

# Consumption Smoothing, Saving, Credit and Insurance

## Lecture 9/3: Problems in rural credit markets

2/2013

Chayanee Chawanote

- ▶ Simple model of credit assumed that the default probability is independent of the amount to be repaid
- ▶ Here, there are theories of informal credit markets explaining problems we often see in rural credit markets
  - ▶ Default and collateral
  - ▶ Default and credit rationing
  - ▶ Informational asymmetries and credit rationing

## Default and collateral

- ▶ Collateral might be valuable to both parties, or the borrower values highly but the lender does not.
- ▶ Suppose a farmer needs a loan of size  $L$ .
- ▶ The landowner asks him to pledge land as collateral for the loan
- ▶ Let  $i$  be the interest rate charged on the loan  $L$ .
- ▶ Let  $V_S$  be the value that a small farmer places on his land
- ▶ Let  $V_B$  be the value that the big landowner attaches to the same plot of land.
- ▶  $F$  is the loss of collateral.

## Default and collateral

- ▶ At the time to return the loan, 2 possibilities can occur:
  - ▶ Involuntary default: borrower loses the land, passing it into the hands of the large landowner
  - ▶ Voluntary default: total loss to borrower =  $V_S + F$ , total gain =  $L(1 + i)$
- ▶ For the latter case, the borrower will prefer to return the loan if  $L(1 + i) < V_S + F$
- ▶ For the lender's preferences, he prefer his money back if  $L(1 + i) > V_B$
- ▶ Loan repayment is in the interest of both parties only if  $V_B < V_S + F$
- ▶ The lender's valuation must not exceed the borrower's valuation too much.

## Default and collateral

- ▶ What if  $V_B > V_S + F$  ?
- ▶ Whenever the borrower prefers to repay the loan, the lender wants him not to do so. The lender would like the credit transaction to be an excuse to acquire the (cheap) collateral.
- ▶ In this case, it might lead to have high rates of default since the lender would like to drive the borrower into a state of default.
- ▶ This analysis works better for consumption loans than production loans where the former the amount of loan cannot vary with the interest rate.

## Default and credit rationing

- ▶ Credit rationing: at the going rate of interest in the credit transaction, the borrower would like to borrow more money, but is not permitted by the lender
- ▶ If imagine a diagram of the demand curve for loans, credit rationing refers to all loan-interest combinations that lie to the left of the demand curve
- ▶ The possibility of default is tied to the existence of credit rationing.
- ▶ Moneylender wants to maximizes his rate of return on the funds
  - ▶ Choosing  $i$  to be large, but not too large since farmer can borrow from other sources, and earn a net profit of  $A$ , after some level of  $i$

## Default and credit rationing

- ▶ Farmer's profit: the vertical difference between the production function (output) and the cost line (loan costs). This must be as large as  $A$ .
- ▶ Farmer's maximized profit: choosing a loan that generate marginal product = marginal cost  $(1+i)$ 
  - ▶ The tangent at the vertical difference between the production function and the cost line represents the maximal surplus to farmer at interest rate  $i$
- ▶ Solution: choose  $i^*$  such that the surplus is  $A$
- ▶ There is no credit rationing here since at any given interest rate, the farmer is getting the desired loan size.

## Default and credit rationing

- ▶ Suppose the farmer can willingly default on the loan (strategic default)
- ▶ This means that moneylender will never lend to him again.
- ▶ To understand this, we need to know that borrower attaches to future gains and losses:  $N$  dates that consequences of his current decisions will arrive.
- ▶ Let  $f(L)$  be the value of the output for every loan size  $L$ .  
 $f'(L) > 0$
- ▶ Participation constraint (a requirement that farmer should want to participate at some interest rate  $i$  and some loan size  $L$ ):  $f(L) - L(1 + i) \geq A$

