

## Chapter 1: Why are financial institutions special?

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### Types of financial institutions:

1. Depository institutions
2. Non-depository institutions

### Types of risks common to financial institutions:

1. Default or credit risk
2. Mismatching of maturities (thus exposing themselves to interest rate risk)
3. Liquidity risk
4. Underwriting risk
5. Operating cost risk

### Functions of financial institutions:

1. Broker
2. Asset transformer
3. Information cost
4. Delegated monitor
5. Information producer
6. Liquidity and price risk
7. Reduced transaction cost
8. Maturity intermediation
9. Transmission of monetary policy
10. Credit allocation
11. Intergenerational wealth transfer or time intermediation
12. Payment services
13. Denomination intermediation

### Types of regulation:

1. Safety and soundness regulation
  - a. Layer one  diversify assets
  - b. Layer two  minimum equity requirement
  - c. Layer three  deposit insurance and security investors protection
  - d. Layer four  monitoring and surveillance
2. Monetary policy regulation
3. Credit allocation regulation
4. Consumer protection regulation
5. Investor protection regulation
6. Entry regulation

**Trends:**

1. The rise of investment banking and the decline of other financial institutions
2. The rise of financial services holding companies
3. The shift away from risk measurement and management and the financial crises
  - a. Increasing role of shadow banks

## Chapter 2: financial services – depository institutions

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Depository Institutions	
Assets	Liabilities and Equity
Loans	Deposits
Other assets	Other liabilities and equity

☒ Depository institutions offer products to their customers on both sides of their balance sheets

### Types of depository institutions:

#### 1. **Commercial banks:**

- Accepts deposits and makes consumer, commercial, and real estate loans
- Historically, they have operated as diversified institutions, having a large concentration of residential mortgage assets but also holding commercial and consumer loans as well

#### 2. **Savings institutions:**

- Depository institutions that specialize in residential mortgages mostly backed by short-term deposits and other funds
- Historically, concentrated on residential mortgages

#### 3. **Credit unions:**

- Non-profit depository institutions, owned by members with a common bond, specializing in small consumer loans
- Historically, focused on consumer loans funded with member deposits

## Chapter 3: financial services – finance companies

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**Finance company:** a firm (other than a depository institution) whose primary assets are loans to individuals and businesses.

### Features:

- Because they do not have access to deposits for their funding, finance companies rely heavily on short / long term debt, especially commercial paper
- Willingness to lend to riskier borrowers than depository institutions
- Direct affiliation with manufacturing firms
- Low regulation

### Major types of finance companies:

1. Sales finance institutions
  - a. Specialize in making loans to the customers of a particular retailer or manufacturer
2. Personal credit institutions
  - a. Specialize in making installment and other loans to consumers
3. Business credit institutions
  - a. Specialize in making business loans

## Chapter 4: financial services – securities firms and investments banks

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**Investment banks:** involve the raising of debt and equity securities for corporations or governments. This includes the origination, underwriting, and placement of securities in money and capital markets. It also involves corporate finance activities such as advising on mergers and acquisitions, as well as advising on the restructuring of existing corporations.

**Securities firms:** involve assistance in the trading of securities in the secondary markets (brokerage services / market making).

### Key activities:

1. Investment banking
2. Venture capital
3. Market making
4. Trading
  - a. Position trading
  - b. Pure arbitrage
  - c. Risk arbitrage
  - d. Program trading
  - e. Stock brokerage
  - f. Electronic brokerage
5. Investing
6. Cash management
7. Mergers and acquisitions
8. Back office and other service functions
  - a. Custody and escrow
  - b. Clearance and settlements
  - c. Research and advisory services

☒ The industry is in a period of consolidation and globalization as the array and scope of its activities expand.

## Chapter 5: financial services – mutual fund and hedge fund companies

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Mutual funds and hedge funds are financial institutions that pool the financial resources of individuals and companies and invest in diversified portfolios of assets.

### Types of mutual funds:

- Long term funds
  - Equity funds – systematic risk
  - Bond funds – interest rate risk
  - Hybrid funds
- Short term funds
  - Money market funds – interest rate risk (low)

### Notes:

- Sector specific funds have systematic and unsystematic risk.
- In general, passively managed index funds perform better than actively managed funds (with the exception of mid-sized companies focused funds)

### Investors generate return from mutual fund ownership through:

1. Income and dividends are earned on the underlying assets
2. Capital gains (due to selling)
3. Capital appreciation (due to time)

**Exchange traded funds (ETFs):** an investment company with shares that trade intraday on stock exchanges at market determined prices.

### ETF features:

- Intraday tradability
- Transparency
- Tax efficiency
- Access to specific markets or asset classes

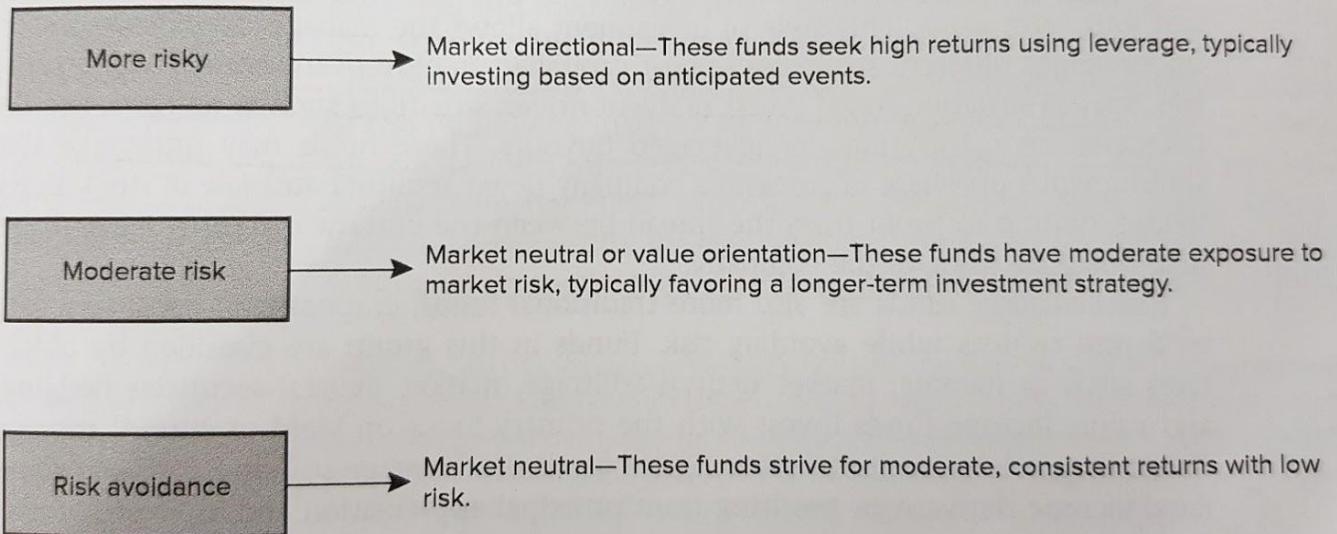
### Mutual fund costs:

