Credit

In general, productive activities require inputs in advance, while revenues are only realized later. Income stream may fluctuate over periods and it will be reflected in the consumption path unless we can borrow against future incomes.

Therefore the credit and insurance market play a very important role. We first will study the outcome with complete credit markets and then look at the impact of an incomplete market or lack of it.

The issues we will address are voluntary and involuntary default, taking into account different degrees of enforcement.

Reasons to require credit:

1. Fixed capital: New startups or substantial expansion of existing production lines.
2. Working capital: credit required for ongoing production activity.
3. Consumption credit: cash requirement due to shock to production output, output price, illness or festivities.

Fixed capital is the engine for growth. However working capital is crucial for low income, agricultural worker to be able to buy the required inputs for production. There is a seasonality of spending and incomes.

On top of the seasonality we have the uncertainty of agricultural activity, which makes consumption credit a key element to smooth consumption trough out the year.

1. Rural credit market.

We observe formal credit institutions and informal lenders.

A common problem with formal credit institutions is that the borrower has limited liability. They repay in good scenarios but cannot repay in adverse situations. This creates an incentive for the borrower to incur in more risky activities, because

his expected return is higher. Therefore the institutional credits agents often require collateral. This requirement is a discrimination against poor borrowers because they don't have acceptable collateral for formal lenders (land and work).
Informal lender may be willing to accept land and labor as collateral. They also have a better notion of the activities and characteristics of the client.

The rural credit market is not competitive; meaning the equilibrium price (interest rate) is not set by market forces.

Some characteristics are:

- Informational constraints. Lack of information on the use of the loan and on the decision regarding repayment.
- Segmentation. Rural money lenders tend to have a fixed clientele. They only borrow in their own village.
- Interlinkages. Landlords tend to give credits to their tenants or farm workers. Traders favor lending to clients from whom they also purchase grain.
- Interest rate variation. We observe a huge variation in interest rates. It depends on

personal characteristics, length of interaction, etc. This same reason makes arbitrage opportunities unfeasible.

- Rationing. The borrower would like to borrow more but cannot. It is related to segmentation.
- Exclusivity. Local monopoly.

2. Theories of informal credit markets

High interest rates are consistent with a money lender with *monopoly* power. Nonetheless empirical surveys tend to reject the notion of one single moneylender per village. We can think of local monopolies.

A more convincing explanation for high interest rates is provided by the *lender's risk hypothesis*. There is a substantial risk of default. It may be involuntary default due to a bad crop; or voluntary or strategic default.

To study the impact of the possibility of default we will assume an exogenous default probability, (1-p). The presence of other moneylender will reduce extra profits of the lender to zero (above the opportunity cost, r). If the loan is at an interest rate i, the zero profit condition establishes:

$$p(1 + i)L - (1 + r)L = 0$$

$$i = \frac{1 + r}{p} - 1$$

The risk of default ($p<1$) justifies $i>r$, even with perfect competition.
However lenders have found different mechanism to induce very low default rates.

The default probability is not independent of the loan size, or the interest rate. Following the same reasoning we observe that the probability of default is related to the kind of use to which the

loan is put. Most of the informal loans will be for *working capital or consumption purposes*, rather than for fixed investments that may permanently reduce the future need for credit (threat of no future loans).

We mentioned that informal lenders accept diverse forms of *collateral*. We can distinguish between collateral that is valuable for the lender and the borrower, and collateral that is only of value for the borrower. Any collateral that is valued by the borrower would reduce the voluntary default incentives. However collateral that is also valued

by the lender serves as insurance against involuntary default.

Suppose a farmer requires a loan of amount L. The interest rate charged is i. Let V_S and V_B the value placed on the land by the small farmer and the big landlord, respectively. Assume that the monetary cost of default is F (besides the collateral).

