Theory of financial intermediations I: Justifying the existence of financial institutions

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Roadmap for this part

- I: Understanding the existence of FIS and banking firms
- II: Banking behavior and its management
- III: Banking competition, industry and regulation

What we have studied so far

- Some stylized facts of financial structure
  - An extensive use of debt contract
  - The existence of "**various types**" of financial institutions.
- We explained the reason why
  - Debt contract is considered an optimal financial contract.
  - Debt capacity occurs as a market solution to handle with asymmetric information problem: agency problem and adverse selection.
- **Question remains to be addressed is why there exist financial institutions.**

Agenda

- Provide general idea supporting the *existence* of Financial institutions

- What justify the existence of ***banking firms*** and banking system?

Drawn from Matthews and Johnson (Ch.3)

The Economics of Banking

Various types of financial institutions: what do they do?

Classifications	Liability	Asset
Security-related institutions		
Brokerage firms ***Investment bank*** ***Credit rating company*** ***Mutual funds***	**Unit investment**	**Marketable securities**
Contractual saving company		
Life-saving insurance	**Insurance premium**	**Credit loan + Marketable securities**
Provident fund	**Contribution fee**	**Marketable securities**
Depository institutions		
Commercial banks	**Deposit**	**Credit loan**
Saving unions	**Borrowing**	
Government-sponsored bank	**Equity**	

Classifications by services: *what do they do?*

- Facilitating asset trading
  - Brokerage firm
- Financial advisory service
  - Credit rating company
  - Investment bank
- Asset-Liability transformation
  - Mutual funds
  - Contractual saving company
  - Depository institution

Explanations to the existence of FIS

- Financial institutions endogenously arise to solve for ***some fundamental frictions*** in the market.

- Fundamental frictions impede the performance of market allocation; some additional features are then required to enhance or improve the market-based allocation.

Trading frictions

- Investments on marketable securities involve with cost for trading asset, i.e. **trading frictions**.
  - Decentralized trading is costly; investors must randomly search for
- Brokerage firm and Organized exchange market exist in order to lower the search cost in buying and selling assets.
  - Centralized trading location; lower search time
  - Operationally, investors pay for the transaction cost.
- Transaction cost leads to another problem called **costly diversification**.
  - Mutual funds endogenously arise to lower the transaction cost for diversification; this arises because of the benefit from **economy of scale**.

Information frictions

- Financial activities involve with **asymmetric information.**
  - **Adverse selection**
  - **Moral hazard**
  - **Costly state verification**
- Market-based solution partially resolve the problem; collateral-backed debt contract arises as an optimal form of financial contract.
- Why are they mostly orginated in terms of "non-tradable" debt contract, i.e. credit loan?

Information frictions: *The problem of a continuum of lenders*

- Real-world financing problem:
  - Most projects require large amount of initial outlay.
  - Each potential lender has limited amount of funding to offer.
- Two problem arises
  - Each potential lender will bear upon risk in the investment as each cannot enjoy the benefit from diversification.
  - Project need several financiers; this leads to incentive issue in enforcing and monitoring borrowers among financiers.

