Chapter 3

Mechanics of the Options Markets

The fundamental difference between a forward or futures contract and an options contract is that *the holder of the option has only the right to do something.*

3.1 Types of Options

- **American option** - An option that can be exercised *at any time* up to the expiration date.

- **European option** - An option that can be exercised *only on the expiration date.*

- **Call option** - Gives the holder of the option *the right to buy* an asset by a certain date for a certain price

  For example, assume an investory buys an option for 100 shares of stock with a strike price of $100. The stock is currently priced at $98. The price

of the option is $5 and expires in 4 months.

- Initial investment = $100 \times \$5 = \$500$

- If the stock price is less than $100, the call option has no value.

- If the stock price increases to say $115, then a profit is made [($115 − $100) × 100 − $500 = $1,000]

For a speculator, a call option only yields a profit when the price increases in value. The holder of the option can now buy for $100 and immediately sell for $115.

How might a call option be used by a hedger? An example is a cattle feeder who wants to limit exposure to increasing corn prices. Increases in corn prices can then be offset from the gains in call option. What if corn prices do not increase? Then the hedger is left with the cost of the option, but has eliminated adverse risk.

Below shows the profit per share from a call option given different ending prices.

- **Put option** - Gives the holder of the option *the right to sell* an asset by a certain date for a certain price

For example, assume an investory buys an option for 100 shares of stock with a strike price of $70. The stock is currently priced at $65. The price of the option is $7 and expires in 3 months.
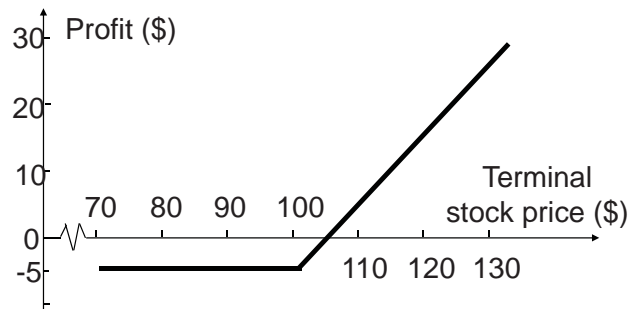
- Initial investment = $100 \times \$7 = \$700$

- If the stock price is more than $70, the put option has no value.

- If the stock price decreases to say $55, then a profit is made [($70 − $55) × 100 − $700 = $800]

Long Call
(Figure 9.1, Page 207)

Profit from buying one European call option: option price = $5, strike price = $100.

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For a speculator, a put option only yields a profit when the price decreases in value. The holder of the option can now sell for $70 and immediately buy for $55.

How might a put option be used by a hedger? An example is a cattle rancher who wants to limit exposure to decreasing cattle prices. Decreases in cattle prices can then be offset from the gains in put option. What if cattle prices do not decrease? Then the hedger is left with the cost of the option, but has eliminated adverse risk.
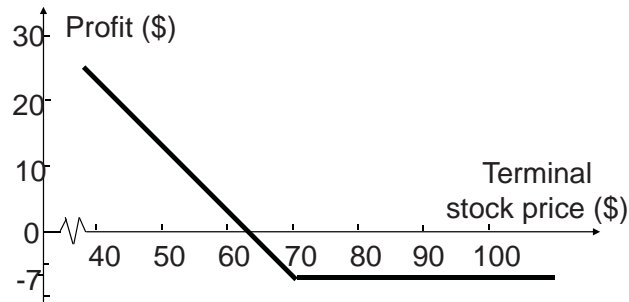
Below shows the profit per share from a put option given different ending prices.

Long Put
(Figure 9.2, page 208)

Profit from buying a European put option: option price = $7, strike price = $70

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3.2   Option Positions

There are two sides to every option:

1. The investor has taken a **long position** (i.e., has bought the option)

2. The investor has taken a **short position** (i.e., has *written* the option)

We've already discussed the long position, but now will focus on the short position. The writer of the option, receives cash up from but has potential liabilities later. The profit or loss for the writer is the reverse of that for the purchaser of the option. Figures 9.3 and 9.4 show the profit or loss for the writer given the examples previously discussed above.
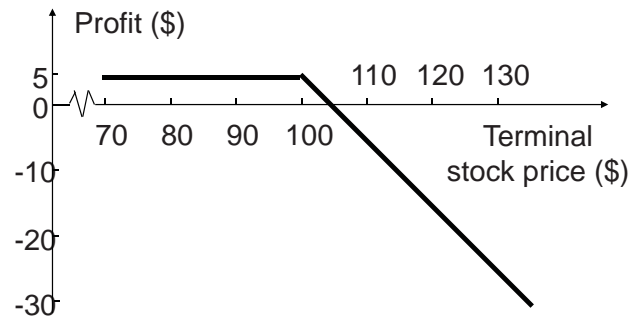
Notice that the writer of the contract always assumes downside risk exposure while the purchaser of the option has very limited downside risk.

Short Call
(Figure 9.3, page 208)

Profit from writing one European call option: option price = \$5, strike price = \$100

Profit (\$)

5
0
-10
-20
-30

70   80   90   100   110 120 130

Terminal stock price (\$)

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To formalize, there are four option positions that can be taken, each with its own profit function

1. Long position in a call option (purchase a call option)

   $Profit = \max(S_T - K, 0) - IC$

2. Long position in a put option (purchase a put option)

   $Profit = \max(K - S_T, 0) - IC$

3. Short position in a call option (write a call option)

   $Profit = \min(K - S_T, 0) + IC$

   Note: $min(K - S_T, 0) + IC = -(max(S_t - K, 0) - IC)$, or rather, the negavative of the short position is equal to the long position. This is a **zero-sum game**.

4. Short position in a put option (write a put option)

$$Profit = \min(S_T - K, 0) + IC$$

where the following are used

- K = Strike price

- S_T = Price of asset at maturity

- IC = Initial Cost of option

3.3 Options Terminology

- **In-the-money** - When the price of the asset is favorable relative to the strike price in that it has value.

  - In the case of a put, when the price is below the strike

  - In the case of a call, when the price is above the strike

- **At-the-money** - When the price of the asset is equal to the strike price.

- **Out-of-the-money** - When the price of the asset is unfavorable relative to the strike price in that it has no value.

  - In the case of a put, when the price is above the strike

  - In the case of a call, when the price is below the strike

3.4 Margins

Margins are required when writing an option, but not when purchasing an option.

Short Put
(Figure 9.4, page 209)

Profit from writing a European put option: option price = $7, strike price = $70