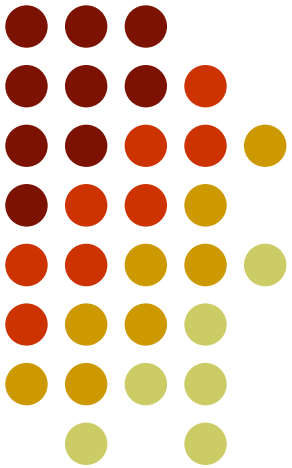
BROOKLYN COLLEGE

Options, Futures, and Commodities

Bus 70.4

A Study of **Derivatives**

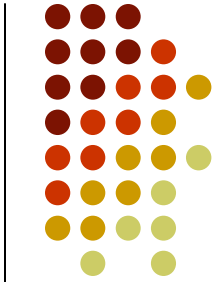
Professor Myles Bassell



Why are Derivatives Important?

Derivatives are important because…

What are Derivatives?



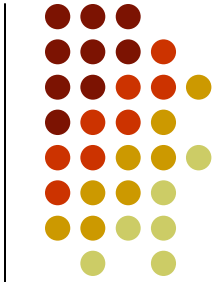
A derivative is a financial instrument whose value depends on the values of other more basic underlying variables and used to _____ ____ associated with fluctuations in

1-

2-

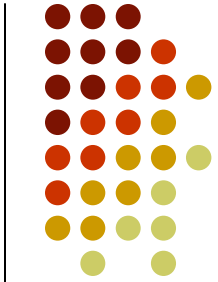
3-

Examples of Derivatives

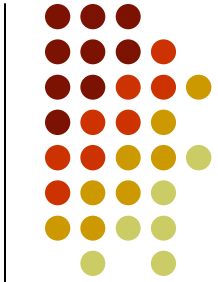


- Futures Contracts
- Forward Contracts
- Swaps
- Options

Derivatives Markets



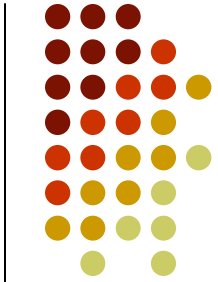
- Exchange traded
  - Traditionally exchanges have used the open-outcry system, but increasingly they are switching to electronic trading
  - Contracts are standard there is virtually no credit risk
- Over-the-counter (OTC)
  - A computer- and telephone-linked network of dealers at financial institutions, corporations, and fund managers
  - Contracts can be non-standard and there is some small amount of credit risk



Futures

Contracts

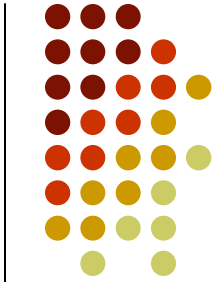
Futures Contracts



- Agreement to buy or sell an asset for a certain price at a certain time

- traded on an exchange

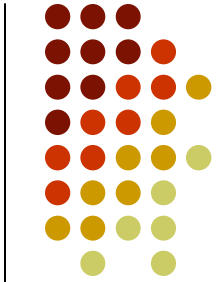
Examples of Futures Contracts



Agreement to:

- buy 100 oz. of gold @ US$400/oz. in December (NYMEX)
- sell £62,500 @ 1.5000 US$/£ in March (CME)
- sell 1,000 bbl. of oil @ US$20/bbl. in April (NYMEX)

Exchanges Trading Futures



- Chicago Board of Trade
- Chicago Mercantile Exchange
- LIFFE (London)
- Eurex (Europe)
- BM&F (Sao Paulo, Brazil)
- TIFFE (Tokyo)
- and many more (see list at end of book)

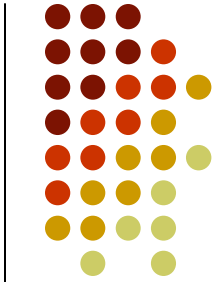
Forward Contracts

Forward Contracts

- Agreement to buy or sell an asset for a certain price at a certain time

- traded Over the Counter (OTC)

Forward Contracts



- Long Forward Contract

Agreeing to buy the underlying asset for a certain price at a certain time in the future

- Short Forward Contract

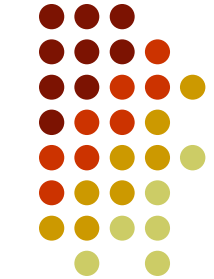
Agreeing to sell the underlying asset for a certain price at a certain time in the future

Forward Price

- The forward price for a contract is the delivery price that would be applicable to the contract if were negotiated today (i.e., it is the delivery price that would make the contract worth exactly zero)
- The forward price may be different for contracts of different maturities

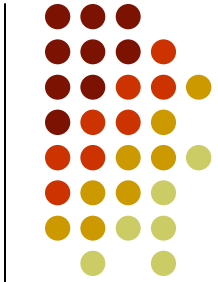
Swaps

Swaps

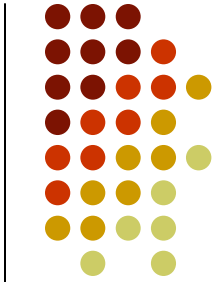


A swap is an agreement to exchange cash flows at specified future times according to certain specified rules

