

Economics of Financial Markets – Lecture 7

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End-of-Chapter Q24 (Review)

• *You wish to hire Ron to manage your Dallas operations. The profits from the operations depend partially on how hard Ron works, as follows.*

Profit Probabilities		
	Profit = \$20,000	Profit = \$40,000
Lazy	70%	30%
Hard worker	30%	70%

- *If Ron is lazy, he will surf the Internet all day, and he views this as a zero cost opportunity*
- *However, Ron views working hard as a “personal cost” valued at \$2,000.*
- *What fixed percentage of the profits should you offer Ron? Assume Ron cares only about his expected payment less any “personal cost.”*

End-of-Chapter Q24 - Answer

- Your expected profit is:
 - If Lazy, $\$20,000 \times 0.7 + \$40,000 \times 0.3 = \$26,000$.
 - If Hard Worker, $\$20,000 \times 0.3 + \$40,000 \times 0.7 = \$34,000$
- Suppose you offer ***R*** portion of the profits.
- For Ron,
 - If Lazy, $\$(20,000 \times \mathbf{R}) \times 0.7 + \$(40,000 \times \mathbf{R}) \times 0.3$
 - If Hard Worker, $\$(20,000 \times \mathbf{R}) \times 0.3 + \$(40,000 \times \mathbf{R}) \times 0.7 - \2000

Incentive Compatible

- You want Ron to Hard Work. Thus, if
$$$(20,000 \times \mathbf{R}) \times 0.7 + $(40,000 \times \mathbf{R}) \times 0.3 \leq $(20,000 \times \mathbf{R}) \times 0.3 + $(40,000 \times \mathbf{R}) \times 0.7 - $2000,$$
then Ron should work hard.
- You should offer Ron at least 25% of the profits, because
 - $\$2000 \leq 0.4 \times \mathbf{R} \times (\$40,000 - \$20,000).$
 - $\$2000 \div \$8000 \leq \mathbf{R}.$

Preview

- We examine how banks attempt to maximize their profits.
- Although the discussion that follows focuses primarily on commercial banks, many of the same principles apply to other financial intermediaries as well.

Learning Objectives

- Summarize the features of a **bank balance sheet**.
- Apply changes to a **bank's assets and liabilities** on a T-account.
- Identify ways in which banks can manage their **assets and liabilities** to maximize profit.

Learning Objectives

- List the ways in which banks deal with **credit risk**.
- Apply gap and duration analysis and identify interest-rate risk.
- Examine off-balance sheet activities.

Table 1 Balance Sheet of All Commercial Banks (items as a percentage of the total, June 2014)

TABLE 1 Balance Sheet of All Commercial Banks (items as a percentage of the total, June 2014)			
Assets (Uses of Funds)*		Liabilities (Sources of Funds)	
Reserves and cash items	19%	Checkable deposits	11%
Securities		Nontransaction deposits	
U.S. government and agency	13	Small-denomination time deposits	47
State and local government and other securities	6	(<\$100,000) + savings deposits	
Loans		Large-denomination time deposits	11
Commercial and industrial	12	Borrowings	20
Real estate	25	Bank capital	11
Consumer	8		
Interbank	1		
Other	7		
Other assets (for example, physical capital)	9		
Total	100	Total	100
*In order of decreasing liquidity.			
Source: http://www.federalreserve.gov/releases/h8/current/ .			

The Bank Balance Sheet: Liabilities

- **Liabilities:**

- Checkable deposits: Bank accounts that allow the owner of the account to write checks to third parties.
- Nontransaction deposits: The primary source of bank funds. Owners cannot write checks on nontransaction deposits, but the interest rates paid on these deposits are usually higher than those on checkable deposits.
- Borrowings: Banks also obtain funds by borrowing from the Federal Reserve System (the central bank system), other banks or corporations. Borrowings from the system are called discount loans.
- Bank capital: The difference between total assets and liabilities.

