EE432 Monetary Theory and Policy

Mid-semester Recap II

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Chapter 7

The Risk and Term Structure of Interest Rates

Ratings and the Risk Structure of Interest Rates

- **Default** is one of the ***most important risks*** a *bondholder faces*.

- **Independent companies (rating agencies)** have arisen to *evaluate the creditworthiness of potential borrowers*.

Bond Ratings

- The best known **bond rating services** are
  - Moody's
  - Standard & Poor's
- They ***monitor*** *the* ***status*** *of individual* ***bond issuers*** and assess the ***likelihood a lender will be repaid*** by the bond issuer.
- A **high rating** suggests that a bond issuer will have **little problem** meeting a ***bond's payment obligations.***

Bond Ratings

- Firms or governments with an *exceptionally strong financial position* carry the ***highest ratings*** and are able to issue the highest-rated bonds, **Triple A**.
- The **top four categories** are considered **investment-grade bonds**.
  - These bonds have a ***very low risk of default***.
  - ***Reserved for*** most government issuers and corporations that are ***among the most financially sound.***

Bond Ratings

- **Speculative grade bonds** are bonds issued by companies and countries that may have *difficulty* meeting their *bond payments* but are *not at risk of immediate default*.
- **Highly speculative bonds** consist of ***debts*** that are in *serious risk of default*.
- All bonds with grades ***below investment grade*** are often referred to as **junk bonds** or ***high-yield bonds***.

Bond Ratings

- Types of **junk bonds**:
  - ***Fallen angels*** are bonds that were *once investment-grade*, but their *issuers fell on hard times*.
  - Bonds issued by *issuers* about which *there is little known.*
- Material changes in a *firm's or government's financial conditions* precipitate changes in its debt ratings.
  - Ratings downgrade - *lower* an issuer's bond *rating*.
  - Ratings upgrade - *upgrade* an issuer's bond *rating*.

Commercial Paper

- **Commercial paper** is a short-term version of a bond.
  - The borrower offers **no collateral** so the **debt is *unsecured*.**
  - Commercial paper is
    - **Issued on a discount basis**, as a zero-coupon bond specifying a ***single future payment*** with ***no associated coupon payments.***
    - Has maturity of less than 270 days.
  - Roughly *one-third* is held by *money-market mutual funds.*

Commercial Paper

- Most commercial paper is issued with a *maturity of 5 to 45 days* and is *used exclusively for* ***short-term financing.***
- The rating agencies rate the creditworthiness of commercial paper issuers *in the same way they do bond issuers.*

The Impact of Ratings on Yields

- **Bond ratings** are designed to ***reflect default risk.***
- The **lower the rating**
  - The *higher the risk of default*.
  - The *lower* its *price* and the *higher* its *yield*.
- To understand quantitative ratings, it is easier to **compare them to a benchmark**.

The Impact of Ratings on Yields

- **U.S. Treasury issues** are viewed as having *little default risk*, so they are used as **benchmark bonds**.
- **Yields** on other bonds are ***measured*** in terms of the **spread over Treasuries**.
- **Bond yield** is the sum of two parts:

  = U.S. **Treasury yield** + **Default risk premium**

Term Structure of Interest Rates

- The *relationship among bonds with the same risk characteristics* but *different maturities* is called the **term structure of interest rates**.
- Comparing 3-month and 10-year Treasury yields we can see:
  1. ***Interest rates of different maturities*** tend to ***move together***.
  2. ***Yields on short-term bonds*** are **more volatile** than yields on long-term bonds.
  3. ***Long-term yields*** tend to **be higher** than short-term yields.

The Expectations Hypothesis

- The **expectations hypothesis** of the term structure focuses on the ***risk-free interest rate***.
- The risk-free interest rate can be computed, assuming there is *not uncertainty about the future.*

The Expectations Hypothesis

- If *there is no uncertainty*, then an investor will be *indifferent* between **holding a two-year bond** or a **series of two one-year bonds**.
  - Certainty means that the bonds of different maturities are perfect substitutes for each other.
- The **expectations hypothesis** implied that the *current two-year interest rate should equal the average of current one-year rate* and the *one-year interest rate one year in the future.*

The Expectations Hypothesis

- When *interest rates are expected to rise*, **long-term interest rate** *will be higher than* **short-term interest rates.**
  - The yield curve which plots the yield to maturity on the vertical axis and the time to maturity on the horizontal axis, will slope up.
- This also means:
  - If **interest rates are expected to fall**, the *yield curve will slope down.*
  - If **expected to stay the same**, the *yield curve will be flat.*

The Expectations Hypothesis

Figure 7.5 The Expectations Hypothesis and Expectations of Future Short-term Interest Rates

The Expectations Hypothesis

- If *bonds of different maturities* are **perfect substitutes for each other**, then we can construct *investment strategies* that must have the *same yields*.
  1. **Invest in a <u>two-year bond</u>** and *hold it to maturity*
  2. **Invest in two <u>one-year bonds</u>**, *one today and one when the first matures.*

The Expectations Hypothesis

- The **expectations hypothesis** tells us investors will be indifferent between the two options.
- This means they must have the same return:

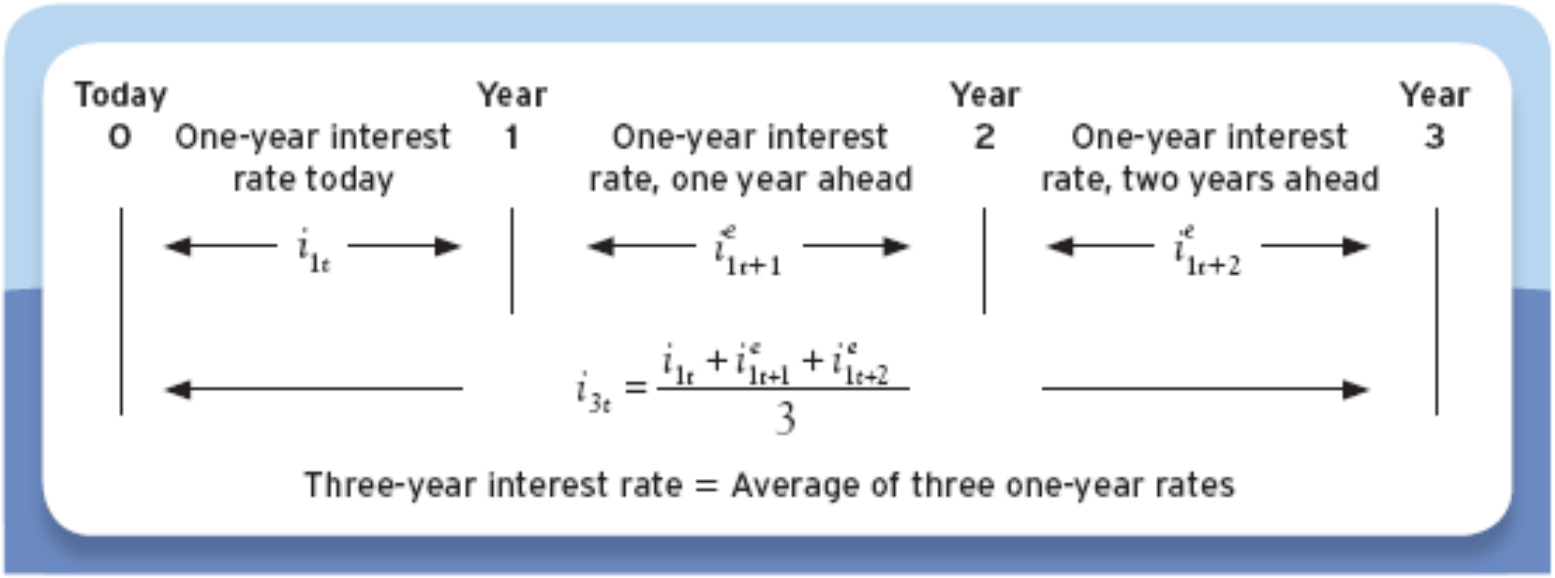
$$(1 + i_{2t})(1 + i_{2t}) = (1 + i_{1t})(1 + i^{e}_{1t+1})$$

