3

Contract Specifications and Option Terminology

Every option market brings together traders and investors with different expectations and goals. Some enter the market with an opinion on which direction prices will move. Some intend to use options to protect existing positions against adverse price movement. Some hope to take advantage of price discrepancies between similar or related products. Some act as middlemen, buying and selling as an accommodation to other market participants and hoping to profit from the difference between the bid price and ask price.

Even though expectations and goals differ, every trader's education must include an understanding of option contract specifications and a mastery of the terminology used in option markets. Without a clear understanding of the terms of an option contract and the rights and responsibilities under that contract, a trader cannot hope to make the best use of options, nor will he be prepared for the very real risks of trading. Without a facility in the language of options, a trader will find it impossible to communicate his desire to buy or sell in the marketplace.

Contract Specifications

There are several aspects to contract specifications.

Type

In Chapter 1, we introduced the two types of options. A *call option* is the right to buy or take a long position in an asset at a fixed price on or before a specified date. A *put option* is the right to sell or take a short position in an asset.

Note the difference between an option and a futures contract. A futures contract requires delivery at a fixed price. The buyer and seller of a futures contract both have clearly defined obligations that they must meet. The seller

must make delivery, and the buyer must take delivery. The buyer of an option, however, has a choice. He can choose to take delivery (a call) or make delivery (a put). If the buyer of an option chooses to either make or take delivery, the seller of the option is obligated to take the other side. In option trading, all rights lie with the buyer and all obligations with the seller.

Underlying

The *underlying asset* or, more simply, the *underlying* is the security or commodity to be bought or sold under the terms of the option contract. If an option is purchased directly from a bank or other dealer, the quantity of the underlying can be tailored to meet the buyer's individual requirements. If the option is purchased on an exchange, the quantity of the underlying is set by the exchange. On stock option exchanges, the underlying is typically 100 shares of stock.[1] The owner of a call has the right to buy 100 shares; the owner of a put has the right to sell 100 shares. If, however, the price of an underlying stock is either very low or very high, an exchange may adjust the number of shares in the underlying contract in order to create a contract size that is deemed reasonable for trading on the exchange.[2]

On all futures options exchanges, the underlying is uniformly one futures contract. The owner of a call has the right to buy one futures contract; the owner of a put has the right to sell one futures contract. Most often, the underlying for an option on a futures contract is the futures month that corresponds to the expiration month of the option. The underlying for an April futures option is an April futures contract; the underlying for a November futures option is a November futures contract. However, an exchange may also choose to list *serial options* on futures—option expirations where there is no corresponding futures month. When a futures option has no corresponding futures month, the underlying contract is the nearest futures contract beyond expiration of the option.

For example, many financial futures are listed on a quarterly cycle, with trading in March, June, September, and December futures. The underlying for a March option is a March futures contract; the underlying for a June option is a June futures contract. If there are also serial options, then

> The underlying for a January or February option is a March futures contract.
> The underlying for an April or May option is a June futures contract.
> The underlying for a July or August option is a September futures contract.
> The underlying for an October or November option is a December futures contract.

Some interest-rate futures markets [e.g., Eurodollars at the Chicago Mercantile Exchange, Short Sterling and Euribor at the London International Financial Futures Exchange], in addition to listing long-term options on a long-term futures contract, may also list short-term options on the same

[1] One hundred shares is sometimes referred to as a *round lot*. An order to buy or sell fewer than 100 shares is an *odd lot*.

[2] Many exchanges also permit trading in *flex options*, where the buyer and seller may negotiate the contract specifications, including the quantity of the underlying, the expiration date, the exercise price, and the exercise style.

long-term futures contract. A March futures contract maturing in two years may be the underlying for a March option expiring in two years. But the same futures contract may also be the underlying for a March option expiring in one year. Short-term options on long-term futures are listed as *midcurve options*. The options can be one-year midcurve (a short-term option on a futures contract with at least one year to maturity), two-year midcurve (a short-term option on a futures contract with at least two years to maturity), or five-year midcurve (a short-term option on a futures contract with at least five years to maturity).

Expiration Date or Expiry

The expiration date is the date on which the owner of an option must make the final decision whether to buy, in the case of a call, or to sell, in the case of a put. After expiration, all rights and obligations under the option contract cease to exist.

