Modeling Credit Markets

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# 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 $(1 - d)r$.

# Credit Markets: some facts

1. **Sizeable gap between lending rates and deposit rates within the same sub-economy:**

   Ghatak (1976) reports data on interest rates paid by cultivators in India from the *All India Rural Credit Survey* for the 1951-2 to 1961-2 period: The average rate varies between a maximum of 18% (in 1959-60) and a minimum of about 15% (in 1961-62). Around 25% of the borrowing reported in these surveys were zero-interest loans, usually from family members or friends. If these were left out, the average rates in these surveys would be above 20%. In comparison, Ghatak reports that

the bond rate in this period was around 3% and the bank deposit rate was probably about the same.

Timberg and Aiyar (1984) report data on indigenous style bankers in India, based on surveys that they carried out. They report the gap between the average rate charged to borrowers and the average rate to depositors by Finance Companies was 16.5%. The same gap for financiers from the Shikarpuri community was 16.5%, 12% for financiers from the Gujerati community, 15.5% for the Chettiars, 11.5% for the Rastogis, etc.

The “Summary Report on Informal Credit Markets in India” (Dasgupta, 1989) reports that for the rural sector (the data is based on surveys of 6 villages in Kerala and Tamil Nadu), the average interest rate charged by professional money-lenders (who provide 45.61% of the credit) in

these surveys is about 52%, while the average deposit rate is not reported, the maximum from all the case studies is 24% and the maximum in four out of the eight case studies is no more than 14%.

For the urban sector, the data is based on various case surveys of specific classes of informal lenders: For Finance Corporations they report that the maximum deposit rate for loans of less than a year is 12% while the minimum lending rate is 48%. For hire-purchase companies in Delhi, the deposit rate was 14% and the lending rate was at least 28%. For auto-financiers in Namakkal, the gap between the deposit rate and the lending rate was 19%. For handloom financiers in Bangalore and Karur, the gap between the deposit rate and the lowest lending

rate was 26%.

Aleem (1990) reports data from a study of professional moneylenders that he carried out in a semi-urban setting in Pakistan in 1980-1981. The average interest rate charged by these lenders is 78.5%. The opportunity cost of capital to these money-lenders was 32.5%.

2. **Extreme variability in the interest rate within the same sub-economy:**

Timberg and Aiyar (1984) report that the rates for Shikarpuri financiers varied between 21% and 37% on loans to members of local Shikarpuri associations and between 21% and 120% on loans to non-members (25% of the loans were to non-members and another 50% were loans through brokers). On the other hand, the Gujerati bankers charged rates of no more than 18%. Moreover, the rates faced by established commodity traders in the Calcutta and Bombay markets were never above 18% and could be as low as 9%.

The “Summary Report on Informal Credit Markets in India” (Dasgupta, 1989) reports that Finance Corporations offer advances for a year or less at rates between 48% per year and the utterly astronomical rate of 5% per day. The rates on loans of more than a year varied between 24% and 48%. Hire-purchase contracts offer rates between 28% to 41% per year. Handloom Financiers charge rates between 44% and 68%. Yet the Shroffs of Western India offer loans at less than 21% and Chit Fund members can borrow at less than 25%.

The same report tells us that among rural lenders, the average rate for professional money-lenders (who in this sample give about 75% of the commercial informal loans) was 51.86%,

whereas the rates for the agricultural money-lenders (farmers who also lend money) who supply the rest was 29.45%. Within the category of professional money-lenders, about half the loans were at rates of 60% or more but another 40% or so had rates below 36%.

The study by Aleem (1990) reports that the standard deviation of the interest rate was 38.14% compared to an average lending rate of 78.5%. In other words, an interest rate of 2% and an interest rate of 150% are both within two standard deviations of the mean.

Swaminathan (1991) reports on a survey of two villages in South India that she carried out: The average rate of interest in one village varied between 14.8% for loans collateralized by immovable

assets (land, etc.) and 60% for loans backed by moveable assets. The corresponding rates in the other village were 21% and 70.6 %. Even among loans collateralized by the same asset—gold—the average rate in one village was 21.8% but it went up to 58.8% when the loans were to landless laborers.

Ghate (1992) reports on a number of case studies from all over Asia: The case study from Thailand found that interest rates were 2-3% per month in the Central Plain but 5-7% in the north and north-east (note that 5 and 7 are very different).

Gill and Singh (1997) report on a survey of 6 Punjab villages they carried out. The mean interest rate for loans up to Rs 10,000 is 35.81% for landowning households in their sample, but 80.57% for landless laborers.

Fafchamps' (2000) study of informal trade credit in Kenya and Zimbabwe reports an average monthly interest rate of 2.5% (corresponding to annualized rate of 34%) but also notes that this is the rate for the dominant trading group (Indians in Kenya, whites in

Zimbabwe) is 2.5% month while the blacks pay 5% per month in both places.

Irfan et al. (1999), mentioned above, report that interest rates charged by professional money-lenders vary between 48% and 120%.

## 3. Low levels of default:

Timberg and Aiyar (1984) report that average default losses for the informal lenders they studied ranges between 0.5% and 1.5% of working funds.

The “Summary Report on Informal Credit Markets in India” (Dasgupta, 1989) attempts to decompose the observed interest rates into their various components, and finds that the default costs explain 14 per cent (not 14 percentage points!) of the total interest costs for the Shroffs, around 7% for auto-financiers in Namakkal and handloom financiers in Bangalore and Karur, 4% for Finance Companies, 3% for hire-purchase companies and essentially nothing for the Nidhis.

