Topic 5 : Banking and the Management of Financial Institutions

EE431/438

, The Economics of Money, Banking and Financial Markets Chapter 9, pp 219 - 238
(available at the reserve section of the library, HG173 .M57 2007)

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- Outline

1. Introduction : What does a bank do?
2. Major risks faced by banks.
3. Liquidity Management and The Role of Reserve
4. Interest Rate Risk Management
5. Credit Risk Management
6. Capital Adequacy Management

1. Introduction

- What is financial intermediary? What does a bank do?
- Why does financial intermediary exist? (topic 6)
- Why do we need to regulate financial intermediaries?
- This topic focuses on the first question, what is financial intermediary?
- The answers to the rest questions are the main focus of topic 6, 7, 8, in which we are going to deal with economic models with asymmetric information.

- Financial institution perform two main functions:
  1. to match transactors (like marriage brokers do)
  2. to manage risk and transform the nature of claims (qualitative asset transformation)

  - Banks make profits by selling liabilities (e.g. deposits) with one set of characteristics and using the proceeds to buy assets (e.g. loans) with a different set of characteristics.
  - Normally, banks borrows from short-dated deposits and lends through long-term loans.
- Financial intermediaries are entities that intermediate between providers and users of financial capital . They borrow on on hand and lend on the other.
- Financial intermediaries perform qualitative asset transformation.

- Financial intermediaries are “firms” which produce “financial services”
- manufacturing firms hold inventories, machines, patents
- financial intermediaries hold large quantities of financial claims
- Both finance their assets by issuing “debt” or “equity”
- Debts :
- Equity :

- D/E ratio : ADVANC = 1.3, DTAC= 1.89, LPN = 0.66 , PTT = 1.49, RS = 0.83, ROBINS = 0.63, BH = 0.89, CPALL = 1.68, SPALI= 0.86
- Guess: What is the average D/E ratio of all commercial banks in Thailand?

- One distinction between financial institutions and manufacturing business is that FIs are highly financial leveraged. In other words, their debt to equity ratio is very high.
- Industrial organization of banking: It is hard to define “production”
  1. deposits as inputs, loans as output
  2. deposits and loans are output, inputs are human capital and physical capital
- To understand banking business, the simplest way is to look at the bank balance sheet
- Balance sheet : the source of funds = the use of funds, total liabilities + capital = total assets
- Liabilities : deposits, borrowings
- Asset : loans, cash (required reserves + excess reserves), securities

- Basic banking operation: Mr Johny opens a checking deposit account with Baht 100, the reserve requiement ratio is 10%.

Bangkok Bank Plc.

Assets	Liabilities
required reserves	checkable deposits
excess reserves	

- Assume that the bank choose not to hod any excess reserves but to make loans

Bangkok Bank Plc.

Assets	Liabilities
required reserves	checkable deposits
loans	

- Suppose that deposit rate is 1 percent and loan rate is 10% and the operation cost is 1 Baht. Then the bank is making a profit of 10%(.....) - 1%(.....) - 1 Baht
- Banking busisness is making profits by borrowing at low interest rate and then lending at high interest rate

2. Major Risks Faced by Banks

- Is this an easy money making?
  - liquidity risk
  - interest rate risk
  - default risk (credit risk)

3. Liquidity management and the role of reserves

- Banks borrow short terms to lend for long terms (maturity mismatch)
- They need to hold enough cash for their depositors to withdraw
- Why don't hold a large amount of reserve to prevent liquidity risk?
- Normally banks retain only some fractions of their customer's deposits as reserve
- In a normal situation, there is no problem in doing this. Why?
- Large number of depositors $\rightarrow$ the amount withdrawals become more predictable, interbank lending
- If a bank does not have enough cash to pay back their depositors on demand, there will be panics. Large number of depositors withdraw their deposits, not because they need to use the money, but because they fear the bank will fail. The effect is contagious. Interbank lending cannot help. Liquidity problem $\rightarrow$ bank failues $\rightarrow$ economy. (Bank runs and deposit insurance - Topic 8)

- How a bank can deal with deposit outflows : reserve requirement ratio = 10%

Bangkok Bank Plc. (million Baht)

Assets		Liabilities	
Reserves	20	checkable deposits	100
Loans	80	bank capital	10
Securities	10		

- Legal Reserve= ..... Excess Reserve = ...
- Suppose there is a deposit outflow of 10 M.Baht.

Bangkok Bank Plc.

