Put Options

A put option is a contract that gives the owner the right, but not the obligation, to sell an underlying asset, at a fixed price ($K), on (or on or before) a specific day.

The put writer is obligated to buy the underlying asset, and pay $K for it.

Define $S$ as the price of the underlying asset, and $K$ as the strike price.

- In, out of, and at the money for puts
  - In the money if $S < K$
  - Out of the money if $S > K$
  - At the money if $S \sim K$
  - Deep in (out of) the money if $S \ll K$ ($S \gg K$)

Intrinsic value of a put = max(0, $K - S$)

Value of Put at Expiration (A.K.A. Payoff Diagram)

Profit Diagram -- Long Put (Buying a Put)

Just lower the payoff diagram by the put premium (price of put) to get the profit diagram.
Example of a Put Option

- buy a put option to purchase 100 Exxon shares
  - strike price = $70
  - price of an option to buy one share = $7
- initial investment is $700
- The outcome
  - Exxon’s share price is $55 at the expiration
  - to exercise the option for a gain of ($70-$55) x 100 = $1,500
  - the net gain = $1,500 - $700 = $800

Profit Diagram – Short Put (Selling a Put)

Insurance

- Insurance. If you own the underlying asset, buying a put provides protection against the possibility that the underlying asset price will fall below $K. Of course, insurance costs money (the put premium).

Call Options

- A call option is a contract that gives the owner the right, but not the obligation, to buy an underlying asset, at a fixed price, on (or on or before) a specific day.
- The fixed price is called the strike price, or the exercise price.

Call Options

- In, out of, and at the money: Define $S$ as the price of the underlying asset, and $K$ as the strike price. Then, for a call:
  - In the money if $S > K$
  - Out of the money if $S < K$
  - At the money if $S \approx K$
  - Deep in (out of) the money if $S >> K$ ($S << K$)
Value of Call at Expiration, (A.K.A. Payoff Diagram)

Profit Diagram -- Long Call (Buying a Call Option)

Example of a Call Option
- buy a call option to purchase 100 MSFT shares
  - strike price = $52
  - current share price = $50
  - price of an option to buy one share = $2
  - initial investment is 100 x $2 = $200
- The outcome
  - MSFT’s share price is $55 at the expiration
  - to exercise the option for a gain of ($55 - $52) x 100 = $300
  - the net gain = $300 - $200 = $100

Example of a Call Option (cont.)

Example of a Call Option
- buy a call option to purchase 100 IBM shares
  - strike price = $100
  - current share price = $98
  - price of an option to buy one share = $5
  - initial investment is 100 x $5 = $500 (Worse case is that this will be lost)
- The outcome
  - IBM’s share price is $115 at the expiration
  - to exercise the option for a gain of ($115 - $100) x 100 = $1,500
  - the net gain = $1,500 - $500 = $1,000

Example of a Call Option (cont.)

Figure Profit from buying a Call Option on 100 IBM shares. Option price = $5; strike price = $100
Profit Diagram – Short Call  
(Selling a Call Option)

Example of a Call Option (cont.)

Example of a Put Option (cont.)

Option Positions (cont.)