

# Credit I: Modeling the Credit Market

14.740x: Foundations of Development Policy

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## Introduction: Lending to the Poor

- In the 1970s and early 1980s, many had given up hope on giving credit to the poor and being repaid.
- Some governments were continuing subsidized credit programs to the poor, which functioned almost like free transfers programs. For example, in India:
  - Mandated bank branch expansion in rural areas helped reduce poverty (Robin Burgess and Rohini Pande), but the default rate is 42%, and it cost \$2.72 to increase income by \$1.
  - Loans are used for political purpose: Shawn Cole shows that agricultural credit increases by 5%-10% in election years, especially in districts where elections are close. These extra loans are not productive.
- Yet, informal credit institutions have always existed: village moneylenders; Rotating Credit and Savings Associations; mutual credit and insurance arrangements.

## Introduction: The Microfinance Revolution

- In 1976, Mohammed Yunus created the Grameen Bank: an institution which made small loans to poor women.
- Microcredit has expanded as a worldwide phenomenon: Today, \$25 billion outstanding, 150-200 million clients; high repayment rates. Many microfinance institutions are profitable. Some are **very** profitable.
- Mohammed Yunus and the Grameen Bank won the Nobel Peace Prize.
- Compartamos, a Mexican MFI had a successful IPO, attracting controversy.
- Microfinance institutions try to also provide a broader set of financial services, beyond traditional group lending: larger individual loans; savings; insurance.
- Starting 2010 or so: backlash on microfinance. Some big crises (Andhra Pradesh, No Pago movement)

# Introduction: The Questions

Today we will try to understand:

- ① Why lending to the poor may be difficult,
  - and to what extent are those difficulties serious;
- ② What innovation did the “microfinance” revolution introduce to overcome those difficulties,
  - and to what extent are those innovations responsible for the ability of microfinance institutions to lend and be reimbursed;
- ③ Whether microcredit really helps the poor, and if so how;
- ④ Other financial services the poor may need: ( savings, insurance), and their impact.

# The Barriers to Credit

- ① Informational asymmetries
  - Moral hazard: The monitoring cost multiplier
  - Adverse selection
- ② Lending to the poor is costly. Their rates of return are too low.

## Credit markets: some facts

- Sizeable gap between lending rates and deposit rates within the same sub-economy
- Extreme variability in the interest rate within the same sub-economy:
- Low levels of default:
- There seems to be ex ante competition in the markets
- Production and trade finance are the main reasons given for borrowing, even in cases where the rate of interest is relatively high

## One example (Aleem (1990))

- Study of 14 money-lenders in one market in Pakistan
- Very detailed data:
  - every step of the lending process is described and priced
- Average lending rate 78.5%
- Average cost of capital for money-lenders 32.5%
- Average bank rate 10%
- Standard deviation of interest rate 38.1%
- Gives default rates for each individual lender. The median default rate is between 1.5 and 2% and the maximum of 10%.

# The neo-classical model of the capital market

- Everyone faces the same interest rate, adjusted for risk. i.e. if there is a  $d\%$  risk of default then  $(1 - d)r$  (where  $r$  is the gross interest rate) is a constant.
- The interest rate paid to depositors is equal to  $(1 - d)r$  less some small change for the cost of operating a bank.
- The expected marginal product of capital should be equated to  $(1 - d)r$ .
- This cannot explain any of these facts!



## A simple model of the credit market

- Loan repayment is imperfectly enforceable.
- Suppose  $k$  dollars invested yields a gross return  $F(k)$  and that the gross interest rate is  $r$ . A borrower who has a wealth of  $w$  and invests  $k$  will need to borrow  $k - w$ . He is supposed to repay  $(k - w)r$  at the end of the period.
- But by expending some resources, which we assume to be proportional to the size of the investment, he can avoid repayment altogether. We denote the constant of proportionality by  $\eta$  and assume that it is less than the cost of capital,  $\rho$ .