- We can now write the *two-year interest rate* as the *average of the current and future expected one-year interest rates*:

$$i_{2t} = \frac{i_{1t} + i^{e}_{1t+1}}{2}$$

The Expectations Hypothesis

The Expectations Hypothesis of the Term Structure:



The Expectations Hypothesis

- We can *generalize* this: a **bond with *n* years to maturity** is the ***average*** **of *n* expected future one-year interest rates**:

$$i_{nt} = \frac{i_{1t} + i^e_{1t+1} + i^e_{1t+2} + \ldots + i^e_{1t+n-1}}{n}$$

The Expectations Hypothesis

Does this **hypothesis** explain the three observations we started with?

1. **Interest rates of different maturities** will ***move together.***
   - We can see this holds from the previous equation.
2. **Yields on short-term bonds will be more volatile** than yields on long-term bonds.
   - **Long-term rates** are ***averages of short-term rates***, so changing one short-term rate has little effect on the long term rate.

The Liquidity Premium Theory

- **Risk** is the key to understanding the *upward slope of the yield curve.*
- *Bondholders face* both **inflation** and **interest-rate risk.**
  - The ***longer the term of the bond***, the ***greater both types of risk.***
- Computing **real return** from nominal return requires a **forecast of *expected* future inflation**.
  - *A bond's inflation risk increases with its time to maturity*.

The Liquidity Premium Theory

- **Interest-rate risk** arises from the **mismatch** between the *investor's investment horizon* and a *bond's time to maturity.*
  - If a bondholder plans to *sell a bond prior to maturity*, changes in the interest rate generate *capital gains or losses*.
  - The **longer the term of the bond**, *the greater the price changes for a given change in interest rates* and the **larger the potential for capital losses**.
- Investors require *compensation for the increase in risk* they take for buying longer term bonds.

The Liquidity Premium Theory

- We can think about **bond yields** as having two parts:
  - One that is **risk free**: explained by the *expectations hypothesis.*
  - One that is a **risk premium**: explained by *inflation and interest-rate risk.*
- Together this forms the liquidity premium theory of the term structure of interest rates.

$$i_{nt} = rp_n + \frac{i_{1t} + i^e_{1t+1} + i^e_{1t+2} + \ldots + i^e_{1t+n-1}}{n}$$

Chapter 8

Stocks, Stock Markets, and Market Efficiency

The Essential Characteristics of Common Stock

- **Stocks**, also known as ***common stock* or *equity***, are **shares in a firm's ownership**.
  - The idea was **to spread the risk through *joint-stock companies*, *organizations*** that issued stock and ***used the proceeds to finance*** several expeditions at once.
  - In **exchange for investing**, stockholders ***received a share of the company's profits***.
- Shares were issued in *small denominations*, allowing investors to ***buy as little or as much*** *as they wanted*.
- Shares were ***transferable*** - an owner could sell them to someone else.

The Essential Characteristics of Common Stock

- Although a **stockholder** is entitled to *participate in the profits of the firm*, they are merely a **residual claimant**.
  - Stockholders are ***paid last***, only *after all other creditors* have been paid.
- However, stockholders have **limited liability** in the firm.
  - *Even if a company fails* completely, the maximum amount a shareholder can ***lose*** is ***their initial investment***.

Valuing Stocks

- People *differ* on **how stocks should be valued**.
- Some believe they ***can predict changes by looking at patterns*** or ***past movements*** - **chartists**.
- Some estimate the *value of stocks based on* their ***perceptions of investor psychology and behavior*** - **behavioralists**.
- Others *estimate stock* based on both its ***current assets*** and on ***estimates of future profitability*** - the **fundamentals**.

Fundamental Value and the Dividend-Discount Model

- A **stock** represents a *promise to* ***make monetary payments*** on *future dates*, under *certain circumstances*.
- The ***payments*** are usually in the form of **dividends**: ***distributions*** *made to the* ***owners*** of a company ***when the company makes a profit***.
- *If a company is sold*, the *stockholders* ***receive a final distribution*** that represents their *share of the purchase price*.

Valuing Stocks: Dividend-Discount Model

- The **current price** is the ***present value*** *of next years price* plus the *dividend*:

$$P_{today} = \frac{D_{next\ \ year}}{(1+i)} + \frac{P_{next\ \ year}}{(1+i)}$$

- *Expanding over an investment horizon of n years*:

$$P_{today} = \frac{D_{next\ \ year}}{(1+i)} + \frac{D_{in\ \ two\ \ years}}{(1+i)^2} + \ldots\ldots + \frac{D_{n\ \ years\ \ from\ \ now}}{(1+i)^n} + \frac{P_{n\ \ years\ \ from\ \ now}}{(1+i)^n}$$

Valuing Stocks: Dividend-Discount Model

- The **price today** is the ***present value*** of the *sum of* the ***dividends*** plus the ***present value*** of the ***price at the time the stock is sold*** *n years from now*.
- What if a company does not pay dividends?
  - We estimate when the ***company will start paying dividends*** and *use the present-value* framework.
  - We *must know something more* about annual *dividend payments*.

Valuing Stocks: Dividend-Discount Model

- **Assume** that ***dividends grow at a constant rate of g per year*** so:

$$D_{next\ year} = D_{today}(1+g)$$

- As long as *growth remains constant*, we can do this for *n* year from now:

$$D_{n\ \ years\ \ from\ now} = D_{today}(1+g)^n$$

Valuing Stocks: Dividend-Discount Model

- We can *rewrite the price equation* as:

$$P_{today} = \frac{D_{today}(1+g)}{(1+i)} + \frac{D_{today}(1+g)^2}{(1+i)^2} + \ldots + \frac{D_{today}(1+g)^n}{(1+i)^n} + \frac{P_{n\ \ years\ \ from\ \ now}}{(1+i)^n}$$

- But we *don't know the price in n years*, so we **assume firm pays dividends forever** turning the stock into something like a consol.
- We can then covert the above into:

$$P_{today} = \frac{D_{today}(1+g)}{i-g}$$

Valuing Stocks: Dividend-Discount Model

- This relationship is the **dividend-discount model**.
  - The ***fundamental price of a stock*** is the ***current dividend*** *divided by the interest rate, minus the dividend growth rate*
- The model tells us that **stock prices** should be **high** when
  - **dividends are high** (D_{today}),
  - **dividend growth** is **rapid** (g is large), or
  - the **interest rate** (i) is **low**.
- Although this model is simple, we have ***ignored risk*** in deriving it.

Why Stocks are Risky

- When you **buy stocks**, it is as if you *put up your wealth to buy the firm* and *borrow the rest*.
  - **Stockholders *get part of the profits***, but **only after everyone else is paid**, including ***bondholders***.
- The **borrowing** creates ***leverage*** *(using debt as a source of funding)*, and *leverage creates risk*.
- The **more debt**, the *more leverage* and the *greater the owners' risk*.

Why Stocks are Risky

- **Stocks are risky** because *shareholders are* ***residual claimants***.
  - They *never know for sure* how much their ***return will be***.
- In contrast, **bond holders *receive fixed nominal payments*** and are ***paid before stockholders*** in the event of *bankruptcy*.