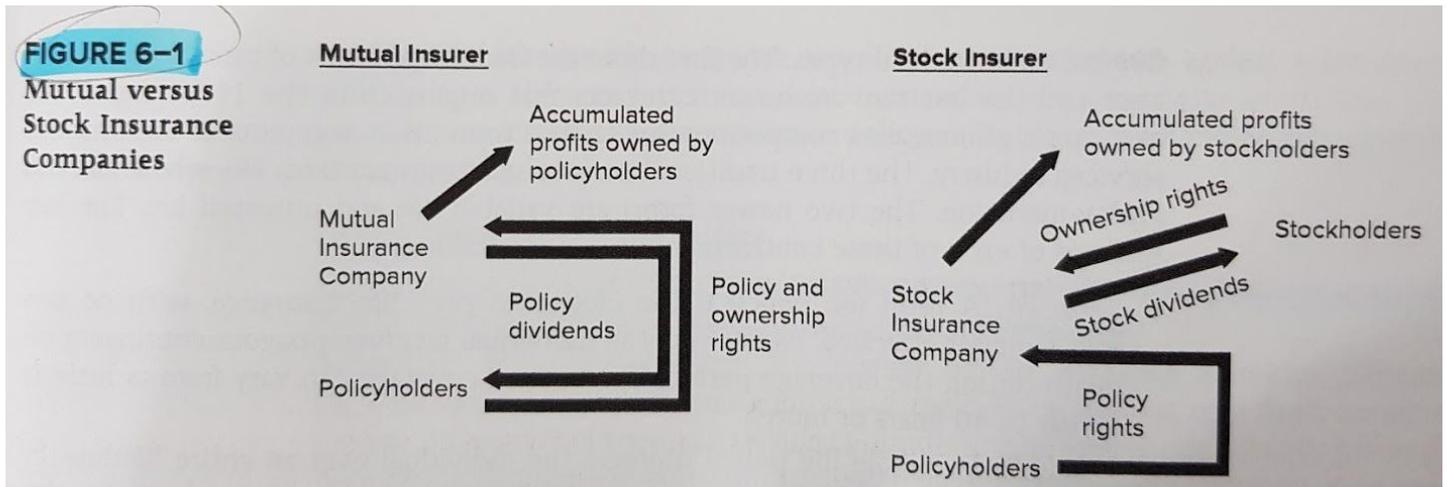
- Sales loads
- Fund operating expenses
  - Management fee
  - Marketing and servicing costs

**TABLE 5-7**

Differences  
between Open-End  
Mutual Funds,  
Closed-End Mutual  
Funds, and ETFs

	<b>Open-End Mutual Fund</b>	<b>Closed-End Mutual Fund</b>	<b>ETF</b>
Number of shares	No limit on shares	Fixed number of shares	Fixed number of shares
Trading	Shares not traded on an exchange but bought from and sold to fund	Shares traded on an exchange	Shares traded on an exchange
Price	Price based on NAV	Price based on supply and demand, not NAV	Price based on NAV
Intraday trading	Trades at market close only	Trading occurs all day	Trading occurs all day

**FIGURE 5-4** Classification of Hedge Funds



## Classification of insurance companies

### 1. Life insurance

- a. Allows individuals and their beneficiaries to protect against losses in income through premature death or retirement.
- b. By pooling risks, life insurance transfers income-related uncertainties from the insured individual to a group
- c. Types of life insurance
  - i. Ordinary life
    1. Term life
    2. Whole life
    3. Endowment life
    4. Variable life
    5. Universal life and variable universal life
  - ii. Group life insurance
  - iii. Industrial life insurance
  - iv. Credit life insurance
  - v. Other insurer activities
    1. Annuities
    2. Private pension plans
    3. Accident and health insurance

### 2. Property-casualty insurance

- a. Property insurance: Involves coverages related to the loss of real and personal property
- b. Casualty / liability insurance: Involves protection against legal liability exposures

## How do insurance companies make profit?

By taking more premium income than they pay out in policy payments. In addition, they:

- Decrease future required payouts (by reducing the risk of insured pool)
- Increase profitability of interest income on net policy reserves

*Example*

$$\begin{array}{rcccccc} \text{Loss ratio} & + & \text{Expense ratio} & + & \text{Dividend ratio} & = & \text{Combined ratio after dividends} \\ 79.8 & + & 27.9 & + & 2.0 & = & 109.7 \end{array}$$

Thus, expected losses on all PC lines, expenses, and dividends exceeded premiums earned by 9.7 percent.

If the company's investment portfolio, however, yielded 12 percent, the operating ratio and overall profitability of the PC insurer would be:

$$\begin{array}{rcccc} \text{Operating ratio} & = & \text{Combined ratio after dividends} & - & \text{Investment yield} \\ & = & 109.7 & - & 12.0 \\ & = & 97.7 \text{ percent} & & \end{array}$$

and

$$\begin{array}{r} \text{Overall profitability} = 100 - \text{Operating ratio} \\ = 100 - 97.7 \\ = 2.3 \text{ percent} \end{array}$$

As can be seen, the high investment returns (12 percent) make the PC insurer profitable overall.

## Remarks:

- insurance companies are state regulated
- credit default swaps (CDS) offer credit protection (insurance) against default on mortgage securities
- insurance companies face an adverse selection problem
- insurance companies concentrate their asset investments at the longer end of the maturity spectrum
- insurance companies can hold mortgages as investment securities (they purchase them from banks in the secondary market)
- insurance guarantee fund ≈ FDIC
- reinsurance == insurance for insurance companies

## Chapter 7: risks of financial institutions

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- 1) **Interest rate risk** The risk incurred by an FI when the maturities of its assets and liabilities are mismatched.
- 2) **Credit risk** The risk that promised cash flows from loans and securities held by FIs may not be paid in full.
- 3) **Liquidity risk** The risk that a sudden surge in liability withdrawals may require an FI to liquidate assets in a very short period of time and at less than fair market prices.
- 4) **Foreign exchange risk** The risk that exchange rate changes can affect the value of an FI's assets and liabilities denominated in nondomestic currencies.
- 5) **Country or sovereign risk** The risk that repayments from foreign borrowers may be interrupted because of restrictions, intervention, or interference from foreign governments.
- 6) **Market risk** The risk incurred from assets and liabilities in an FI's trading book due to changes in interest rates, exchange rates, and other prices.
- 7) **Off-balance-sheet risk** The risk incurred by an FI as the result of activities related to its contingent assets and liabilities held off the balance sheet.
- 8) **Technology risk** The risk incurred by an FI when its technological investments do not produce anticipated cost savings.
- 9) **Operational risk** The risk that existing technology, auditing, monitoring, and other support systems may malfunction or break down.
- 10) **Insolvency risk** The risk that an FI may not have enough capital to offset a sudden decline in the value of its assets.

