MONTRÉAL EXCHANGE

Equity Options

Reference Manual

TMX THE FUTURE IS YOURS TO SEE.

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The masculine form used in this document designates without discrimination both women and men.

Introduction

The options market offers a wealth of possibilities! Unlike most investors, who limit themselves to a few trading strategies, the option user enjoys a wider variety of investment alternatives! These strategies run the gamut from the most conservative to the most speculative, and can give you better control over the performance of your portfolio and the related risks.

Traded in conjunction with previously established positions in the stock market, options can be used to reduce downside risk or to generate incremental returns on portfolio positions. They are also a valuable means of locking in today's stock prices in anticipation of a future purchase or sale. And, as a proxy for transacting in the actual stock market, options offer the most adventurous investor a means of substantially increasing his investment leverage without adding unlimited downside risk to his net position.

There are three primary situations to consider when choosing an appropriate strategy on the options market: initial position on the stock market, predictions about market conditions and the availability of funds. Certain factors can have an impact on the dynamics of these elements such as the direction, amplitude and timing of variations in the price of a security. This guide presents the effect of changes in various components on the value of options.

Although options are not for everyone, many investors should consider them when determining their investment objectives. You should also make sure you understand the concepts underlying the trading of options, know the risks and advantages of the investment strategy you choose, and understand how you can manage your portfolio based on changes in the market.

What is an equity option contract?

An option is an agreement between two parties for a specified time period (up to the expiry date) that gives the holder the right, not the obligation, to buy or sell a specified number of shares, usually a lot of 100 shares, at a pre-determined price (exercise or strike price). You can buy and sell options just like shares.

When the option is acquired, the buyer of the option (holder) pays a premium (price of the option) to the seller (writer). The holder thus obtains the right to decide what happens. The writer must abide by the decision of the holder. It is important to understand that an option contract is simply a right on the part of the buyer and an obligation on the part of the writer to transact at a future date.

Elements in an option contract

The way options are listed on the Montréal Exchange, just as at other exchanges, is shown below. For example, this is how an option to buy 100 common shares of ABC Inc. with a strike price of $50.00 per share and a premium (price of the option) of $2.10 per share would be shown:

OPTION TYPE	Security	Series (expiration)	Strike price	Premium
Call	ABC	APRIL	50	2.10

Option types

There are two types of options: options to buy (call options) and options to sell (put options). The ABC APR 50 call option gives the holder the right to buy 100 shares of ABC Inc. at $50.00 per share, any time up to the April contract expiry date. Conversely, the person who buys the ABC APR 50 put option has the right to sell 100 shares of ABC Inc. at $50.00 per share, any time up to the April contract expiry date.

Similarly, under the ABC APR 50 call option, the writer is obliged—if the option is assigned—to sell 100 shares of ABC Inc. at $50.00 per share. And conversely, if the holder of the ABC APR 50 put option exercises his option, the writer must buy from him 100 shares of ABC Inc. at $50.00 per share.

Underlying asset

Usually, options apply to common shares, i.e. the shares that can be traded when the option is exercised. Each call or put option represents 100 shares of a Canadian company whose shares are widely held in the market and actively traded on an exchange.

Holding an option does not mean you have bought or sold the shares. Rather, it is a contractual agreement whereby you obtain the right to buy or sell the stock at a specific price any time until the preset expiry date.

Other options also exist like bond options, currency options, index options, options on futures contracts, etc.

Expiry month

This is the month during which the option and the right to exercise it cease to exist. An option holder can exercise the option and buy (or sell) the shares any time up to and including the third Friday of the expiry month. The option expires on the Saturday following the third Friday of the month specified in the contract.

All equity options issued by the Canadian Derivatives Clearing Corporation (CDCC) and listed on the Montréal Exchange have expiry cycles. Expiry cycles are used to establish the length of time that an option will be listed and quoted by the equity option market makers.

