

## Handout 17: Definitions and Payoffs at Expiration of Calls and Puts

Corporate Finance, Sections 001 and 002

### I. The Options Contract

An option contract has three elements. The underlying asset, exercise price (also called the strike price) and the expiration date.

- Buyer of a call option is the *right* to buy stock at date  $t$  for the exercise price  $E$ .
- Buyer of a put option is the *right* to sell stock at date  $t$  for the exercise price  $E$ .

On the other side of each of these contracts is a counterparty. In options parlance “write” is the same as “sell”.

- Writer of a call has the *obligation* to sell the stock at date  $t$  for the exercise price  $E$  if the counterparty chooses to exercise.
- Writer of a put has the *obligation* to buy the stock at date  $t$  for the exercise price  $E$  if the counterparty chooses to exercise.

### II. Payoffs and Profits at Expiration

The payoff at expiration is the dollar amount the investor receives at expiration from following the option strategy.

The profit at expiration is the payoff, minus the cost of the setting up the strategy.

Notation:

$S$      Stock price

$E$      Exercise price

Claim: At expiration,

$$\text{Payoff to buying a call} = \max[0, S - E]$$

$$\text{Payoff to buying a put} = \max[0, E - S]$$

For these examples, consider  $E = 100$ . Suppose that when the strategies were set up, calls and puts with this exercise price each cost \$10.

1. Buying a call (long a call)

| S   | Payoff | Profit         |
|-----|--------|----------------|
| 130 | 30     | $30 - 10 = 20$ |
| 120 | 20     | 10             |
| 110 | 10     | 0              |
| 100 | 0      | -10            |
| 90  | 0      | -10            |
| 80  | 0      | -10            |
| 70  | 0      | -10            |

2. Buying a put (long a put)

| S   | Payoff | Profit |
|-----|--------|--------|
| 130 | 0      | -10    |
| 120 | 0      | -10    |
| 110 | 0      | -10    |
| 100 | 0      | -10    |
| 90  | 10     | 0      |
| 80  | 20     | 10     |
| 70  | 30     | 20     |

3. Selling (writing) a call (short a call)

| S   | Payoff | Profit |
|-----|--------|--------|
| 130 | -30    | -20    |
| 120 | -20    | -10    |
| 110 | -10    | 0      |
| 100 | 0      | 10     |
| 90  | 0      | 10     |
| 80  | 0      | 10     |
| 70  | 0      | 10     |

4. Selling (writing) a put (short a put)

| S   | Payoff | Profit |
|-----|--------|--------|
| 130 | 0      | 10     |
| 120 | 0      | 10     |
| 110 | 0      | 10     |
| 100 | 0      | 10     |
| 90  | -10    | 0      |
| 80  | -20    | -10    |
| 70  | -30    | -20    |