Assets	Liabilities
Reserves	checkable deposits
Loans	bank capital
Securities	

- With 10% reserve requirement, bank still has excess reserves of 1 million Baht: no changes needed in balance sheet

- No excess reserve.

Bangkok Bank Plc. (million Baht)

Assets		Liabilities	
Reserves		checkable deposits	100
Loans		bank capital	10
Securities	10		

- Suppose there is a deposit outflow of 10 M.Baht.

Bangkok Bank Plc.

Assets		Liabilities	
Reserves		checkable deposits	
Loans		bank capital	
Securities			

- Now the bank has a problem. It does not have enough reserves as required.

- Basically, the bank has four options: there is a cost associated with all the four options.
  1. borrow from other banks in the interbank market
  2. sell some of its securities
  3. borrowing from the central bank
  4. sell off loans

1. Borrow from other banks
Bangkok Bank Plc.

Assets	Liabilities	
Reserves	checkable deposits	90
Loans	borrowing	
Securities	bank capital	

- Cost : interbank rate

2. Sell some of it securites
Bangkok Bank Plc.

Assets	Liabilities	
Reserves	checkable deposits	90
Loans	borrowing	
Securities	bank capital	

- Cost : capital loss, opportunity cost

3. Borrowing from the central bank

Bangkok Bank Plc.

Assets	Liabilities	
Reserves	checkable deposits	90
Loans	borrowing	
Securities	bank capital	

- Cost : discount window rate

4. Sell off loans

Bangkok Bank Plc.

Assets	Liabilities	
Reserves	checkable deposits	90
Loans	borrowing	
Securities	bank capital	

- Cost : capital loss, opportunity cost
- it is not always possible to sell off loans

4. Interest Rate Risk Management

- Most of a bank's income comes from interest paid from loan repayment.
- Most of a bank's expense comes from interest paid to depositors.
- A change in the interest rate affects the bank's income, expenses, profit or loss, financial position (value of asset and liabilities)
- The bank is facing with the interest rate risk.
- How a change in the interest rate affect a bank's financial position and performance?
- Both sides of the bank's balance sheets are debt instruments.
- However, on the asset side, most are long-term debt instruments (loans). On the liabilities side, most are short-term debt instruments(deposits).
- A change in the interest rate may affect the bank's income and the bank's expense at different rates.
- A change in the interest rate can bring about a decrease in a bank's profit or a fall in a bank's net worth.

4.1 Gap Analysis

Bangkok Bank Plc. (million Baht)

Assets		Liabilities	
Fixed Rate Asset	**350**	**Fixed rate libilities**	**230**
reserves, long-term security, fixed rate loans, government bonds		checkable deposits long-term CDs	
Variable Rate Assets	**130**	**Variable Rate Liabilities**	**230**
S-T securities, variable rate loans		S-T CDS, saving deposits	
		Net Worth	.....
Total Asset	**480**	**Total Liabilities**	**.....**

- GAP = rate-sensitive assets – rate-sensitive liabilities = ... – ..... =..... million Baht
- When i $\uparrow$ 5%:
  1. Δ Income on assets = ...$\times$..... = ...
  2. Δ Costs of liabilities = ...$\times$..... = ...
  3. $$\begin{aligned} \Delta Profits &= \text{.....} = \text{.....} \\ &= 5\% \times (\text{.....} - \text{.....}) = \\ &= 5\% \times \text{GAP} \end{aligned}$$
- ΔProfit $= \Delta i \times$ GAP
- Hence, when Gap is negative, the bank's net worth would decrease when interest rate .....
- When GAP is positive, the bank's net worth would decrease when interest rate .....

4.2 Duration Analysis

Bangkok Bank Plc.

Assets		Liabilities	
long term assets	480	short-term liablities	460

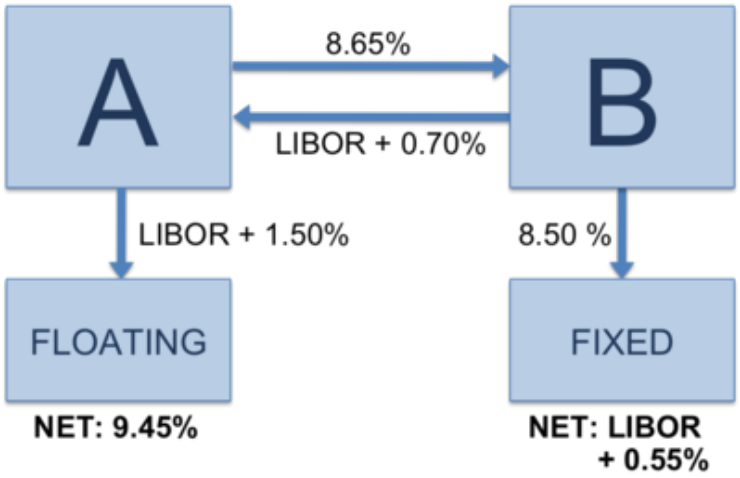
- Suppose that modified duration of bank assets = 3 years, modified duration of liabilities = 2 years. The interest rate is expected to fall by 5%.
- $\%\Delta$ value = $\Delta i \times$ Modified Duration
- $\%\ \Delta$ assets = ...
- $\%\Delta$ liabilities = ...
- $\%\Delta$ net worth = ...

