EE432 Monetary Theory and Policy

Lecture 4 Stocks and Derivatives

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Quiz & Assignment Reschedule

- Individual **pre-class reading quizzes 1-4** (week 2-5) submission due dates are extended to be on 22 February
- Individual **out-of-class quiz assignments** (multiple choices) due dates are also rescheduled :
  - Quiz assignment 1 (covering textbook **chapter 1-7**): **22 February**
  - Quiz assignment 2 (covering textbook **chapter 8,9,11,12,13,14**): **8 March**
  - Quiz assignment 3 (covering textbook **chapter 15,17,18**): 6 April
  - Quiz assignment 4 (covering textbook **chapter 21,22**): 27 April

Class Reschedule

Week	Topic	Date
1	Money and the Financial System (Cecchetti & Schoenholtz Textbook Chapter 1-3)	19 Jan 2019
2	Present value, interest rate and risk (Cecchetti & Schoenholtz Textbook Chapter 4-5) # Pre-class reading quiz 1 for Chapter 4-5, worth 1%	26 Jan 2019
3	Bond price and term structure of interest rates (Cecchetti & Schoenholtz Textbook Chapter 6-7) # Pre-class reading quiz 2 for Chapter 6-7, worth 1%	9 Feb 2019
4	Stocks and Derivatives (Cecchetti & Schoenholtz Textbook Chapter 8-9) # Pre-class reading quiz 3 for Chapter 8-9, worth 1%	16 Feb 2019
5	The Economics of Financial Intermediation (Cecchetti & Schoenholtz Textbook Chapter 11-12) # Pre-class reading quiz 4 for Chapter 11-12, worth 1%	23 Feb 2019
6	Financial Industry Structure (Cecchetti & Schoenholtz Textbook Chapter 13-14) # Pre-class reading quiz 5 for Chapter 13-14, worth 1%	2 Mar 2019
7	Foreign Exchange (Cecchetti & Schoenholtz Textbook Chapter 10) # Pre-class reading quiz 6 for Chapter 10, worth 1%	16 Mar 2019

Week	Topic	Date
8	Central banks (Cecchetti & Schoenholtz Textbook Chapter 15, 17) *# Pre-class reading quiz 7 for Chapter 15&17, worth 1%*	23 Mar 2019
9	Monetary policy: stabilizing the domestic economy (Cecchetti & Schoenholtz Textbook Chapter 18) *# Pre-class reading quiz 8 for Chapter 18,* ***worth 2%***	* 28 Mar 2019 5-8 PM (Make-up class)
10	Output, inflation, and monetary policy (Cecchetti & Schoenholtz Textbook Chapter 21) *# Pre-class reading quiz 9 for Chapter 13-14,* ***worth 2%***	30 Mar 2019
11	Understanding business cycle fluctuations (Cecchetti & Schoenholtz Textbook Chapter 22) *# Pre-class reading quiz 10 for Chapter 22, worth 1%*	20 Apr 2019
12	Money growth and money demand (Cecchetti & Schoenholtz Textbook Chapter 20) *# Pre-class reading quiz 11 for Chapter 20, worth 1%*	27 Apr 2019
13	Modern monetary policy and the challenges (Cecchetti & Schoenholtz Textbook Chapter 23) *# Pre-class reading quiz 12 for Chapter 23, worth 1%*	4 May 2019
14	Exchange rate policy (Cecchetti & Schoenholtz Textbook Chapter 19) *# Pre-class reading quiz 13 for Chapter 19, worth 1%*	11 May 2019
15	Special topic: New Keynesian monetary economics	* 2 May 2019 5-8 PM (Make-up class)

Outline

- Stock Markets and Stock Index
- Stock Valuation
- Theory of Efficient Market
- Derivatives; Forward and Futures
- Calls and Puts Options
- Swaps

Chapter 8

Stocks, Stock Markets, and Market Efficiency

Stock, Stock Markets and Stock Index

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***.

Measuring the Level of the Stock Market

- We need to understand the dynamics of the stock market.
- We also need to be able to ***measure the level of fluctuation*** *in all* ***stock values***.
  - This concept is the ***value*** of the stock market.
  - We will refer to its measures as ***stock-market indexes***.