On many stock option exchanges, the expiration date for stock and stock index options is the third Friday of the expiration month.[3] Of more importance to most traders is the *last trading day*, the last business day prior to expiration on which an option can be bought or sold on an exchange. For most stock options, expiration day and the last trading day are the same, the third Friday of the month. However, Good Friday, a legal holiday in many countries, occasionally falls on the third Friday of April. When this occurs, the last trading day is the preceding Thursday.

When stock options were introduced in the United States, trading in expiring contracts ended at the close of business on the third Friday of the month. However, many derivative strategies require carrying an offsetting stock position to expiration, at which time the stock position is liquidated. Consequently, stock exchanges found that as the close of trading approached on expiration Friday, they were faced with large orders to buy or sell stock. These large orders often had the effect of disrupting trading or distorting prices at expiration.

To alleviate the problem of large order imbalances at expiration, some derivative exchanges, working with the stock exchanges on which the underlying stocks were traded, agreed to establish an expiration value for a derivatives contract based on the opening price of the underlying contract rather than the closing price on the last trading day. This *AM expiration* is commonly used for stock index contracts. Options on individual stocks are still subject to the traditional *PM expiration*, where the value of an option is determined by the underlying stock price at the close of trading on the last trading day.

Although the expiration date for stock options is relatively uniform, the expiration date for futures options can vary, depending on the underlying commodity or financial instrument. For futures on physical commodities, such as agricultural or energy products, delivery at maturity may take several days. As a consequence, options on futures for physical commodities will often expire several days or even weeks prior to the maturity of the futures contract, most commonly in the month prior to the futures month. An option on a March futures contract will expire in February; an option on a July futures contract will

[3] In the early days of option trading, exchange-traded options often expired on a nonbusiness day, typically on a Saturday. This gave the exchange an extra day to process the paperwork associated with expiring options.

expire in June; an option on a November futures contract will expire in October. A trader will need to consult the exchange calendar to determine the exact expiration date, which is set by each individual exchange.

Exercise Price or Strike Price

The exercise or strike price is the price at which the underlying will be delivered should the holder of an option choose to exercise his right to buy or sell. If the option is exercised, the owner of a call will pay the exercise price; the owner of a put will receive the exercise price.

The exercise prices available for trading on an option exchange are set by the exchange, usually at equal intervals and bracketing the current price of the underlying contract. If the price of the underlying contract is 62 when options are introduced, the exchange may set exercise prices of 50, 55, 60, 65, 70, and 75. At a later date, as the price of the underlying moves up or down, the exchange can add additional exercise prices. If the price of the underlying rises to 70, the exchange may add exercise prices of 80, 85, and 90. Additionally, if the exchange feels that it will further facilitate trading, it can introduce intermediate exercise prices—52½, 57½, 62½, 67½.

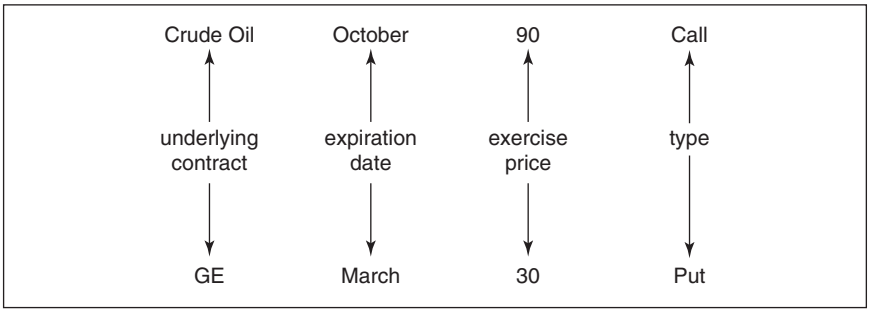
As an example of an exchange-traded option, the buyer of a crude oil October 90 call on the New York Mercantile Exchange has the right to take a long position in one October crude oil futures contract for 1,000 barrels of crude oil (the underlying) at a price of $90 per barrel (the exercise price) on or before the October expiration (the expiration date). The buyer of a General Electric March 30 put on the Chicago Board Options Exchange has the right to take a short position in 100 shares of General Electric stock (the underlying) at a price of $30 per share (the exercise price) on or before March expiration (the expiration date).