Cycles vary in relation to the dividend that is being paid out by the underlying listed company and comprise four maturities: two near months and two quarterly months.

CYCLE	Description
Cycle 1	Four maturities — two near months and the next two months from the January, April, July, October cycle.
Cycle 2	Four maturities — two near months and the next two months from the February, May, August, November cycle.
Cycle 3	Four maturities — two near months and the next two months from the March, June, September, December cycle.

For example, for ABC Inc. you could have the following expiry months:

OPTION TYPE	Security	Series (expiration)	Strike price
Call or put option	ABC	MARCH	50
Call or put option	ABC	APRIL	50
Call or put option	ABC	MAY	50
Call or put option	ABC	AUGUST	50

This gives you the right to buy or sell 100 shares of ABC Inc. at the price of $50.00 per share, at a time you choose, up to the expiry date of March, April, May or August—cycle 2.

Thus, for a given underlying security, there will generally be four expiration series (i.e. four different expiration months) open for trading at any time. So, at a given date, as many as four options on the same stock may be traded having the same strike price but different expiry dates.

The Montréal Exchange also lists long-term equity options that expire in one-, two- or three-year intervals. Long-term options have only one expiry month, the month of January. Long-term options eventually become regular options when they have nine months to expiry.

Strike price

The strike price is the price at which the option holder can buy (or sell) the shares. If you hold a call option on ABC Inc. at a strike price of $50.00, you can exercise the option and pay only $50.00 per share even if the stock is trading at a higher price.

When an option is listed on the Exchange, the strike prices are set closely to the underlying stock price at the time of listing. Since the stock price could go up or down before the option expires, at least five strike prices (generally, two strike prices in-the-money, one strike price at-the-money and two strike prices out-of-the-money) are established for the same expiry month.

For example, if the shares of ABC Inc. are trading at $50.00, five strike prices (let's say $46.00, $48.00, $50.00, $52.00 and $54.00) are available[1]:

1. The interval between the strike prices may vary for each stocK.

OPTION TYPE	Security	Series (expiration)	Strike price
Call or put option	ABC	APRIL	46
Call or put option	ABC	APRIL	48
Call or put option	ABC	APRIL	50
Call or put option	ABC	APRIL	52
Call or put option	ABC	APRIL	54

Premium

The premium is the price of the option, i.e. the amount the buyer pays to the seller for the right of the option. Option premiums are quoted per dollar per share. For example, the premium of $2.10 for the ABC APR 50 call option means each option contract costs $210.00 ($2.10 x 100 shares). The premium is not a downpayment on a future stock purchase. The seller keeps the premium even if the option is not exercised. The option holder pays a premium and hopes to make a profit by reselling the option or exercising it. The option writer, on the other hand, considers the premium he receives from the buyer as a source of additional income or as protection. He receives the premium as compensation for the risks he assumes in agreeing to honour the option terms.

As mentioned above, it is important to understand that an option contract is simply a right on the part of the buyer and an obligation on the part of the writer to transact at a future date. The buyer is under no obligation to actually exercise his option before expiration. He may either let the option expire if it has no value or may resell the option on the market to another buyer.

The option buyer's gain or loss will depend upon whether he can resell the option he owns at a price above the one he originally paid. The option writer, conversely, hopes to repurchase the series he has written at a price below the one he received when he sold the contract in order to make a profit. For the option writer, the maximum profit accrues when the option series he has written expires unexercised and he retains all of his premium income. Remember, however, that neither the buyer nor the writer is obliged to see his option positions through to expiration. The buyer may resell his options whenever he pleases at the market rate while the writer can terminate his obligations by repurchasing his option series at the current premium (closing transaction vs. opening transaction).

The premium of an option varies constantly and it is the result of two main components: intrinsic value and time value.

Intrinsic value of options

The intrinsic value of a call option is the difference between the price of the underlying stock and the option strike price. A positive intrinsic value means that the option is currently in-the-money. An intrinsic value of or near zero means that the option is at-the-money. By definition, the intrinsic value cannot be negative. A negative intrinsic value (we say that it has no value) means that the option is out-of-the-money.