## 1. Interest rate risk

- 1.1. Refinancing risk: cost of reborrowing funds will rise above the returns being earned on asset investments
- 1.2. Reinvestment risk: return on funds to be reinvested will fall below the cost of funds
- 1.3. FIs can hedge against interest rate risk by matching the maturity of their assets and liabilities
  - 1.3.1. Not necessarily consistent with an active asset transformation function of an FI
  - 1.3.2. Will reduce profitability
  - 1.3.3. Cannot be controlled (e.g., prepayment of loans)

## 2. Credit risk

- 2.1. Longer maturities increase credit risk
- 2.2. General ranking of credit risk
  - 2.2.1. Credit card loans
  - 2.2.2. Commercial and industrial loans
  - 2.2.3. Real estate loans
- 2.3. Types of credit risk
  - 2.3.1. Firm-specific credit risk
  - 2.3.2. Systematic credit risk

## 3. Liquidity risk

## 4. Foreign exchange risk

- 4.1. Matching both size and maturity exposure in assets and liabilities of a given currency hedges against foreign currency and foreign interest rate risk
- 4.2. An FI can still be exposed to foreign risk if it deals with a customer that operates in a foreign market

## 5. Country or sovereign risk

- 5.1. You cannot do much in case of default unless you are also the future supplier of funds

## 6. Market risk

- 6.1. Trading portfolio can be differentiated from investment portfolio (at least in theory)
- 6.2. Increasing trend of tradable assets (held for less than a year)

	<b>Assets</b>	<b>Liabilities</b>
Banking book	Cash Loans Premises and equipment Other illiquid assets	Deposits Other illiquid borrowed funds Capital
Trading book	Bonds (long) Commodities (long) FX (long) Equities (long) Derivatives* (long)	Bonds (short) Commodities (short) FX (short) Equities (short) Derivatives* (short)

\*Derivatives are off-balance sheet items (as discussed in Chapter 16).

## 7. Off-balance sheet risk

- 7.1. Off-balance sheet activities affect the future, rather than the current, shape of an FI's balance sheet
- 7.2. They involve the creation of contingent assets and liabilities
- 7.3. Contingent assets and liabilities: may produce positive or negative cash flows for an FI (e.g., letter of credit)

## 8. Technology and operational risk

- 8.1. Economies of scale / scope
- 8.2. Can include reputational and strategic risk

## 9. Insolvency risk

9.1. Results from other risks previously mentioned

9.2. Lower leverage == more solvent

**10. Other risks**

10.1. Risks are interdependent

10.2. Increased risk due to an increasingly integrated economy

10.3. Discrete risks that might be external

## Chapter 8: interest rate risk 1

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Mismatching balance sheet maturities leads to interest rate risk. To measure this asset-liability gap exposure, three models can be used:

1. The repricing (or funding gap) model
2. The maturity model
3. The duration model

### The repricing model:

- A simple model used by small (thus most) FIs.
- It is essentially a book (historic) value accounting cash flow analysis of the repricing gap between interest income earned on an FIs assets and the interest expense paid on its liabilities (or net interest income) over a particular period of time.

**Rate-sensitive asset or liability:** an asset / liability that is repriced at or near current market interest rates within a maturity bucket.

**Refinancing risk:** the cost of reborrowing funds will rise above the returns being earned on asset investments.

**Reinvestment risk:** the returns on funds to be reinvested will fall below the cost of the funds.

$\Delta NII_i$  = Change in net interest income in maturity bucket  $i$

$GAP_i$  = Dollar size of the gap between the book value of rate-sensitive assets and rate-sensitive liabilities in maturity bucket  $i$

$\Delta R_i$  = Change in the level of interest rates impacting assets and liabilities in the  $i$ th bucket

Then:

$$\Delta NII_i = (GAP_i) \Delta R_i = (RSA_i - RSL_i) \Delta R_i$$

**One-year rate sensitive assets (RSAs) include:**

1. Short-term consumer loans
2. Three-month T-bills
3. Six-month T-notes
4. 30-year floating rate mortgages

**One-year rate sensitive liabilities (RSLs) include:**

1. Three-month CDs
2. Three-month bankers' acceptances
3. Six-month commercial paper
4. One-year time deposits

**Arguments for and against including demand deposits (or transaction accounts in general) as RSLs:**

- For
  - Even though they don't pay explicit interest, they pay implicit interest
  - Run off in case of a rise in interest rate
- Against
  - Explicit interest rates is zero by regulation
  - They act as core deposits meaning that they are a long-term source of funds

**The time horizon used to measure interest rate risk is critical:**

- If excessively long, then it overstates the rate sensitivity of the balance sheet
- If excessively short, then it understates the rate sensitivity of the balance sheet

**Spread effect:** the effect that a change in the spread between rates on RSAs and RSLs has on net interest income as interest rates change.

☐ whenever the spread increases (decreases), NII increases (decreases)

**Weaknesses of the repricing model:**

1. Market value effects
2. Over aggregation
3. The problem of runoffs
4. Cash flows from off-balance sheet activities

☐ **IMPORTANT:** review the examples in the book.

Duration is a more complete measure of an asset / liability interest rate sensitivity than is maturity because duration takes into account the time of arrival / payment of all cash flows as well as the asset / liability maturity.

### **Definition of Duration**

1. The weighted-average time to maturity on a security.
2. The interest elasticity of a security's price to small interest rate changes.

### **Features of Duration**

1. Duration increases with the maturity of a fixed-income security, but at a decreasing rate.
2. Duration decreases as the yield on a security increases.
3. Duration decreases as the coupon or interest payment increases.

### **Risk Management with Duration**

1. Duration is equal to the maturity of an immunized security.
2. Duration gap is used by FIs to measure and manage the interest rate risk of an overall balance sheet.

**Duration gap:** a measure of overall interest rate risk exposure for an FI.

### **Macaulay duration model assumptions:**

1. The term structure of interest rates is flat, changes shift the curve in a parallel fashion
2. No default risk

### **Remarks:**

1. Only when all cash flows are limited to one payment at the end of the period with no intervening flows does duration equal maturity.
2. While maturity can be infinite (e.g., Consol bonds), duration is finite.
3. The larger the duration, the more sensitive is the price of an asset / liability is to interest rate changes.
4. To immunize itself against interest rate risk, an FI can:
  - 4.1. Buy maturity discount bonds that matches its target
  - 4.2. Buy duration coupon bonds that matches its target

**Difficulties in applying the duration model:**

1. Duration matching can be costly
2. Immunization is a dynamic problem
3. Has issues for large changes in interest rates (large interest rate changes and convexity)

☒ **IMPORTANT:** review the examples in the book.