Option contract specifications are further outlined in Figure 3-1.

Exercise and Assignment

The buyer of a call or a put option has the right to exercise that option prior to its expiration date, thereby converting the option into a long underlying position in the case of a call or a short underlying position in the case of a put. A trader who exercises a crude oil October 90 call has chosen to take a long position in one October crude oil futures contract at $90 per barrel. A trader who

Figure 3-1 Option contract specifications.



exercises a GE March 30 put has chosen to take a short position in 100 shares of GE stock at $30 per share. Once an option is exercised, the rights and obligations associated with the option cease to exist, just as if the option had been allowed to expire.

A trader who intends to exercise an option must submit an exercise notice to either the seller of the option, if purchased from a dealer, or to the exchange, if the option was purchased on an exchange. When a valid exercise notice is submitted, the seller of the option has been assigned. Depending on the type of option, the seller will be required to take a long or short position in the underlying contract at the option's exercise price.

Once a contract has been traded on an exchange, the link between buyer and seller is broken, with the exchange becoming the counterparty to all trades. Still, when a trader exercises an option, the exchange must assign someone to either buy or sell the underlying contract at the exercise price. How does the exchange make this decision? The party who is assigned must be someone who has sold the option and has not closed out the position through an offsetting trade. Beyond this, the exchange's decision on who will be assigned is essentially random, with no trader having either a greater or lesser probability of being assigned.

New traders sometimes become confused about whether the exercise and assignment result in a long position (buying the underlying contract) or a short position (selling the underlying contract). The following summary may help: if you

Exercise a call	You choose to *buy* at the exercise price.
Are assigned on a call	You are required to *sell* at the exercise price.
Exercise a put	You choose to *sell* at the exercise price.
Are assigned on a put	You are required to *buy* at the exercise price

Depending on the underlying contract, when an exchange-traded option is exercised, it can settle into

1. The physical underlying
2. A futures position
3. Cash

Settlement into the Physical Underlying

If a call option settles into the physical underlying, the exerciser pays the exercise price and in return receives the underlying. If a put option settles into the physical underlying, the exerciser receives the exercise price and in return must deliver the underlying. Stock options always settle into the physical underlying.

You exercise one January 110 call on stock.
  You must pay 100 × $110 = $11,000.
  You receive 100 shares of stock.
You are assigned on six April 40 calls on stock.
  You receive 600 × $40 = $24,000.
  You must deliver 600 shares of stock.

You exercise two July 60 puts on stock.
You receive 200 × $60 = $12,000.
You must deliver 200 shares of stock.
You are assigned on three October 95 puts on stock.
You must pay 300 × $95 = $28,500.
You receive 300 shares of stock.

Note that the cash flow resulting from settlement into the physical underlying depends only on the exercise price. In our examples, whether the price of the stock at exercise is $10 or $1,000, the exerciser of a call pays only the exercise price, not the stock price. The exerciser of a put receives only the exercise price. Of course, the profit or loss resulting from the option trade will depend on both the stock price and the price originally paid for the option. But the cash flow when the option is exercised is independent of these.

Settlement into a Futures Position

If an option settles into a futures position, it is just as if the exerciser is buying or selling the futures contract at the exercise price. The position is immediately subject to futures-type settlement, requiring a margin deposit and accompanied by a variation payment.

An underlying futures contract is currently trading at 85.00 with a point value of $1,000. Margin requirements are $3,000 per contract.

You exercise one February 80 call.
You immediately become long one futures contract at a price of 80.
You must deposit with the exchange the required margin of $3,000.
You will receive a variation credit of (85 – 80) × $1,000 = $5,000.
You are assigned on six May 75 calls.
You immediately become short six futures contracts at a price of 75.
You must deposit with the exchange the required margin of 6 × $3,000 = $18,000.
You will have a variation debit of (75 – 85) × $1,000 × 6 = –$60,000
You exercise four August 100 puts.
You immediately become short four futures contracts at a price of 100.
You must deposit with the exchange the required margin of 4 × $3,000 = $12,000.
You will receive a variation credit of (100 – 85) × $1,000 × 4 = $60,000.
You are assigned on two November 95 puts.
You immediately become long two futures contracts at a price of 95.
You must deposit with the exchange the required margin of 2 × $3,000 = $6,000.
You will have a variation debit of (85 – 95) × $1,000 × 2 = –$20,000.