The Bank Balance Sheet: Asset

- A bank uses the funds that it has acquired by issuing liabilities to purchase income-earning assets.
- **Assets:**
 - Reserves (see the next slide)
 - Cash items in process of collection: A check written on an account at another bank, that has not yet collected.
 - Deposits at other banks
 - Securities
 - Loans
 - Other assets

Assets: Reserves

- All banks hold some of the funds they acquire as deposits in an account at the central bank (the Fed in US, RBA in Australia).
- **Reserves** consists of these deposits plus currency that is physically held by banks (called **vault cash**).
- **Reserve Requirements:** The regulation that for every dollar of checkable deposits at a bank, a certain fraction (10 cents, for example) must be kept as reserves.
- This fraction (10% in our example) is called the **required reserve ratio**.

Basic Banking

- **Asset Transformation:** Banks make profits by selling liabilities with one set of characteristics and using the proceeds to buy assets with a different set of characteristics.
- For example, a savings deposit held by one person can provide the funds that enable the bank to make a mortgage loan to another person.
- **T-account:** A simplified balance sheet with lines in the form of a T.

Basic Banking

- Cash Deposit:

First National Bank		First National Bank	
Assets	Liabilities	Assets	Liabilities
Vault Cash +\$100	Checkable deposits +\$100	Reserves +\$100	Checkable deposits +\$100

- Jane opens a checking account with a \$100 bill.
- Opening of a checking account leads to an increase in the bank's reserves equal to the increase in checkable deposits.

Basic Banking

First National Bank	
Assets	Liabilities
Cash items in process of collection +\$100	Checkable deposits +\$100

Check Deposit:
When a bank receives additional deposits, it gains an equal amount of reserves; when it loses deposits, it loses an equal amount of reserves.

First National Bank		Second National Bank	
Assets	Liabilities	Assets	Liabilities
Reserves +\$100	Checkable deposits +\$100	Reserves -\$100	Checkable deposits -\$100

If Jane had opened her account with a \$100 check written on an account at another bank, say the Second National Bank, we would get the same result as above.

Making a profit

- The First National Bank has just received the extra \$100 of checkable deposits.
- The bank is obliged to keep a certain fraction of its checkable deposits (for example, 10%) as required reserves.

First National Bank	
Assets	Liabilities
Required reserves + \$10	Checkable deposits +\$100
Excess reserves + \$90	

First National Bank	
Assets	Liabilities
Required reserves + \$10	Checkable deposits +\$100
Loans + \$90	

- **Asset transformation:** selling liabilities with one set of characteristics and using the proceeds to buy assets with a different set of characteristics
- The bank borrows short and lends long
- The bank is now making a profit because it holds short-term liabilities, such as checkable deposits, and uses the proceeds to fund longer-term assets, such as loans with higher interest rates.

General Principles of Bank Management

- **Liquidity Management:** The acquisition of assets that are liquid enough to meet the bank's obligations to depositors.
- **Asset Management:** The bank manager must pursue an acceptably low level of risk by acquiring assets that have a low rate of default and by diversifying asset holdings.
- **Liability Management:** Acquiring funds at low cost.
- **Capital Adequacy Management:** The manager must decide the amount of capital and acquire the needed capital.
- **Credit Risk:** The risk arising because borrowers may default.
- **Interest-rate Risk:** The riskiness of earnings and returns on bank assets caused by interest-rate changes.

Liquidity Management and the Role of Reserves: Sufficient Excess Reserves

- Excess reserves:

Assets		Liabilities	
Reserves	\$20M	Deposits	\$100M
Loans	\$80M	Bank Capital	\$10M
Securities	\$10M		

Assets		Liabilities	
Reserves	\$10M	Deposits	\$90M
Loans	\$80M	Bank Capital	\$10M
Securities	\$10M		

- Suppose a bank's required reserves are 10%.
- If a deposit outflow of \$10 million occurs, the bank's balance sheet changes from the left side to the right side.
- If a bank has ample excess reserves, a deposit outflow does not necessitate changes in other parts of its balance sheet.