Strategies to Manage Interest-rate Risk

1. Rearrange balance-sheet
2. Interest-rate swap
3. Hedge with financial futures

Interest Swap

- An interest rate swap (IRS) is a popular and highly liquid financial derivative instrument in which two parties agree to exchange interest rate cash flows, based on a specified notional amount from a fixed rate to a floating rate (or vice versa) or from one floating rate to another.[1] Interest rate swaps are commonly used for both hedging and speculating.



An interest rate future

- An interest rate future is a financial derivative (a futures contract) with an interest-bearing instrument as the underlying asset. Examples include Treasury-bill futures, Treasury-bond futures and Eurodollar futures.
- Interest rate futures are used to hedge against the risk of that interest rates will move in an adverse direction, causing a cost to the company. For example, borrowers face the risk of interest rates rising. Futures use the inverse relationship between interest rates and bond prices to hedge against the risk of rising interest rates. A borrower will enter to sell a future today. Then if interest rates rise in the future, the value of the future will fall (as it is linked to the underlying asset, bond prices), and hence a profit can be made when closing out of the future (i.e. buying the future).

- What will happen if there is a default?

Bangkok Bank Plc.

Assets		Liabilities	
Reserves	20	checkable deposits	100
Loans	80	bank capital	10
Securities	10		

- Suppose that the bank find that 20 M.Baht of their loans become worthless.

Bangkok Bank Plc.

Assets	Liabilities
Reserves	checkable deposits
Loans	bank capital
Securities	

- Banks try to find borrowers who will pay high interest rates and unlikely to default on their loans.
- It is very difficult to predict the riskiness of each borrower because of the asymmetric information problem
- adverse selection :
  - the bank should charge high(low) interest rate to high(low) risk customers
  - screening, credit analysis, long-term customer relationship
  - if the bank cannot separate high risk from low risk customers, it cannot price its financial products correctly
  - then, the bank will make a loss on its lending business
- moral hazard : monitoring, collateral requirement
- Banks are in a better position than individual savers. They can analyse credit risk better than individual savers. (Topic 6)
- How to design a loan contract that reduces moral hazard behaviour? (Topic 7)

- What will happen if there is a default?

Bangkok Bank Plc.

Assets		Liabilities	
Reserves	20	checkable deposits	100
Loans	80	bank capital	10
Securities	10		

- Suppose that the bank find that 5 M.Baht of their loans become worthless.

Bangkok Bank Plc.

Assets	Liabilities
Reserves	checkable deposits
Loans	bank capital
Securities	

- If the bank has held only 4 M.Baht capital, what will happen?

Bangkok Bank Plc.

Assets		Liabilities	
Reserves	20	checkable deposits	106
Loans	80	bank capital	4
Securities	10		

- Suppose that the bank find that 5 M.Baht of their loans become worthless.

Bangkok Bank Plc.

Assets	Liabilities
Reserves	checkable deposits
Loans	bank capital
Securities	

- The bank would fail. It does not have enough asset to pay back its liability
- A bank maintains bank capital to lessen the chance that it will become insolvent.

- Why don't hold a large amount of capital?
- Large equilty capital $\rightarrow$ lower return on equity for the bank's shareholders
- Returns on assets: $ROA = \dfrac{\text{net profit after taxes}}{\text{assets}}$
- Returns on equity: $ROE = \dfrac{\text{net profit after taxes}}{\text{equity}}$
- Equity multiplier: $EM = \dfrac{\text{assets}}{\text{equity}}$
- $ROE = ROA \times EM$
- As equity $\uparrow$, ROE .....
- "limited liability"$\rightarrow$ shareholders of the bank want to hold minimum amount of equity capital
- Bank equity capital is important to prevent banks from the risk of failures.
- Regulators has to set "minimum capital adequacy regulations" ; as suggested by BIS