Settlement into Cash

This type of settlement is used primarily for index contracts where delivery of the underlying contract is not practical. If exercise of an option settles into cash, no underlying position results. There is a cash payment equal to the difference between the exercise price and the underlying price at the end of the trading day.

An underlying index is fixed at the end of the trading day at 300. The exchange has assigned a value of $500 to each index point.

You exercise three March 250 calls.
You have no underlying position.
Your account will be credited with (300 – 250) × $500 × 3 = $75,000.
You are assigned on seven June 275 calls.
You have no underlying position.
Your account will be debited by (275 – 300) × $500 × 7 = $87,500.
You exercise two September 320 puts.
You have no underlying position.
Your account will be credited with (320 – 300) × $500 × 2 = $20,000.
You are assigned on four December 340 puts.
You have no underlying position.
Your account will be debited by (300 – 340) × $500 × 4 = $80,000.

Exercise Style

In addition to the underlying contract, exercise price, expiration date, and type, an option is further identified by its exercise style, either *European* or *American*. A European option can only be exercised at expiration. In practice, this means that the holder of a European option must make the final decision whether to exercise or not on the last business day prior to expiration. In contrast, an American option can be exercised on any business day prior to expiration.

The designation of an option's exercise style as either European or American has nothing to do with geographic location. Many options traded in the United States are European, and many options traded in Europe are American.[4] Generally, options on futures and options on individual stocks tend to be American. Options on indexes tend to be European.

Option Price Components

As in any competitive market, an option's price, or premium, is determined by supply and demand. Buyers and sellers make competitive bids and offers in the marketplace. When a bid and offer coincide, a trade is made.

The premium paid for an option can be separated into two components—the *intrinsic value* and the *time value*. An option has intrinsic value if it enables the holder of the option to buy low and sell high or sell high and buy low, with the intrinsic value being equal to the difference between the buying price and the selling price. With an underlying contract trading at $435, the intrinsic value of a 400 call is $35. By exercising the option, the holder of the 400 call can buy at $400. If he then sells at the market price of $435, $35 will be credited to his account. With an underlying contract trading at $62, the intrinsic value of a 70

[4] It does appear that the first options traded in the United States carried with them the right of early exercise—hence the term *American option*.

put is $8. By exercising the option, the holder of the put can sell at $70. If he then buys at the market price of $62, he will show a total credit of $8.

A call will only have intrinsic value if its exercise price is less than the current market price of the underlying contract because no one would choose to buy high and sell low. A put will only have intrinsic value if its exercise price is greater than the current market price of the underlying contract because no one would choose to sell low and buy high. The amount of intrinsic value is the amount by which the exercise price is less than the current underlying price in the case of a call or the amount by which the exercise price is greater than the current underlying price in the case of a put. No option can have an intrinsic value less than zero. If S is the spot price of the underlying contract and X is the exercise price, then

Call intrinsic value = maximum of either 0 or $S - X$.
Put intrinsic value = maximum of either 0 or $X - S$.

Note that the intrinsic value is independent of the expiration date. With the underlying contract at $83, a March 70 call and a September 70 call both have an intrinsic value of $13. A June 90 put and a December 90 put both have an intrinsic value of $7.

Usually, an option's price in the marketplace will be greater than its intrinsic value. The *time value*, sometimes also referred to as the option's *time premium* or *extrinsic value*, is the additional amount of premium beyond the intrinsic value that traders are willing to pay for an option. Market participants are willing to pay this additional amount primarily because of the protective characteristics afforded by an option over an outright long or short position in the underlying contract.

An option's premium is always composed of precisely its intrinsic value and its time value. Examples of intrinsic value and time value are shown in Figure 3-2. If a $400 call is trading at $50 with the underlying trading at $435, the time value of the call must be $15 because the intrinsic value is $35. The two components must add up to the option's total premium of $50. If a $70 put on a stock is trading for $11 with the stock trading at $62, the time value of the put must be $3 because the intrinsic value is $8. Again, the intrinsic value and the time value must add up to the option's premium of $11.

