Lecture 9
Capital markets

INTRODUCTION
Evidence that majority of population is excluded from credit markets
Demand for Credit arises for three reasons:
(a) To finance fixed capital acquisitions (e.g., new machines)
(b) To finance working capital (e.g., seeds)
(c) To allow consumption smoothing (e.g., illness)
Working capital and consumption credit are particularly important for the poor in developing economies, because of:
- subsistence level consumption (low savings to face shocks)
- seasonality of agriculture
Availability of credit is crucial for the functioning of the economy: allocative efficiency: marginal return is highest and equity
Need to grant access to financial services to poor is not new however it has proven to be difficult:
- failure of state lending policies in favor of agriculture in the 1950-70s
- supply of services by traditional banks is inadequate.
As always, useful to start with the benchmark: complete, competitive markets

\[
S \uparrow \rightarrow i \downarrow \quad \text{and} \quad D \uparrow \rightarrow i \uparrow \quad \text{unique market equilibrium at } i^* \text{ where market clears } (D=S)
\]

The question is now: what is special about rural credit markets in LDCs

Lecture Outline
Introduction
I-Basic characteristics of rural credit markets in LDCs
   I-1 Who provides credit?
      I-2 Market failure: asymmetric information combined with limited liability
II-Two anomalies in rural credit markets
   II-1 Formal lenders only lend to wealthy borrowers
   II-2 Credit rationing
III-How to solve these problems
   III-1 Informal lenders practices
   III-2 Failure of government-led development bank
Conclusion
I-Rural credit markets
I-1 Who provides rural credit?
There is a large variety of credit markets in LDCs.
Institutional lenders: institutional lenders: government banks, commercial banks, credit bureaus, and so on.
Informal:
- marketing agents, salesmen
- dealer of production inputs
- landowner
   \text{\textbf{interlinked contracts}}
- family/friends: 0 interest rate
- moneylender
- ROSCA rotating saving and credit association

I-2 Market failure: asymmetric information combined with limited liability

Enforcement problem: loan is a limited liability contract
Debtor may be unable to repay: involuntary default or unwilling to repay: voluntary default
Later happens when lender has insufficient sanctions against delinquent borrowers:
- no framework of legal enforcement
- costs of enforcement are too high

Consequence: a lender may simply cease to lend - a situation that may well arise for poor farmers in developing countries.

I-Rural credit markets

I-2 Market failure: asymmetric information combined with limited liability

Asymmetric information

Efficiency of credit markets impeded by 3 main information problems during the 3 phases of a project
- information on borrowers’ characteristics
- information on borrowers’ actions
- information on borrowers’ reimbursement capacity

II- Two anomalies in rural credit markets

II-1 Formal lenders only lend to wealthy borrowers
This anomaly can be explained by the existence of asymmetric information combined with limited liability

Case 1: Involuntary Default
- assume borrower has to choose between 2 projects, and lender cannot observe the choice
- assume borrower is subject to limited liability and his wealth = 0
- assume both projects require L = 100 and i = 10% and
  - P1 yields 120 with certainty
  - P2 yields 230 w/probability ½ and 0 w/probability ½

Which maximizes social welfare?
Clearly P1 maximizes social welfare, since
E(P1) = 120 > E(P2) = 115 (230 * ½)

II- Two anomalies in rural credit markets

II-1 Formal lenders only lend to wealthy borrowers

Is it optimal for the lender to finance either project?

LP(1) = 110 - 100 = 10
LP(2) = ½ (110 - 100) + ½ (-100) = -45
the lender will want to finance P1 but not P2

What will the borrower choose? assume he is subject to limited liability and his wealth = 0, then:

BP(1) = 120 - 100 * (1 + 0.1) = 10
BP(2) = ½ (230 - 100 * (1 + 0.1)) + ½ (0) = 60
BP(2) > BP(1) so borrower chooses P2

Because of limited liability, borrower repays 0 if project fails
Because of limited liability, borrower repays 0 if project fails
So?
Borrower prefers P2. Anticipating this, lender won’t lend.

II-Two anomalies in rural credit markets
II-1 Formal lenders only lend to wealthy borrowers

Case 2: Voluntary Default (“take the money and run”)  
- assume borrower can only choose P1, which yields 120 for sure  
- assume, again, that P1 requires L=100 and i=10%  
- assume that borrower can choose between “honesty” (i.e. repay) and “cheating” (i.e. running away with 100)  
- assume that if he runs he’s caught with a positive probability, say p=.6, in which case the lender can seize the project return (100)  
- assume borrower is subject to limited liability and his wealth=0, then  

**What is the pay-off?**  
- honesty payoff =120-100*(1.1)=10  
- cheating payoff= .4*100+.6*0=40

So?
Borrower prefers to run; anticipating this, lender won’t lend.