For example, on December 30, the price of DEF Inc. (DEF) is $29.75 and the DEF JAN call option with a strike price of $26.00 is trading at $4.00. The intrinsic value of this option is $3.75 ($29.75 – $26.00). That is, the DEF JAN 26 call option gives the holder the right to acquire DEF at $3.75 below the current market price. If this difference is zero or below, the option premium has no intrinsic value. In this situation, the premium is equivalent to the time value of the option.

For a put option, the intrinsic value is the difference between the strike price and the price of the underlying stock. Similarly, a positive intrinsic value means that the option is in-the-money, a value at or close to zero that the option is at-the-money, and a value below zero that the option is out-of-the-money.

For example, on December 30, the price of DEF Inc. (DEF) is $29.75 and the DEF JAN 32 put option is trading at $2.55. The intrinsic value of this option is $2.25 ($32.00 – $29.75). That is, the DEF JAN 32 put option gives the holder the right to sell the shares at $2.55 above the current market price. If this difference is zero or below, the

option premium has no intrinsic value. In a situation like this, the premium is equivalent to the time value of the option.

Time value of options

The time value of an option is the portion of the option premium that is attributable to the amount of time remaining until the expiration of the option contract. Time value is the difference between the option premium and its intrinsic value. The factors that strongly impact the time value are the volatility of the underlying stock, the remaining days to expiry, the dividends paid out during the life of the option, the risk-free interest rates, and the supply and demand for the option.

For example, on February 10, the price of ABC Inc. (ABC) is $34.00 and the MAR 32 call is trading at $3.80. Since the intrinsic value of this option is $2 ($34.00 – $32.00), its time value is $1.80 ($3.80 – $2.00). In the case of a put, the same calculations apply. On the same date, the MAR 36 put is trading at $3.95. The intrinsic value of this option is $2 ($36.00 – $34.00) and its time value is $1.95 ($3.95 – $2.00).

The time value represents the value given to time remaining until the option's expiry by the buyer and writer of the option. The longer an option's time to expiry, the greater its time value, everything else constant, since the price of the stock has more time to move in the forecasted direction.

As you can see, the intrinsic value of an option is easy to calculate since it simply reflects the change in the price of the underlying stock compared with the option strike price. The time value, on the other hand, is determined by the interaction of several factors that depend on market conditions.

Exercise styles

There are two main styles of options available to investors, American and European. American options allow the holder to exercise the option at any time during the life of the option. With European options, on the other hand, the holder can only exercise the option on its expiry date. Generally, most equity options are American style, which gives investors more flexibility. However, this extra privilege comes at a price that is built into the option premium, which is why the value of American options is usually higher than the value of European options.

Call options

A call option is an agreement between two parties for a specified time period (up to the expiry date), which gives the option holder the right, not the obligation, to buy a specific number of shares, usually a lot of 100, at a price stipulated in advance (strike price). If the holder exercises his right, the counterparty of this option—the writer—is assigned and is obliged to sell the specific number of shares to the holder at the strike price stipulated in the contract. A special terminology is used to express the value of options (as shown in the following table)

TERMINOLOGY	Description
Out-of-the-money	A call option is said to be out-ofthe-money when the price of the underlying stock is lower than the strike price. If this difference is substantial, the option is deeply out-of-the-money.
At-the-money	A call option is said to be at-themoney when the price of the underlying stock is identical or relatively close to the option strike price.
In-the-money	A call option is said to be in-themoney when the price of the underlying stock is higher than the strike price. If this difference is substantial, the option is deeply in-the-money.