Risk and the Value of Stocks

- **Stockholders** require *compensation for risk.*
  - The *higher the risk*, the *higher the compensation*.
- An investor will *buy a stock* with the idea of **obtaining a certain return**, which *includes* ***compensation for the stock's risk.***
- We know the return to holding stock for one year

$$= \frac{D_{next\ \ year}}{P_{today}} + \frac{P_{next\ \ year} - P_{today}}{P_{today}}$$

Risk and the Value of Stocks

- We can think of the **required return** as the *sum of* the *risk-free return* and the *risk premium* (*equity risk premium*).
- We can write this as:

Required Stock Return (*i*)
= **Risk-free Return (*rf*)** + **Risk Premium (*rp*)**

- Rewrite dividend-discount model:

$$P_{today} = \frac{D_{today}(1+g)}{rf + rp - g}$$

The Theory of Efficient Markets

- The basis for the **theory of efficient markets** is the notion that the ***prices of all financial instruments*** *reflect all available information*.
  - Markets **adjust** immediately and continuously **to changes in fundamental values**.
- This implies that **stock price movements** are ***unpredictable***.
  - *Any prediction* that *causes people to buy or sell* the stock, *thereby changes the price* through *simple supply and demand*.

The Theory of Efficient Markets

- This means active portfolio management will *not yield a higher return* than of the *broad stock-market index*, year after year.
- Evidence suggests both that:
  - **Prices are unpredictable**, and
  - Professional money managers cannot beat *an index like the S&P 500 regularly*.

The Theory of Efficient Markets

- *But* we do *see some managers who claim to exceed the market*. How?
  - They have *inside information*, which is illegal.
  - They are *taking on risk and are compensated* as such.
  - They are *lucky*.
  - **Markets aren't efficient**.

Investing in Stocks For the Long Run

- *Stocks appear to be risky*, but **people hold a substantial proportion of their portfolio in stock**.
- *Thus, some investors either thought either* ***stocks are not that risky*** *or themselves* ***are not risk averse***.

The Stock Market's Role in the Economy

- The **prices** determined in the stock market tell us the *market value of companies*.
  - This *guides the* ***allocation*** *of resources*.
- If **stock prices** accurately ***reflect fundamental values***, the *resource allocation mechanism works well*.
- **However**, stock prices ***sometimes deviate significantly from the fundamentals***.

The Stock Market's Role in the Economy

- Both **euphoria** and **depression** are **contagious**
  - When investors become unjustifiably exuberant, **prices rise regardless** of the **fundamentals** this creates ***bubbles***, *persistent and expanding gaps between actual stock prices* and those warranted by the *fundamentals*.
  - *Bubbles lead to* ***crashes***.
  - This explains the *very jagged pattern* in annual stock returns.

The Stock Market's Role in the Economy

- **Bubbles** affect everyone because they *distort economic decisions* that companies and consumers make.
  - Companies ***sell shares*** for *prices that are* ***too high***.
  - Companies then ***invest too much***.
  - Those *not in the euphoria* ***invest too little***.
  - People think they are ***wealthier*** *than they are* and *spend too much*.

The Stock Market's Role in the Economy

- **Crashes** *do the opposite*.
  - The *shift from over-optimism* to **excessive pessimism** causes a **collapse** in investment and economic growth.
  - Large stock market swings alter economic prospects even if grounded in fundamentals.
  - The recent financial crisis, the inducement to *pull back on investment* intensified helping to *amplify the recessions* of 2007-2009.

Chapter 9

Derivatives: Futures, Options, and Swaps

The Basics: Defining Derivatives

- A **derivative** is a ***financial instrument*** whose ***value*** is ***derived from*** the *value of some* ***other financial instrument***, call the ***underlying asset***.
- For example:
  - A **contractual agreement** *between two investors* that ***obligates*** *one to* ***make a payment*** *to the other*, **depending on the movement** ***of interest rates*** over the *next year*.
    - An **interest-rate** ***futures contract***

The Basics: Defining Derivatives

Derivatives are different from *straight purchases* because:

1. Derivatives *provide* an easy way for *investors* **to profit from price declines**.
2. In a *derivatives transaction*, ***one person's loss*** is *always* ***another person's gain***.

The Basics: Defining Derivatives

- While derivatives can be used to ***speculate***, or *gamble* on future price movements, they **allow investors to manage and reduce risk**.
  - *Farmers* use derivatives regularly to *insure themselves against fluctuations* in the price of their crops.
- *The purpose of derivatives is to **transfer risk** from one person or firm to another.*

The Basics: Defining Derivatives

- By shifting risk to those willing and able to bear it, *derivatives* **increase the risk-carrying capacity of the economy** as a whole.

- This *improves the allocation of resources* and *increase the level of output*.

Forward and Futures

- *A* **forward**, *or* **forward contract**, *is an* ***agreement*** *between a buyer and a seller* ***to exchange*** *a commodity or financial instrument* ***for a specified amount*** *of cash* ***on a prearranged future date****.*
- Because they are *customized*, **forward contracts** are very *difficult to resell*.

Forward and Futures

- *A* **future**, *or* **futures contract**, *is a forward contract that has been* ***standardized*** *and* ***sold through an organized exchange***
- The contract specifies that the **seller** (*short position*) ***will deliver*** *some quantity of a commodity* or *financial instrument* to the *buyer (long position)* **on a specific date**, called the ***settlement*** **or** ***delivery*** **date**, for a **predetermined price**.

Forward and Futures

- **No payments are made** when *the contract is agreed to*.
- The **seller/short position** *benefits from* ***declines in the price*** of the underlying asset.
- The **buyer/long position** *benefits from* ***increases in the price*** of the underlying asset.

Forward and Futures

- The **two parties to a futures contract** each ***make an agreement*** *with* a **clearing corporation**.
- The *clearing corporation* operates like a *large insurance company* and is the *counter party to both sides of the transaction*.
  - They **guarantee** that the *parties will meet their obligations*.
- This **lowers** the ***risk*** buyers and sellers face.
- The *clearing corporation* has the ability to *monitor traders* and the *incentive to limit their risk taking*.

Hedging and Speculating with Futures

- **Futures contracts** allow the *transfer of risk between buyer and seller* through **hedging** or **speculation**.
- For example of the ***sale of a U.S. Treasury bond future contract***, the **seller/short position** benefits from the **price declines**.
    - The ***seller of the futures contract*** can ***guarantee the price*** at which the ***bonds are sold***.

Hedging and Speculating with Futures

- **Buying a futures contract** *fixes the price that the fund will need to pay*.
  - In this example, ***both sides use the futures contract as a hedge*** - they are both *hedgers*.
- **Producers and users of commodities** employ *futures markets* to hedge their risks
- They **own the commodity outright**, so they want to ***stabilize revenue streams***.

Hedging and Speculating with Futures

- **Speculators** are *trying to make a profit*.
  - They bet on price movements.
    - ***Sellers of futures*** are betting that **prices will fall**.
    - ***Buyers of futures*** are betting that **prices will rise**.
- **Futures contracts** are popular tools for speculation because *they are cheap*.
- An investor needs only a ***small amount to invest - the margin*** - to *purchase the future contract.*
  - Margin requirements of 10% or less are common.

Arbitrage and the Determinants of Futures Prices

- On the **settlement or delivery date**, the ***price of the futures*** *contract must equal the* ***price of the underlying asset*** *the* ***seller is obligated to deliver***.
- The practice of ***simultaneously buying and selling financial instruments*** in order *to benefit from temporary price differences* is *called* **arbitrage** while the people who engage in it are called ***arbitrageurs***.