## A simple model of the credit market

- Lenders will only provide finance up to the point where the borrower has the incentive to repay: this requires  $F(k) - r(k - w) \geq F(k) - \eta k$  which gives us:

$$\frac{k}{w} = \frac{r}{r - \eta} \equiv \lambda(r, \eta).$$

- Firms are credit rationed. They cannot borrow as much as they want.
- The amount you can borrow is increasing in your wealth and your  $\eta$  but decreasing in the interest rate.
- The interest rate is equal to the cost of capital. It obviously does not vary across borrowers.
- This is a handy model but does not fit the facts.

## Extending the model: 1

- It is natural to assume that the lender needs to spend resources in order to make the borrower want to repay. In other words,  $\eta = 0$  unless the lender spends some resources.
- First let monitoring cost be linear in the amount borrowed:  $\phi(k - w)$ .
- In this case

$$\begin{aligned}r(k - w) &= \rho(k - w) + \phi(k - w) \\ r &= \rho + \phi\end{aligned}$$

- $r$  will only vary to the extent that  $\phi$  or  $\rho$  varies.

## Extending the model: 2

- Let monitoring be a variable cost,  $\phi$  per unit of  $\eta k$ , i.e. the cost does not depend on the amount borrowed but on amount invested.
- Under the assumption of competition, the lender just breaks even:

$$r(k - w) = \rho(k - w) + \phi\eta k$$

- For any credit constrained borrower,  $k = \frac{r}{r-\eta} w$ , which implies that

$$r = \rho + \phi r = \frac{\rho}{1 - \phi}.$$

- Aleem calculates  $\phi r$  to be 50 cents per dollar lent on average, easily explaining the gap between the 32.5% cost of capital and the 78.5% average interest rate in this data.
- For this  $\phi$  needs to be about 0.6
- Does not explain exclusion

## Extending the model: 3

- Let the monitoring cost be a fixed cost  $\phi$
- Then the lender's zero profit condition is

$$r(k - w) = \rho(k - w) + \phi$$

- In the model without default, the borrower's IC constraint is now given by

$$r(k - w) = \eta k$$

which together give us

$$\rho(k - w) + \phi = \eta k$$

- We can rewrite this in the form  $k = \frac{\rho w - \phi}{\rho - \eta}$ . What if  $\rho w < \phi$ ? Is this necessarily more than  $w$ ?
- Multiplier property.:

$$r = \rho + \frac{\phi(\rho - \eta)}{\eta w - \phi}$$

## Implications of the model

- Can explain a large wedge between the cost of capital and the interest rate and by implication a very high monitoring cost.
- The interest rate can be very sensitive to the cost of capital and the monitoring cost, if  $1-\phi$  is small
- The interest rate will be especially sensitive where the interest rate is high relative to the cost of capital
- However we do not explain equilibrium default.

## Some Policy Implications

- What is the total amount lent?
- In the model without default, the borrower's IC constraint is now given by

$$r(k - w) = \eta k$$

while the lender's zero profit condition is

$$r(k - w) = \rho(k - w) + \phi$$

which together give us

$$\rho(k - w) + \phi = \eta k$$

or

$$k = \frac{\rho w - \phi}{\rho - \eta}$$

## Some Policy Implications

- One dollar subsidy to monitoring costs reduces  $\phi$  by  $\rho$  dollars (since we assume monitoring costs are paid at the end of the period) which increases the amount of resources going to the poor by  $\frac{\rho}{\rho-\eta} > 1$  dollars.
- Keeping the interest rate fixed, the effect of \$1 subsidy would have been  $\frac{r}{r-\eta} < \frac{\rho}{\rho-\eta}$ . The multiplier adds to the leverage, especially when monitoring is expensive.
- Cutting monitoring costs is the *raison d'être* of the micro-credit movement.
- Note however that one dollar subsidy to wealth ( $w$ ) would have the same effect.
- However this is only true for those who have  $\eta w - \phi > 0$ .
- Those who have  $\eta w - \phi < 0$ , start out unable to borrow.
- This may be why some micro-credit organizations insist on savings as a way into borrowing (especially under the self-help group model): Helping them save may be way to subsidize building wealth.