# Development economics

## Lecture 12: Credit markets and Microcredit (financial capital)

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Why do credit markets matter for development?

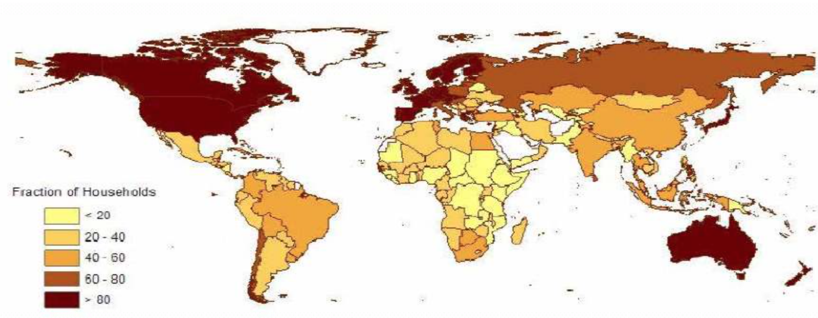
Information problems and access to credit

Microcredit and overcoming problems of credit delivery to the poor

# Why do credit markets matter for development?

- Investment over time: capital needed upfront, then used for production
  - **Fixed capital**: eg., wheel cart, machinery
  - **Working capital**: material used for production, e.g., fruits, raw materials.
  - Above especially crucial in agriculture: seasonality - cropping season: need for seeds, fertilizers, repayment when harvest collected.
- Smoothing consumption over seasonal cycles or temporary periods without income
  - **Consumption credit**: unexpected health expenditures, studies, unemployment, etc.
- Financial markets help direct funds where it is most needed from those who currently do not need it

# Access to financial markets (bank accounts)




Source: WB (2013)

# Potential for credit markets in developing countries

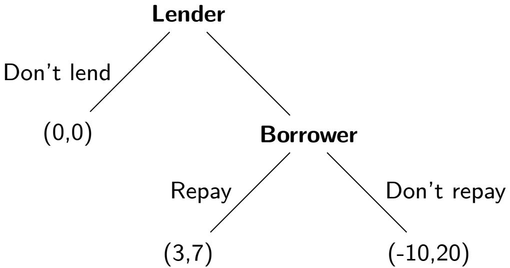
- Recall: returns to capital very high (De Mel, McKenzie, and Woodruff, 2008) - often above 100% annualy (Mexico, Ghana, Kenya)
- Q: What are the problems with credit markets in developing countries?
    1. Information problems: Lenders may not know what is being done with their money and whether the other party is able to repay (risky activity and failure vs. outright fraud)
    2. No (or very specific and limited) collateral
    3. Poor enforcement mechanisms
    4. Transaction costs high (administration of loans)

# Default on loans

- Two types of default:
  - **Involuntary default**: risky activity and failure
  - **Voluntary/strategic default**: borrower could repay, but chooses not to; especially pronounced in countries with weak legal enforcement
  - Q: Why do we care about the distinction?
- How to prevent fradulent behavior?
  - Prevention of future loans.
  - Q: But what if there are multiple lenders and no individual credit history?
- Consequences of high possibility of default:
  - Recall **backwards induction**: lenders know that their funds would most likely not be repaid $\Rightarrow$ they are not willing to give loans in the first place

# Credibility and subgame-perfection

- Assume a problem of a lender borrowing money where the lender does not have an assurance of borrower's repayment (trust-like interaction):



# Supply of credit: formal lenders

- **Formal (institutional) lenders**: commercial or government banks
  - Huge expansion (currently largest ongoing financial access experiment: bank accounts to all adults in India)
  - Past experience with agricultural banks in many developing countries (main push around 1970s): rather cash disbursement than credit
  - Problems: No personal knowledge of clients $\rightarrow$ poor monitoring availability
    - **Principal-agent problem** (firm has a project, but no money; bank has money, but no project (not its objective))

# Formal lenders: information problems (simple model)

- **Case 1**: No uncertainty
  - Setup:
    - Firm can engage in two projects, both costing \$100000; firm has no money upfront.
    - Project 1 yields \$115000 for sure.
    - Project 2 yields \$120000 for sure.
    - Bank loan at 10%.
  - Q: Which project would the bank want the firm to undertake?
  - Q: Which project would the borrower want to undertake?
  - Aligned interests of the bank and the lender.