Calls, Puts, and All That: Definitions

- **Options** are *agreements* between two parties.
  - The *seller* is an ***option writer***.
  - A *buyer* is an ***option holder***.
- A **call option** is the *right to buy*, "call away", *a given* ***quantity of an underlying asset*** at a *predetermined price*, called the **strike price** (or ***exercise price***), on or before a specific date.
  - A July 2016 **call option** on *100 shares of Apple stock* at a strike price of 100 gives the **option holder** the *right to buy 100 shares of Apple for $100* each *prior to the 3rd Friday of July 2016*.

Calls, Puts, and All That: Definitions

- The ***writer*** of the **call option** *must* **sell the share** *if and when the holder choose to use the call option*.
- The ***holder*** of the call is ***not required*** to **buy the shares** - they have *the option if it is beneficial*.
  - When the **Apple stock price** *exceeds the option strike price of 100*, the **option holder** can either **call away** *the 100 shares* by ***exercising*** the *option* or **sell** *the option at a profit*.

Calls, Puts, and All That: Definitions

- When the ***price of the stock*** *is above the* ***strike price*** *of the* ***call option***, ***exercising the option*** *is* ***profitable*** and the option is said to be "***in the money***"; while the price of the stock exactly equals the strike price, the option is said to be "***at the money***"
- Otherwise, the ***strike price*** exceeds the ***market price of the stock***, it is termed ***"out of the money"***

Calls, Puts, and All That: Definitions

- A **put option** gives the *holder* the ***right*** but *not the obligation* to ***sell the underlying asset*** at *a* ***predetermined price*** on or before a ***fixed date***
- The *writer* of the option is *obliged to buy* the shares should the *holder choose to exercise the option*.
- The same terminology that is *used to describe calls*, is also used to *describe* ***puts***:
  - **In the money** - ***profitable***
  - **At the money** - ***same price***
  - **Out of the money** - ***not profitable***

Calls, Puts, and All That: Definitions

- Although **options** can be ***customized***, most are *standardized and traded on exchanges*.
- A *clearing corporation* guarantees the *obligations embodied in the option* -- those of the option writer.
  - The **options writer** is required to *post margin*.
  - The **option holder** incurs *no obligation*, ***so no margin is needed***.

Using Options

- ***Options*** *transfer risk* from the *buyer to the seller*, so can be **used for** both **hedging** and **speculation**.
- For someone who *wants to* ***purchase*** *an asset in the future*, a **call option** ensure that the *cost of buying the asset will not rise*.
- For someone who *plans to* ***sell*** *the asset in the future*, a **put option** ensures that the *price at which the asset can be sold will not go down*.

Using Options

Suppose that **interest rates are going to fall**.

- You can:
  - ***Buy a bond*** but *that's expensive* as you need money (**as bond price increase**).
  - *Buy a futures contract* taking the long position - *low investment but high risk*.
  - *Buy a call option* that *pays off only if the interest rate falls* - if you are wrong, *only cost is the price of the option*.

Using Options

The **option writer** can take a large loss, so who does this?

1. **Speculators** willing to *take the risk* and *bet that prices will not move against them*.
2. **Dealers** called *market makers* who engage in the regular purchase and sale of the underlying asset.

Using Options

- **Market makers** both
  - **Own the underlying asset** so they *can deliver it*, and
  - Are **willing to buy the underlying asset** so they *have it ready to sell to someone else*.
- If you *own the underlying asset*, **writing a call option** that ***obligates you to sell it*** at ***a fixed price*** is not that risky.
- Market makers *write options* to **get the fees** *from the buyer.*

Using Options

- **Options** are ***very versatile*** and *can be bought and sold* in many combinations.
- *Allow investors* to **get rid of risks** they do not want and keep the ones they do.
- **Options** *allow investors to bet that prices will be volatile*.

Swaps

- **Swaps** are ***contracts*** that ***allow traders to transfer risk*** just like other derivatives.
  - ***Interest-rate swaps*** which *allow one swap party, for a fee*, to **alter the stream of payments** it makes or receives.
  - ***Credit-default swaps (CDS)*** which are a form of ***insurance*** that allow a buyer to **own a bond or mortgage** ***without bearing its full default risk***.

Understanding Interest-Rate Swaps

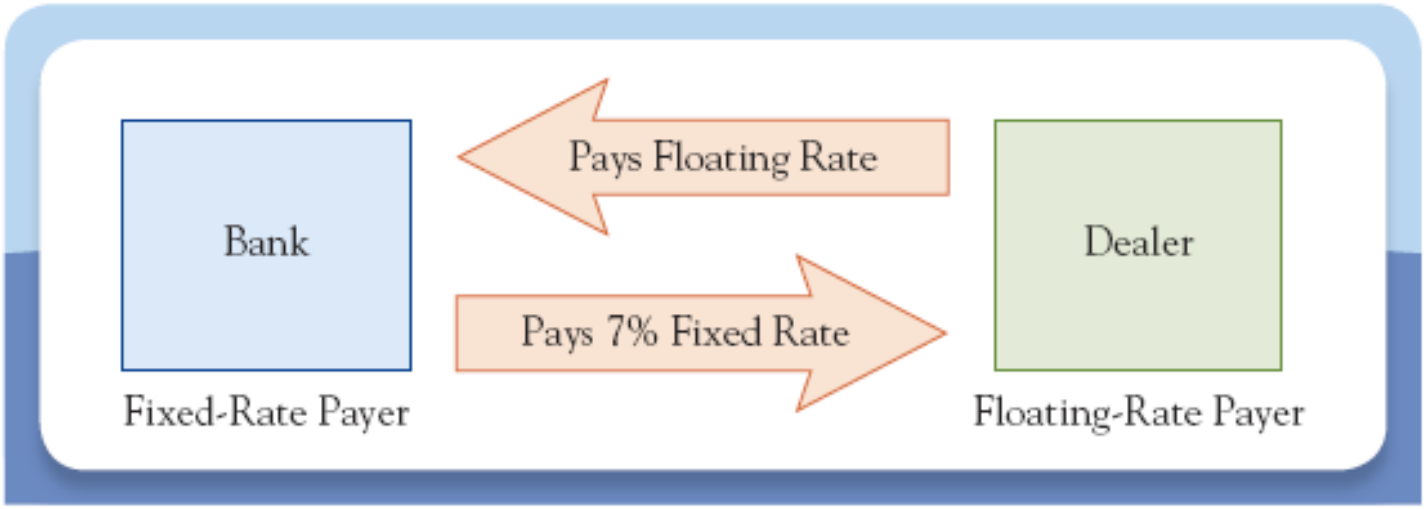
- **Interest-rate swaps** are *agreements* between two counterparties ***to exchange periodic interest-rate payments*** *over some future period*, based on an *agreed-upon amount of principal*, called the **notional principal**.
- The term *notional* is used because the *principal of a* ***swap*** *is* *not borrowed*, lent, or exchanged.

Understanding Interest-Rate Swaps

- In the simplest type of **interest-rate swap**, ***one party*** *agrees to* ***make payments*** *based on a fixed interest rate*, and *in exchange* the ***counterparty*** *agrees to* ***make payments based on a floating interest rate***.
  - This ***turns*** **fixed rates** in to **floating rates** and vice versa.

Understanding Interest-Rate Swaps

Figure 9.1 An Interest-Rate Swap Agreement



The bank agrees to pay a fixed rate to the swap dealer in exchange for payments based on a floating rate. The fixed-rate payments match the bank's loan income, while the floating-rate payments match the payments promised to the bank's deposit holders.

