

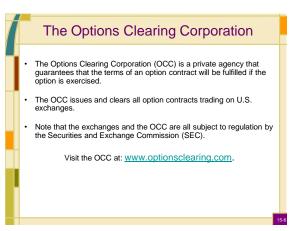




 A list of available option contracts and their prices for a particular security is known as an option chain.

- Stock option ticker symbols include:
  - Letters to identify the underlying stock.
  - A letter to identify the expiration month as well as whether the option is a call or a put. (A through L for calls; M through X for puts).
  - A letter to identify the strike price (a bit more complicated—see Yahoo or Stock-Trak for tables to explain this letter.)

	TABLE 15.1 Stock Option Ticker Symbol and Strike Price Codes								
		Expiration Month	Calls	Puts	Strike S	A	Strike 70	N	
		January February	B	M	10	8	75	0	
		March	c	o	15	c	80		
		April	D	P	20	D	85	0	
		May	E	0	25	E	90	R	
		June	F	R	30	F	95	5	
		July	G	5	35	G	100	T	
		August	н	т	40		7.5	U	
		September	1	U	45	1	12.5	٧	
		October	1	v	50	1	17.5	w	
		November	к	w	55	к	22.5	х	
		December	L	×	60	L	27.5	Y	
					65	м	32.5	z	



## Stock Index Options

- · A stock index option is an option on a stock market index.
- The most popular stock index options are options on the S&P 100, S&P 500, and Dow Jones Industrial Average.
- Because the actual delivery of all stocks comprising a stock index is impractical, stock index options have a cash settlement procedure.
  - That is, if the option expires in the money, the option writer simply pays the option holder the intrinsic value of the option.
  - The cash settlement procedure is the same for calls and puts.

## Option "Moneyness"

- "In-the-money" option: An option that would yield a positive payoff if exercised
- "Out-of-the-money" option: An option that would NOT yield a positive payoff if exercised
- · Use the relationship between S (the stock price) and K (the strike price):

	In-the-Money	Out-of-the-Money
Call Option	S > K	S≤K
Put Option	S < K	S≥K

Note for a given strike price, only the call or only the put can be "in-the-money."

# **Option Writing**

- · The act of selling an option is referred to as option writing.
- · The seller of an option contract is called the writer.
  - The writer of a call option contract is obligated to sell the underlying asset to the call option holder.
  - The call option holder has the right to exercise the call option (i.e., buy the underlying asset at the strike price).
  - The writer of a put option contract is obligated to buy the underlying asset from the put option holder.
  - The put option holder has the right to exercise the put option (i.e., sell the underlying asset at the strike price).
- Because option writing obligates the option writer, the option writer receives the price of the option today from the option buyer.

### **Option Exercise**

- Option holders have the right to exercise their option.
  If this right is only available at the option expiration date, the option is said to have European-style exercise.
  - If this right is available at any time up to and including the option expiration date, the option is said to have American-style exercise.
- Exercise style is not linked to where the option trades. Europeanstyle and American-style options trade in the U.S., as well as on other option exchanges throughout the world.
- Very Important: Option holders also have the right to sell their option at any time. That is, they do not have to exercise the option if they no longer want it.

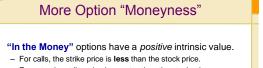
## **Option Payoffs versus Option Profits**

- Option investment strategies involve initial and terminal cash flows.
  - Initial cash flow: option price (often called the option premium).Terminal cash flow: the value of an option at expiration (often
  - called the option payoff.
- The terminal cash flow can be realized by the option holder by exercising the option.

Option Profits = Terminal cash flow - Initial cash flow

## **Option Intrinsic Values**

- The *intrinsic value* of an option is the payoff that an option holder receives if the underlying stock price does not change from its current value.
- That is, if S is the current stock price, and K is the strike price of the option:
- Call option intrinsic value = MAX [0, S-K]
  - In words: The call option intrinsic value is the maximum of zero or the stock price minus the strike price.
- Put option intrinsic value = MAX [0, K-S]
  - In words: The put option intrinsic value is the maximum of zero or the strike price minus the stock price.



- $-\,$  For puts, the strike price is  $\ensuremath{\textit{greater}}$  than the stock price.
- "Out of the Money" options have a zero intrinsic value.
  - For calls, the strike price is greater than the stock price.
  - For puts, the strike price is less than the stock price.
- "At the Money" options is a term used for options when the stock price and the strike price are about the same.

## Arbitrage and Option Pricing Bounds

#### Arbitrage:

- No possibility of a loss
- A potential for a gain
- No cash outlay
- In finance, arbitrage is not allowed to persist.
  "Absence of Arbitrage" = "No Free Lunch"
  - The "Absence of Arbitrage" rule is often used in finance to calculate option prices.
- Think about what would happen if arbitrage were allowed to persist. (Easy money for everybody)

## The Upper Bound for a Call Option Price

- · Call option price must be less than the stock price.
- Otherwise, arbitrage will be possible.
- How?

 Suppose you see a \$65 call option selling for \$1, and the underlying stock is selling for \$60.

- The Arbitrage: option is exercised and you pocket \$4.

## The Lower Bound on Option Prices

- Option prices must be at least zero.
- An option holder can simply discard the option.
  This means that no one would pay someone to take an option off their hands.
- Therefore, the price of the option cannot be negative.

## **Put-Call Parity**

- Put-Call Parity is perhaps the most fundamental relationship in option pricing.
- Put-Call Parity is generally used for options with European-style exercise.
- Put-Call Parity states: the difference between the call price and the put price equals the difference between the stock price and the discounted strike price.

# The Put-Call Parity Formula

$$C - P = S - K/(1+r)^{T}$$

#### In the formula:

- C is the call option price today
- S is the stock price today
- r is the risk-free interest rate
- P is the put option price today
- $-\,$  K is the strike price of the put and the call
- $-\$  T is the time remaining until option expiration

Note: this formula can be rearranged:  $K/(1+r)^{T} = S + P - C$