# Formal lenders: information problems (simple model)

- **Case 2**: Uncertainty
  - Setup:
    - Firm can engage in two projects, both costing \$100000; firm has no money upfront.
    - Project 1: 50% of the cases it returns \$0 and in 50% of the cases it returns \$230000 (on average still \$115000)
    - Project 2 yields \$120000 for sure.
    - Bank loan at 10%.
  - Q: Which project would the bank want the firm to undertake? Project 2
  - Q: Which project would the borrower want to undertake? Project 1
  - Conflicting interests of the bank and the lender.

# Formal lenders: information problems (simple model)

- **Case 2**: Uncertainty
  - Returns to the firm from Project 2: \$120000 (gain) - \$110000 (returns to the bank at 10% interest rate)
  - Returns to the firm from Project 1: 0.5 (\$230000 - \$110000) + 0.5(0) = \$60000
    - Why 0 in the case of the failure of the project? Borrower has *limited liability*
    - Borrowers take too much risk (**moral hazard**).
- Q: What if the bank has means to push the borrower to repay under every circumstance? Discrimination against poor borrowers, banks often require collateral (a house?)
- Q: What collateral do the poor have? Often a small piece of land (property rights?) or can offer labor
- Q: Would the bank accept this? Why (not)?

# Supply of credit: informal lenders

- **Informal lenders**: Traders, rich landowners, shopkeepers (almost never pure lenders – interlinkages)
  - Living in the same area where the borrowers are - much better information about the actual situation of the borrowers
  - Land or labor as collateral may be acceptable to them
  - Often borrow from formal banks in order to cater to the needs of the poor
- Information constraints:
  - Lack of information on how the loan will be used
  - Lack of information about repayment decision

# Informal lenders: characteristics

- Segmentation / Exclusivity:
  - Mutual relationships based on trust costly to build - lenders with fixed client base
  - Exclusivity: lenders preventing loan take-up from others (70% in Pakistan; Aleem, 1993)
  - Repeated lending very common (as high as 70% in Pakistan; Aleem, 1993) - this builds trust and trustworthiness (recall the trust game)
- Interlinkages
  - Moneylenders often own businesses and mainly offer loans to their customers or tenants
  - Terms in credit markets often determined by terms in other markets (land or labor)

# Informal lenders: characteristics

- Variation in interest rates:
  - Pakistan: from 18% to 200% (average 78.7%) (Aleem, 1993)
  - But not everywhere: often flexible loans provided by family members' networks with very low interest rates (and the terms usually adjustable)
  - Often interest rates not charged even by lenders.
  - But: *shadow interest*: lower prices at which grain is purchased from the farmers, forced labor to pay off the debt... (recall the interlinkages)
- Arbitrage:
  - Q: If there is such a variation in interest rates, why don't farmers go to where the loans are cheapest (this is what makes interest rates pretty smooth across institutions in the developed world)? Informational constraints!

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# Informal lenders: high interest rates model

- High interest rate not due to lenders' monopoly powers (not empirically confirmed). Risk of default might explain the high interest:
- Recall: Involuntary vs. strategic default
- Simple model:
  - $p \ldots$ probability of repayment (default w/ prob $1 - p$)
  - $L \ldots$ total amount of funds lent
  - $r \ldots$ opportunity cost for lenders
  - $i \ldots$ interest rate charged by lenders
  - Perfect competition: zero profits to lenders on average

# Informal lenders: high interest rates model

- Model continued:
  - Expected profit of lenders (perfect competition):

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

  - Rearrange to get:

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

    - If $p = 1$, then $i = r$
    - If $p < 1$, then $i > r$
- Example: assume $r = 0.1$ p.a. and $p = 0.5$ then $i = 1.2$, i.e. 120% annually
- Recall: in developed world lenders protected from default

# Informal lenders: collateral and induced default

- Collateral of two types:
  - High value for lender and borrower alike (Example?)
  - High value for borrower, low value for lender (Example?)
  - Q: Why is the second also acceptable as collateral?