Pricing and Using Interest Rate Swaps

- *Pricing* **interest-rate swaps** means figuring out the *fixed interest rate to be paid*.
- Financial firms begin by *noting the market interest rate* on a U.S. Treasury bond of the same maturity as the **swap**, called a *benchmark*.
- The *rate* to *be paid by the fixed-rate payer*, the ***swap rate***, is the *benchmark rate plus a premium*.

Pricing and Using Interest Rate Swaps

- The **difference** between the *benchmark rate* and the *swap rate* is called the **swap spread** and is a ***measure of risk***.
  - The **swap spread** has become a *measure of overall risk in the economy*.
  - When the **swap spread *widens***, it signals that *general economic conditions are* ***deteriorating***.

Pricing and Using Interest Rate Swaps

- **Who uses interest-rate swaps?**
  - ***Banks***
    - **Deposits** are *short-term liabilities*
    - **Loans** are *long-term assets*
    - *Swaps help control risk*
  - ***Government debt managers***
    - Issue *long-term debt* relatively cheaply
    - *Tax revenue* matches up *better with short-term interest rate*

Pricing and Using Interest Rate Swaps

- The ***primary risk*** in a swap is the *risk that one of the parties* will **default**.
  - The risk is *not very high* because the *other side can enter into another agreement* to *replace the one that failed*.
- **Unlike futures and options, *swaps*** are <u>not</u> ***traded on organized exchanges***.
  - Swaps are **<u>very difficult to resell</u>**.

Credit-Default Swaps

- A **credit-default swap (CDS)** is a *credit derivative* that ***allows lenders to insure themselves against the risk*** that a *borrower will default.*
- The *buyer of a CDS* makes *payments*, like **insurance premiums**, *to the seller*, and the **seller agrees to pay the buyer** *if* an underlying loan or security defaults.
- The **CDS buyer** pays a fee to ***transfer the risk of default***, the credit risk, to the CDS seller.
- A **CDS agreement** often ***lasts several years*** and *requires that collateral be posted to protect* against the *inability to pay* of either the seller or the buyer of the insurance.

Credit-Default Swaps

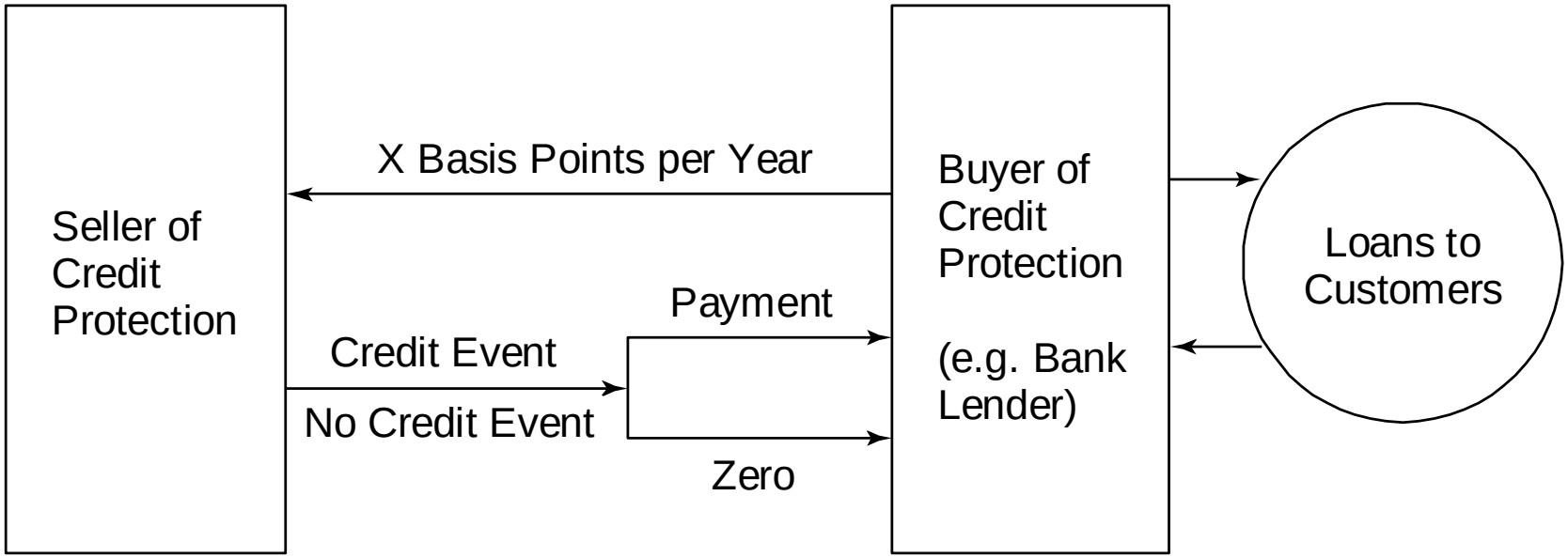
CDS *contributed to the financial crisis* in three important ways:

1. ***Fostering uncertainty*** about *who bears the credit risk* on a *given loan or security*,
2. Making the ***leading CDS sellers*** *mutually vulnerable*, and
3. Making it ***easier for sellers*** of insurance *to assume and conceal risk*.

Credit-Default Swaps

- Because **CDS contracts** are *traded over the counter (OTC)*, even traders cannot identify others who take on concentrated positions on one side of a trade.
- So long as **CDS trading** *lacks transparency*, the lingering worry is that *a failure of one institution* could *bring down the financial system* as a whole.

Figure 15.6 A credit default swap (CDS).



Chapter 10

Foreign Exchange

The Nominal Exchange Rate

- The **nominal exchange rate**, or simply the *exchange rate*, is the ***rate** at which **one can exchange the currency of one country** for the **currency of another country***.
- The **price of the British pound** is quoted as the ***number of dollars** that can be **exchanged for one pound (£).***

The Nominal Exchange Rate

- A ***decline*** in the *value of one currency relative to another* is called a **depreciation** of the currency that is *falling in value*.
- The ***rise*** in the *value of one currency relative to another* is called an **appreciation** of the currency that is *rising in value*.

The Real Exchange Rate

- The **real exchange rate** is the ***rate*** *at which one can* **exchange** *the* ***goods and services from one country*** for *the* ***goods and services*** *from* ***another country***

The Real Exchange Rate

- The **competitiveness of exports** *depends on* the ***real exchange rate***.
- **Appreciation** *of the real exchange rate* makes ***exports more expensive to foreigners***, reducing competitiveness.

The Law of One Price

- The **law of one price** is *based on the concept of* ***arbitrage*** -- the *identical products* ***should sell for the same price***, regardless of *where* they are sold.
- ***If they don't***, **someone can make a profit**.

The Law of One Price

The law of one price fails almost all of the time.

1. **Transportation costs**
2. **Tariffs**, the *taxes countries charge at their borders*, can be high.
3. **Technical specifications** can *differ*.
4. **Tastes differ across countries**, leading to *different pricing*.
5. Some things simply **cannot be traded**.

Purchasing Power Parity

- We can **extend** the *law from a single commodity* ***to a basket of goods and services***.
- The result is the **theory of purchasing power parity (PPP)**, which means that ***one unit of domestic currency*** will buy the ***same basket of good and services*** *anywhere in the world*.

Purchasing Power Parity

- According to the **theory of purchasing power parity**:

$$\text{Dollar price of basket of goods in U.S.} = \text{Dollar price of basket of goods in U.K.}$$

$$\frac{\text{Dollar price of basket of goods in U.S.}}{\text{Dollar price of basket of goods in U.K.}} = 1$$

- Thus, ***purchasing power parity*** *implies that the* ***real exchange rate*** *is* ***always equal to one***.