The borrower will prefer to return the loan if

$$L(1+i)<V_S+F \qquad (1)$$

On the other hand the lender wants his money back if:

$$L(1+i)>V_B \qquad (2)$$

Combining (1) and (2) we find that the repayment of the loan is interest of both parties only if:

$$V_B<V_S+F \qquad (3)$$

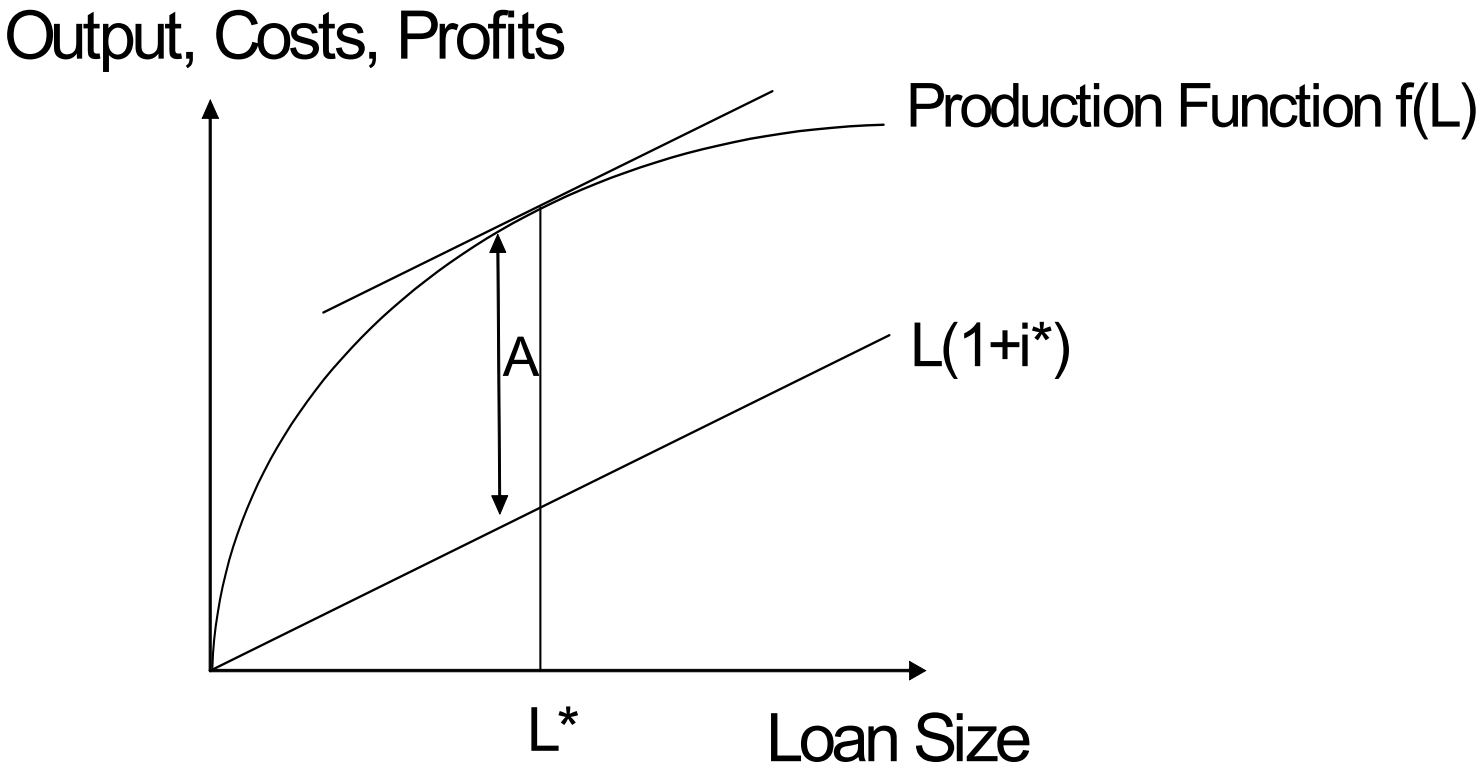
The lender values the collateral less than the borrower. Otherwise the loan would only be an excuse to acquire the collateral. The lender can

set very high interest rates to induce the voluntary default.

Credit rationing: at the going interest rate the borrower would like to borrow more money, but it is not permitted by the lender.
We will study a model that shows the relation between credit rationing and possibility of default.
Assume we have a moneylender and many farmers looking for a loan. The outside option of the farmer is a net profit of A by borrowing somewhere else.