Measuring the Level of the Stock Market

- **Stock indexes**:
  - Tell us *how much the **value of an average stock** has changed*, and how much ***total wealth** has gone up or down*.
  - Provide *benchmarks for performance of money managers*.

The Dow Jones Industrial Average

- The **DJIA**
  - Is the *first and best known stock market index*.
  - Is based on the *stock prices of **30 of the largest companies** in the U.S*.
  - Measures the value of purchasing a single share of each of the stocks in the index.
- The **percentage change in the DJIA** over time is the **percentage change in the sum of the 30 prices**.
- The DJIA is a **price-weighted average**, which gives ***greater weight*** to shares *with **higher prices***.
- The behavior of **higher priced stocks *dominates*** the movement of a price-weighted index

The Standard and Poor's 500 Index

- The **S&P 500** is constructed from the prices of many more stocks than the DJIA.
- It is ***based on the value of 500 largest firms*** in the U.S. economy.
  - It tracks the total value of owing the entirety of those firms.
- It uses a **value-weighted index** where ***larger firms*** *carry more weight*.

Stock Valuation

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 **<u>obtaining a certain return</u>**, 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:

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

Risk and the Value of Stocks

Table 8.4 Implications of the Dividend-Discount Model with Risk

Stock Prices Are High When:

1. Current dividends are high (D_{today} is high).
2. Dividends are expected to grow quickly (g is high).
3. The risk-free rate is low (rf is low).
4. The risk premium on equity is low (rp is low).

The Theory of Efficient Markets

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**.

