Mechanics of Options Markets

Chapter 9
Types of Options

- A call is an option to *buy* the underlying asset at a pre-specified “strike” price.

- A put is an option to *sell* the underlying asset at a pre-specified “strike” price.

- A European option can be exercised only at the end of its life, at expiration (nothing to do with geography).

- An American option can be exercised at any time prior and up to expiration (nothing to do with geography).
Option Positions

- Long call: buy a call option
- Long put: buy a put option
- Short call: sell or “write” a call option
- Short put: sell or “write” a put option
Payoffs from Options
Top: bought and sold call ; Bottom: bought and sold put

\[ K = \text{Strike price}, \quad S_T = \text{Price of asset at maturity} \]

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\begin{align*}
\text{Payoff} & : \quad \text{Max}(S_T - K, 0) \\
\text{Max}(K - S_T, 0) & : \quad \text{Payoff} \\
\text{Payoff} & : \quad - \text{Max}(S_T - K, 0) \\
\text{Payoff} & : \quad - \text{Max}(K - S_T, 0) \\
\end{align*}
\]
**Long/Bought Call**

**Profit** from buying one European call option:

Option price = $5, Strike price = $100.
Profit from writing one European call option:
Option price = $5, Strike price = $100
Long/Bought Put

**Profit** from buying a European put option:

Option price = $7, Strike price = $70

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**Diagram**: The diagram illustrates the profit from buying a European put option. The x-axis represents the terminal stock price ($), ranging from 40 to 100. The y-axis represents profit ($), ranging from -7 to 30. The graph shows a downward sloping line, indicating that as the terminal stock price increases, the profit decreases. The option price and strike price are explicitly noted within the diagram.
Profit from writing a European put option:

Option price = $7,  Strike price = $70

Profit ($) vs. Terminal stock price ($)

Profit = $7 - (Strike price - Terminal stock price)

For example:
- If Terminal stock price = $70, Profit = $7 - ($70 - $70) = $7
- If Terminal stock price = $80, Profit = $7 - ($80 - $70) = $7
- If Terminal stock price = $90, Profit = $7 - ($90 - $70) = $2
Assets Underlying Exchange-Traded Options

- Options Exchanges in the US:
  - Chicago Board Options Exchange
  - NASDAQ OMX (acquired the Philadelphia Stock Exchange in 2008)
  - NYSE Euronext (acquired the American stock exchange in 2008)
  - International Securities Exchange
  - Boston Options Exchange

- Underlying Assets Traded:
  - Stocks
  - Foreign Currency
  - Stock Indices
  - Futures
Specification of Exchange-Traded Options

- Expiration date
  - Options expire on Saturday following the 3rd Friday of expiration month.
  - Stock options in the US are on a January, February, or March cycle.

- Strike price
  - Usually spaced $2.50, $5, or $10 apart, depends on whether stock is:
  - between $5 and $25, $25 and $200, or above $200.

- European or American
  - Whether one can exercise the option only at expiration or anytime.

- Call or Put (option class)
Terminology

Moneyness:

- At-the-money option
  - Stock price = strike price

- In-the-money option
  - Stock price > strike for calls, stock price < strike for puts

- Out-of-the-money option
  - Stock price < strike for calls, stock price > strike for puts
Terminology

- Option class
  - Calls vs. puts

- Option series
  - Options of a given class with same expiration date and strike

- Intrinsic value
  - $\text{Max}(S-K,0)$ for calls, $\text{Max}(K-S,0)$ for puts

- Time value
  - Intrinsic value + time value = option premium (price)
Dividends & Stock Splits

- Suppose you own options with a strike price of $K$ to buy (or sell) $N$ shares:
  - No adjustments are made to the option terms for cash dividends.
  - For an $n$-for-$m$ stock split (going from $m$ to $n$ shares),
    - the strike price is reduced to $mK/n$.
    - the number of shares that can be bought (or sold) is increased to $nN/m$.
  - Stock dividends are handled in a manner similar to stock splits.
Dividends & Stock Splits: Example

- Consider a call option to buy 100 shares for $30 per share.

- How should terms be adjusted:
  - for a 2-for-1 stock split?
  - for a 20% stock dividend?
Dividends & Stock Splits: Example

- A 2-for-1 stop split doubles the number of shares and halves the price.
- The new strike price becomes $30/2 = $15.
- The option under the new contract terms now gives the owner the right to buy $100 \times 2 = 200$ shares.

- A 20% stock dividend gives you 120 shares for every 100 shares owned: same as a 120-for-100 or 6-for-5 stock split.
- The new option contract gives you the right to buy $100 \left( \frac{6}{5} \right) = 120$ shares at a new strike price of $30 \left( \frac{5}{6} \right) = $25.
Market Makers

- Most exchanges use market makers to facilitate options trading, ensuring orders get executed without any delays.

- A market maker quotes both bid and ask prices when requested and supplies liquidity/inventory.

- The market maker does not know whether the individual requesting the quotes wants to buy or sell.

- The market maker makes a profit from the bid-ask spread, (not from a proprietary trading strategy).
Margin

- Margin is required when options are sold.

- For example, when a naked call option is written in the US, the margin is the greater of:

  1. A total of 100% of the proceeds of the sale plus 20% of the underlying share price less the amount (if any) by which the option is out of the money.

  2. A total of 100% of the proceeds of the sale plus 10% of the underlying share price (exercise price for a put).
The Options Clearing Corporation

- The OCC performs the same function for options as the clearinghouse for futures markets.

- Has a number of members, and all option trades must be cleared through a member.

- If a broker is not itself a member of an exchange’s OCC, it must arrange to clear its trades with a member.

- Members must have a minimum capital and contribute to a special fund that can be used in case of default.
Warrants

- Warrants are options that are issued by a corporation or a financial institution.

- The number of warrants outstanding is determined by the size of the original issue and changes only when they are exercised or when they expire.
Warrants (continued)

- Warrants are traded in the same way as stocks, but over-the-counter.
- The issuer settles up with the holder when a warrant is exercised.
- When call warrants are issued by a corporation on its own stock, exercise will lead to new treasury stock being issued.
Employee/Executive Stock Options

- Employee stock options are a form of remuneration issued by a company to its executives.

- They are usually at the money when issued.

- When options are exercised, the company issues more stock and sells it to the option holder for the strike price.

- Expensed on the income statement.
Convertible Bonds

- Convertible bonds are regular bonds that can be exchanged for equity at certain times in the future according to a predetermined exchange ratio.

- In return for the equity/upside potential, the bond usually pays lower coupons than an otherwise identical bond.

- But should the stock price rise above a pre-determined ("nominal price") threshold, the bond can be converted.

- Therefore these bonds have an embedded call option on the company stock.