The lender wants to maximize his rate of return subject to the participation constraint (PC).

$$\text{PC:} \quad f(L) - (1+i) \geq A \qquad (4)$$


Output, Costs, Profits
Production Function f(L)
L(1+i*)
A
L*
Loan Size

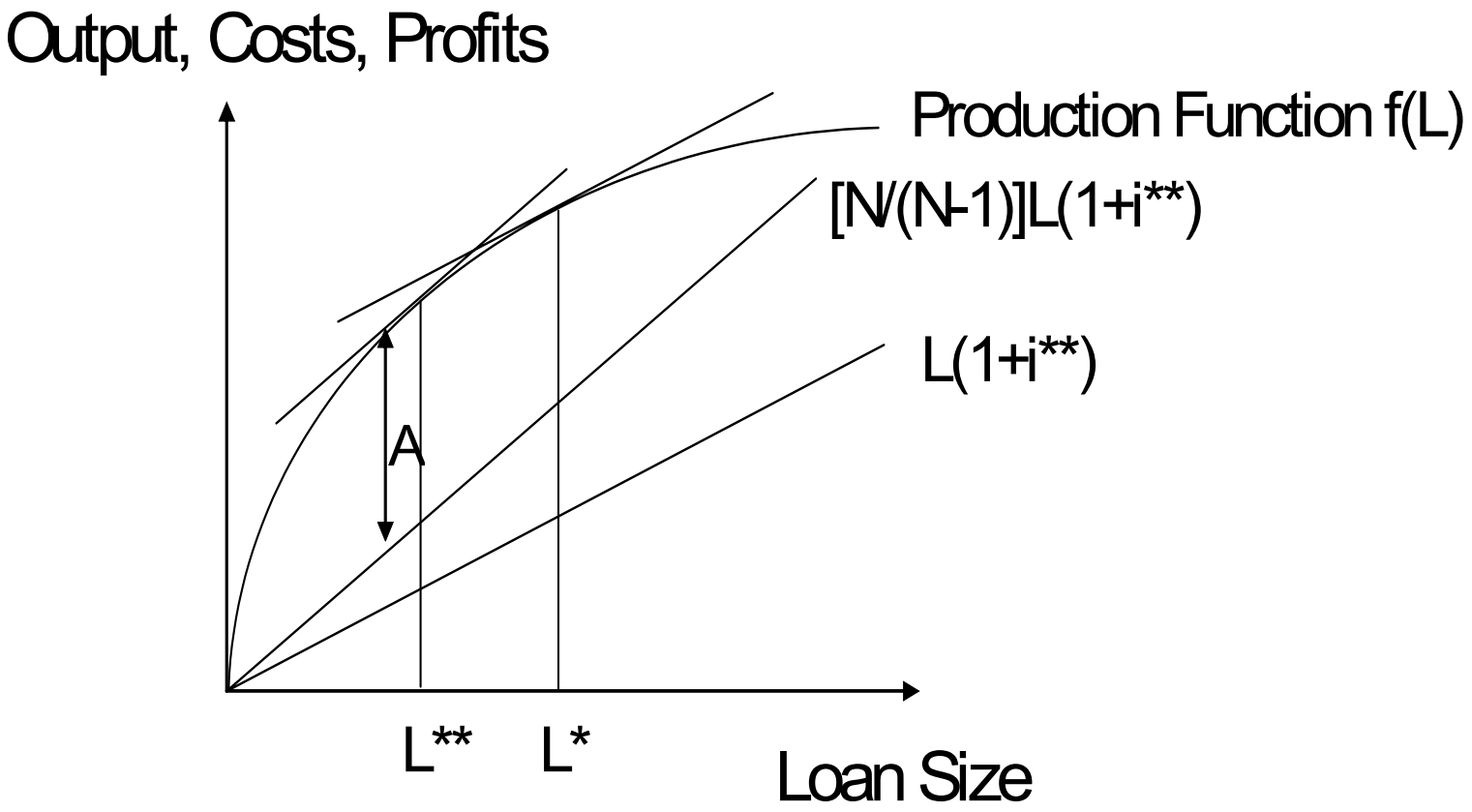
Introducing the possibility of strategic default:

If the farmer defaults he can't get more credits from the lender, but still has the outside option. Hence he won't default only if:

$$N[f(L)-L(1+i)] \geq f(L)+(N-1)A \qquad (4)$$

$$f(L)-[N/(N-1)]L(1+i) \geq A \qquad (5)$$

This restriction is tighter than the PC.