## Chapter 10: credit risk – individual loan risk

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### Types of loans:

#### 1. Commercial and industrial loans

- 1.1. Short vs long term loans
  - 1.1.1. Short term loans are used to finance working capital
  - 1.1.2. Long term loans are used to finance expansion
- 1.2. Can be syndicated
- 1.3. Can be secured or unsecured
- 1.4. Can have fixed or floating rate
- 1.5. Can be spot or loan commitment
- 1.6. The rise in commercial paper have decreased commercial loans

#### 2. Real estate loans

- 2.1. Primarily mortgage loans and home equity loans
- 2.2. Can be adjustable rate mortgages (ARMs)

#### 3. Consumer loans

- 3.1. Personal and auto loans
- 3.2. Can be revolving or nonrevolving

#### 4. Other loans

- 4.1. Example: financing an individual investment portfolio

### Calculating the return on a loan:

$$1 + k = 1 + \frac{of + (BR + \phi)}{1 - [b(1 - RR)]}$$

### The FI manager should:

- Set the risk premium sufficiently high to compensate for default risk
- Recognize that setting high risk premiums may reduce the probability of repayment

### Retail vs wholesale credit decisions:

#### 1. Retail

- 1.1. Accept / reject decisions
- 1.2. Same rate charged
- 1.3. Credit rationing is used

#### 2. Wholesale

- 2.1. Credit rationing as well as variable risk premiums are used
- 2.2. If risk premiums are low, borrowers can take low risks and still pay the lender
- 2.3. If risk premiums are high, borrowers must take high risks in order to pay the lender

## Default risk models:

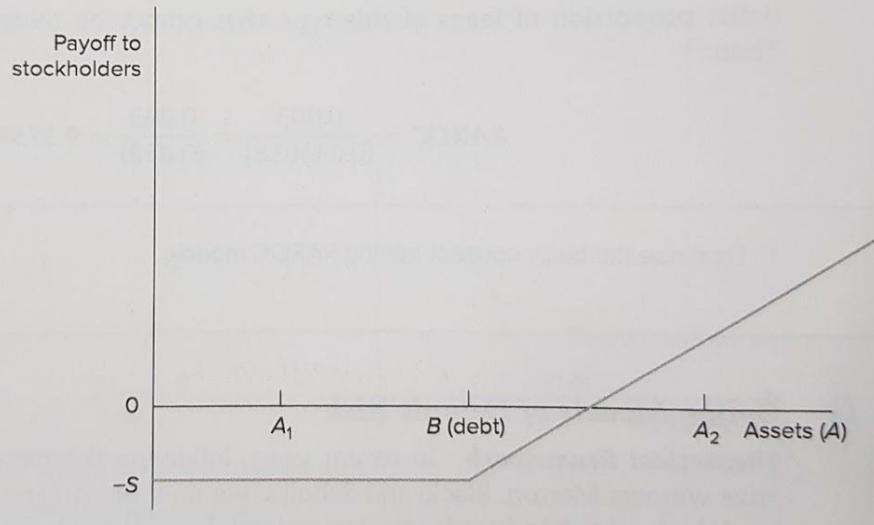
### 1. Qualitative models

- 1.1. Borrower specific factors
  - 1.1.1. Reputation
  - 1.1.2. Leverage
  - 1.1.3. Volatility of earnings
  - 1.1.4. collateral
- 1.2. Market specific factors
  - 1.2.1. Business cycle
  - 1.2.2. Level of interest rates
- 1.3. The 5Cs of credit
  - 1.3.1. Character / willingness to pay
  - 1.3.2. Capacity / cash flow
  - 1.3.3. Capital / wealth
  - 1.3.4. Collateral / security
  - 1.3.5. Conditions / economic conditions

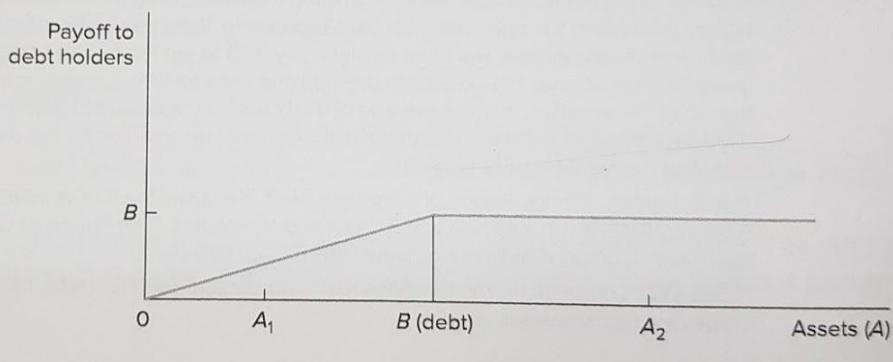
### 2. Quantitate models

- 2.1. Broad types:
  - 2.1.1.1. Linear probability models  Values lie outside [0, 1]
  - 2.1.1.2. Logit models  Values lie inside [0, 1]
  - 2.1.1.3. Linear discriminant models  Classification of risk (default, or no default)
- 2.2. Issues:
  - 2.2.1. Variable weights should not be constant over time
  - 2.2.2. Ignore important / hard to quantify factors
  - 2.2.3. Rarely use publicly available information
  - 2.2.4. No centralized database of defaults exist
- 2.3. Newer risk models:
  - 2.3.1. Term structure of credit risk approach
    - 2.3.1.1. Uses spread between base rate and debt rate
    - 2.3.1.2. Mainly outsourced to rating agencies
  - 2.3.2. Mortality rate approach
    - 2.3.2.1. Analyze historic debt of a similar quality
  - 2.3.3. RAROC models
    - 2.3.3.1. Risk adjusted return on capital
    - 2.3.3.2. Approve debt only if RAROC > benchmark ROE set by the FI
  - 2.3.4. Option models
    - 2.3.4.1. Based on the following insight:
      - 2.3.4.1.1. For an FI  if the borrower pays you get your money, if he doesn't you lose your money
      - 2.3.4.1.2. For a borrower  if the investment succeeds then I pay my loans and get the remaining profits from my investment, if it doesn't then I only lose my equity in the business