For example, the shares of XYZ Inc. (XYZ) are currently trading at $61.50. The January call with the strike price closest to the stock price, i.e. $62.00, is trading at-the-money. XYZ call options with a strike price of $64.00 or more are trading out-of-the-money, whereas options with a strike price of $60.00 or less are trading in-the-money. Obviously, the situation changes as the price of the underlying stock fluctuates. If the price of XYZ shares goes up significantly, say to $68.00, the option with a strike price of $68.00 will then be at-the-money; options with a strike price of $70.00 or more will be out-of-the-money; and options with a strike price of $66.00 or less will be in-the-money.

Why do investors buy or sell call options?

Two of the primary reasons for buying call options are the high potential leverage and the limited risk. High leverage, since the investor stands to benefit from an increase in the value of the underlying stock while investing only a fraction of the capital needed to purchase the stock outright; limited risk due to the fact the maximum loss is the premium paid. Buying call options allows investors to act on bullish views.

The criteria for selecting a particular stock upon which to buy call options is a matter of personal choice. Presumably the decision to buy call options on a particular stock is a reflection of the investor's belief that the stock will rise in value. Once a particular underlying stock has been selected, however, the investor still has to select a particular series.

The choice of an option series is primarily a function of two variables related to the forecasted rise: timing and magnitude. That is, when will the stock price rise and by how much. An investor will only be certain to resell his option at a profit if the forecasted rise in the price of the underlying stock occurs before the expiration of the call option.

These two factors—magnitude and timing—determine, respectively, the strike price and the expiration month to be selected. The specifics vary with the particular strategy. Note that these guidelines are based simply on general experience and are not necessarily applicable in all circumstances.

- The shortest-term option series is not usually purchased unless the investor is very confident of an immediate rise in the stock value. The time value of options with short maturity depreciates quickly. The price of the stock may move, but after the option's expiration.
- For the reasons outlined in the previous point, positions with less than six weeks to maturity ought to be examined closely for resale value. That is, it is often best to resell call options with less than six weeks to maturity and roll forward (i.e. buy) to options with a more distant expiration month.
- Deeply out-of-the-money options are generally acquired only if a very large move in the price of the stock is expected. Deeply out-of-the-money series require large percentage increases in the value of the underlying stock in order to break even. Remember, there is a reason the out-of-the-money option premium seems so low: the chances of profit are slimmer.

Some investors consider the writing of call options as an occasional investment practice. Others consider the writing of call options as an important investment activity, if not the most important one.

Recall that call options writers are paid a premium for undertaking the obligation to deliver the underlying security at the contract's strike price if the option buyer exercises his option. Thus, in one sense, the writers are risk-takers in the stock options market: in return for a one-time revenue flow, the writer risks the possibility of having to sell the underlying stock at a price well below prevailing market rates.

Since stock options are American style, call option writers must keep in mind one basic point: when an option becomes in-the-money, it may be exercised and the writer called upon to deliver the underlying shares for the strike price at any time prior to the expiry date. The decision to exercise an option and the timing thereof rest solely with the option holder. Although unusual, some call options are exercised days, weeks or even months prior to the expiry date (especially before the ex-dividend date).

A writer cannot predict with certainty the date on which an option will be exercised. However, the chances of the option being exercised are greater when the premium is almost exactly equal to the intrinsic value of the option. This occurs when an option is deeply in-the-money and/or near expiration. If a writer does not want to be called upon to deliver the underlying security, he may effect a closing transaction prior to the exercise of his option. A closing transaction is effected by purchasing an option identical to the one the writer has previously sold to close the position.

Call option writers may write the options "against" positions already held in the underlying stock or they may be "uncovered" writers. The uncovered writer is prepared to take additional risks in the hope of making larger profits. For this reason, uncovered writers must maintain a minimum margin deposit with their broker. The major reasons for writing covered options are to reduce the purchase cost of the underlying value, to profit from a moderate increase of the price of the underlying, to provide an alternative to a limit sell order, and to increase the return of a portfolio. In writing covered or uncovered options, the writer is said to be "short" the call option so long as the option he has written is still trading and he has not repurchased it.