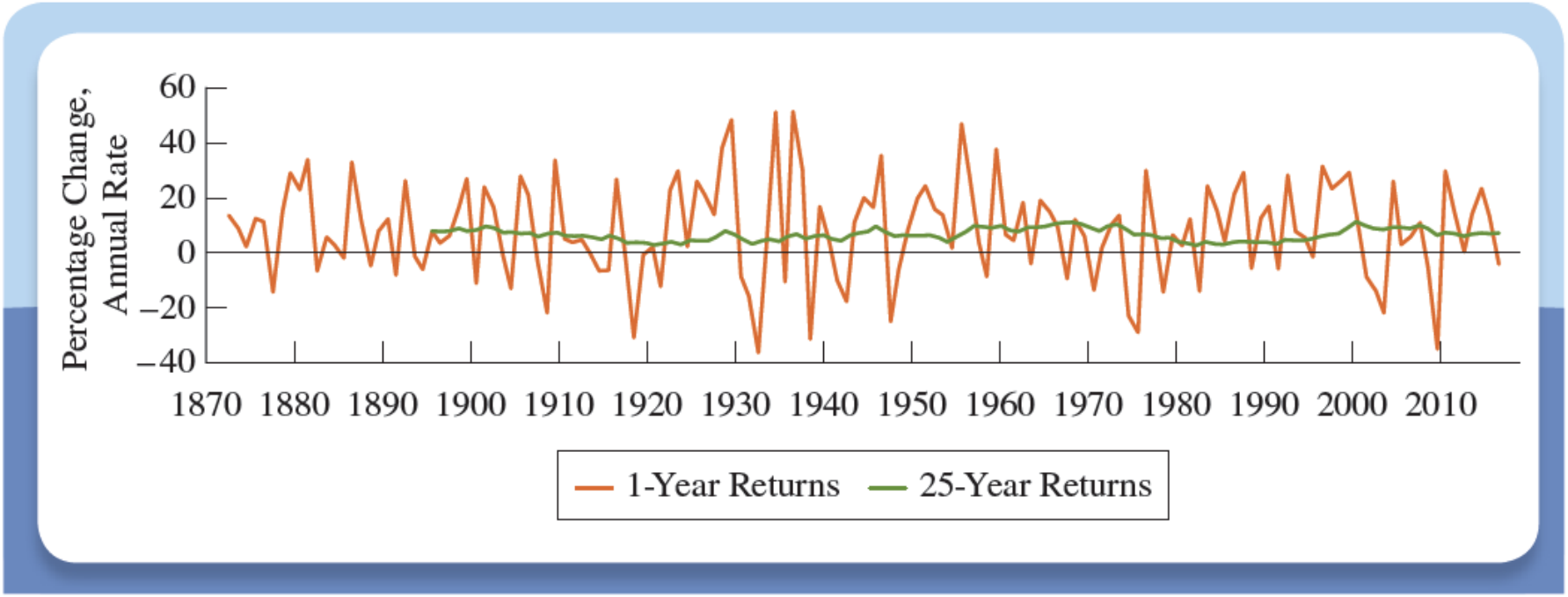
Investing in Stocks For the Long Run

- *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***.

Investing in Stocks For the Long Run

Figure 8.2 S&P 1-Year and 25-Year Stock Returns, 1872 to 2016

(Returns are Real, Adjusted for Inflation Using the CPI)



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

Forward and Futures

The Basics: Defining Derivatives

- A **derivative** is a ***financial instrument*** whose ***value*** *depends on,* 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*.

Margin Accounts and Marking to Market

- The **clearing corporation** *requires both parties* to a futures contract to **place a deposit** with the corporation.
  - This is called **posting margin** in a *margin account*.
  - This *guarantees* when the contract comes due, the *parties will be able to meet their obligations*.

Margin Accounts and Marking to Market

- The **clearing corporation** posts *daily gains and losses* on the contract *to the margin account of the parties* involved.
  - This is called ***marking to market***.
- If *someone's margin account falls below the minimum*, the **clearing corporation** will *sell the contracts*, ending the *person's participation in the market*.

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 risk**.
- **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***.

Arbitrage and the Determinants of Futures Prices

- If the ***price of a specific bond*** is **higher** *in one market than in another*:
  - The **arbitrageur** can *buy at the low price and sell at the high price*.
  - This **increases demand** *in one market* and *supply in another.*
  - The *increase in demand* **raises price in that market**.
  - The *increase in supply* **lowers price in the other market.**
  - This ***continues*** *until* ***the prices are equal*** *in both markets.*

Arbitrage and the Determinants of Futures Prices

Table 9.2 Who's Who in Futures

	Buyer of a Futures Contract	Seller of a Futures Contract
This is called the	*Long* position	*Short* position
Obligation of the party	Buy the commodity or asset on the settlement date	Deliver the commodity or asset on the settlement date
What happens to this person's margin account after a *rise* in the market price of the commodity or asset?	*Credited*	*Debited*
Who takes this position to *hedge?*	The *user* of the commodity or *buyer* of the asset who needs to insure against the price *rising*	The *producer* of the commodity or owner of the asset who needs to insure against the price *falling*
Who takes this position to *speculate?*	Someone who believes that the market price of the commodity or asset will *rise*	Someone who believes that the market price of the commodity or asset will *fall*

Calls and Puts Options

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.
  - *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 read 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*.

Pricing Options: Intrinsic Value and the Time Value of the Option

An **option** *has two parts*:

1. ***Intrinsic value*** - the value of the option *if it is exercised immediately*, and
2. **Time value of the option** - the *fee paid for the option's potential benefits*.

Option price = Intrinsic value + time value of the option

Pricing Options: Intrinsic Value and the Time Value of the Option

- We can **calculate the time value of the option** by calculating the *expected present value of the payoff*.
  - For a **call option**, we take the ***probability*** *of a favorable outcome (a higher price),* ***times the payoff***
  - ***Increasing the standard deviation*** *of the stock price*, an *increase in* ***volatility***, *increases the* ***option's time value***.

General Considerations

- Calculating the **price of an option** and **how it might change** *means* developing some rules for figuring out its **intrinsic value** and **time value**.
- The most important thing to remember is that a *buyer is not bound to exercise the option*.
- Because the **options** can *either be exercised* or *expire worthless*, we can conclude that the **intrinsic value** *depends only on* ***what the holder receives*** *if the* ***option is exercised***.

General Considerations

- For an **in-the-money call**, or the *option to buy*, the **intrinsic value to the holder** is the *market price of the underlying asset minus the strike price.*
- Similarly, the **intrinsic value of a put**, or the ***option to sell***, equals the *strike price minus the market price of the underlying asset, or zero - which ever is greater*.