Purchasing Power Parity

- If we ***quote*** *the price of a basket of goods in the U.K* ***in pounds*** instead of dollars, then:

$$\frac{\text{Dollar price of basket of goods in U.S.}}{(\text{Pound price of basket of goods in U.K.}) \times (\text{Dollars per pound})} = 1$$

$$\frac{\text{Dollar price of basket of goods in U.S.}}{\text{Pound price of basket of goods in U.K.}} = (\text{Dollars per pound})$$

- Purchasing power parity implies that ***when prices change in one country*** but not in another, the **exchange rate should change as well**.

Purchasing Power Parity

- If **inflation occurs** in one country but not in another, the *change in prices* creates an *international inflation differential*.
- The **currency of a *country with high inflation*** will **depreciate**.

Purchasing Power Parity

- We often hear of currencies being undervalued or overvalued.
- When people use these terms, they often have in mind a **current market rate** that ***deviates*** *from what they consider to be purchasing power parity.*

Chapter 11

The Economics of Financial Intermediation

The Role of Financial Intermediaries

- **Financial intermediaries** are *important* because of **information**.
- **Lending and borrowing** *involves* both **transactions costs** and **information costs**
- Financial institutions exist to ***reduce these costs***.

The Role of Financial Intermediaries

Financial institutions **perform** *five functions*:

1. **Pooling the resources** of small savers,
2. **Providing safekeeping** and accounting services, as well as access to **payments system**,
3. **Supplying liquidity** by ***converting*** savers' balances directly *into a* ***means of payment*** whenever needed,
4. Providing ways to **diversify risk**, and
5. *Collecting and processing information* in ways that **reduce information costs**.

Pooling Savings

- The most straightforward economic function of a financial intermediary is to **pool the resources of <u>many small savers</u>**.
  - By ***accepting*** *many* ***small deposits***, banks empower themselves ***to make large loans***.
- In order to do this, the intermediary:
  - Must **attract substantial numbers of savers**, and
  - Must **convince** potential depositors of the **<u>institution's soundness</u>**.

Safekeeping, Payments System Access, and Accounting

- Banks:
  - Are a **place for safekeeping**.
  - Provide access to the **payments system** -- the **network that *transfers funds*** from the *account of one person or business* to the *account of another*.
  - *Specialize in handing payments transactions*, allowing them to **offer these services** *relatively cheaply.*
- Financial intermediaries **reduce** the ***costs of financial transactions***.

Safekeeping, Payments System Access, and Accounting

- Financial intermediaries **facilitate** the ***exchange of goods and services***.
- This principal of ***comparative advantage*** leads to **specialization** so that each of us ends up doing just one job and being paid in some form of money.
- Financial intermediaries help our economy to function **more efficiently**.

Safekeeping, Payments System Access, and Accounting

- Financial intermediaries also help us **manage our finances.**
- They provide us with **bookkeeping** and **accounting services**, *noting all our transactions for us*
- These force financial intermediaries to **write legal contracts** - but *one can be written* and *used over and over again* - reducing the cost of each.
- Much of what financial intermediaries do takes advantage of ***economies of scale***

Providing Liquidity

- ***Liquidity*** is a measure of the **ease and cost** with which an **asset *can be turned into*** *a means of* ***payment***.
- Financial intermediaries offer us the **ability to transform assets into money** at relatively low cost
- Banks can structure their assets accordingly, **keeping enough funds in short-term**, ***liquid financial instruments,*** *to satisfy the few people who will need them* and **then lending out the rest**.

Providing Liquidity

- By **collecting funds** from a large number of *small investors*, the bank can ***reduce the cost of their combined investment***, *offering each individual investor both liquidity and* ***high rates of return***.
- Intermediaries *offer* both individuals and businesses **lines of credit**, which provides customers with **access to liquidity**.
- A financial intermediary must **specialize** in **liquidity management**.
- It **must design its balance sheet** so that it can *sustain* ***sudden withdrawals***.

Diversifying Risk

- Financial institutions enable us to **diversify our investments** and **reduce risk**.
- Banks *take deposits from thousands of individuals* and *make thousands of loans* with them.
  - ***Each depositor*** *has* ***a very small stake*** in each one of the loans.
- All financial intermediaries provide a **low-cost** way **for individuals** *to diversify their investments.*

Collecting and Processing Information

- The fact that the **borrower** *knows whether he or she is trustworthy*, while the **lender** faces ***substantial costs to obtain that information***, results in an *information asymmetry*.
  - *Borrowers have information that lenders don't.*
- By *collecting and processing standardized information*, financial intermediaries **reduce the problems** that information asymmetries create.

Information Asymmetries and Information Costs

Asymmetric information poses two important **obstacles** to the *smooth* **flow of funds** from *savers to investors*:

1. **Adverse selection** *arises before the transaction occurs*.
   - Lenders need to know **how to distinguish *good credit risks*** from ***bad***.
2. **Moral hazard** occurs *after the transaction.*
   - Will borrowers **use the money as they claim**?

Adverse Selection in Financial Markets

- **If you can't tell *good from bad* companies**
  - **Stocks** of good companies are ***undervalued***, and
  - **Owners** will ***not want to sell*** them.
- **If you can't tell *good from bad* bonds**
  - Owners of good companies will **have to sell bonds for too low a price**, so
  - **Good bonds** *won't be sold want to do* it.

Disclosure of Information

- An obvious way **to solve the *hidden attributes* problem** is *to* ***provide more information***.
- In most advanced economies, *public companies* are **required to disclose** voluminous amounts of **information**.
  - For example, in the *Securities and Exchange Commission (SEC) requires firms* to **produce public financial statements** that are prepared according to standard accounting practices.

Disclosure of Information

- In a limited sense, **there is *private information* collected and sold to investors**.
  - *Research services* like Moody's , *collect information directly from firms* and *produce evaluations*.
  - *To be credible*, *companies cannot pay* for this research, so **investors have to pay**.

Collateral and Net Worth

- **Collateral** is something of value *pledged or* ***guaranteed by a borrower*** to the lender *in the event of the borrower's default*.
  - It is said to *back* or *secure* a loan.
- **Unsecured loans**, like *credit cards,* are **loans** made **without collateral**.
  - Because of this they generally have ***very high interest rates.***

Collateral and Net Worth

- The **net worth** is the owner's stake in a firm;
  - *the value* of the **firm's assets *minus*** the value of its **liabilities**.
    - **Net worth** *serves the same purpose as* ***collateral***
    - ***If a firm defaults*** on a loan, the **lender** can **make a claim** against the ***firm's net worth***.
- **Most small business owners** must ***put up their homes and other property*** *as* **collateral** for their business loans.

Moral Hazard: Problem and Solutions

- **Moral hazard** arises when
  - we ***cannot observe people's actions*** and therefore ***cannot judge whether a poor outcome*** *was* ***intentional*** or *just a result of bad luck*.
  - the ***borrower knows more than the lender*** about ***the way borrowed funds will be used*** *and the effort that will go into a project.*

Moral Hazard in Equity Finance

- If you buy stock in a company, *how* do you know *your money will be used* in the way that is *best for* you, the *stockholder*?
- It is more likely that the ***managers will use the funds in a way that is most advantageous to themselves***, not you.
- The separation of your ownership from their control creates what is called a ***principal-agent problem***.

Solving the Moral Hazard Problem in Equity Financing

- The attempts to align managers' interests with those of stockholders were **giving stock options** *as incentives to managers* that provided lucrative payoffs ***if a firm's stock price rose above a certain level***.
- When the ***managers are the owners***, ***moral hazard*** *in equity finance* ***disappears***.