- When would lender want to induce default?
- Simple model:
  - $L \ldots$ loan size
  - $V_B \ldots$ value (of land, labor, etc.) to borrower
  - $V_L \ldots$ value to lender
  - $F \ldots$ borrower's cost of not repaying (no access to future loans, being beaten up, shame etc.)

# Informal lenders: collateral and induced default

- Borrower wants to repay if:

$$L(1+i) < V_B + F$$

- Lender prefers the money back if:

$$L(1+i) > V_L$$

- Loan repayment in interest of both parties if:

$$V_L < V_B + F$$

  - In case $V_L > V_B + F$ the lender actually wants the borrower to default
  - How to prevent such collateral acquisition?
    - Increase interest rates
    - But: High interest rates may discourage the loan uptake

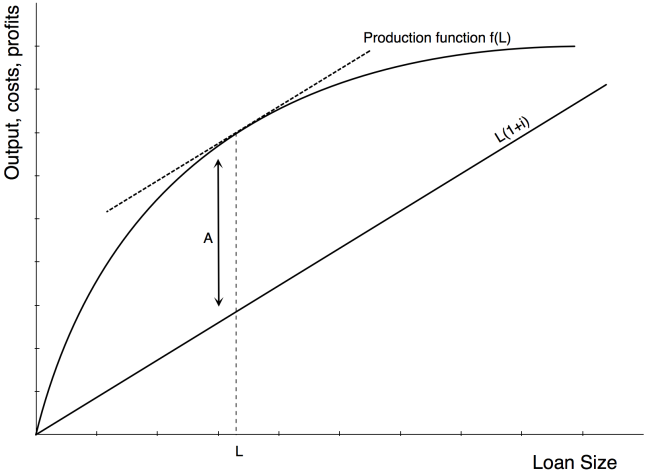
# Informal lenders: credit rationing

- **Credit rationing**: borrower would like to borrow more at the current interest rate $i$, but is not served by the lender
- Simple model: no collateral, repayment only due to *dynamic incentives* (recall: fixed matching of lenders and borrowers)
  - $f(L)\dots$ production function (in \$) given the loan $L$
  - $A\dots$ outside option (borrowing elsewhere, not borrowing)
  - **Participation constraint:** Borrower takes-up loan only if:

$$f(L) - (1+i)L > A$$

  - Lender sets $i$ so that $i = \frac{\partial f(L)}{\partial L} - 1$

# Informal lenders: maximizing interest rate on a loan



# Informal lenders: credit rationing

- Let's take this to multiple periods (no time discounting here):
  - $N \dots$ lifetime of the individual (or horizon)
  - Lifetime returns if repayment: $N[f(L) - (1+i)L]$
  - Default in period 1 $\Rightarrow$ no future loan from period 2 on from the current lender; has to switch to $A$
  - Total profit over $N$ periods: $f(L) + (N-1)A$
- So that default does not occur, the following must hold

$$N[f(L) - L(1+i)] > f(L) + (N-1)A$$

# Informal lenders: credit rationing

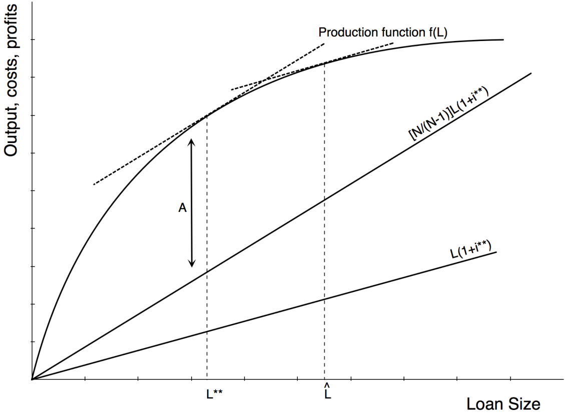
$$N[f(L) - L(1+i)] > f(L) + (N-1)A$$

- Rearranging yields a **no-default constraint** :

$$f(L) - \frac{N}{N-1}L(1+i) > A$$

  - Note 1: recall the participation constraint $f(L) - (1+i)L > A$
  - Q: It makes no sense to default in any later period than in period 1. Why?
  - Q: What if people are myopic and do not see longer than 2 periods?