General Considerations

- *Prior to expiration*, there is always the chance that the ***price of the underlying asset*** will *move making the option valuable*.
- *The* ***longer the time to expiration***, the **bigger the likely payoff** when the ***option does expire*** and, thus, the ***more valuable it is***.

General Considerations

- *The likelihood that an option will pay off* ***depends on the volatility****, or* ***standard deviation****, of the* ***price of the underlying asset****.*
  - The **more variability** there is in the asset's price, the *more chance it has to move into the money*.
  - Therefore the **option's time value** *increases with volatility* in the *price of the underlying asset*.
  - **Increased volatility** has *no cost to the option holder - only benefits*.

General Considerations

Table 9.4 Factors Affecting the Value of Options

Option Value = Intrinsic Value + Time Value

Increase in one factor, holding all others fixed	Call (the right to buy)	Put (the right to sell)
Increase in the strike price	Decrease (intrinsic value falls)	Increase (intrinsic value rises)
Increase in the market price of the underlying asset	Increase (intrinsic value rises)	Decrease (intrinsic value falls)
Increase in the time to expiration	Increase (time value rises)	Increase (time value rises)
Increase in the volatility of the underlying asset price	Increase (time value rises)	Increase (time value rises)

Swaps

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

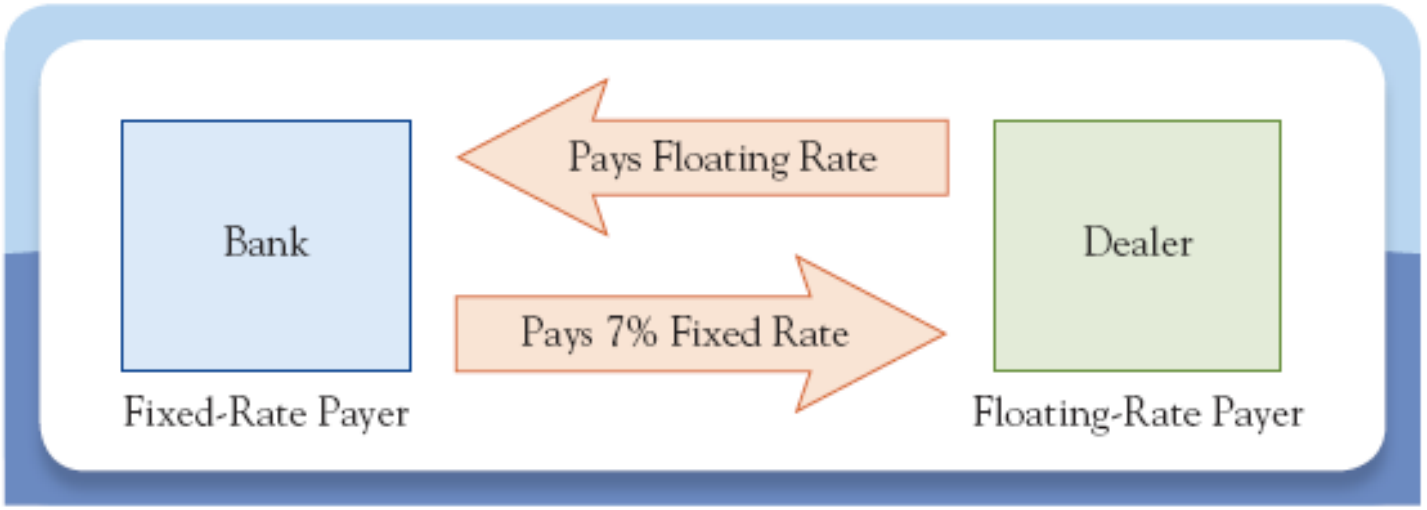
- **Interest-rate swaps** are *agreements* between two counterparties ***to exchange periodic interest-rate payments*** *over some future period*, based on an *agreed-upon amount of principal*, called the **notional principal**.
- The term *notional* is used because the *principal of a **swap** is not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

End of lecture