## Default and credit rationing

- ▶ What farmer gets over the entire horizon of  $N$  date:  
 $N[f(L) - L(1 + i)]$
- ▶ What he gets if he decides to default:  $f(L) + (N - 1)A$ 
  - ▶ Get today =  $f(L)$
  - ▶ From tomorrow, moneylender won't allow him to borrow. So, he only earns  $A$  (from other best source) period
- ▶ For the default not to occur (No-default constraint), we need
$$N[f(L) - L(1 + i)] \geq f(L) + (N - 1)A$$
$$f(L) - \frac{N}{N-1}L(1 + i) \geq A$$

## Default and credit rationing

- ▶  $f(L) - \frac{N}{N-1}L(1+i)] \geq A$
- ▶ If  $N = 1$  (short mental horizon), farmer will never contemplate the future consequences of his current actions, and the above inequality can never be satisfied. Farmer will always default on the loan
- ▶ If  $N$  is very large and  $N/(N-1)$  is close to 1, only participation constraint matters
- ▶ We are interested in situations in which  $N$  is neither too large nor too small.
- ▶ Now, maximize the vertical difference between the production function and the modified cost line (optimal credit transaction): marginal product of loan =  $\frac{N}{N-1}(1+i)$

## Default and credit rationing

- ▶ Moneylender will advance a loan of  $L^{**}$  with interest rate  $i^{**}$
- ▶ We have credit rationing: if the borrower were asked in an interview if he would like to borrow more at the rate  $i^{**}$ , he would answer yes.
- ▶ He would like to borrow the amount  $\hat{L}$  (see Figure 14.3) for which marginal product of loan =  $(1+i^{**})$ , the true marginal cost faced by the borrower.
- ▶ However, moneylender won't give the amount  $\hat{L}$  because a higher loan increases the return to a borrower by allowing him to pocket more money, and this prompts a default.

## Informational asymmetries and credit rationing

- ▶ Another explanation for credit ration, why the moneylend won't increase the interest rate.
- ▶ Two types of borrowers: high-risk borrowers (risky type) and low-risk borrowers (safe type)
- ▶ Risk may be correlated with characteristics of the borrower that are observable or unobservable to the lender.
- ▶ When it is unobserved, the interest rate affects the mix of clients that are attracted, and hence the average probability of default.
- ▶ Suppose each type needs a loan of size  $L$  to invest in some project.
- ▶ Safe type: always obtain a secure return of  $R$
- ▶ Risky type: Obtain a higher return of  $R'$  with probability  $p$  and possibly get zero return with probability  $1-p$

# Informational asymmetries and credit rationing

- ▶ The lender can freely set the interest rate; which rate he should choose?
- ▶ What is the highest interest rate that the safe borrower wants the loan?
  - ▶ From net return,  $i_1 = R/L - 1$
- ▶ What is the highest interest rate that the risky borrower wants the loan?
  - ▶ From expected return,  $i_2 = R'/L - 1$
- ▶ Since we have  $R' > R$ , we then have  $i_2 > i_1$
- ▶ Note that this interest rate is independent of the risky type's probability of success.

## Informational asymmetries and credit rationing

- ▶ Suppose the lender charges  $i_2$ , his expected profits are  $\Pi_2 = p(1 + i_2)L - L$ 
  - ▶ Only the risky type is willing to borrow at  $i_2$
- ▶ If the lender charges  $i_1$ , both types are in; hence, his expected profits are  $\Pi_1 = \frac{1}{2}i_1L + \frac{1}{2}[p(1 + i_1)L - L]$
- ▶ When  $\Pi_1 > \Pi_2$ , the lender will be reluctant to charge the higher interest rate.
- ▶ By substituting  $i_1$  and  $i_2$ , we obtain the condition  $p < \frac{R}{2R' - R}$ 
  - ▶ If the high-risk type is sufficiently risky (a lower  $p$  means a higher chance of default), the lender will not raise his interest rate to  $i_2$  that attract on the risky type.
- ▶ The price is not raised even in the face of excess demand.