Moral Hazard in Debt Finance

- **Debt contracts** allow **owners** to ***keep all the profits in excess of the loan payments***, they **encourage risk taking**.
- **Lenders** need to find ways to ***make sure borrowers don't take too many risks***.
- People with **risky projects** are ***attracted to debt finance*** because they ***get the full benefit of the upside***, while the **downside is limited to their collateral**.

Solving the Moral Hazard Problem in Debt Finance

- **Legal contracts** can ***solve the moral hazard problem*** inherent in debt finance.
  - The firm may **have to maintain a certain level of net worth**, a **minimum credit rating**, or a **minimum bank balance** or **home insurance and fire insurance** for mortgages.

Financial Intermediaries and Information Costs

- To *reduce information costs* and *minimize the effects of adverse selection* and *moral hazard*, intermediaries should:
  - **Screen loan applicants,** and
  - **Monitor borrowers**

Screening and Certifying to Reduce Adverse Selection

- The **lender *analyzes credit information*** from **credit score.**
- Every time someone requests a credit score, they **have to pay**, *eliminating the free rider problem.*
- **Banks can collect information on a borrower** that goes beyond their credit report and loan application.

Monitoring to Reduce Moral Hazard

- Intermediaries **monitor firms** that *issue bonds and stocks* to reduce moral hazard.
  - *Many hold significant number of shares* in individual firms.
  - They ***may place a representative*** on the company's *board of directors*.

Monitoring to Reduce Moral Hazard

- For new companies, a financial intermediary called a *venture capital firm* does the monitoring.
  - They specialize in investing in risky new *ventures* in return for a stake in the ownership and a share of the profits.
  - They keep a close watch on the managers' actions.
- The threat of a takeover helps to persuade managers to act in the interest of the stock and bondholders.

Chapter 12

Depository Institutions: Banks and Bank Management

The Balance Sheet of Commercial Banks

- The ***difference*** *between a bank's* ***assets*** and ***liabilities*** is the bank's capital, or **net worth**.
  - **Net worth** is the *value of the bank* to *its owners*.
- A **bank's profits** come from *both* ***service fees*** and from the ***difference*** *between* ***what it pays for its liabilities*** and the ***return it receives on its assets***.

Assets: Uses of Funds

- The **asset** side of the balance sheet shows *what banks do with the funds they raise*.
- **Assets** are divided into four broad categories:
  - ***Cash***
  - ***Securities***
  - ***Loans***
  - ***All other assets***

Cash Items

Cash asset are of three types:

1. **Reserves** - the most important.
   - ***Regulations require a certain percent of cash held in reserves.***
   - Include the ***cash in the bank's vault***, **vault cash**, and *bank's deposits at the Federal Reserve System*.
   - **Cash** is the *most liquid of the bank's assets*.
2. **Cash items in process of collection**.
   - *The uncollected funds from checks.*
3. **Balances of the accounts** that banks **hold at other banks.**
   - Small banks have accounts at large banks - *correspondent bank* deposits.

Securities

- **Securities** are the *second largest component of bank assets.*
- Banks *cannot hold stocks*, so these are **only bonds.**
- About half of all securities are **mortgage-backed.**
- A sizeable portion ***are very liquid*** - can be *sold quickly if the bank needs cash.*

Loans

- Loans are the **primary assets of modern commercial banks**, accounting for well over one-half of assets.
- Loans can be divided into **five categories**:
  1. **Business loans** called ***commercial and industrial (C&I) loans;***
  2. **Real estate loans**, including both *home and commercial mortgages* and *home equity loans;*
  3. **Consumer loans**, like *auto and credit card loans*;
  4. **Interbank loans**; and
  5. **Other types**, including *loans for the purchase of other securities.*

Loans

- The *different loan types* **differ in their liquidity**.
- The primary difference in *various kinds of depository institutions* is their **composition of loan portfolios.**
  - **Commercial banks** make loans primarily to ***businesses***.
  - **Savings** provide ***mortgages to individuals***.
  - **Credit unions** specialize in ***consumer loans***.

Loans

- *Prior to the financial crisis*, commercial banks became *more involved in the real estate*.
  - The rise of the ***commercial paper market*** made ***securities debt finance*** more convenient for large firms.
  - The creation of **mortgage-backed securities (MBS)** meant that *banks could sell the mortgage loans they made,* which *reduced the risk of illiquid assets.*

Liabilities: Sources of Funds

- **Banks** get ***funds*** *from* ***savers*** *and from* ***borrowing*** *in the financial markets*.
- There are two types of deposit accounts:
  - **Transaction accounts** (checkable deposits)
  - **Nontransaction accounts** (savings deposits and time deposits)

Checkable Deposits

- **Demand deposits** make up the *largest component of checkable deposits.*
- *Financial innovation* has *reduced the importance of checkable deposits* in the day-to-day business of banking.
  - They have a **low return for consumers**
  - Traditional checking accounts are **no longer the principal source of bank funds**

Nontransaction Deposits

- **Savings deposits** were popular for may decades, but *less so today.*
- **Time deposits** are **certificates of deposit (CDs) with a fixed maturity.**

Borrowings

- **Borrowing** is the second most important source of bank funds.
- ***Banks can borrow*** by:
  - Borrowing *from the central bank*, which is rare
  - Borrowing *from other banks*

Borrowings

- Banks with **excess reserves** will *lend their surplus funds to banks that need them* though an **interbank market** called the **federal funds market**.
  - The *lending bank* must ***trust*** ***the borrowing bank*** as these *loans are unsecured*.
- Commercial banks **also borrow from foreign banks**.

Borrowings

- Banks finally can *borrow using an instrument called* a **repurchase agreement, or repo**.
  - A **short-term collateralized loan** in which a ***security*** *is exchanged for cash*.
  - The *parties agree* to **reverse the transaction** *on a specific future date, typicaly the next day*.

Bank Capital and Profitability

- **Net worth** is referred to as **bank capital**, **or *equity capital*.**
- Capital is the **cushion** banks have ***against a sudden drop*** in the **value of their assets** or an **unexpected withdrawal of liabilities**.
  - It *provides some insurance against insolvency*.

Bank Capital and Profitability

- An important component of bank capital is **loan loss reserves**:
  - **Loan loss reserves** are an ***amount the bank sets aside*** to **cover potential losses** from ***defaulted loans***.
- At some point the *bank gives up hope a loan will be repaid* and it is ***written off***, or erased from the bank's balance sheet.
- At this point, the ***loan loss reserve*** is ***reduced*** by the ***amount of*** *the loan that has* ***defaulted***.

Bank Capital and Profitability

There are several measures of **bank profitability**.

1. **Return on assets (ROA)**
   - **ROA** is the ***bank's net profit left after taxes*** divided by *the* ***bank's total assets***.

$$ROA = \frac{\text{Net profit after taxes}}{\text{Total bank assets}}$$

   - It is a measure of ***how efficiently*** **a particular banks** ***uses its assets***.