Put options

A put option is an agreement between two parties for a specified time period (up to the expiry date), which gives the option holder the right, not the obligation, to sell a specified number of shares, usually a lot of 100, at a price stipulated in advance (strike price). If the holder exercises his right, the counterparty of this option—the writer—is assigned and obliged to buy the specific number of shares from the holder at the strike price stipulated in the contract.

As with call options, the different values of put options are shown in the following table:

TERMINOLOGY	Description
Out-of-the-money	A put option is out-of-the-money when the price of the underlying stock is higher than the strike price. If this difference is substantial, the option is deeply out-of-the-money.
At-the-money	A put option is said to be at-themoney when the price of the underlying stock is identical or relatively close to the option strike price.
In-the-money	A put option is in-the-money when the price of the underlying stock is lower than the strike price. If this difference is substantial, the option is deeply in-the-money.

For example, the shares of XYZ Inc. (XYZ) are currently trading at $64.00. The January put with a strike price closest to the stock price, i.e. $64.00, is trading at-the-money. XYZ put options with a strike price of $62.00 or less are trading out-of-the-money, whereas options with a strike price of $66.00 or more are trading in-the-money. Obviously, the situation changes with daily fluctuations in the price of the underlying stock. If the price of XYZ goes down significantly, say to $58.00, the option with a strike price of $58.00 will then be at-the-money; options with a strike price of $56.00 or less will be out-of-the-money; and options with a strike price of $60.00 or more will be in-themoney.

Why do investors buy or sell put options?

Put options are options to sell the underlying stock at the option's strike price at any time up to the contract's expiration. The put option holder pays the option premium to obtain this right. The put option writer receives premium revenue in return for assuming the obligation to buy the underlying security if it is "put to him" by the holder of the option. Obviously the put writer takes on substantial risk since he may be forced to buy a stock at a price well above its market value. Of course, the buyer of the option stands to profit if the market price of the underlying stock falls below the put strike price.

An investor buys put options on a stock to profit from expected declines in market price or to protect existing holdings against possible drops. When choosing among the various series listed on a particular stock, he must consider, as is the case when purchasing call options, the magnitude and timing of the feared or forecasted decrease in the stock's market value.

The principles discussed earlier regarding the purchase of call options generally apply to the purchase of put options. The shortest-term options, while less expensive, give the underlying stocks very little time to drop as forecasted. Remember that the stock must, in most cases, drop by more than the amount of the put premium before the expiry date for the put option buyer to profit. Furthermore, as the time value of the shortest-term options depreciates quickly, the holder of these options who decides to close out his position to limit his losses (i.e. he no longer feels the stock price will decrease) may find that his options have little resale value.

As the purchase of put options in conjunction with ownership of the underlying stocks is a popular strategy, it is worthwhile to keep these points in mind:

- In-the-money put options, while more expensive, offer the stockholder more protection should the stock price decrease, as he is assured of a higher selling price (i.e. strike price minus premium paid). However, if the stock should drop in value, it must do so by an amount greater than the premium for the investor to profit, since the profits on the fall in value of the stock must be sufficient to offset the put option premiums.
- Conversely, the less expensive out-of-the-money put options offer the hedger less protection in the case where the stock price declines; the "assured" selling price is less than that with the in-the-money options. Note, however, that should the stock price decrease in value, it must do so by only a small amount for the investor to profit from the stock's overall depreciation, since the premium paid for the protection is lower than that of the in-the-money put option.

The writer of a put option receives a premium from the put option buyer in return for agreeing to buy the underlying stock from the put holder at the option's strike price if the holder exercises his option. Since a put option premium tends to rise as the price of the underlying security falls and decline if the underlying stock price is stable or rising, it stands to reason that a put option writer is probably at least mildly bullish on the underlying stock hoping that the option will expire worthless.