Typical Uses of an Interest Rate Swap

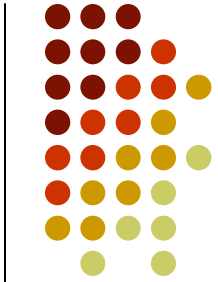


- Converting a liability from
  - fixed rate to floating rate
  - floating rate to fixed rate
- Converting an investment from
  - fixed rate to floating rate
  - floating rate to fixed rate



Options

Options



An option is the **right** to buy or sell an asset at a certain price at a certain time

Terminology

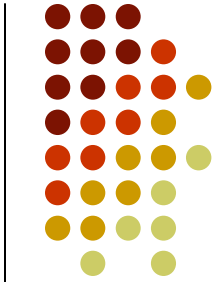
- The party that has agreed to buy has what is termed a long position
- The party that has agreed to sell has what is termed a short position

Long = Buy Short = Sell

Short Selling

- Short selling involves selling securities you do not own
- Your broker borrows the securities from another client and sells them in the market in the usual way

Short Selling
(continued)

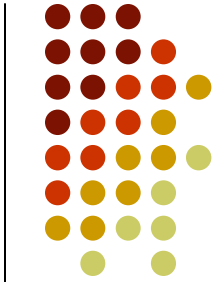


- At some stage you must buy the securities back so they can be replaced in the account of the client
- You must pay dividends and other benefits the owner of the securities receives

Options

- A **call** option is an option to buy a certain asset by a certain date for a certain price (the strike price)
- A **put** option is an option to sell a certain asset by a certain date for a certain price (the strike price)

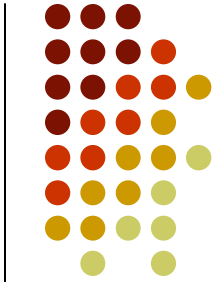
Review of Option Types



- A call is an option to buy
- A put is an option to sell
- A European option can be exercised only at the end of its life
- An American option can be exercised at any time

Call = Buy Put = Sell

Option Positions



- Long call
- Long put
- Short call
- Short put

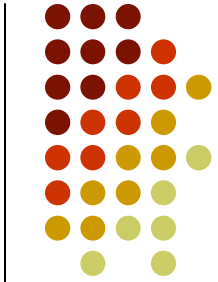
Long = Buy

Call = Buy

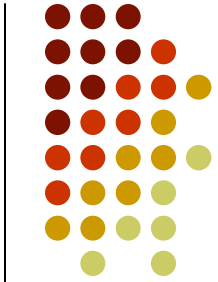
Short = Sell

Put = Sell

Specification of Exchange-Traded Options



- Expiration date
- Strike price
- European or American
- Call or Put (option class)



Futures

Hedging

Chapter 3

Chapter 3 Hedging - Futures

- A trader is HEDGING when she has an exposure to the price of an asset and takes a position in a derivate to offset the exposure

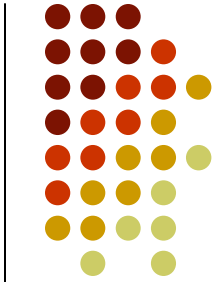
Chapter 3 Hedging - Futures

- Short Hedge – when a company owns an asset and expects to sell the assest in the future and want to lock in the price
- Long Hedge -when a company knows it will have to purchase the asset in the future and want to lock in the price

Hedging Examples

- A US company will pay £10 million for imports from Britain in 3 months and decides to hedge using a long position in a forward contract
- An investor owns 1,000 Microsoft shares currently worth $28 per share. A two-month put with a strike price of $27.50 costs $1. The investor decides to hedge by buying 10 contracts

Calculating
Optimal Hedge Ratio



$$HR = CC\left(\frac{SD\ \Delta S}{SD\ \Delta F}\right)$$

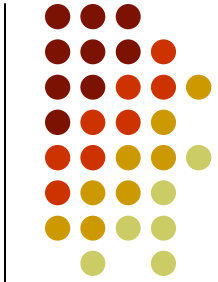
Calculating Optimal Hedge Ratio

Problem **3.6**

HR = CC (SD ΔS / SD ΔF)

CC	.8
SD ΔS	.65
SD ΔF	.81

Calculating Optimal Hedge Ratio



Problem **3.6**

HR = CC (SD ΔS / SD ΔF)

.8 (.65 / .81) = .642

The size of the futures position should be **64.2%** of the size of the company's exposure in a 3 month hedge

Calculating Optimal # of Contracts Prob 3.7

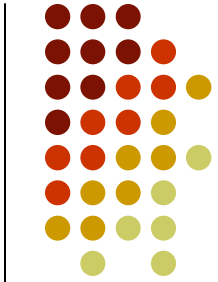
1.2 x [20,000,000 / (1080 x 250)]

88.9 = 89 contracts should be shorted.

Chapter 3 Hedging - Futures

- Basis Risk – arises from the hedgers uncertainty as to the difference between the spot price and the futures price at the expiration of the hedge

Calculating Basis

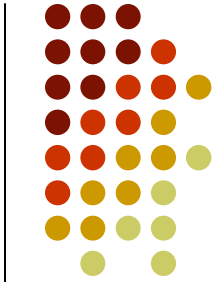


Basis = Spot price - Futures price

S1, S2, F1, F2, b1, b2

b1 = S1 - F1 b2=S2 – F2

Options vs Futures/Forwards



- A futures/forward contract gives the holder the obligation to buy or sell at a certain price
- An option gives the holder the right to buy or sell at a certain price