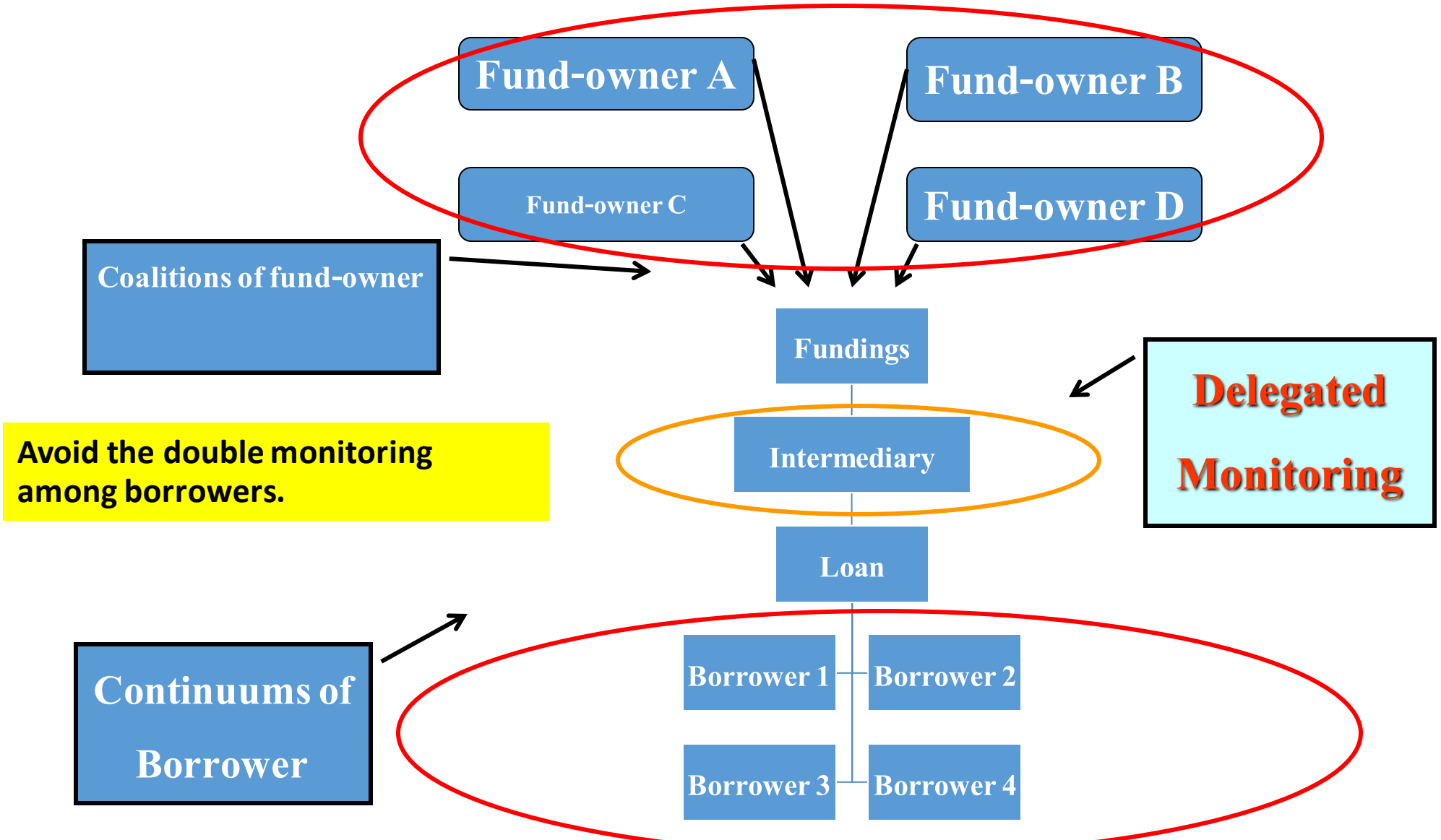
Information frictions: *The problem of a continuum of lenders*

- Debt contract is an optimal incentive provision as we have seen before.
- Several features, such as **collateral requirement or restrictive covenants**, are included in the debt contract so that the contract betters solve for the information frictions.
- But, to induce the most efficient result, enforcement on covenants requires constant monitoring.
  - Rule is always meant to be broken unless someone keeps an eye on the borrower.
  - Procedure/effort taken by lender to ensure that borrower behaves in the way that is not harmful to the lender is then called "**monitoring task**"

Information frictions: *The problem of a continuum of lenders*

- Monitoring is costly to those who perform the monitoring task.
  - Under the project with single lender, this monitoring cost is basically internalized to the loan pricing of financer, as well as the benefit from monitoring.
- However, under multiple lenders, an incentive issue would arises; **free riding issue!**
- Financial institutions arise as a **delegated monitoring!**

Financial institution arises as the solution that helps (i) reduce diversification cost and (ii) implementing the efficient level of monitoring activity



But, why bank is so powerful.

- Let alone we rely on the asymmetric information, the theory appears to miss something.

- What sort of other "**frictions**" do we need to justify the existence of banking sector?

- **Mostly important one might be the liquidity Frictions… Banks provide *liquidity insurance*!!!**

Random liquidity needs and Liquidity frictions

- Most potential borrowers want to secure long-term finance.
- Most potential lenders face with random liquidity demand (liquidity shocks).
  - They don't know exactly when you need cash for consumption.
- Committing to long-term market is risky!
  - High degree of liquidity frictions (risks) in long-term secondary market.
  - Few potential traders → Depressed price!
- Is there any better way to alleviate the problem/frictions?
  - Bank can mitigate this liquidity frictions, and allow lenders to secure better stream of consumption timing under the random liquidity demand.

Modeling liquidity shocks/frictions

- Consider an economy where there are N units of household. Each owns $1 in cash.

- Agents should not hold cash because cash only offer liquidity services, but not giving return.

- The agent can only access to (illiquid) long-term asset (technology) which pays "R" two periods from now.
  - If liquidated in period one, savage value would be $\theta \ll 1 \ll R$.