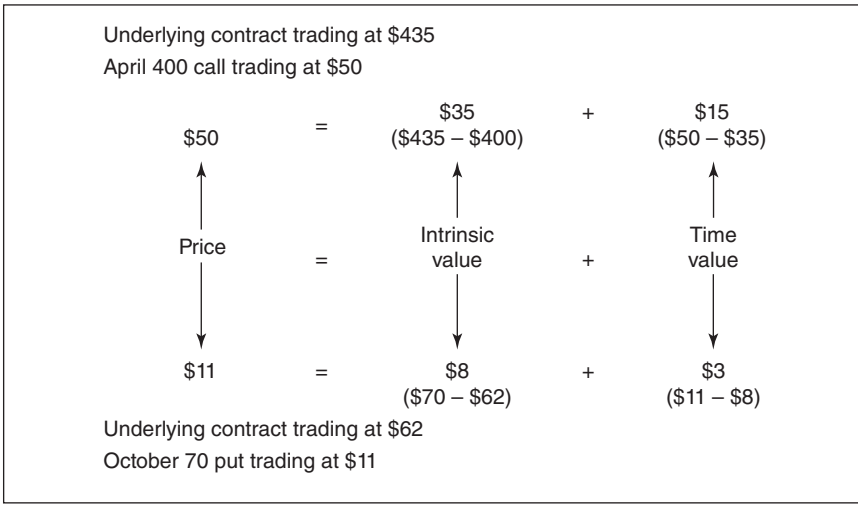
Even though an option's premium is always composed of its intrinsic value and its time value, one or both of these components can be zero. If the option has no intrinsic value, its price in the marketplace will consist solely of time value. If the option has no time value, its price will consist solely of intrinsic value. In the latter case, traders say that the option is trading at *parity*.

Although an option's intrinsic value can never be less than zero, it is possible for a European option to have a negative time value. (More about this in Chapter 16 when we look at the early exercise of American options.) When this happens, the option can trade for less than parity. Usually, however, an option's premium will reflect some nonnegative amount of time value.

In the Money, At the Money, and Out of the Money

Depending on the relationship between an option's exercise price and the price of the underlying contract, options are said to be in the money, at the

Figure 3-2 Intrinsic value and time value.

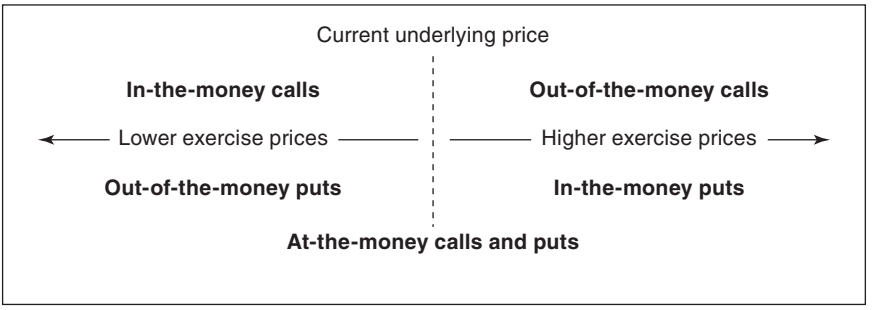


money, and out of the money. Any option that has a positive intrinsic value is said to be *in the money* by the amount of the intrinsic value. With a stock at $44, a $40 call is in the money by $4. A $55 put on the same stock is in the money by $11. An option with no intrinsic value is said to be *out of the money*, and its price consists solely of time value. In order to be in the money, a call must have an exercise price lower than the current price of the underlying contract, and a put must have an exercise price higher than the current price of the underlying contract. Note that if a call is in the money, a put with the same exercise price and underlying contract must be out of the money. Conversely, if the put is in the money, a call with the same exercise price must be out of the money. In our examples with the stock at $44, the $40 put is out of the money by $4 and the $55 call is out of the money by $11.

Finally, an option whose exercise price is equal to the current price of the underlying contract is said to be *at the money*. Technically, such an option is also out of the money because it has no intrinsic value. Traders make the distinction between at-the-money and out-of-the-money options because, as we shall see, at-the-money options often have very specific and desirable characteristics, and such options tend to be the most actively traded.