Bank Capital and Profitability

2. The **bank's *return to its owners*** is measured by the **return on equity (ROE).**
   - This is the ***bank's net profit after taxes*** divided by ***the bank's capital***.

$$ROE = \frac{\text{Net profit after taxes}}{\text{Capital}}$$

Bank Capital and Profitability

- **ROA and ROE** are *related to leverage.*
- One measure of **leverage** is the *ratio of banks **assets** to bank **capital**.*
- Multiplying **ROA** *by asset to capital ratio* gives **ROE**.

$$ROE = \frac{\text{Net profit after taxes}}{\text{Bank Capital}}$$

$$ROA \times \frac{\text{Bank Assets}}{\text{Bank Capital}} = \frac{\text{Net profit after taxes}}{\text{Total bank assets}} \times \frac{\text{Bank Assets}}{\text{Bank Capital}}$$

$$= \frac{\text{Net profit after taxes}}{\text{Bank capital}} = ROE$$

Bank Capital and Profitability

3. The final measure of bank profitability is ***net interest income*.**
   - This is related to the fact that ***banks pay interest on their liabilities*** and ***receive interest on their assets.***
   - *Net interest income* is the **difference** between
     - **Securities and loans generate *interest income***
     - **Deposits and bank borrowing rate *interest expenses***

Bank Capital and Profitability

- **Net interest income** can also be expressed as
  - the ***difference*** between the ***interest income*** *generated by banks or other financial institutions* and the *amount of* ***interest paid out*** *to their lenders, relative to the amount of their interest-earning assets:* **net interest margin**.
  - This is the bank's **interest rate spread** - the *weighted average* ***difference*** between the ***interest rate received on assets*** and the ***interest rate paid for liabilities.***

Off-Balance-Sheet Activities

To generate **fees**, banks engage in numerous **off-balance-sheet activities**.

1. **Lines of credit** - *similar to maximum credit limits allowed on credit cards.*
   - The firm **pays a bank a fee** *in return for the* ***ability to borrow whenever necessary.***
   - The **payment is made** when *the agreement is signed* and *firm receives* a ***loan commitment*****.**

Off-Balance-Sheet Activities

2. Letters of credit

- These **guarantee** that a *customer of the bank will be* ***able to make a promised payment***.
- Customer might **request** that the **bank send a *commercial letter of credit*** *to an exporter in another country* ***guaranteeing*** *payment for the goods on receipt.*
- In return for taking this risk, the **bank receives a fee.**

Off-Balance-Sheet Activities

3. Standby letter of credit

- Standby letters of credit are ***letters issued to firms and governments that wish to borrow in the financial markets***
- They act as a form of insurance.

Liquidity Risk

- **Liquidity risk** is the *risk of a **sudden** demand for **liquid funds***.
- Banks face liquidity risk on **both sides of their balance sheets**.
  - **Deposit withdrawal** is a liability-side risk.
  - **Lines of credit** are an asset-side risk.
- *Even if* a bank has a *positive net worth*, ***illiquidity** can still drive it out of business*.

Liquidity Risk

- *In the past*, the common way to *manage liquidity risk* was to **hold excess reserves**.
  - This is a **passive way** to manage liquidity risk.
  - Holding excess reserves is **expensive**, because it means *forgoing higher rates of interest* than can be *earned with loans or securities*.
- There are two other ways to manage liquidity risk.
  - The bank can **adjust** its ***assets*** or its ***liabilities***.

Liquidity Risk

On the **asset side** a bank has several options.

1. The easiest option is to ***sell a portion of its securities portfolio***.
   - Most **treasuries** can be ***sold quickly*** at relatively low cost.
   - Banks that are particularly concerned about liquidity risk ***can structure their securities holdings*** to *facilitate such sales.*

Liquidity Risk

2. A second possibility is for the bank to **sell some of its loans** to another banks.
   - Banks generally make sure that a *portion of the loans they hold* are ***marketable*** for this purpose.
3. Another way is to **refuse to renew a customer loan** that has come due.
   - However this is bad for business.
     - The bank can **lose a good customer.**
     - Reducing assets **lowers profitability**.

Liquidity Risk

Bankers prefer to ***use*** **liability management** to address liquidity risk.

1. Banks can **borrow to meet any shortfall** either *from the central bank* or *from another bank*.
2. The bank can **attract additional deposits**.

Credit Risk

- **Credit risk** is the ***risk*** *that a* ***bank's loans*** *will* ***not*** *be* ***repaid****.*
- Banks use a variety of tools *to manage credit risk:*
  1. **Diversification**, where banks ***make a variety of different loans to spread the risk***.
  2. **Credit risk analysis,** where the bank ***examines the borrower's credit history*** to determine the *appropriate interest rate to charge*.

Credit Risk

- **Diversification** can be *difficult* for banks, especially *if they focus on a certain type of lending.*
  - If a bank lends in only **one geographic area** or **one industry,** it is *exposed to economic downturns* that are ***local or industry-specific***.
- **Credit risk analysis** uses a *combination* of *statistical models* and *information* that is ***specific to the loan applicant***
  - The result is an **assessment of the likelihood** that a **particular borrower will default**.

Interest-Rate Risk

- A ***bank's liabilities*** *tend to be* ***short-term***, while ***assets tend to be long term***.
  - The **mismatch** between the two sides of the balance sheet create **interest-rate risk**.
- When **interest rates rise**, banks face the risk that the ***value of their assets*** will *fall more than the value of their liabilities*, **reducing the bank's capital.**
- **Rising interest rates *reduce revenues relative to expenses,*** directly *lowering a bank's profits*.

Interest-Rate Risk

- The term ***interest-rate sensitive*** means that a *change in interest rates* will *change the revenue produced by an asset.*
- For a bank **to make a profit**, the ***interest rate on its liabilities*** must be **lower** than the ***interest rate on its assets***.
  - The difference in the two rates is the bank's **net interest margin.**
- *When a* ***bank's liabilities*** *are* ***more interest-rate sensitive*** *than its assets*, an **increase in interest rates** will **cut into the bank's profits**.

Interest-Rate Risk

- To manage interest-rate risk is to *determine how sensitive the bank's balance sheet is to a change in interest rates.*
- **Managers** *must compute* an **estimate of the *change in the bank's profit* for each one-percentage-point change in the interest rate**.
- This procedure is called ***gap analysis***.

Interest-Rate Risk

Bank managers can *use a number of tools to manage interest-rate risk.*

1. They can **match the interest-rate sensitivity of assets *with*** that of **liabilities**.
2. Alternatives include the **use of derivatives**, *specifically interest-rate swaps*.

Trading Risk

- **Risk** that the ***value of instrument may go down rather than up is called*** **trading risk**, or *market risk*.
- Today **banks hire traders** to *actively buy and sell securities, loans, and derivatives* using a portion of the bank's capital.
- **Traders** normally ***share in the profits from good investments***, but the *bank pays for the losses*.
- This creates **moral hazard** - ***traders take more risk*** than the banks would like.

Trading Risk

- The solution to the moral hazard problem is to *compute the risk the traders generate*.
  - *Use standard deviation and value at risk*.
- The **bank's risk manager *limits the amount of risk any individual trader is allowed to assume*** and *monitors closely*.
- The ***higher the inherent risk in the bank's portfolio***, the ***more capital the bank will need to hold.***

Other Risks

- ***Foreign exchange risk*** comes from *holding* ***assets denominated in one currency*** and *liabilities denominated in another.*
- Banks manage this in two ways:
  - They work to **attract deposits** that are *denominated in the* ***same currency as their loans***, matching assets to liabilities.
  - They ***use foreign exchange futures and swaps*** to hedge the risk.

Other Risks

- ***Sovereign risk*** arises from the fact that ***some foreign borrowers may not repay*** *their loans* because their **government prohibits them from doing so.**
  - If a foreign country is experiencing a *financial crisis*, the **government may decide to restrict dollar-denominated payments.**
- Banks have three options:
  - **Diversification,**
  - **Refuse loans to certain countries**, or
  - **Use derivatives to hedge the risk**.

Other Risks

- **Operational risk** is when ***computer systems fail or buildings burn down***.
  - This was an issue for some banks when the *World Trade Center was destroyed*.
- The banks must **make sure their computer systems and buildings are sufficiently robust** to withstand potential disasters.

End of lecture