Output, Costs, Profits
Production Function f(L)
[N/(N-1)]L(1+i**)
L(1+i**)
A
L**
L*
Loan Size

The marginal cost faced by the borrower is (1+i**). So he would like to borrow more. He is being rationed.

Informational asymmetries and credit rationing. Lending risk may vary significantly from borrower to borrower. It may be correlated with observable as well as unobservable characteristics.
Suppose the moneylender faces 2 type of borrowers: safe type and risk type. Both need a loan of L.
The safe type always has a return R>L.

The risky type can have a return R'>R with probability p and a return of 0 with probability (1-p)
From the PC we can find the highest admissible interest rate for each type of borrower.

Safe type: $R-(1+i)L \geq 0$

$i_1 = R/L - 1$

Risky type: $p[R'-(1+i)L] \geq 0$

$i_2 = R'/L - 1$

The risky borrower is willing to pay a higher interest rate than the safe borrower, and this interest rate is independent of his probability of success.

What are the expected returns for the lender?

$\prod_1 = 1/2 i_1 L + 1/2[p(1+i_1)L - L]$

$\prod_2 = p(1+i_2)L - L]$

The lender will prefer to charge the lower interest rate if $\prod_1 > \prod_2$, meaning:

$$p \prec \frac{R}{2R' - R}$$

If p is sufficiently low (higher chance of default) the lender would prefer to charge i_1 and take the chance of getting the safe type. This solution will ration away one of the borrowers.

Default and enforcement. We saw the condition (5) on which repayment can be forced with the threat of no future loan. A system of reputation could also help to discipline the borrower by reducing other credit options. This threat work in very small villages an in industrialized countries, but is not credible in many cases.

Segmented markets induce borrower to repay because it is very difficult to find a new loan source.

