Financial Intermediation, Loanable Funds and the Real Sector

By Bengt Holmstorm and Jean Tirole (1997)

Presentation by Mohammadreza Farajpour

Introduction

- During late 1980s and early 1990s several OECD countries suffered from credit crunch
  - Higher interest rates reduced cash flows and pushed down asset prices, weakening the balance sheets of firms.
  - Loan losses and lower asset prices (particularly in real estate) ate significantly into the equity of the banking sector, causing banks to pull back on their lending and to increase interest rate spreads.
  - The credit crunch hit small, collateral-poor firms the hardest.
  - Larger firms were less affected as they could either renegotiate their loans or go directly to the commercial paper or bond markets.

Introduction

- Firms with substantial net worth can rely on cheaper less information intensive financing channels.
- Highly leveraged firms demand more information intensive finance
- Reduce monitoring capital, and capital poor firms are the first to suffer.
- Credit crunches increase the spread between intermediated and market debt

Purpose

- construct a simple principal-agent equilibrium model
- Replicate some of stylized facts on loanable funds and the role of capital constraints in explaining them
- Primarily interest is the effects of reductions in different types of capital on investment, interest rates, and the forms of financing.

Assumptions

- Three types of agents; firms, intermediaries and investors
- Two time periods with returns being realized only at time $t = 2$
- All parties are risk neutral and are protected by limited liability
- Different firms have different initial endowments $\boldsymbol{A}$ (cash for ease of analysis)
- Distribution of $\boldsymbol{A}$ across firms follows a CDF $\boldsymbol{G}(\boldsymbol{A})$

Real Sector (Firms)

- Aggregate capital is $K_f = \int AdG(A)$
- Firm undertakes a project at $t = 1$ with cost $\boldsymbol{I} > 0$, so the initial funding requirement is $\boldsymbol{I} - \boldsymbol{A}$ if $\boldsymbol{A} < \boldsymbol{I}$
- Return on Investment $= \boldsymbol{0}$ If the project fails
  $= \boldsymbol{R}$ if the project succeeds

Real Sector (Firms)

Project	Good	Bad low	Bad high
Private Benefit	0	b	B
Probability of success	P_H	P_L	P_L

A good Project is viable if:

$$P_H R > P_L R + B$$

Financial Sector

- Monitoring can prevent firm from undertaking B-project
- Monitoring is privately costly ($c > 0$)
- Aggregate amount of intermediary ("informed") capital is K_m
- All projects financed by intermediaries are perfectly correlated

The Investors

- Uninformed investors demand an expected rate of return γ
- $S(\gamma)$ is assumed to be an increasing supply function
- firms cannot monitor other firms and excess cash in firms earns γ

Scenarios

- Direct Financing
  - Only firms with $A \geq \bar{A}(\gamma)$ can invest using direct finance
- Indirect Financing
  - For the intermediary to invest: $\beta = \frac{p_H R_m}{I_m} > \gamma$
  - to access uninformed funding $A \geq \underline{A}(\gamma, \beta)$
  - $\underline{A}(\gamma, \beta)$ is increasing in both γ and β

$A \geq \bar{A}(\gamma)$	Firm gets direct finance
$A < \underline{A}(\gamma, \beta)$	Firms won't get funding
$\underline{A}(\gamma, \beta) \leq A < \bar{A}(\gamma)$	Firm can invest and requires monitoring