# Informal lenders: credit rationing




- Lender only provides $L^{**} < \hat{L}$
- Note 1: $\frac{\partial f(L)}{\partial L} = \frac{N}{N-1}(1 + i^{**})$
- Note 2: with perfect repayment enforcement: $\hat{L}$ lent

# Informal lenders: credit rationing and information asymmetry

- Not all information about the risk-type of borrower observable to the lender (not even if he is local) - aversion to risk, farming skills, land quality, etc.
- Model:
  - There is a risky and a safe borrower, one lender
  - $L \ldots$ loan size
  - $R(R') \ldots$ safe (risky) type's return
    - w/ prob $p$: $R' > R$ (example: investment in new technology, introduction of new seed variety)
    - w/ prob $(1-p)$: 0 return for risky type

# Credit rationing and information asymmetry

- **Safe type:**

$$R > (1 + i_S)L$$

  - Maximal participation interest rate for safe type: $i_S = \frac{R}{L} - 1$

- **Risky type:**

$$pR' + (1 - p)0 > p(1 + i_R)L + (1 - p)0$$

$$i.e., \;\; pR' > p(1 + i_R)L$$

  - Maximal participation interest rate for risky borrower: $i_R = \frac{R'}{L} - 1$
    - Note 2: since $R' > R$ then $i_R > i_S$
    - Note 1: What happened to $p$?

# Credit rationing and information asymmetry

$$i_S = \frac{R}{L} - 1$$
$$i_R = \frac{R'}{L} - 1$$

- If the lender charges $i_S$, both types apply
- If the lender charges $i_R$, the risky type applies
- Lender's profit under $i_R$:

$$\pi_R = p(1 + i_R)L - L$$

Lender's profit under $i_S$:

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

# Credit rationing and information asymmetry

- Lender willing to charge the lower rate iff $\pi_S > \pi_R$

$$\frac{1}{2}i_S L + \frac{1}{2}[p(1+i_S)L - L] > p(1+i_R)L - L$$

$$\frac{1}{2}(\frac{R}{L} - 1)L + \frac{1}{2}[p(1+\frac{R}{L} - 1)L - L] > p(1+\frac{R'}{L} - 1)L - L$$

$$\frac{1}{2}(\frac{R}{L} - 1)L + \frac{1}{2}[p\frac{R}{L}L - L] > p\frac{R'}{L}L - L$$

$$\frac{1}{2}R - \frac{1}{2}L + \frac{1}{2}pR - \frac{1}{2}L > pR' - L$$

$$R > p[2R' - R]$$

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

# Credit rationing and information asymmetry

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

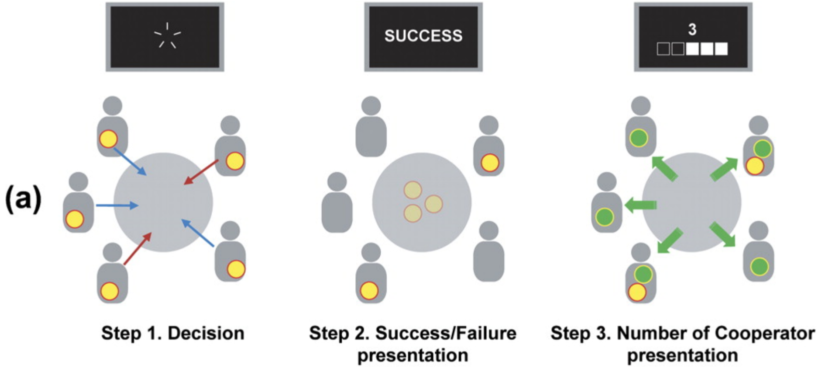
- In such case only one of the customers served (picked randomly): credit rationing (both would be willing to get the credit)
- Increasing interest rate would drive the safe type away!

# Informal lenders: default and enforcement

- All above assumes enforcement impossible
- Recall the $A$ (alternative, outside option). Q: What is it?
  - Could be further lending opportunity from another lender.
- Q: How do lenders prevent default?
  - Reputation building – building "credit history"
  - Lenders announce the default publicly
  - Social networks in rural societies as a credible enforcement mechanism
- But: Networks in urban areas or large rural societies (or resettled societies)?
  - Recall trust game: if no one (borrower) can be expected to be trustworthy, why would anyone (lender) trust in the first place
  - No credibility of information provided – *cheap talk*, validation of disclosed information costly (building trust & fixed pairs)

# Informal lenders: credit history institution?

- Q: Why there is no centralised system of credit history checks for small-scale lenders?