Modeling liquidity shocks/frictions

- Decision problem would be so easy if agent knows exactly when he/she needs to use the money.
  - Suppose he knows that he needs cash in period 1 ➔ holding cash is the best.
  - Suppose he knows that he needs cash in period 2 ➔ holding long-term asset is the best.

Modeling liquidity shocks/frictions

- In the real world, people don't exactly know when cash/liquidity is needed. Timing in which agent needs liquidity (cash) is uncertain.

- To capture this realistic feature, let's introduce π as the probability that you need cash in time 1, and hence $1 - \pi$ as the probability that you need cash in time 2.

- This environment complicates the decision problem because agent faces uncertainty about timing of liquidity needs, and the foregone return that could have been obtained.

Modeling liquidity shocks/frictions

- Which option to choose? Using the expected utility criteria then
  - Suppose that u = $1 - \frac{1}{c}$

- Option 1 (Cash)

  c(1) = 1 and c(2) = 1 ➔ U1(c(1),c(2)) = 0

- Option 2 (Invest)

  c(1) = θ and c(2) = R ➔ U2(c(1),c(2)) = $1 - \pi\frac{1}{\theta} - (1-\pi)\frac{1}{R}$

Option 2 is preferable to option 1 if $\pi\frac{1}{\theta} + (1-\pi)\frac{1}{R} < 1$

Better way to deliver better outcome?

- Is there any alternative way of economic arrangement in which each agent may possibly consume “r1” in the first period, and “r2” in the second period, and

$$1 - \pi(1 - \frac{1}{r1}) - (1- \pi)(1 - \frac{1}{r2}) > 1 - \pi(1 - \frac{1}{\theta}) - (1- \pi)(1 - \frac{1}{R})$$

- This looks like banking service in which a bank engineers a financial contract that promise to repay agent r1 in period one, and r2 in period 2. Repaying agent in period 1 is called to service the withdrwal request.

Bank-based equilibrium can occur.

- Bank can occur/arise and dominate the traditional market-based solution.
- What a bank does is the following.
  - Collecting all the resources from market.
  - The bank foresees that πN will be arriving the bank to withdraw cash.
  - Given that bank needs to fulfill the contract by paying "r1" to each client who arrives at the bank in the first period, bank needs to have cash ready by r1*πN.

Bank-based equilibrium can occur.

- To manage liquidity needs, bank compares two possible options, i.e. holding cash or holding long-term asset (and then liquidate).

- Which way?

- Consider first when $\theta < 1$.
- In this case, would it make sense for banks to invest 100% in the illiquid asset?

Bank-based equilibrium can occur.

- To insure against withdrawal in period 1, bank needs to set aside r1*πN in cash.

- The amount of long-term investment is then equal to (N - r1*πN), which could generate proceeding amount of money in period 2 equal to (N - r1*πN)*R

A numerical example: Bank-based equilibrium can occur.

- $\mathrm{N} = 100$ (Each \$1)
  - $\mathrm{Total} = \$100$
- $\pi = \frac{1}{4}$ → 25% of 100 households will be needing cash in period 1.
- Let suppose that $\theta = 0.5$ $R = 2$

- Bank equilibrium can occur, with r1= 1.28 *and* r2 = 1.813

Can r1= 1.28 *and* r2 = 1.813 be feasible under the banking equilibrium?

- Bank has a total resource $100.
- Bank knew in advance that 25 households will be claiming in period 1.
- Given the promised return "r1", bank must be standing by and having 25*1.28 = $32 on hand.
- Given that $\theta = 0.5$, bank will hold $32 to fulfill its promise on liquidity service.
- Hence, bank invests in long-term asset only $68, which would earn bank $68*2 = $136 in period 2.
- Each of the remaining 75 households would get back $1.813 as promised.

Feasible, but really better?

- Yes, let's compare ex-ante expected utility
- Direct investment

$$\frac{1}{4}\left(1-\frac{1}{1}\right)+\frac{3}{4}\left(1-\frac{1}{2}\right)=\frac{3}{8}=0.375$$

- Investment via bank

$$\frac{1}{4}\left(1-\frac{1}{1.28}\right)+\frac{3}{4}\left(1-\frac{1}{1.813}\right)=0.391$$

- Bank can protect you against the liquidity shocks and mitigate the impact of liquidity frictions. In particular, households trade-off their upside gain for the protection against the downside loss arising under an unlucky draw on the timing of liquidity demand.

What does a commercial bank do?

- Delegated monitoring

- Offering liquidity insurance.
  - Accept deposit
  - Fractional reserve banking
  - Invest in the (**non-tradable**) long-term asset