Liquidity Management and the Role of Reserves: Insufficient Excess Reserves

- Shortfall:

Assets		Liabilities	
Reserves	\$10M	Deposits	\$100M
Loans	\$90M	Bank Capital	\$10M
Securities	\$10M		

Assets		Liabilities	
Reserves	\$0	Deposits	\$90M
Loans	\$90M	Bank Capital	\$10M
Securities	\$10M		

- Reserves are a legal requirement and the shortfall must be eliminated.
- Excess reserves are insurance against the costs associated with deposit outflows.

Liquidity Management and the Role of Reserves: Option 1

- Borrowing: Borrowing them (\$9million) from other banks or corporations.

Assets		Liabilities	
Reserves	\$9M	Deposits	\$90M
Loans	\$90M	Borrowing	\$9M
Securities	\$10M	Bank Capital	\$10M

- Cost incurred is the interest rate paid on the borrowed funds

Liquidity Management and the Role of Reserves: Option 2

- Securities sale: Selling some of its securities.

Assets		Liabilities	
Reserves	\$9M	Deposits	\$90M
Loans	\$90M	Bank Capital	\$10M
Securities	\$1M		

- The cost of selling securities is the brokerage and other transaction costs.

Liquidity Management and the Role of Reserves: Option 3

- Federal Reserve (Central Bank): Borrowing from the central bank.

Assets		Liabilities	
Reserves	\$9M	Deposits	\$90M
Loans	\$90M	Borrow from Fed	\$9M
Securities	\$10M	Bank Capital	\$10M

- Borrowing from the Fed (central bank) also incurs interest payments based on the **discount rate**.

Liquidity Management and the Role of Reserves: Option 4

- Reduce loans: Reducing loans and depositing with the central bank's account.

Assets		Liabilities	
Reserves	\$9M	Deposits	\$90M
Loans	\$81M	Bank Capital	\$10M
Securities	\$10M		

- Reduction of loans is the most costly way of acquiring reserves.
- Calling in loans antagonizes customers.
- Other banks may only agree to purchase loans at a substantial discount.

Asset Management

Three goals:

1. Seek the highest possible returns on loans and securities.
2. Reduce risk.
3. Have adequate liquidity.

Asset Management

Four Tools:

1. Find borrowers who will pay high interest rates and have low possibility of defaulting.
2. Purchase securities with high returns and low risk.
3. Lower risk by diversifying.
4. Balance need for liquidity against increased returns from less liquid assets. The bank must manage the liquidity of its assets so that it can meet deposit outflows and still satisfy its reserve requirements without bearing huge costs.

Liability Management

- Recent phenomenon due to rise of money center banks
- Expansion of overnight loan markets and new financial instruments (such as negotiable CDs)
- Checkable deposits have decreased in importance as source of bank funds.

Capital Adequacy Management

- Bank capital helps prevent bank failure.
- The amount of capital affects return for the owners (equity holders) of the bank.
- Regulatory requirement

Capital Adequacy Management

How Bank Capital Helps Prevent Bank Failure:

High Capital Bank				Low Capital Bank			
Assets		Liabilities		Assets		Liabilities	
Reserves	\$10 million	Deposits	\$90 million	Reserves	\$10 million	Deposits	\$96 million
Loans	\$90 million	Bank capital	\$10 million	Loans	\$90 million	Bank capital	\$ 4 million

\$5 million of their housing loans become worthless.

High Capital Bank				Low Capital Bank			
Assets		Liabilities		Assets		Liabilities	
Reserves	\$10 million	Deposits	\$90 million	Reserves	\$10 million	Deposits	\$96 million
Loans	\$85 million	Bank capital	\$ 5 million	Loans	\$85 million	Bank capital	−\$ 1 million

Capital Adequacy Management

How the Amount of Bank Capital Affects Returns to Equity Holders:

Return on Assets: net profit after taxes per dollar of assets

$$ROA = \frac{\text{net profit after taxes}}{\text{assets}}$$

Return on Equity: net profit after taxes per dollar of equity capital

$$ROE = \frac{\text{net profit after taxes}}{\text{equity capital}}$$

Relationship between ROA and ROE is expressed by the
Equity Multiplier: the amount of assets per dollar of equity capital

$$EM = \frac{\text{Assets}}{\text{Equity Capital}}$$

$$\frac{\text{net profit after taxes}}{\text{equity capital}} = \frac{\text{net profit after taxes}}{\text{assets}} \times \frac{\text{assets}}{\text{equity capital}}$$

$$ROE = ROA \times EM$$

Example

- $ROE = ROA \times EM$.
- What happens to the return on equity when a bank holds a smaller amount of capital for a given amount of assets?
- High Capital Bank initially has \$100 million of assets and \$10 million of equity. So EM is 10 ($= 100/10$).
- Low Capital Bank has only \$4 million of equity and so EM is 25 ($100/4$).
- Suppose that both banks have the same return on assets, 1%.
- Then High Capital Bank earns 10%, while Low Capital Bank earns 25%.
- **Given the return on assets, the lower the bank capital, the higher the return for the owners of the bank.**

Capital Adequacy Management

- Trade-off between safety and returns to equity holders:
 - Benefits the owners of a bank by making their investment safe
 - Costly to owners of a bank because the higher the bank capital, the lower the return on equity
 - Choice depends on the state of the economy and levels of confidence

Managing Credit Risk

- Screening and Monitoring:
 - Screening
 - Specialization in lending
 - Monitoring and enforcement of restrictive covenants

Managing Credit Risk

- Long-term customer relationships
- Loan commitments: A bank's commitment to provide a firm with loans up to a given amount at an interest rate that is tied to some market interest rate. The advantage for a bank is that the loan commitment promotes a long-term relationship.
- Collateral
- Compensating balance: The requirement that a firm receiving the loan must keep some minimum amount in their checking account.
- Credit rationing: Refusing to make loans even if borrowers are willing to pay the stated interest rate, or even a higher rate.

Managing Interest-Rate Risk

- If a bank has more rate-sensitive liabilities than assets, a rise in interest rates will reduce bank profits and a decline in interest rates will raise bank profits.

First National Bank			
Assets		Liabilities	
Rate-sensitive assets	\$20 million	Rate-sensitive liabilities	\$50 million
Variable-rate and short-term loans		Variable-rate CDs	
Short-term securities		Money market deposit accounts	
Fixed-rate assets	\$80 million	Fixed-rate liabilities	\$50 million
Reserves		Checkable deposits	
Long-term loans		Savings deposits	
Long-term securities		Long-term CDs	
		Equity capital	

Example:

- Suppose that interest rates rise by 5% from 10% to 15%.
- The income on the assets increases by \$1 million ($5\% \times \20 million).
- The payments on the liabilities increase by \$2.5 million ($5\% \times \50 million).
- The Bank's profits decline by \$1.5 million, because $\$1 \text{ million} - \$2.5 \text{ million} = -\$1.5 \text{ million}$.

Gap and Duration Analysis

- Basic gap analysis:

$$(\text{rate sensitive assets} - \text{rate sensitive liabilities}) \times \text{change in interest rates} \\ = \text{change in bank profit}$$

- From Example

$$(\$20 \text{ million} - \$50 \text{ million}) 5\% \times = - \$1.5 \text{ million.}$$

Gap and Duration Analysis

$$\begin{aligned} &\% \text{ change in market value of security} \\ &\approx - \% \text{ point change in interest rate} \\ &\quad \times \text{ duration in years.} \end{aligned}$$

- Uses the weighted average duration of a financial institution's assets and of its liabilities to see how net worth responds to a change in interest rates.
- Suppose that the average duration of the bank's assets is three years, while the average duration of the liabilities is two years.
- The Bank has \$90 million of liabilities and the bank's capital is 10% of assets.

Example

- With a 5% increase in interest rates, the market value of the bank's assets falls by 15% ($= -5\% \times 3 \text{ years}$) = a decline of \$15 million on the \$100 million of assets.
- The market value of the bank's liabilities falls by 10% ($-5\% \times 2 \text{ years}$) = a decline of \$9 million on the \$90 million of liabilities.
- The net worth has declined by \$6 million, or 6% of the total original asset value.
- **Point: both duration analysis and gap analysis indicate that the bank will suffer if interest rates rise.**