There are two main reasons to write put options: to increase income during a stable or rising market and to acquire stock at a net price below market value. Each investor's inclinations and goals will determine, to a large extent, the selection of a particular expiration month and strike price. What all put option writers should keep in mind is that the shortest-term, in-the-money series are more risky but offer a greater profit potential. Less aggressive writers will choose near-term, out-of-the-money series. All writers should be prepared to take delivery of the underlying shares, since they may be assigned.

Components that influence option premiums

Market dynamics influence option premiums in different ways. It is essential to understand these dynamics in order to evaluate the impact of variations of certain components on the value of options. Following are the six components that affect the value of options.

Underlying stock price

The market price of the stock underlying a particular option is the most important determinant of premiums because if the stock price is much higher or much lower than the strike price, the effect of other components will be minimal. In general, the relationship of a call option premium to the price of the underlying stock is quite simple. If the price of the stock rises, the call premium will tend to rise, all else being equal. Conversely, the premium of a put option tends to rise as the value of the underlying share declines. The higher the stock price, the greater the value of a call option and the lower the value of a put option.

At expiration, only the stock price and the strike price determine what the option is worth. The value of the option, at that moment, is composed entirely of its intrinsic value.

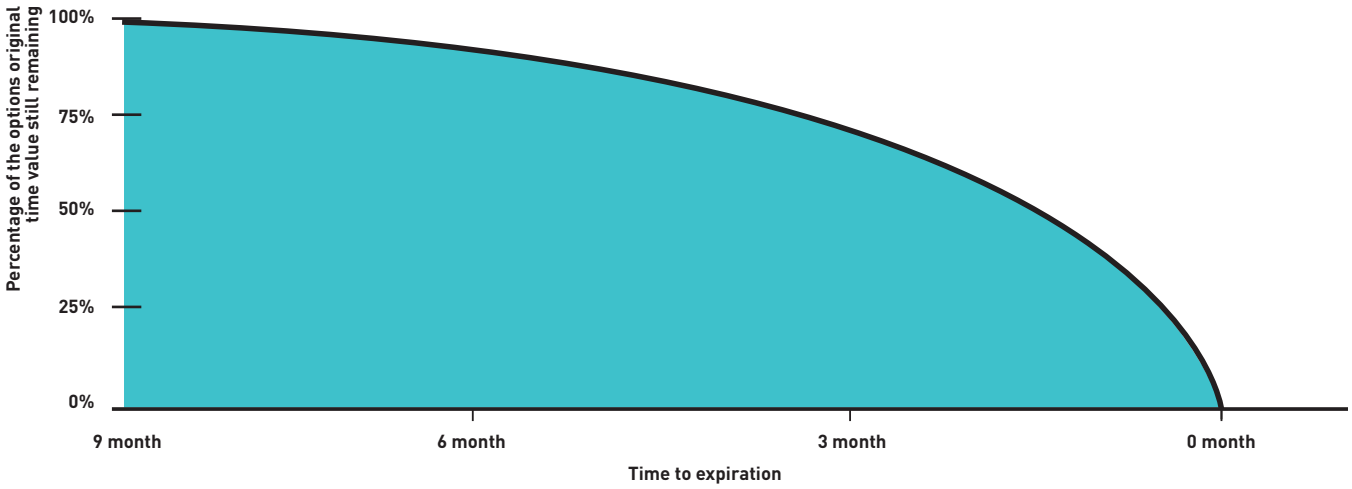
Strike price

In the case of call options, the higher the strike price compared to the stock price, the lower the value of the option. In the case of put options, the higher the strike price compared to the stock price, the greater the value of the option.

Time to expiry

Generally, the more time remaining before an option expires, the higher the premium. It is quite logical when we recall that option writers demand larger premiums when they perceive their risks to be greater. For example, the premium for a December option contract on a particular stock is higher than the premium for a September contract on the same stock because the December option gives three additional months during which the price of the stock can go up or down.

An option is a wasting asset in the sense that part of its value, the time value, decreases with the passage of time. This phenomenon is illustrated graphically below.