Source: Chung et al. (2011)

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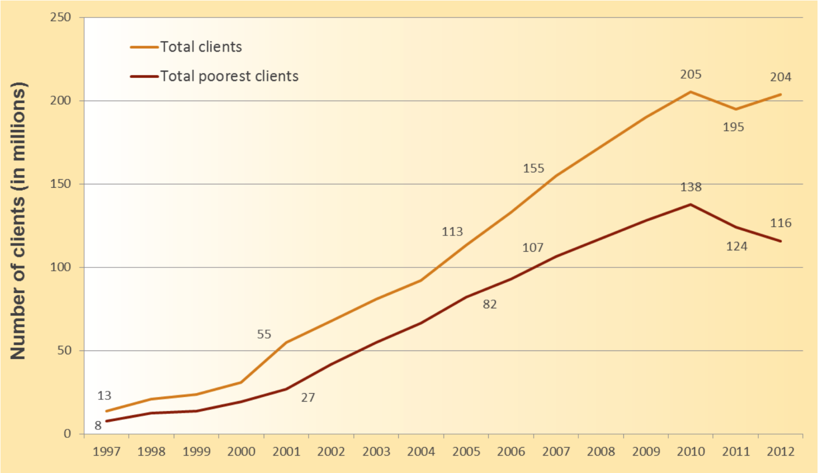
# Microcredit: introduction

- Main idea of **microcredit**: Information base and enforcement mechanisms of social networks used by institutions to overcome information asymmetry
- History: Mohammad Yunus and Grameen Bank
  - Pilot scheme in Bangladesh in 1970s: small loans to rural communities $\rightarrow$ High repayment rates $\rightarrow$ Grameen Bank as a scale-up $\rightarrow$ Nobel Peace Prize in 2006
- Microcredit providers (examples):
  - BancoSol (Bolivia), Badan Kredit (Indonesia), BRAC (Bangladesh), Pride Africa (Kenya, Tanzania, Uganda, Malawi and Uganda), FINCA (South America, Africa)

# Microcredit: features

- Main features:
  - Group lending: groups of 5+ poor people who know each other well
  - No collateral required
  - Loans small, gradually increasing
  - Lending to women
  - Frequent repayment
- Main results:
  - Average repayment over 95%

# Microcredit: number of clients




Source: Eysinga and Dibner-Dunlap (2014)

# Microcredit: group lending

- Group lending and the use of information for group formation
  - If one member defaults, the entire group is denied access to future loans (**dynamic incentive**)
  - **Assortative matching** of group members - safe borrowers match with safe borrowers
  - Q: Who do risky lenders want to team up with?
  - Risky borrowers have no incentive of entering the relationship or die out soon
- Peer monitoring
  - Note: Division to safe and risky types only an approximation
  - Instead of lenders, group members monitor each other (interests of group members and lenders aligned)

# Microcredit: potential drawbacks

- Exact timing of meetings
- Inflexible intervals
- Repayment from the first week
- Excessive pressure on safe investment (detrimental to economic growth)
- Heterogeneity may prove detrimental to economic potential of the most successful group members (need to accommodate to the slowest member).

# Microcredit: sustainability

- Morduch (1997)
  - The traditional Grameen model needs around 20% subsidies
  - Grameen bank charging around 15% p.a.
  - At current conditions would have to charge around 20% p.a.
  - But also subsidies on loans to Grameen. Without these the interest rates would have to be around 40%.

# Microcredit: evaluation

- Q: Why can't we compare the lenders to non-lenders of Grameen to assess the effect of microcredit on individual incomes or consumption?
- *Selection bias*: recall, only safe types in groups, but both safe and risky outside (plus other differences in characteristics)

- Further reading for those interested on microcredit evaluation using RCTs:
  - Banerjee, Karlan, and Zinman (2015) + the accompanying issue of the American Economic Journal: Applied Economics, 7(1)
  - Karlan and Zinman (2011, Science)

# Microcredit: further readings