Credit Rationing in Markets with Imperfect Information

by

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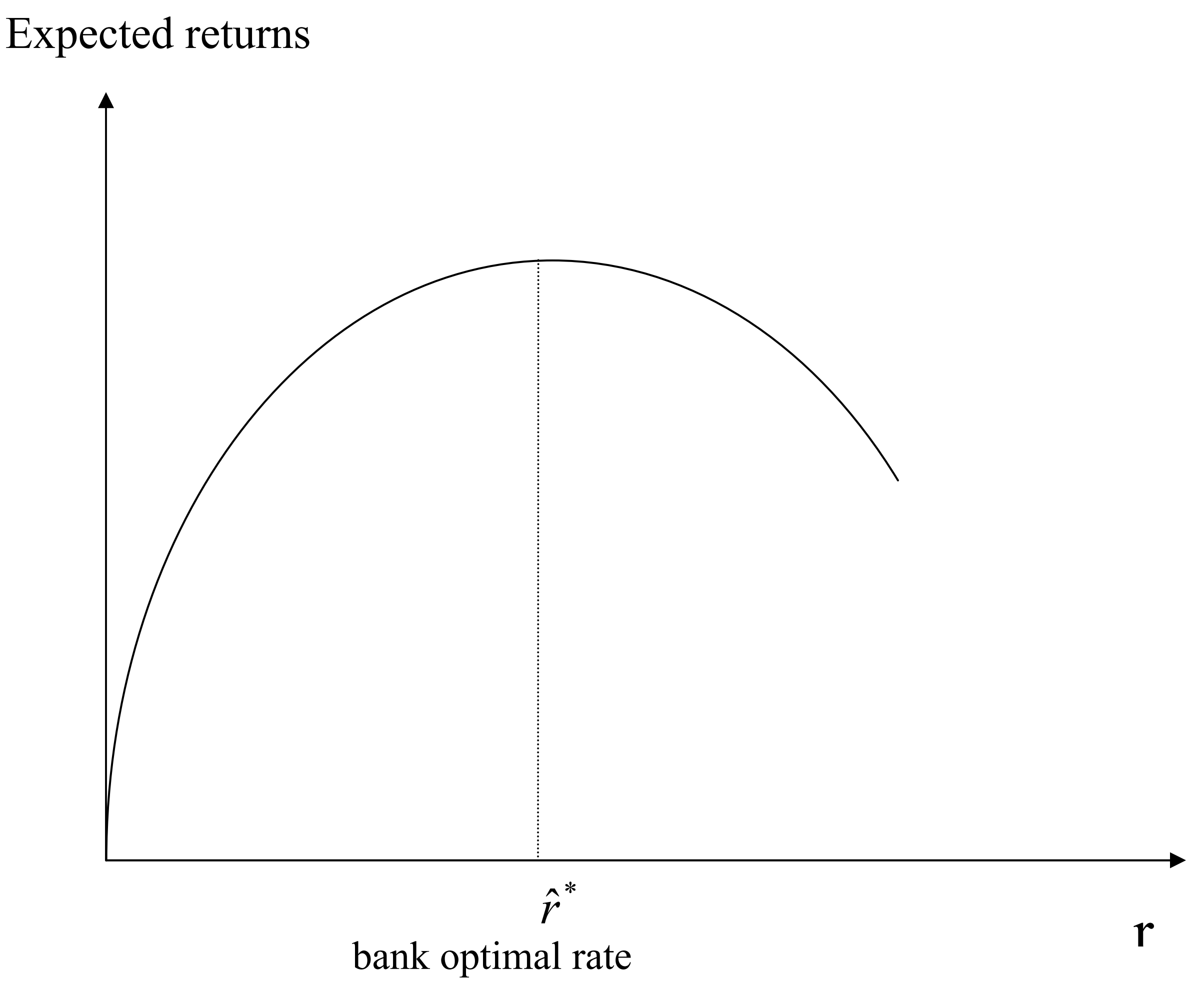
Idea: show that in a competitive equilibrium a loan market may be characterized by *credit rationing*.

Mechanism: the interest rate a bank charges may itself affect the *riskiness* of a pool of loans by either:

1. sorting potential borrowers – *adverse selection*
2. affecting the actions of borrowers – *moral hazard*

Information asymmetry: borrowers have different probability of repayment but banks can't identify "good" borrowers from "bad." Hence prices act as a screening device.