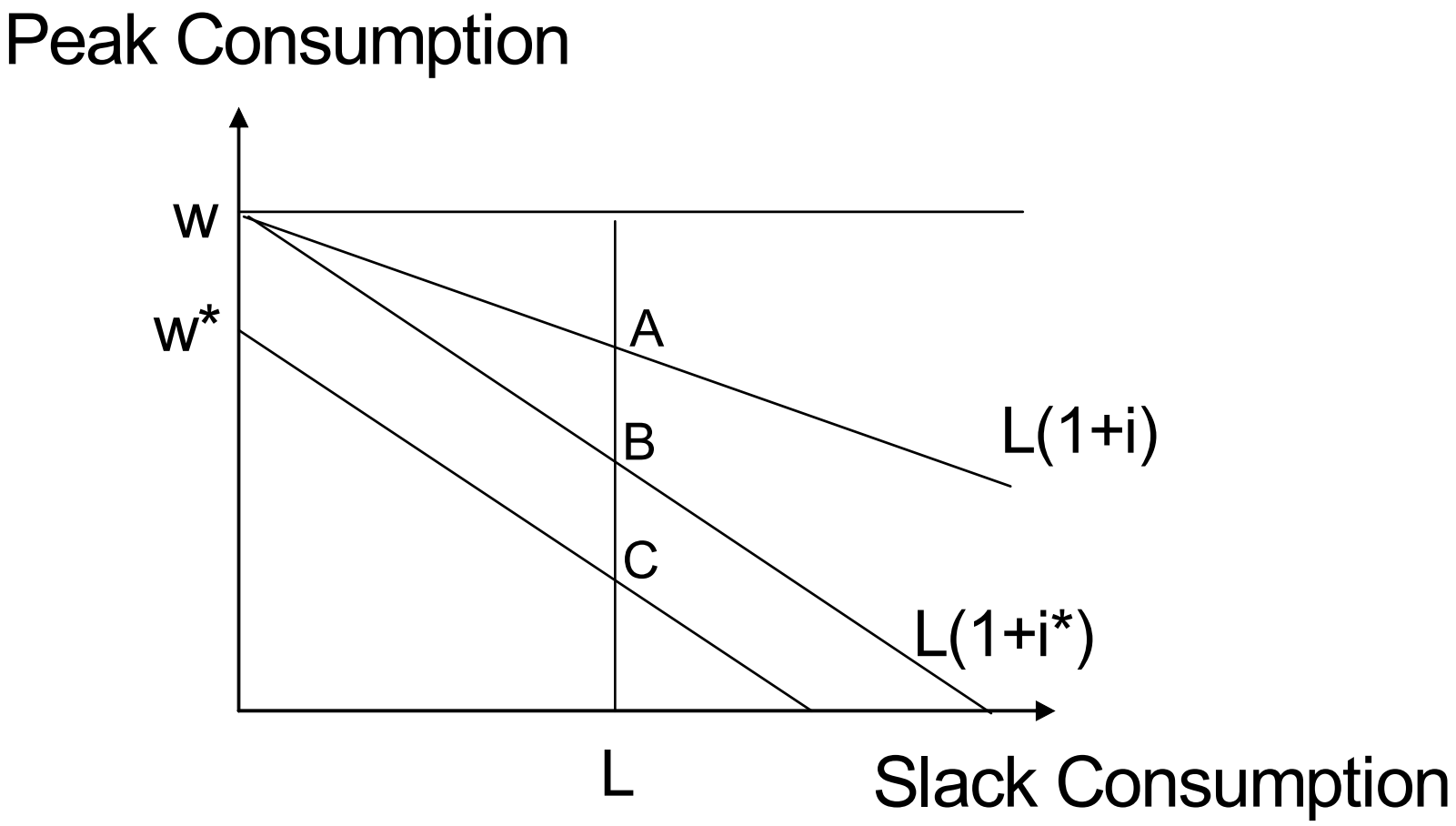
3. Interlinked transactions

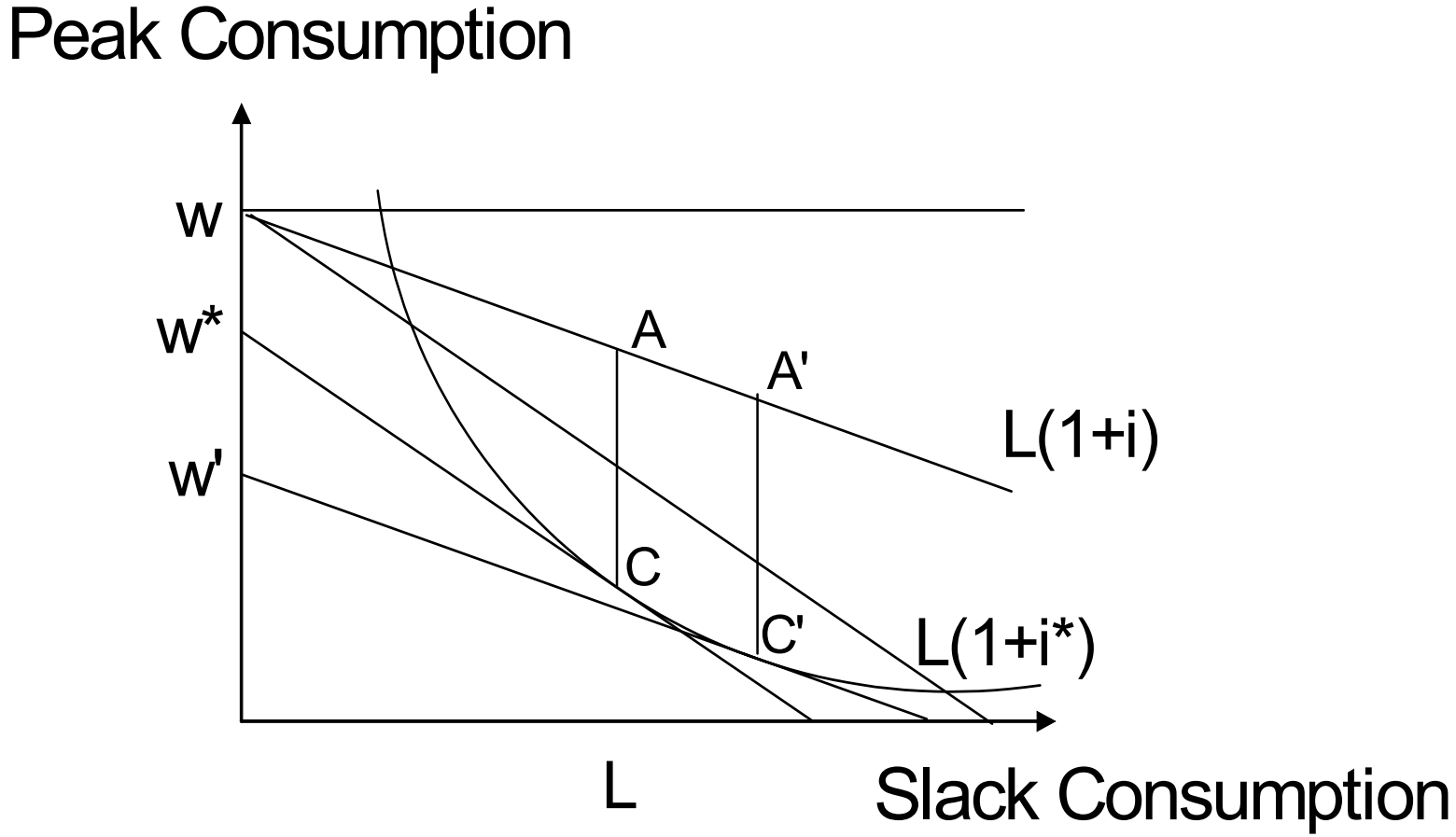
It is very common in LDC that loan transactions are tied to dealings in other market. For example the landlord gives a loan and uses the tenant's labor as collateral. Traders give loans with the crop as collateral. Table 14.1