II-Two anomalies in rural credit markets
II-1 Formal lenders only lend to wealthy borrowers

**Why are rich borrowers different?**
Assume the borrower has assets worth 110 that can be expropriated in case of default.

**In case 1** (involuntary default) payoffs are:  
BP(1)=10  
BP(2)=1/2*(230-110)+1/2*(-110)=5

II-Two anomalies in rural credit markets
II-1 Formal lenders only lend to wealthy borrowers

So?
Both borrower and lender prefer PI

II-Two anomalies in rural credit markets
II-1 Formal lenders only lend to wealthy borrowers

**Why are rich borrowers different?**
Assume the borrower has assets worth 110 that can be expropriated in case of default.

**In case 2** (voluntary default) payoffs are:  
- honesty payoff =120-100*(1.1)=10  
- cheating payoff= .4*100+.6*(-110)=-26

So?
Both borrower and lender prefer honesty

- **Intuition:** by pledging collateral rich borrowers have more stakes in the success of the project: less likely to default.

II-Two anomalies in rural credit markets
II-2 Credit rationing

**Definition:** credit rationing refers to a situation in which at the going rate of interest in the credit transaction, the borrower would like to borrow more money, but is not permitted to by the lender. Need for the rate of interest to be specified.
II-Two anomalies in rural credit markets

II-2 Credit rationing

**Case 1: Credit Rationing and Adverse Selection: lower i to get safe projects.**

Assume: lender has L and 2 borrowers (Mr. Blue & Mr. Green) ask for a loan.

- Mr. Blue has a project that gives gain G with pr = 1
- Mr. Green's project gives gain G' with pr = p and 0 with pr = 1-p

Assume the lender is color blind and borrowers default if yield=0. Then the **participation constraint** is:

- Mr. Blue will take L if G-(1+i)L > 0 \[ \rightarrow i < i_S = G/L - 1 \]
- Mr. Green will take L if G'-(1+i)L > 0 \[ \rightarrow i < i_R = G'/L - 1 \]

**Key feature:**

\[ i_R > i_S \]: riskier borrower is willing to pay higher interest rate intuition: if project succeeds, return is high (G'>G), if project fails borrower does not repay.

II-Two anomalies in rural credit markets

II-2 Credit rationing

If lender charges \( i_S \):

- he'll get 2 applications and toss a coin:

\[ LP(i_S) = \frac{1}{2}(1+i_S) L - L + \frac{1}{2} p(1+i_S) L + (1-p) 0 - L \]

If lender charges \( i_R \): only Mr. Green will apply:

\[ LP(i_R) = p(1+i_R) L + (1-p) 0 - L \]

So:

Lender will prefer to charge \( i_S \) if and only if: \( P(i_S) > LP(i_R) \) so \( p < R/(2G' - G) \) (see appendix)

If the high-risk type is "sufficiently" risky, then the lender will not raise his interest rate to \( i_R \) thereby attracting the risky type.

Instead, he will stick to the lower level \( i_S \) and take the 50-50 chance of getting a safe customer.

II-2 Credit rationing

**If lender charges \( i_S \):** There is **credit rationing**: both Mr Blue and Mr Green would like to borrow L at the going rate \( i_S \) but only one gets it.

In contrast, if lender charges \( i_R \), there is no credit rationing: only Mr Green applies for the loan and he gets it.

The key observation here is that the **interest rate has two effects**.

- It serves the usual allocative role of equating supply and demand for loanable funds.
- It also affects the average quality of the lender's loan portfolio.

For this reason lenders may not use interest rates to clear the market and may instead fix the interest rate, meanwhile rationing access to funds.

The lending is however too low from a social point of view: justification of **intervention**.

II-Two anomalies in rural credit markets

II-2 Credit rationing

**Case 2: Credit Rationing and Moral Hazard: lower i to ensure no Default**

- 1 farmer, 1 lender
- if farmer borrows L he produces \( f(L) \)
- if he borrows 0, he gets A (outside option)
- feasible \((L, i)\) combinations are all those such that:

\[ f(L) - L(1+ i) \geq A \]

(participation constraint)

\( L^* \) is given by maximization of \( i(f(L^*) \) by the lender provided lender gets a profit of A.

