

## EE431 Economics of Financial Markets and Institutions

## Problem Set 6: Banking and the Management of Financial Institutions

## Solutions

1. Banks earn profit when ...the interest rate on their assets exceeds the interest rate on their liabilities....
2. By law, banks must 0.2% of their demand deposits as required reserves. Thus, we say the 0.2% is ..the required reserve ratio....
3. The bank you own has the following balance sheet:

| Assets   |      | Liabilities and Equities |      |
|----------|------|--------------------------|------|
| Reserves | 300  | Deposits                 | 1300 |
| Security | 100  | Equities                 | 100  |
| Loans    | 1000 |                          |      |

If the bank suffers a deposits outflow of \$200 million with a required reserve ratio on deposits of 10%, does the bank have enough reserves to meet the reserve requirement?

Answer.

If the bank suffers a deposit outflow of \$200 million, the bank's reserves will decline to  $300 - 200 = \$100$  million. The bank's deposits will reduce to  $1300 - 200 = \$1100$  million. With the required reserve ratio of 10%, banks need to have reserve =  $10\% \times \$1100 = \$110$ . Since now the bank has reserves only \$100 million which is less than the requirement of \$110 million, the bank does not have enough reserve to meet the requirement.

4. The bank you own has the following balance sheet:

| Assets               |      | Liabilities and Equities       |      |
|----------------------|------|--------------------------------|------|
| Fixed rate asset     | 400  | Fixed rate liabilities         | 1400 |
| Variable rate assets | 1300 | Variable rate liabilities      | 200  |
|                      |      | Equities                       | 100  |
| Total assets         | 1700 | Total liabilities and equities | 1700 |

Use the gap analysis to analyze the bank's interest rate risk.

Answer.

$$\begin{aligned}
 \text{Gap} &= \text{variable rate asset} - \text{variable rate liability} , \\
 &= 1300 - 200, \\
 &= 1100.
 \end{aligned}$$

The gap is positive. The bank's net worth will increase(decrease) when interest rate increases(decreases).

- Suppose interest rate increases by 2%,
  - the bank's income will increase by  $2\% \times 1300 = 26$  , and
  - the bank's expense will increase by  $2\% \times 200 = 4$ ,
  - hence the bank's profit will increase by  $26 - 4 = 22$ .

- $\Delta \text{profit} = 2\% \times (\text{GAP}) = 2\% \times (1100) = 22$ .
  - This is because the bank's income on assets grows more than expense from liabilities does when interest rate increases.
  - Suppose interest rate decreases by 2%,
    - the bank's income will decrease by  $2\% \times 1300 = 26$ , and
    - the bank's expense will decrease by  $2\% \times 200 = 4$ ,
    - hence the bank's profit will decrease by  $26 - 4 = 22$ .
    - $\Delta \text{profit} = -2\% \times (\text{GAP}) = -2\% \times (1100) = -22$ .
    - This is because the bank's income on assets shrinks more than expense from liabilities does when interest rate decreases.
  - The bank faces with interest rate risk as the bank's profit is sensitive to the change in interest rate.
5. "The banks' capital base was far too thin to protect them against the shocks in property markets that eventually eroded confidence in virtually all big banks in America and Europe. ..."

The Economist, April 13, 2013.

How could the banks' capital base help protecting them against the shocks in property market? Why did too thin capital cushion erode confidence in the big banks? Explain.

Answer.

When there is a shock in property market, some borrowers may not be able to pay back their debt. The value of collateral drops, increasing default risk. If the bank holds a large amount of bank capital (equities), it can help protecting them from bankruptcies.

"Bank equity represents the money a bank's owner have invested in it. Balance-sheet can shrink because the value of a bank's riskier assets-mortgages, bonds, loans to companies - can drop sharply if the prospects of the borrowers sour. The danger is that the value of bank's asset could fall below its liabilities. When the value of bank's asset falls below its liabilities (equity capital is negative), the bank fails or is forced into bankruptcies. Equity takes the first hit when asset values drop. Since the bank's owners absorb the loss, its creditors - bondholders and depositors - can rest assured that they will not have to." If the bank's equity is large enough to absorb the loss, the depositors will not be affected. On the other hand, if the bank's equity capital is too thin, it is likely that the depositors will be negatively affected by loan losses.

Too thin capital cushion increases the likelihood that the bank will fail and the depositors will be badly affected. Hence, when there is a negative shock to the property market, the risk of bank loan losses increases and the confidence in the (even big) banks which hold too thin capital will be eroded. Equity capital can prevent the banks from downside risk. When bank capital is too thin, the risk of the bank will increase.

Notice : "Big banks" refers to those banks which have large amount of assets. Assets can be financed by debts and equities. If a bank holds large amount of capital, the depositors of the bank can be more confident in the bank's financial status, under the given situation. The bank with large amount of capital is safer from downside risk than the bank with small amount of capital.