Why do we observe interlinked transaction?

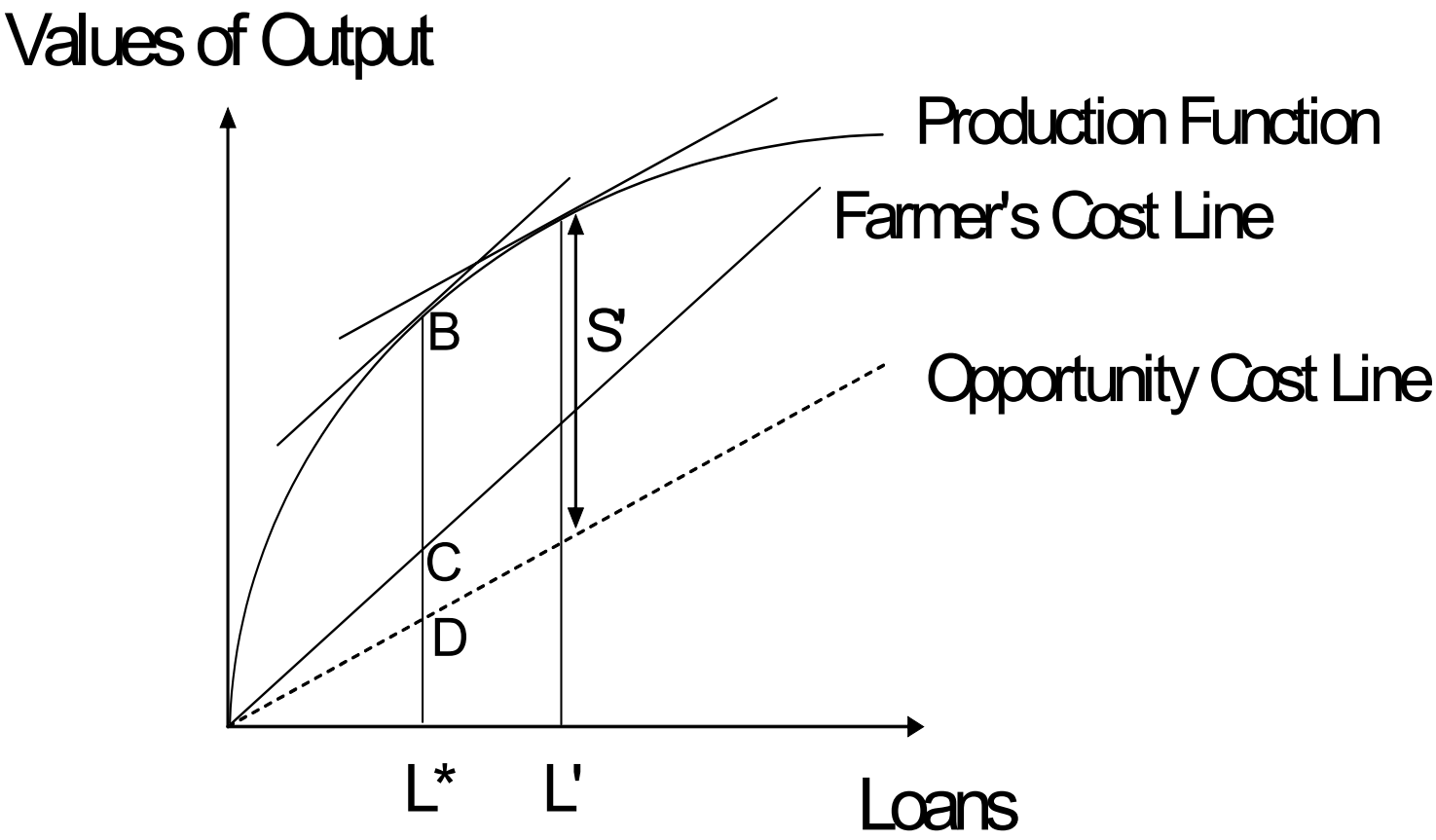
a) Hidden interest. If explicit interest charging is forbidden the usufruct appears as an indirect way of charging it. It could also be through lower crop prices.