<u>Incentives:</u> higher prices cause borrowers to select riskier projects.



The price mechanism may not clear the loan market if interest rates go above $\hat{r}^*$ since the bank would be attracting worse risk.

Hence the bank's best strategy is to *ration credit* whenever demand pushes interest rates above $\hat{r}^*$.

Credit Rationing – Definitions:

1. given loan applicants that appear equal, some receive a loan and some do not even when they offer to pay a higher interest rate.
2. some individuals unable to get a loan under one supply schedule at any interest rate would get a loan under a larger schedule.

Interest Rates as screening devices

- Let θ index projects
- Let R be gross returns, distributed $F(R, \theta)$
- *Mean preserving spread:* if two projects have the same expected return but $\theta_1 > \theta_2$, then θ_1 is considered a riskier project
- Let B be the amount borrowed; and C the collateral. Then default occurs when $C + R \leq B(1+\hat{r})$
- Let the net return to the borrower be $\pi(R,\hat{r})$, hence

$$\pi(R,\hat{r}) = \max(R-(1+\hat{r})B;-C)$$

- The return to the bank is

$$\rho(R,\hat{r}) = \min(R+C;B(1+\hat{r}))$$

Adverse Selection:

- Theorem 1: Let $\hat{\theta}$ denote the value of θ s.t. expected returns are 0, i.e.

$\int_0^\infty \max\left[R-(1+\hat{r})B;-C\right]dF(R,\hat{\theta})=0$, then if $\theta > \hat{\theta}$, the firm borrows.

- Theorem 2: $\frac{d\hat{\theta}}{d\hat{r}} > 0$, that is, as $\hat{r}$ increases, the pool of applicants becomes riskier. This can be shown by differentiating the previous expression.

- Theorem 3: $\frac{d\rho}{d\theta} < 0$, bank returns are a decreasing function on the riskiness of the loan.

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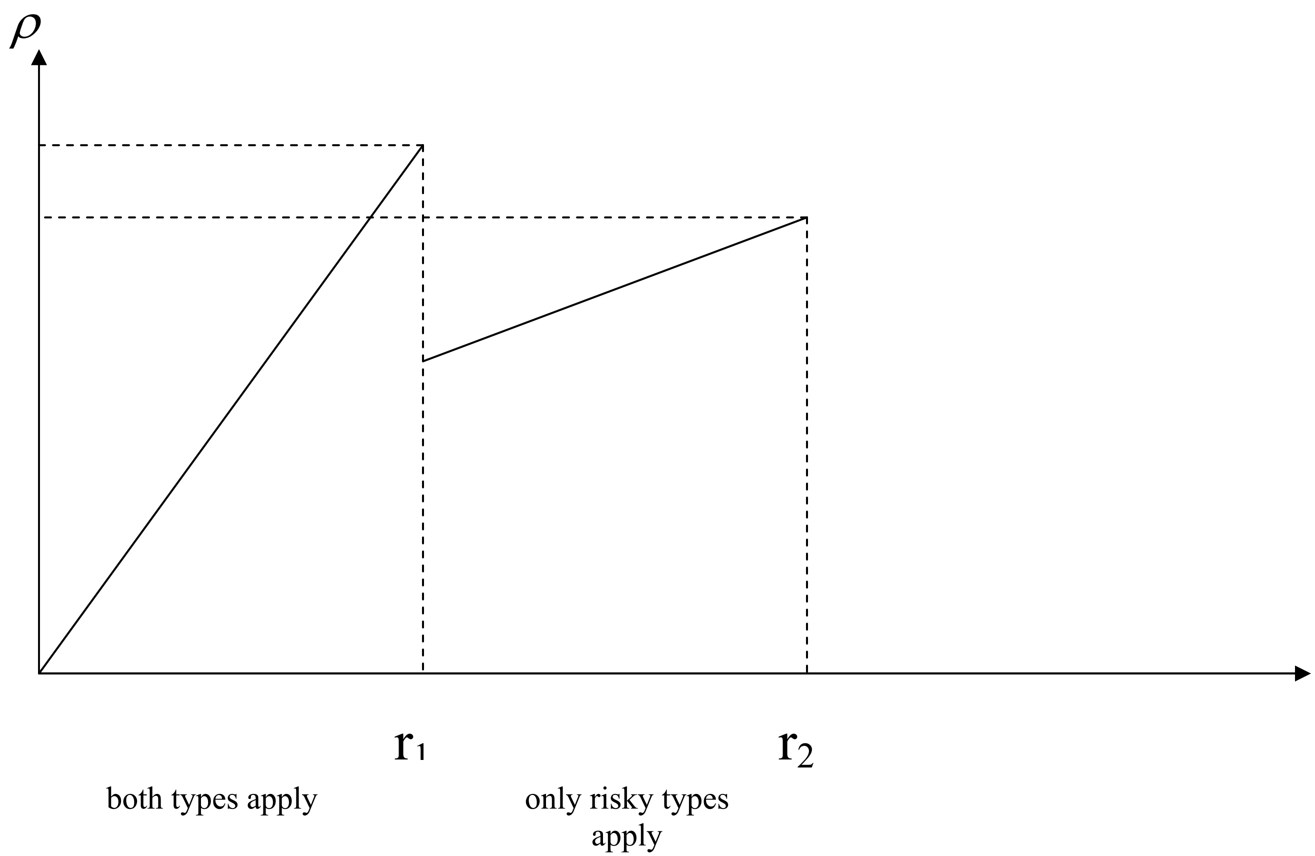
- <u>Theorem 4:</u> Expected returns are non-monotonic