**FIGURE 10-9**  
Payoff Function  
to Corporate  
Borrowers  
(Stockholders)

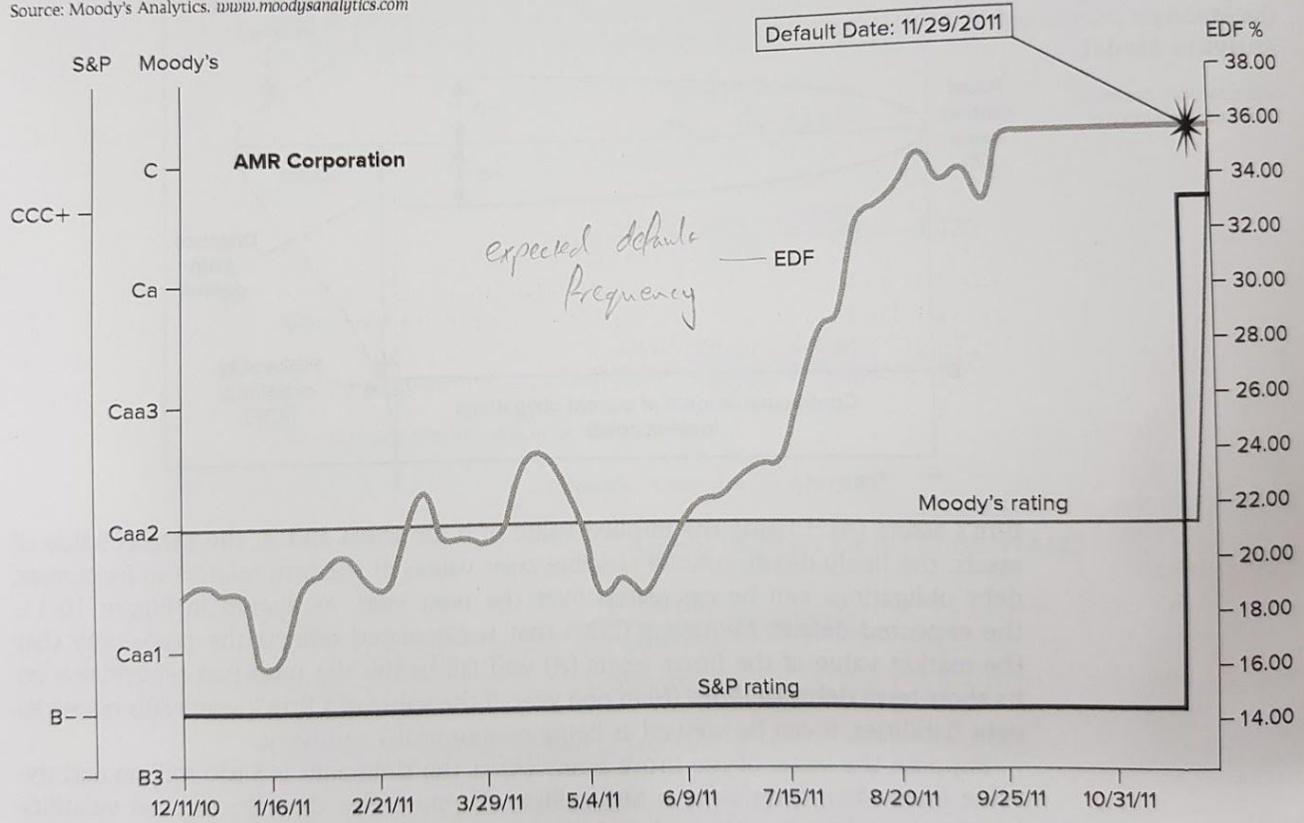


**FIGURE 10-10**  
Payoff Function to  
the Debt Holder  
(the FI) from a  
Loan



**FIGURE 10-12** Moody's Analytics EDF, Moody's, and S&P Ratings for AMR Corporation

Source: Moody's Analytics. [www.moodyanalytics.com](http://www.moodyanalytics.com)



## Chapter 11: credit risk – loan portfolio and concentration risk

### Simple models of loan concentration risk:

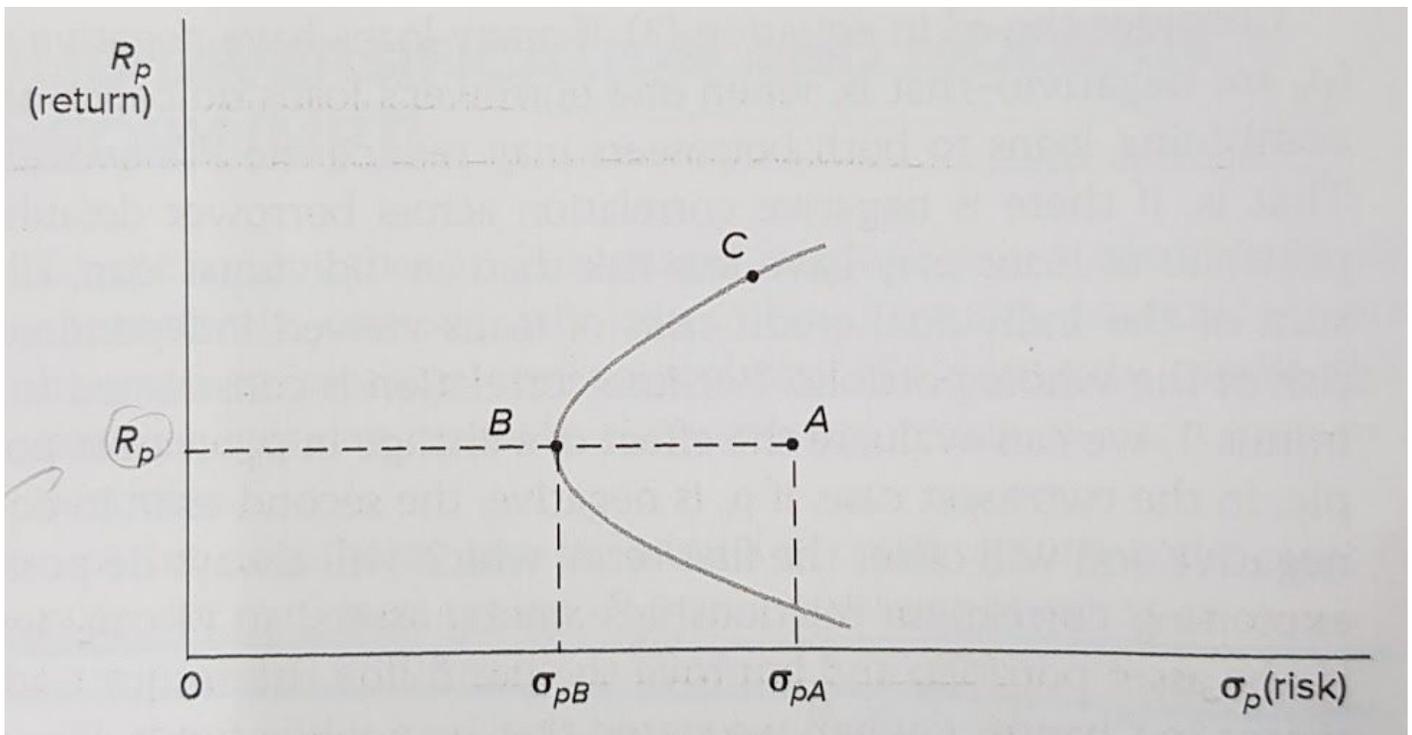
#### 1. Migration analysis

- a. a method to measure loan concentration risk by tracking credit ratings of firms in particular sectors or rating class for unusual declines (e.g., using a loan migration matrix)
- b. a disadvantage is that information might be too late

#### 2. Concentration limits

- a. external limits set on the maximum loan size that can be made to an individual borrower
- b. can be based on
  - i. industry sector
  - ii. geography
  - iii. individual borrower

**Modern portfolio theory:** diversify considerable amounts of credit risk as long as the returns on different assets are imperfectly correlated with respect to their default risk adjusted returns.