If we want to be very precise, for an option to be at the money, its exercise price must be exactly equal to the current price of the underlying contract. However, for exchange-traded options, the term is commonly applied to the call and put whose exercise price is closest to the current price of the underlying contract. With a stock at $74 and $5 between exercise prices ($65, $70, $75, $80, etc.), the $75 call and the $75 put are the at-the-money options. These are the call and put options with exercise prices closest to the current price of the underlying contract. In-, at-, and out-of-the-money options are outlined in Figure 3-3.

Figure 3-3 In-, at-, and out-of-the-money options.



Automatic Exercise

At expiration an in-the-money option will always have some intrinsic value. A trader can capture this value by either selling the option in the marketplace prior to expiration or exercising the option and immediately closing the underlying position. When exchange-traded options were first introduced, anyone wishing to exercise an option was required to formally submit an *exercise notice* to the exchange. If someone forgot to submit an exercise notice for an in-the-money option, the option would expire unexercised, and the trader would lose the intrinsic value. This is an outcome that no rational person would accept. Unfortunately, in the early days of option trading, this occurred occasionally for various reasons: perhaps the trader was unaware that he was required to submit an exercise notice, perhaps the trader was out of communication with the exchange and was therefore unable to submit an exercise notice, or perhaps there was an error on the part of the clearing firm in processing the exercise notice.

To avoid a situation where an in-the-money option expires unexercised, which would be an embarrassment to both the individual trader and the exchange, most exchanges have instituted an *automatic exercise policy*. The exchange will exercise on behalf of the option holder any in-the-money option at expiration, even if an exercise notice has not been submitted. The criteria for automatic exercise may vary from one exchange to another and may also vary depending on who holds the option. For example, because of transaction costs, it may not be economically worthwhile to exercise an option that is only very slightly in the money. Therefore, the exchange may automatically exercise only options that are in the money by some predetermined amount. If the automatic exercise threshold is 0.05, then an option must be in the money by at least 0.05 in order for the exchange to exercise the option. If the option is in the money by 0.03, a trader may still exercise the option but must do so by submitting an exercise notice. On the opposite side, if the option is in the money by 0.06, a trader who feels that the option is not worth exercising may submit a *do not exercise notice*. Otherwise, the exchange will automatically exercise the option on the trader's behalf.

Because professional traders and retail customers have different cost structures, the exchange may have a different automatic exercise threshold for

each party. The threshold may be 0.05 for retail customers but only 0.02 for professionals. To determine who is a professional trader and who is not, an exchange will usually specify the criteria necessary for inclusion in each category.

Option Margining

Depending on the exchange and the type of underlying contract, options can be subject to either stock-type settlement or futures-type settlement. However, once an option trade is made, there are additional risks that the clearinghouse must consider. Is the risk to an option position limited or unlimited? If unlimited, how should the clearinghouse protect itself?

When the risk of an option position is limited, the margin that must be deposited with the clearinghouse will never be greater than the maximum risk to the position. The buyer of an option can never have risk greater than the premium paid for the option, and the clearinghouse will never require a margin deposit greater than this amount. Even if an option position is very complex, as long as there is a maximum risk to the position, there will also be a maximum margin requirement.

Some option positions, however, have unlimited risk. For such positions, the clearinghouse must consider the risk associated with a wide variety of outcomes. Once this is done, the clearinghouse can require a margin deposit commensurate with the perceived risk of the position. Unlike futures margining, where the clearinghouse sets a fixed margin deposit for each open futures position, there is no single method of determining the margin for a complex option position. However, all methods are *risk-based*, requiring an analysis of the position's risk under a broad range of market conditions. In the United States, the Options Clearing Corporation has developed its own risked-based margining system for stock and index options. The most widely used margining system on futures exchanges is the *Standard Portfolio Analysis of Risk* (SPAN) system developed by the Chicago Mercantile Exchange. Both margining systems create an array of possible outcomes with respect to both the underlying price and the perceived speed with which the underlying price can change. The clearinghouse then uses this array to determine a reasonable margin requirement.[5]

[5] A description of SPAN margining can be found at http://www.cmegroup.com/clearing/risk-management. A description of the risk-based margining system used by the Options Clearing Corporation can be found at http://www.optionsclearing.com/risk-management/margins/.