The same study reports that in four case studies of money-lenders

in rural India they found default rates explained about 23% of the observed interest rate.

The study by Aleem gives default rates for each individual lender. The median default rate is between 1.5 and 2% and the maximum of 10%.

4. **There seems to be ex ante competition in the markets**

Large numbers of lenders in any sub-market

- Aleem (1989) shows that lenders do not earn excess profits on average

The “Summary Report on Informal Credit Markets in India” (Dasgupta, 1989) claims that only a small part of the interest rate is explained by profits.

Ghate (1992) echoes the same conclusion.

5. **Production and trade finance are the main reasons given for borrowing, even in cases where the rate of interest is relatively high:**

Ghatak (1976) concludes on the basis of his study that “the existing belief about the unproductive use of loans by Indian cultivators ... has not been substantiated.”

Timberg and Aiyar (1984) report that for Shikarpuri bankers (who charge 31.5% on average, and as much as 120% on occasion), at least 75% of the money goes to finance trade and, to lesser extent, industry.

The “Summary Report on Informal Credit Markets in India” (Dasgupta, 1989), reports that several of the categories of lenders that have been already mentioned, such as hire-purchase financiers (interest rates between 28%-41%), handloom financiers (44%-68%), Shroffs (18%-21%) and Finance Corporations (24%-48% for longer term loans and more than 48% on loans of less than a year) focus almost exclusively on financing trade and industry, and even for Chit Funds and Nidhis, which do finance consumption, trade and industry dominate.

Swaminathan (1991) reports that in the two villages she surveys, the share of production loans in the portfolio of lenders is 48.5% and 62.8%. The higher share of production loans is in

Gokalipuram, which has the higher interest rates (above 36% for all except the richest group of borrowers).

Ghate (1992) also concludes that the bulk of informal credit goes to finance trade and production.

Murshid (1992) studies Dhaner Upore (cash for kind) loans (you get some amount in rice now and repay some amount in rice later) and argues that most loans in his sample are production loans despite the fact that the interest rate is 40% for a 3-5 month loan period.

Gill and Singh (1997) report that the bulk (63.03%) of borrowing from the informal sector goes to finance production. This proportion is lower for the landless laborers but it is an non-negligible fraction

(36%).

6. **Rich people borrow more and pay lower rates of interest; more generally it appears that those who borrow more pay lower interest rates:**

    Ghatak (1976) correlates asset category with borrowing/debt in the *All India Rural Credit Survey* data and finds a strong positive relationship.

    Timberg and Aiyar (1984) report that some of the Shikarpuri and Rastogi lenders set a credit limit that is proportional to the borrower's net worth: Several lenders said that they would lend no more than 25% of the borrower's net worth, though another said he would lend up to 33%.

The “Summary Report on Informal Credit Markets in India” (Dasgupta, 1989) tells us that in their rural sample, landless laborers paid much higher rates (ranging from 28-125%) than cultivators (who paid between 21 and 40%). Moreover, Table 15.9 in that report clearly shows that the average interest rate declines with loan size (from a maximum of 44% to a minimum of 24%). The relation between asset category and interest rate paid is less clear in their data but it remains that the second poorest group (those with assets in the range Rs 5,000-10,000) pays the highest average rate (120%) and the richest (those with more than Rs 100,000) pay the lowest rate (24%).

Swaminathan (1991) finds a strong negative relation between the value of the borrower's land assets and the interest rate he faces: The poorest (those with no land assets) pay 44.9% in one village and 45.4% in the other, while the rich (those with land valued at more than Rs 50,000) pay 16.9% and 24.2% in the corresponding villages.

Ghate (1992) notes that the interest rate on very small loans in Bangladesh tends to be very high (Taka 10 per week on a loan of Taka 500, or 86% per annum).

Gill and Singh (1997) show that the correlation between loan size and the interest rate is negative after controlling for the wealth of the borrower, and that the correlation between the wealth of the borrower and loan size is

negative after controlling for loan size. They also find a positive relation between the borrower’s wealth and the loan he gets.

# 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, $\rho$.

- 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 (how does this relate to the fact that $\lambda_r < 0$). It obviously does not vary across borrowers.
- This is a handy model but does not fit the facts.

# Extending the model

- 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.
- Let monitoring be a variable cost, $\phi$ per unit of $\eta k, i.e.$ the cost does not depend on the amount borrowed. Aleem calculates them 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
- 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

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

# 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 the interest rate does not depend on the borrower's wealth or the amount borrowed.

# The model with a fixed cost of monitoring

- Let monitoring involve a fixed cost, $\phi$, but let there be no variable cost.
- Aleem (1989) gives some clues as to why it should be a fixed cost: Most lenders say that they go through the same steps vis a vis every new borrower, seemingly independently of the amount of the loan.
- Under the assumption of competition, the lender just breaks even:

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

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

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

- For $\phi > \eta w$, this has no solution with $r > \rho$. These people will not be able to borrow
- For $\phi < \eta w$, this has a solution: $r$ goes down when $w$ goes up, $\eta$ goes up.

- Multiplier property

$$dr/d\rho = 1/(1 - \phi/\eta w),$$

$$\frac{dr}{d\phi} = \frac{\frac{1}{\eta w}(r - \eta)}{1 - \frac{\phi}{\eta w}}.$$

- Can explain huge variations in $r$ especially if $w$ is small.
- However there is no equilibrium default, whereas in the data there is some but not a lot.
- Relatedly, we do not model the monitoring decision.
- No long term contracts.