b) Interlinkages and information. Having the right to crop or use of labor reduces the chances of involuntary default at low monitoring costs.
c) Interlinkages and enforcement. Having a deal in a different market can result in an interlinked threat. E.g., a loan to a tenant at a preferred rent will have the threat of loosing the rent contract in case of default.
d) Interlinkages and creation of efficient surplus. Loan contracts may be denominated in labor to maximize the total surplus.


Peak Consumption
w
w*
A
B
C
L(1+i)
L(1+i*)
L
Slack Consumption


Peak Consumption
w
w*
w'
A
A'
C
C'
L(1+i)
L(1+i*)
L
Slack Consumption

Lower crop prices combined with low interest rate may also maximize surplus.



With a combined operation they would get a higher profit. There is an interlinked contract than is equivalent to the combined operation.
Suppose the farmers outside option guarantees him A. Therefore the contract needs to leave him at least A. The lender can get S'-A with a profit tax of t per dollar.

$$S' = pQ' - (1+i)L'$$

$$A = tS' = ptQ' - (1+i)tL' = p'Q' - (1+i')L'$$

The pair (p',i') is an interlinked contract that leaves the farmer with A and the lender with S'-A, maximizing total surplus.

4. Alternative credit policies

In an effort to expand rural credit we can either expand formal credit to local moneylenders, or try to design innovative organizations.

Vertical formal-informal links

Expanding the formal credit to landowners, trader or cooperative groups may increase competition among them and hopefully improve the borrowing conditions of the lenders (lower i).

Higher competition may increase the incentives to default (reduce incentives to repay) increasing *monitoring costs* and making the credit more costly for everybody.

Lenders may *collude* (to not invade each other's territory). The incentives to collude may be higher with more formal credit by increasing the severity of credible punishment in case of deviation.
Lenders may have *differential information*. An increase in formal resources may allow the better informed lender to get all good borrowers and take the other one out of business.

Microfinance

Formal institution may mimic the trader-moneylender activity, by accepting rice as repayment for loans. E.g.: Grameen Bank of

Bangladesh. They are credits for very poor households. The bank lends to a groups rather than an individual. In case of default no group member is allowed to borrow again. This policy induces self-selection of the members.

Some specific implications of group lending are:

- Positive assortative matching. Good credit risks come together.
- Peer monitoring. Group members can monitor and influence the choice of individual projects.
- Potential drawbacks. Contagion effect of an individual default. Solution: sequential lending. Groups may be over conservative and therefore

not reach the social optimum. They lack of flexibility.

The Grameen bank has been heavily subsidized. It is not easy to measure his performance since program placement isn’t random (D-D).