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- Theorem 5: existence of credit rationing depends on $\rho(r)$ being non-monotonic.

Moral Hazard

- Theorem 7: If, at a given interest rate r, a risk-neutral firm is indifferent between two projects, an increase in the interest rate results in the firm preferring the project with the high probability of bankruptcy (but higher expected return).

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Example

Project A's (B's) return in the good state, R^a , (R^b); 0 in the bad state, with $R^b > R^a$

Let p^a (p^b) denote the probability of project A (B) succeeding, then $p^a > p^b$

Assume: $p^a R^a > p^b R^b$ (1)

Expected returns:

$$E(\pi^A) = p^a\left(R^a - (1+r)B\right) - (1-p^a)C$$

$$E(\pi^B) = p^b\left(R^b - (1+r)B\right) - (1-p^b)C$$

Then $E(\pi^A) > E(\pi^B)$ iff

$$\frac{p^a R^a - p^b R^b}{p^a - p^b} > (1+r)B - C$$

Let r^* be such that $E(\pi^A) = E(\pi^B)$ so that the previous expression holds with equality. Then,

- if $r < r^*$ then $E(\pi^B) < E(\pi^A)$ (i.e. the firm chooses the low risk project.
- if $r > r^*$ then $E(\pi^B) > E(\pi^A)$ (i.e. the firm chooses the high risk project.

Returns to the lender:

- if $r < r^*$ then $p^a(1+r)B + (1-p^a)C$
- if $r > r^*$ then $p^b(1+r)B + (1-p^b)C$

Note: $p^a(1+r)B + (1-p^a)C > p^b(1+r)B + (1-p^b)C$

Hence the lender will choose $r < r^*$ which results in credit rationing.

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Collateral:

Can the bank increase the collateral requirements (thus increasing the liability of the borrower if the project fails) thus reducing demand for funds and default risk? NO

Reason: higher collateral means firms can only finance smaller projects with higher risk (under suitable but reasonable assumptions). Therefore higher collateral results in adverse selection.

Monitoring Costs

The lender can observe the borrower's project outcome at some positive cost.

- If the borrower reports a successful project return, it repays the loan and no monitoring is needed.
- if the borrower reports a bad outcome instead and defaults, the bank incurs in the monitoring cost to verify the loss.

Williamson shows that neither adverse selection nor moral hazard are therefore necessary for rationing to exist.

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Conclusions

We have examined several informational asymmetries that generate rationing in an otherwise competitive market. The types of asymmetry are:

1. Adverse Selection I: higher r attracts riskier borrowers.
2. Moral Hazard: higher r encourages firms to choose riskier projects.
3. Adverse Selection II: higher collateral attracts riskier borrowers.
4. Monitoring: causes rationing

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Discussion

- Does an increase in interest rates have a symmetric effect on loans relative to a decrease in rates? NO. According to this literature, an increase in interest rates generates credit rationing, whereas a decrease in rates may have no effect.

- Will a reduction in interest rates always increase the availability of funds? NO. It may in fact reduce it.

These informational mechanisms therefore suggest that monetary policy may have asymmetric effects on the economy.