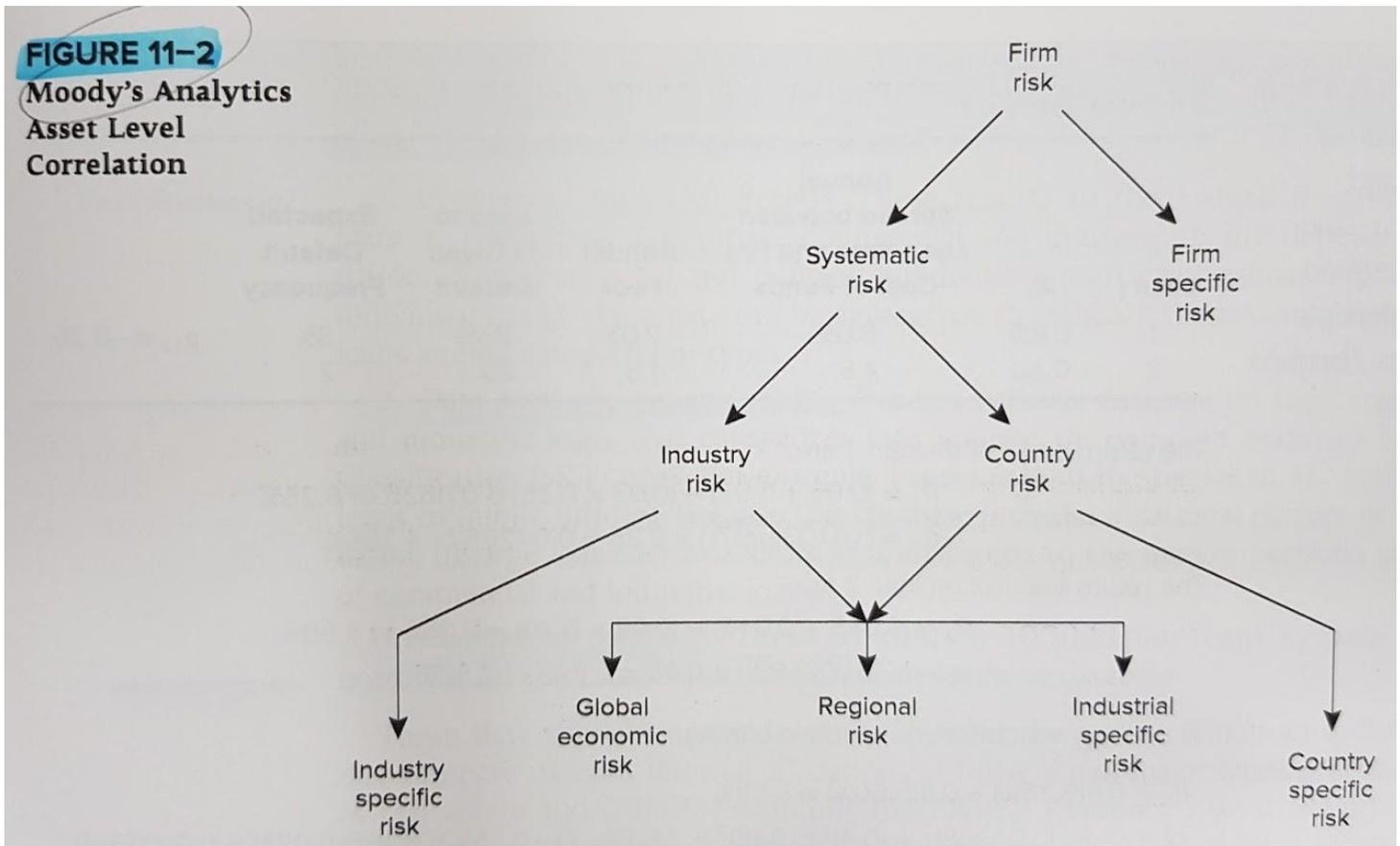


#### Remarks:

- point B is the minimum risk portfolio (i.e., highly risk averse FI)
- an FI might choose point C since it maximizes the firm value (think of a Sharpe ratio)
- Issues in diversification:
  - focus on a sector and gain expertise (no need to be familiar with more areas of business)
  - small / local banks may not be able to diversify
  - diversification is hindered by difficulty in trading loans and bonds

**Moody's analytics portfolio manager:** a model that applies modern portfolio theory to the loan portfolio.

Return  $\rightarrow R_i = AIS_i - E(L_i) = AIS_i - (EDF_i \times LGD_i)$   
 Risk  $\rightarrow \sigma_i = UL_i = \sigma_{Di} \times LGD_i = \sqrt{EDF_i (1 - EDF_i)} \times LGD_i$   
 Corr  $\rightarrow \rho_{ij}$  = Correlation between the systematic return components of the asset returns of borrower  $i$  and borrower  $j$



**Partial applications of portfolio theory:**

1. loan volume-based models □ looks at an FI's loan allocation across sectors compared to the national levels or other FIs
2. loan loss ratio-based models □ involves estimating the systematic loan loss risk of a particular sector relative to the loan loss risk of an FI's total loan portfolio

**Regulatory models:**

1. for banks □ bank of international settlements guidance on sound risk assessment and valuation for loans
2. for insurance □ general diversification limits

## Chapter 12: liquidity risk

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**Liquidity risk:** the risk that the firm will be unable to meet its contractual and contingent obligations.

**Liquidity risk management:** intends to ensure that the firm has the appropriate amount, composition, and tenor of funding and liquidity in support of its assets.

Remarks:

- It is a normal aspect of everyday management of an FI
- In extreme cases, can develop into solvency risk problems
- Order of FIs with liquidity risk exposure:
  - Depository institutions
  - Life insurance companies
  - Funds and property-casualty insurance companies

**Liquidity risk arises from two sides of a balance sheet:**

1. Liabilities
  - a. Deposits
2. Assets
  - a. Exercise of loans
  - b. Investment portfolio

**And can be resolved via:**

1. Stored liquidity management  forgone opportunity cost
2. Purchased liquidity management  frequent use leads to increased rates

**TABLE 12-2**

Effect of Net  
Deposit Drain on  
the Balance Sheet  
(in millions of  
dollars)

Panel A: Balance Sheet Immediately before and after Deposit Drain							
Before the Drain				After the Drain			
Assets		Liabilities and Equity		Assets		Liabilities and Equity	
Assets	150	Deposits	100	Assets	150	Deposits	95
		Borrowed funds	20			Borrowed funds	20
		Other liabilities	5			Other liabilities	5
		Equity	25			Equity	25
	<u>150</u>		<u>150</u>		<u>150</u>		<u>145</u>
Panel B: Adjusting to a Deposit Drain through Purchased Liquidity Management							
Assets				Liabilities and Equity			
Assets		150		Deposits		95	
				Borrowed funds		25	
				Other liabilities		5	
				Equity		25	
		<u>150</u>				<u>150</u>	

**TABLE 12-3**

Composition of  
the DI's Balance  
Sheet (in millions  
of dollars)