II-Two anomalies in rural credit markets

Source: DR p. 549
II-2 Credit rationing

Case 2: Credit Rationing and Moral Hazard: lower i to ensure no default

- now introduce the possibility of default
- assume that if the farmer defaults, the lender will never lend again
- assume time horizon = N
- then, what are the payoffs?

What does it take to discourage default?

“honesty” payoff = \[ N[f(L) - L(1+i)] \]

default payoff = \[ f(L) + (N-1)A \]

What does it take to discourage default?

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

This new restriction is the no-default constraint credit-rationing

II-Two anomalies in rural credit markets

II-2 Credit rationing

Compare participation constraint \( f(L) - L(1+i) \geq A \)

With the no-default constraint: \( f(L) - \frac{N}{N-1} L(1+i) \geq A \)

Since \( \frac{N}{N-1} > 1 \) (multiplies the cost line), the “no-default constraint” is tighter than the participation constraint

II-Two anomalies in rural credit markets

II-2 Credit rationing

The maximum interest rate that can be applied need to respect the two constraints: \( f(L) - L(1+i) \geq A \) and \( f(L) - \frac{N}{N-1} L(1+i) \geq A \)

\( L^{**} \) is given by maximization of \( i^{**} \) by the lender provided difference of \( A \) between production and the modified cost.

Source: DR p. 552

At \( i^{**} \) the borrower wants to borrow \( L \): Credit constraint

II-Two anomalies in rural credit markets

II-2 Credit rationing

* when there is moral hazard so that the farmer can default, the feasible interest rate (i.e. the interest rate that guarantees no default) is lower for any given loan size: \( i^{*} > i^{**} \)

* to ensure no default the lender offers less loans (lower \( L \)) at a lower interest rate

Notice that there is credit rationing: at the given interest rate, the borrower would like a larger loan
However, the lender is not willing to increase L or increase \( i \) because this would increases the payoff to default and violate the no-default constraint.

III-How to solve these problems

These problems could potentially be eliminated

**INFORMATION:** if banks had cheap ways to gather and evaluate information on their clients. But high transactions cost as handling small transactions is more expensive than a large one.

**COLLATERAL:** if borrowers had marketable assets to offer as collateral. But borrowers are too poor to have much in the way of marketable assets.

So finance has fueled a vicious circle

III-How to solve these problems

III-1 Informal lenders practices

Formal and informal lenders coexist, the poor only borrow from the latter as informal lenders can deal better with the poor:

- **Close-knit communities:** easier to gain information and to enforce punishments
- **Multi-market interaction:** easier to gain info on risk and easier to accept many forms of collateral (e.g. labor)
- **Repeated interaction:** easier to provide incentives not to default

**But still information is not “perfect”, lenders need to:**
- solve the moral hazard problem, i.e. provide incentives not to default
- solve the adverse selection problem, i.e. screen projects
- they can do so by using: direct mechanisms (e.g. monitoring); indirect mechanisms: can lead to credit rationing (II-2)

III-How to solve these problems

III-1 Informal lenders practices

Therefore rural credit markets are characterized by

- **Segmentation:**
- **Inter linkage:**
- **Inter-rate variation:** no possibility of arbitrage:
- **Rationing**
- **Exclusivity**

This results in high interest rates because of:

- monitoring costs
- risk: even in case of no profit probability \( p \) of default can bring high interest rate

\[
p(1+i)L - (1+r)L = 0 \Rightarrow i = \frac{(1+r)}{p} - 1
\]

If \( p=50\% \) and \( r \) is \( 10\% \), \( i \) will be \( 120\% \)

Growing consensus to reject exclusive monopoly power of lenders but 3 problems with informal lending:

- higher i (higher r) ; limited resources; no insurance capacity

III-How to solve these problems

III-2 Failure of government-led development bank

Subsidies can be potentially justified on efficiency and equity grounds. However, subsidies via development banks (1960-70s) failed

- **Break down of rationing mechanism:** no selection mechanism between good and bad projects
- **Embezzlement:** Low interest rates created excess demand adding pressure to allocate loans to politically-favored residents
- **Crowding out:** Subsidized banks pushed out informal credit suppliers on which the poor relies
- **Saving disincentive:** low rate left only unattractive and inefficient ways to save for poor households

Disincentive for good management and efficient institutions

CONCLUSION

These negative legacies drove the microfinance movement to look to the private sector for inspiration.

Combination of the banks’ resources with the local informational and cost advantages of neighbors and moneylenders.
Like traditional banks, microfinance institutions can bring in resources from outside the community.

- Use of social capital as substitute for physical collateral: joint liability
- Dynamic incentives

Microfinance is not the first attempt to do this, but it is the most successful by far.