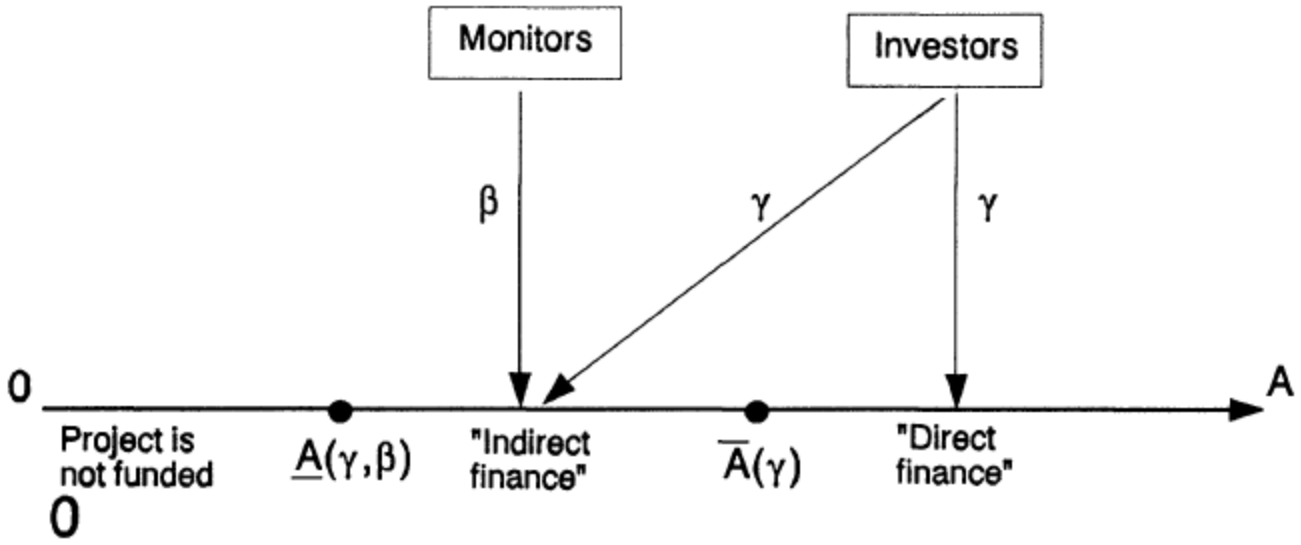

FIGURE II
Certification

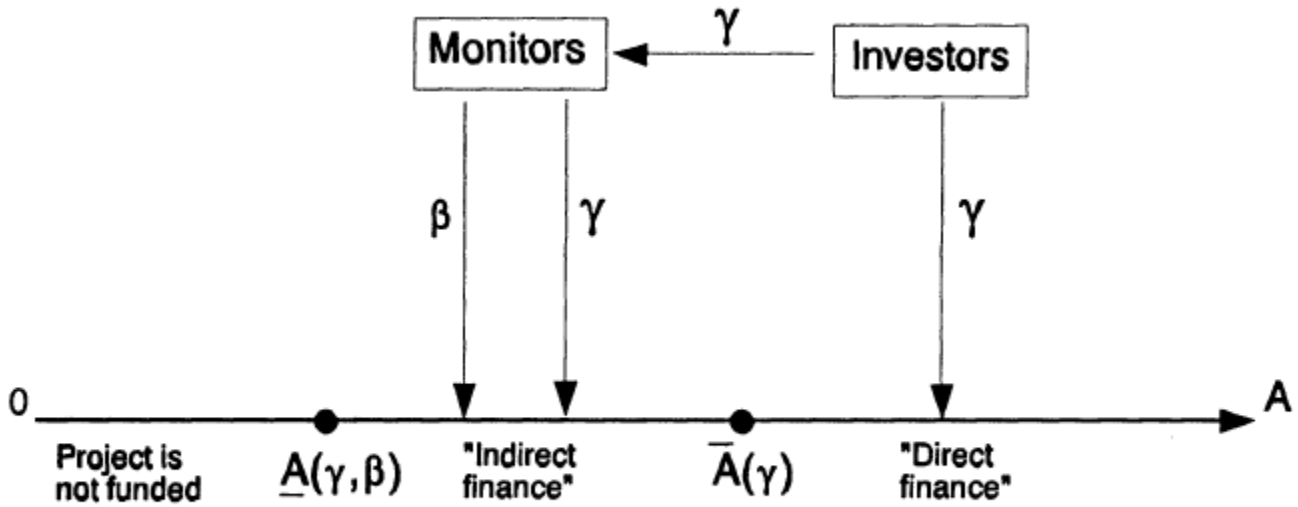

FIGURE III
Intermediation

Equilibrium in Credit Market

$$D_M(\gamma,\beta) = I_M(\beta)\int_{\underline{A}(\gamma,\beta)}^{\bar{A}(\gamma)} dG(A)$$

$$D_U(\gamma,\beta) = \int_{\underline{A}(\gamma,\beta)}^{\bar{A}(\gamma)} \big(I - A - I_M(\beta)\big)dG(A) + \int_{\bar{A}(\gamma)}^{\infty} (I - A)dG(A)$$

$$\int_{\underline{A}(\gamma,\beta)}^{\infty} (I - A)dG(A) = S(\gamma) + K_M$$

Variable Investment Scale

$$\max U(A_0) = p_H RI - p_H R_m - p_H R_u + \gamma(A_0 - A)$$
$$s.t.\ A \le A_0$$
$$A + I_m + I_u \ge I$$
$$p_H R_m \ge \beta I_m$$
$$p_H R_u \ge \gamma I_u$$
$$R_m \ge \frac{cI}{\Delta p}$$
$$R_f \ge \frac{bI}{\Delta p}$$
$$R_f + R_m + R_u \le RI$$

Variable Investment Scale

$$I(A_0) = \frac{A_0}{A_1(\gamma, \beta)}$$

- A firm can NEVER lever its own capital ($A_1(\gamma, \beta) \leq 1$)
- In equilibrium γ and β, must be such $A_1(\gamma, \beta) > 0$ so that a firm can never invest without limit.

$$\max U(A_0) = \left\{ \frac{P_H b}{\Delta p A_1(\gamma, \beta)} - \gamma \right\} A_0$$

Equilibrium in Capital Market with Variable Investment

$$K = K_m + K_f + K_u$$

$$\gamma_e = \frac{P_H K \left(R - \frac{b+c}{\Delta p} \right)}{K_u}$$

$$\beta^* = \frac{P_H C K}{K_m \Delta p}$$

Solvency Ratio: $\begin{cases} r_f = \frac{K_f}{K} \\ r_m = \frac{K_m}{K_m + K_u} \end{cases}$

Results

- A decrease in K_m (Credit Crunch)
  - (1) decreases γ
  - (2) increases β
  - (3) decreases r_m
  - (4) increases r_f
- A decrease in K_f (collateral squeeze)
  - (1) decreases γ
  - (2) decreases β
  - (3) increases r_m
  - (4) increases r_f
- An inward shift in $S(\gamma)$ (savings squeeze)
  - (1) increases γ
  - (2) decreases β
  - (3) increases r_m
  - (4) increases r_f

Results

- With endogenous monitoring, aggregate investment also depends on the relative amounts of firm and intermediary capital
- Lower leverage reduces sensitivity to a rise in β. Lower marginal returns make large firms more sensitive to a rise in β