Panel A: Balance Sheet Immediately before Deposit Drain			
Assets		Liabilities and Equity	
Cash	12	Deposits	100
Other assets	138	Borrowed funds	20
		Other liabilities	5
		Equity	25
	<u>150</u>		<u>150</u>
Panel B: Adjusting to a Deposit Drain through Stored Liquidity Management			
Assets		Liabilities and Equity	
Cash	7	Deposits	95
Other assets	138	Borrowed funds	20
		Other liabilities	5
		Equity	25
	<u>145</u>		<u>145</u>

**TABLE 12-4**

Effects of a Loan Commitment Exercise (in millions of dollars)

Panel A: Balance Sheet Immediately before and after Exercise							
(a) Before Exercise				(b) After Exercise			
Cash	12	Deposits	100	Cash	12	Deposits	100
Other assets	138	Borrowed funds	20	Other assets	143	Borrowed funds	20
		Other liabilities	5			Other liabilities	5
		Equity	25			Equity	25
	<u>150</u>		<u>150</u>		<u>155</u>		<u>150</u>

Panel B: Adjusting the Balance Sheet to a Loan Commitment Exercise							
(a) Purchased Liquidity Management				(b) Stored Liquidity Management			
Cash	12	Deposits	100	Cash	7	Deposits	100
Other assets	143	Borrowed funds	25	Other assets	143	Borrowed funds	20
		Other liabilities	5			Other liabilities	5
		Equity	25			Equity	25
	<u>155</u>		<u>155</u>		<u>150</u>		<u>150</u>

**TABLE 12-5**

Effects of a Drop in the Value of the Investment Securities Portfolio (in millions of dollars)

Panel A: Balance Sheet Immediately before and after Drop in Investment Portfolio Value							
Before Drop in Value				After Drop in Value			
Cash	\$ 12	Deposits	\$100	Cash	\$ 12	Deposits	\$100
Investment portfolio	50	Borrowed funds	20	Investment portfolio	45	Borrowed funds	20
Other assets	88	Other liabilities	5	Other assets	88	Other liabilities	5
		Equity	25			Equity	20
	<u>\$150</u>		<u>\$150</u>		<u>\$145</u>		<u>\$145</u>

Panel B: Adjusting the Balance Sheet for a Drop in Investment Portfolio Value							
(a) Purchased Liquidity Management				(b) Stored Liquidity Management			
Cash	\$ 12	Deposits	\$105	Cash	\$ 7	Deposits	\$100
Investment portfolio	50	Borrowed funds	20	Investment portfolio	50	Borrowed funds	20
Other assets	88	Other liabilities	5	Other assets	88	Other liabilities	5
		Equity	20			Equity	20
	<u>\$150</u>		<u>\$150</u>		<u>\$145</u>		<u>\$145</u>

## Methods for measuring a DI's liquidity risk exposure:

### 1. Financing gap

We define a **financing gap** as the difference between a DI's average loans and average (core) deposits, or:

$$\rightarrow \text{Financing gap} = \text{Average loans} - \text{Average deposits}$$

If this financing gap is positive, the DI must fund it by using its cash and liquid assets and/or borrowing funds in the money market. Thus:

$$\rightarrow \text{Financing gap} = -\text{Liquid assets} + \text{Borrowed funds}$$

We can write this relationship as:

$$\rightarrow \text{Financing gap} + \text{Liquid assets} = \text{Financing requirement (borrowed funds)}$$

### 2. Peer group ratio comparisons

	Northern Trust Bank	Bank of America
Borrowed funds to total assets	8.84%	10.22%
Loans to deposits	36.94	68.07
Core deposits to total assets	35.77	71.24
Commitments to lend to total assets	33.37	47.13

### 3. Liquidity index

$$I = \sum_{i=1}^N [(w_i)(P_i/P_i^*)]$$

where  $w_i$  is the percent of each asset in the FI's portfolio:

$$\sum_{i=1}^N w_i = 1$$

The liquidity index will always lie between 0 and 1. The liquidity index for this DI could also be compared with indexes calculated for a peer group of similar DIs.

### 4. Liquidity coverage ratio (short term)

$$\text{Liquidity coverage ratio} = \frac{\text{Stock of high-quality liquid assets}}{\text{Total net cash outflows over the next 30 calendar days}} \geq 100\%$$

### 5. Net stable funding ratio (long term)

$$\text{NSFR} = \frac{\text{Available amount of stable funding}}{\text{Required amount of stable funding}} > 100\%$$

*ASF*  
*RSF*

### 6. Other liquidity risk control measures

- Contractual maturity mismatch
- Concentration of funding
- Available unencumbered asset
- LCR by significant currency
- Market-related monitoring tools



### **Liquidity planning components:**

1. Delineation of managerial details and responsibilities
2. Detailed list of fund providers who are most likely to withdraw as well as the pattern of fund withdrawals
3. Identification of the size of potential deposit and fund withdrawals over various time horizons in the future as well as alternative private market funding sources to meet such withdrawals
4. Set internal limits on separate subsidiaries and branches borrowings as well as bounds for acceptable risk premiums to pay in each market

### **Abnormal deposit drains can occur because of:**

1. Concerns about a DI's solvency
2. Failure of a related DI
3. Sudden changes in investor preferences

### **Bank runs can lead to bank panics. Some of the ways to deter such a thing from happening are:**

- Deposit insurance
- Discount window

### **Liquidity risk at other types of FIs:**

- Life insurance companies
  - Decreasing insurance premium income
  - Increasing cash ins from policyholders
- Property-casualty insurance companies
  - Cancel / fail to renew policies
  - Large unexpected claims
- Investment funds
  - Being the first in line to withdraw has no overall advantage as it has at Dis

