

Theory of financial intermediations I: Justifying the existence of banking

EE 431 Semester 1/2017

Kittichai Saelee

Roadmap for this part

- I: Understanding the existence of FIS and banking firm
- II: Banking behavior
- III: Banking industry and regulation

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

Motivations

- Limited accessibility to financial market, aka direct finance, have been clearly observed.
- Financial frictions, such as *asymmetric information and transaction cost*, impair the function of financial markets.
- Financial institutions *endogenously* arise as the solution to the information problem.
- What specific features of financial frictions does financial institution solve?

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.
- A simple (possible) solution:
 - A single borrower must secure funds from a continuum of lenders.
 - Then use debt contract, i.e. a standard form of “optimal” financial contract.
- If then, why can't firm directly borrow in the market? Why doesn't each lender offer loan in the market?

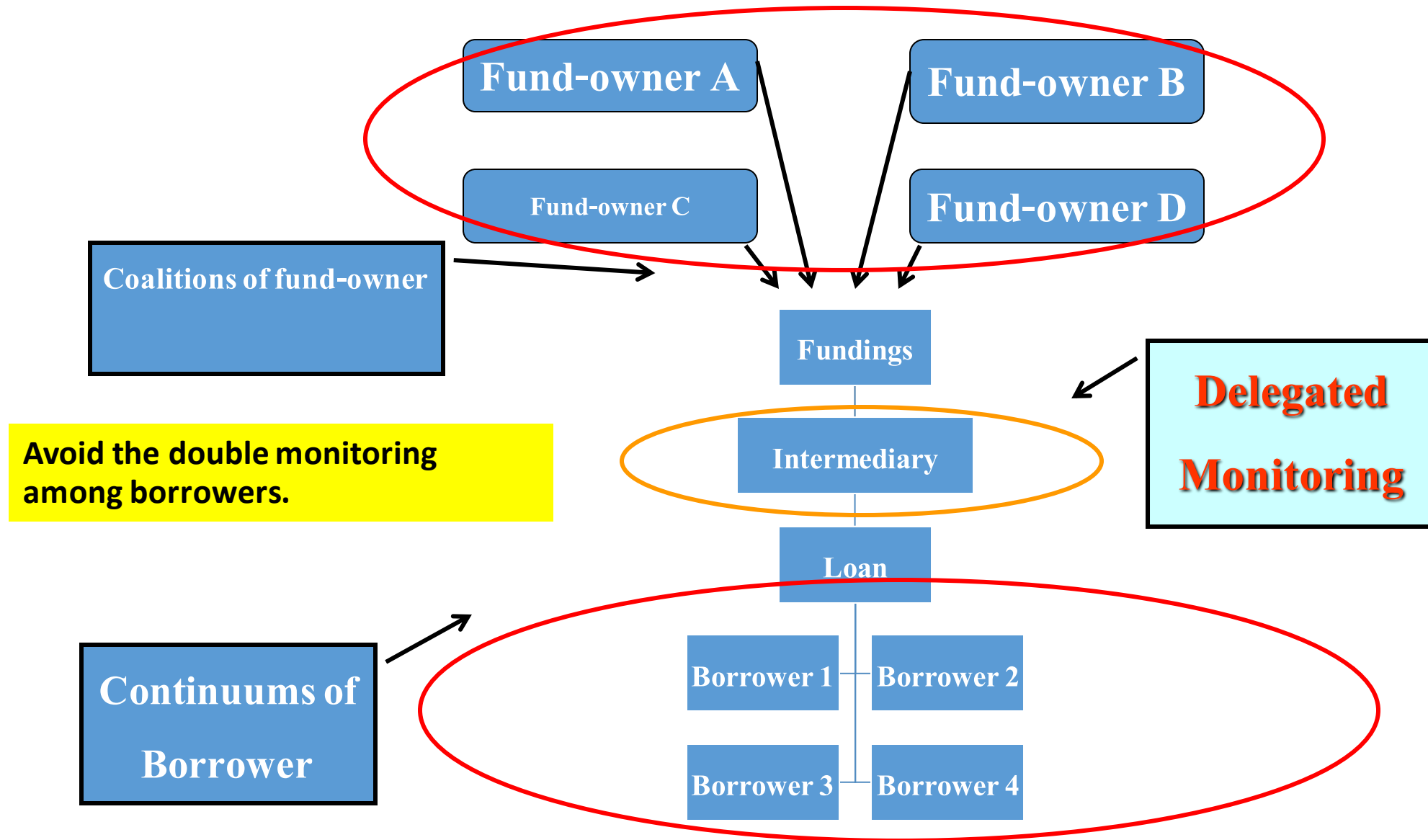
The problem of a continuum of lenders

- Part of the reason is the forgone benefit of diversification.
 - Very hard for each lender to split the money for the investment in a variety of projects.
 - Discourage potential lenders (with limit fundings) to engage directly in the market.
- Costly diversification (transaction cost) justifies the existence of FIs.
- Anything else?

The problem of a continuum of lenders

- Debt contract is optimal, but to induce the most efficient result, monitoring is required/needed under the debt contract.
- What is monitoring?
 - Procedure/effort taken by lender to ensure that borrower behaves in the way that is not harmful to the lender.
 - E.g. asset diverting and private-benefit issue.
- Then, who monitor?
 - Excessive monitoring problem V.S. Free-riding

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, salvage 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)

$$c(1) = 1 \text{ and } c(2) = 1 \Rightarrow U1(c(1), c(2)) = 0$$

- Option 2 (Invest)

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

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

$$1 - \pi(1 - \frac{1}{r_1}) - (1 - \pi)(1 - \frac{1}{r_2}) > 1 - \pi(1 - \frac{1}{\theta}) - (1 - \pi)(1 - \frac{1}{R})$$

- 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 withdrawal 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 “ r_1 ” to each client who arrives at the bank in the first period, bank needs to have cash ready by $r_1 * \pi N$.

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 $r_1 * \pi N$ in cash.
- The amount of long-term investment is then equal to $(N - r_1 * \pi N)$, which could generate proceeding amount of money in period 2 equal to $(N - r_1 * \pi N) * R$

A numerical example: Bank-based equilibrium can occur.

- $N = 100$ (Each \$1)
 - Total = \$100
- $\pi = \frac{1}{4} \rightarrow$ 25% of 100 households will be needing cash in period 1.
- Let suppose that $\theta = 0.5$ $R = 2$
- Bank equilibrium can occur, with $r_1 = 1.28$ and $r_2 = 1.813$

Can $r_1 = 1.28$ and $r_2 = 1.813$ 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 “ r_1 ”, 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