### Option Terminology

- **Buy - Long**
- **Sell - Short**
- **Call**—the right to buy
- **Put**—the right to sell
- **Key Elements**
  - Exercise or Strike Price
  - Premium or Price of the option
  - Maturity or Expiration

### Market and Exercise Price Relationships

**In the Money** - exercise of the option would be profitable
- **Call**: market price > exercise price
- **Put**: exercise price > market price

**Out of the Money** - exercise of the option would not be profitable
- **Call**: market price < exercise price
- **Put**: exercise price < market price

**At the Money** - exercise price and asset price are equal

### Options Trading

- Some options trade on over-the-counter (OTC) markets
- Option contracts traded on exchanges are standardized
- Most options trading in the U.S. take place on:
  - Chicago Board Options Exchange
  - International Securities Exchange in New York

### Figure 15.1 Options on IBM

<table>
<thead>
<tr>
<th>Option</th>
<th>Strike</th>
<th>Call</th>
<th>Put</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar 2007</td>
<td>85</td>
<td>7.50</td>
<td>17.50</td>
</tr>
<tr>
<td>Apr 2007</td>
<td>85</td>
<td>6.00</td>
<td>20.00</td>
</tr>
<tr>
<td>Jul 2007</td>
<td>85</td>
<td>5.00</td>
<td>15.00</td>
</tr>
<tr>
<td>Oct 2007</td>
<td>85</td>
<td>2.00</td>
<td>10.00</td>
</tr>
</tbody>
</table>

**Underlying stock price: 95.50**
**American vs. European Options**

American - the option can be exercised at any time before expiration or maturity

European - the option can only be exercised on the expiration or maturity date

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**The Option Clearing Corporation**

- Jointly owned by the exchanges on which options are traded
- The OCC places itself between options traders
- OCC guarantees contract performance
  - Thus option writers are required to post margin

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**Different Types of Options**

- Stock Options
- Index Options
- Futures Options
- Foreign Currency Options
- Interest Rate Options

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**15.2 VALUES OF OPTIONS AT EXPIRATION**

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**Payoffs and Profits on Options at Expiration - Calls**

**Notation**

- Stock Price = S
- Exercise Price = X

**Payoff to Call Holder**

- \((S - X)\) if \(S > X\)
- 0 if \(S \leq X\)

**Profit to Call Holder**

- Payoff - Purchase Price

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**Payoffs and Profits on Options at Expiration - Calls**

- \((S - X)\) if \(S > X\)
- 0 if \(S \leq X\)

**Profit to Call Writer**

- Payoff + Premium
Payoffs and Profits at Expiration - Puts

Payoffs to Put Holder
0 if \( S_T \geq X \)
\((X - S_T)\) if \( S_T < X \)

Profit to Put Holder
Payoff - Premium

Payoffs and Profits at Expiration - Puts

Payoffs to Put Writer
0 if \( S_T \geq X \)
\(-(X - S_T)\) if \( S_T < X \)

Profits to Put Writer
Payoff + Premium

Equity, Options & Options Plus T-Bills - Text Example

<table>
<thead>
<tr>
<th>Investment</th>
<th>Strategy</th>
<th>Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity only</td>
<td>Buy stock @ 90 100 shares</td>
<td>$9,000</td>
</tr>
<tr>
<td>Options only</td>
<td>Buy calls @ 10 9 Contracts (900 calls)</td>
<td>$9,000</td>
</tr>
<tr>
<td>Calls Plus</td>
<td>Buy calls @ 10 1 Contract</td>
<td>$1,000</td>
</tr>
<tr>
<td>T-Bills</td>
<td>Buy T-bills @ 2% Yield</td>
<td>$8,000</td>
</tr>
</tbody>
</table>
Table 15.1 Payoff to Protective Put Strategy

<table>
<thead>
<tr>
<th>Stock</th>
<th>$S_t \leq X$</th>
<th>$S_t &gt; X$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Put</td>
<td>$S_t$</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>$X$</td>
<td>$S_t$</td>
</tr>
</tbody>
</table>

Figure 15.5 Rate of Return to Three Strategies

Option Strategies

- Protective Put
  - Long Stock
  - Long Put
- Covered Call
  - Long Stock
  - Short Call
- Straddle
  - Long Call
  - Short Call High Ex.
- Bullish Spread
  - Long Call Low Ex.
  - Short Call High Ex.

Figure 15.6 Value of Protective Put Position at Expiration
Figure 15.7 Protective Put Versus Stock Investment (at-the-money put)

Table 15.2 Payoff to a Covered Call

<table>
<thead>
<tr>
<th>$S_T &lt; X$</th>
<th>$S_T &gt; X$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payoff of stock</td>
<td>$S_T$</td>
</tr>
<tr>
<td>Payoff of call</td>
<td>$-0$</td>
</tr>
<tr>
<td>Total</td>
<td>$S_T$</td>
</tr>
</tbody>
</table>

Table 15.3 Payoff to a Straddle

<table>
<thead>
<tr>
<th>$S_T &lt; X$</th>
<th>$S_T &gt; X$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payoff of call</td>
<td>$0$</td>
</tr>
<tr>
<td>Payoff of put</td>
<td>$- (X - S_T)$</td>
</tr>
<tr>
<td>Total</td>
<td>$X - S_T$</td>
</tr>
</tbody>
</table>

Figure 15.8 Value of a Covered Call Position at Expiration

Table 15.4 Payoff to a Bullish Spread

<table>
<thead>
<tr>
<th>$S_T &lt; X_1$</th>
<th>$X_1 &lt; S_T &lt; X_2$</th>
<th>$S_T &gt; X_2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payoff of first call, exercise price $= X_1$</td>
<td>$0$</td>
<td>$S_T - X_1$</td>
</tr>
<tr>
<td>Payoff of second call, exercise price $= X_2$</td>
<td>$0$</td>
<td>$-0$</td>
</tr>
<tr>
<td>Total</td>
<td>$0$</td>
<td>$S_T - X_1$</td>
</tr>
</tbody>
</table>
Collars

- A collar is an options strategy that brackets the value of a portfolio between two bounds.
- Appropriate for an investor who has a target wealth goal but is unwilling to risk losses beyond a certain level.

Optionlike Securities

- Callable Bonds
- Convertible Securities
- Warrants
- Collateralized Loans
- Levered Equity and Risky Debt
15.4 EXOTIC OPTIONS

Exotic Options

- Asian Options
- Barrier Options
- Lookback Options
- Currency-Translated Options
- Binary Options