, so that it be used as little as possible. We consider now a contract which is such that the borrower reports truthfully (not due to ethical concerns, those having had a look at mechanism theory will know that we are just using what is called the revelation principle – if some desirable properties can be obtained with contracts, it can also be obtained in contracts where truth is optimal report). Using this property (truth is the smartest report that the borrower can make) some properties an be deduced: Introducing an inspection region (reports which will give rise to inspection) one sees that the repayment function is constant outside this region, and that inspection will be made only for reports below

a certain limit. If a no-waste-of-inspection condition is added, one gets the *standard* contract.

In the case of no information, another way of keeping the borrower to the agreement -is to threaten with termination of possible future relationships. Our first model shows how this may work in a very simple setup, where renewal is denied if the borrower has reported bad outcome in the first period. In a two-period model this means the bank must earn all its profit in the first period, and we check when this is at all possible.

A second model which also uses the threat of no renewal has to do with sovereign lending. The model uses a standard Solow growth model for a country which borrows abroad to invest and then repays the loan. A country not paying back increases the current payoff but it loses the possibility of borrowing in all future. Depending on parameter values, not paying back may be better than paying back.

Turning then to (2), we consider a case where the outcome is perfectly observable, but where the probability of getting a good outcome depends on the activity of the borrower, and this activity cannot be observed. Basically the contract is a lottery for the borrower (whose effort matters), who either must leave everything or nothing at all to the lender. We run quickly through the proof which look formidable but turns out to be very straightforward. Although we do not emphasize formalisms, looking at the argumentation helps understanding why we get the seemingly mystical result.

So far, we have looked at situations where the loan contract consisted only of a repayment function. Adding other features may be helpful in cases of asymmetric information, and *collateral* is one such additional feature. A collateral is an asset which will be left to the disposal of the lender in the case that the borrower doesn't fulfil the engagement.

We consider the use of collateral in the context of a specific model of moral hazard model. In this model, there are two types of borrowers, namely (1) good investors having a high probability of success even when doing very little, and (2) bad investors who will have a smaller probability of success unless they put up considerable effort. Notice that *types are observable* to the lender, what is hidden is the *effort*. (We shall later consider a model, also with two types of borrowers, where the lender cannot observe the type, this gives rise to different – though with some similarities – contract structures.)

We begin the treatment of this model (if time permits) and finish the treatment in the next lecture.

We read:

Chapter 5, Sections 1–3, beginning of Section 4.