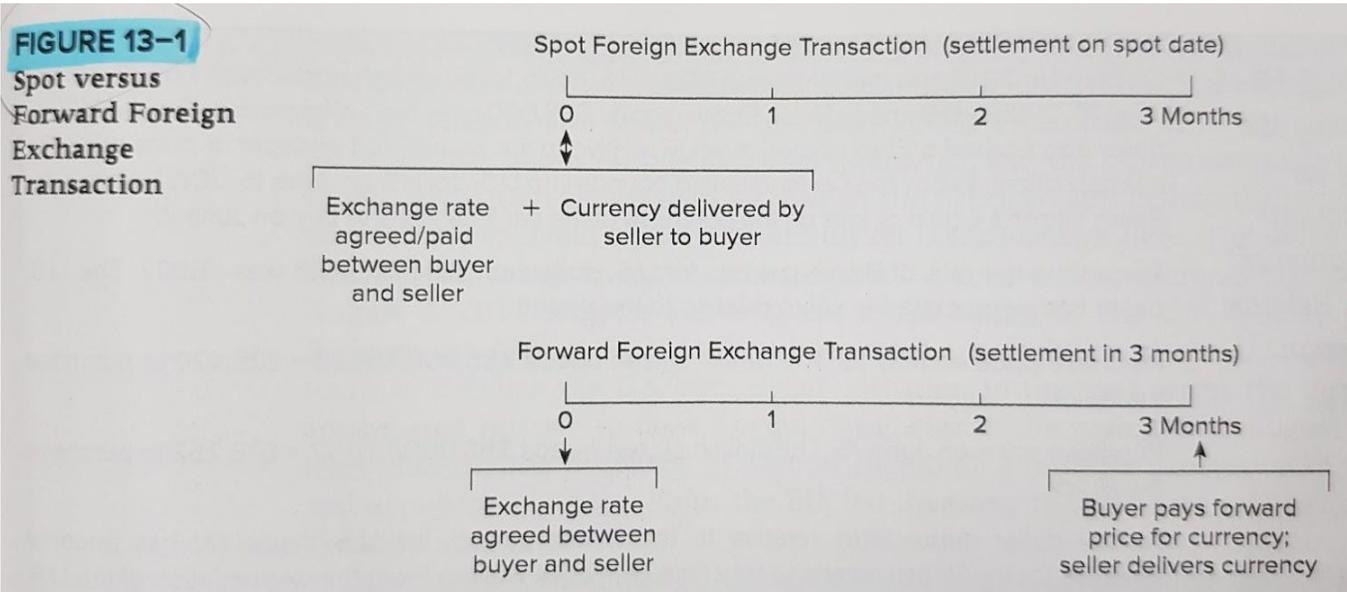
## Chapter 13: foreign exchange risk

### Types of quotes:

1. Direct quote □ U.S. dollars received for one unit of the foreign currency exchanged
2. Indirect quote □ foreign currency received for each U.S. dollar exchanged

### Types of foreign exchange transactions:

1. Spot foreign exchange transaction
2. Forward foreign exchange transaction



**Net exposure:** the degree to which an FI is net long (positive) or net short (negative) in a given currency.

$$\begin{aligned} \text{Net exposure}_i &= (\text{FX assets}_i - \text{FX liabilities}_i) + (\text{FX bought}_i - \text{FX sold}_i) \\ &= \text{Net foreign assets}_i + \text{Net FX bought}_i \end{aligned}$$

**TABLE 13-3** Monthly U.S. Bank Positions in Foreign Currencies and Foreign Assets and Liabilities, March 2015 (in currency of denomination)

Source: *Treasury Bulletin*, June 2015, pp. 51-61. [www.treas.gov](http://www.treas.gov)

	(1)	(2)	(3)	(4)	(5)
	Assets	Liabilities	FX Bought*	FX Sold*	Net Position†
Canadian dollars (millions of C\$)	177,478	165,360	1,245,024	1,251,594	5,548
Japanese yen (billions of ¥)	139,626	129,204	639,224	647,901	1,745
Swiss francs (millions of SFr)	99,698	79,129	1,238,550	1,273,833	-14,714
British pounds (millions of £)	724,126	657,852	2,077,024	2,143,136	162
Euros (millions of €)	2,376,658	2,309,050	8,277,674	8,385,755	-40,473

\* Includes spot, future, and forward contracts.

† Net position = (Assets - Liabilities) + (FX bought - FX sold).

**Note:** the trading book can also be used to offset an imbalance in an FI's foreign asset-liability portfolio.

### Foreign exchange rate volatility and FX exposure

$$\text{Dollar loss/Gain in currency } i = [\text{Net exposure in foreign currency } i \text{ measured in U.S. dollars}] \times \text{Shock (volatility) to the } \$/\text{foreign currency } i \text{ exchange rate}$$

### FX trading activities:

1. To allow customers to partake in and complete international commercial trade transactions □ FI as an agent
2. To allow customers (or the FI) to take positions in foreign real and financial investments □ FI as an agent
3. For hedging purposes to offset customer (or FI) exposure in any given currency □ FI acts defensively
4. For speculative purposes through forecasting or anticipating future movements in FX rates □ open positions

### Types of hedging:

1. On-balance sheet hedging
2. Off-balance sheet hedging (i.e., hedging with forwards)
3. Diversification

### Interaction of interest rates, inflation, and exchange rates:

1. Purchasing Power Parity (PPP): the theory explaining the change in foreign currency exchange rates as inflation rates in the countries change.

$$i_{\text{Domestic}} - i_{\text{Foreign}} = \frac{\Delta S_{\text{Domestic/Foreign}}}{S_{\text{Domestic/Foreign}}}$$

$S_{\text{Domestic/Foreign}}$  = Spot exchange rate of the domestic currency for the foreign currency (e.g., U.S. dollars for Swiss francs)

$\Delta S_{\text{Domestic/Foreign}}$  = Change in the one-period spot foreign exchange rate

2. Interest Rate Parity Theorem (IRPT): relationship in which the discounted spread between domestic and foreign interest rates equals the percentage spread between forward and spot exchange rates.

$$1 + r_{ust}^D = \frac{1}{S_t} \times [1 + r_{ukt}^L] \times F_t$$

Rate on U.S. investment = Hedged return on foreign (U.K.) investment

where

$1 + r_{ust}^D$  = 1 plus the interest rate on U.S. CDs for the FI at time  $t$

$S_t$  = \$/£ spot exchange rate at time  $t$

$1 + r_{ukt}^L$  = 1 plus the interest rate on U.K. CDs at time  $t$

$F_t$  = \$/£ forward exchange at time  $t$

## Chapter 14: sovereign risk

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**Sovereign risk:** the risk that repayment from foreign borrowers may be interrupted because of interference from foreign governments.

### Terms to know:

- Debt moratoria == delay in repayment
- Rescheduling == multiyear restructuring agreement (MYRA)
- Repudiation == outright cancellation of all current and future debt obligations by a borrower

### Steps taken before an FIs exposes itself to foreign risk:

1. Assess credit risk
2. Assess sovereign risk
3. If there is sovereign risk, do not lend

### Country risk evaluation:

#### 1. Outside evaluation models

- 1.1. The Euromoney country risk index
- 1.2. The economist intelligence unit
- 1.3. The institutional investor index
- 1.4. OECD country risk evaluations

#### 2. Internal evaluation models

- 2.1. Debt service ratio
- 2.2. Import ratio
- 2.3. Investment ratio
- 2.4. Variance of export revenue (VAREX)
- 2.5. Domestic money supply growth (MG)

#### 3. Issues with statistical models:

1. Measurement of key variables
2. Population groups
3. Political risk factors
4. Portfolio aspects
5. Incentive aspects
6. Stability

## **The structure of the market:**

### 1. Sellers

- 1.1. Large FIs willing to accept write-downs of loans
- 1.2. Small FIs wishing to disengage themselves
- 1.3. FIs willing to swap debt

### 2. Buyers

- 2.1. Wealthy investors, hedge funds, FIs, and corporations seeking to engage in debt-for-equity swaps or speculative investments
- 2.2. FIs seeking to rearrange / reorient their debt concentrations

## **Today's market for sovereign debt:**

1. Sovereign bonds
2. Performing loans
3. Nonperforming loans

## **Some history:**

- Past □ sovereign bonds
- Present □ bank loans

## **Why?**

1. Few lenders make negotiations easier
2. Lenders are usually the same, reach consensus faster
3. International loan contracts contain cross-default provisions
4. The interplay of politics and finance