This graph shows the impact of the passage of time on an option premium. For the sake of simplicity, assume that other premium determinants are stable (e.g. the price of the stock does not change during the nine months until expiration). At the listing of the option (i.e. nine months until expiration), it obviously has 100% of its original time premium. But three months later—when the option has six months remaining until expiration—the option's time value may have declined to 80% of its original value. If all other factors remain constant, the option premium's time value might decline to 60% of its original level when there are only three months until expiration. But note the accelerated rate of deterioration of the premium during the last three months. This illustrates an important

principle in option trading. All other factors being constant (which is rarely the case, but a useful assumption), the time value portion of an option premium over the nine-month life of the option declines at an accelerating rate such that perhaps over one-half of the premium is "lost" in the last one-third of the option's life.

Though the actual percentages and periods until expiration are simply estimates and will vary with the particular stock and other factors, the fundamental relationships are sound. An option's time premium declines at an accelerating rate over the life of the option. This is an important factor in the selection of an option series.

Stock price volatility

The more volatile the price of the underlying stock, the higher the price of both the call and the put options. Why? Because the greater the volatility, the greater the fluctuation in the stock price, hence the greater the likelihood that each option will be deeply in-the-money on the expiry date. Similarly, stock option premiums in general will rise if overall stock market conditions are more volatile.

Both of these generalizations—that option premiums rise for more volatile stocks or during more volatile periods— are perfectly logical if one recalls the nature of an option contract. The buyer of call options is acquiring the right to buy shares at a future date. He ought to be willing to pay a higher premium for this right, given volatile stock prices, for two fundamental reasons.

- The likelihood of the underlying stock price rising (above the option contract's strike price), enabling the buyer to profit, may be better when the stock is volatile.
- The buyer may prefer the purchase of call options to the outright acquisition of the underlying stock if he feels there is a significant likelihood of a large decline in value. This is because his potential losses due to a decline in the price of the stock will be virtually unlimited so long as he owns the stock but will be limited to the price of the contract (premium) in the case of a call option on the same stock.

Recall also that the option premium is negotiated by the buyer and the seller. The call option seller will demand higher premiums during volatile price periods, since his risks of being obliged to deliver the underlying stock at well below market prices are perceived as substantially higher.

Risk-free interest rates

Interest rates during the life of an option have the opposite effect on the price of call and put options. High interest rates tend to drive up the premium of call options (all else being equal) and drive down the premium of put options. However, studies have shown that changes in interest rates have little effect on the option's price. When interest rates are high, investors prefer to buy call options rather than the actual shares (because less investment is required) and invest the rest of their money in fixed-income instruments offering a higher return.

This significant advantage of call options during periods of high interest rates results in higher call option premiums, as the call options become more attractive to investors. The "cost of carry" of an equivalent stock position at short-term rates is, therefore, built into the premium.

Anticipated dividends during the life of the option

Since the stock price will generally decrease by the amount of the dividend (after the ex-dividend date), the call option on the stock will necessarily be worth less. Therefore, imminent dividend payments are reflected in lower call option premiums. Conversely, since the price of the underlying stock will generally decrease by the amount of the dividend, and put premiums rise as the stock price falls, the put premium will reflect the anticipated drop in the stock price.

The following table shows the effect on the value of call and put options of an increase in each of the six components:

COMPONENTS	American call	American put
Stock price	▲	▼
Strike price	▼	▲
Time to expiry	▲	▲
Share price volatility	▲	▲
Risk-free interest rates	▲	▼
Dividend paid prior to expiry	▼	▲

Implied volatility of options

The last variable, which is not directly observable in option pricing models, is called implied volatility. It represents the volatility of the underlying stock built into the price of an option on the market. Implied volatility is particularly important because it mirrors market consensus about the probable volatility of the underlying stock during the life of the option. Implied volatility reflects market supply and demand in the price of an option.

Advanced concepts

Using options judiciously requires the application of certain strategies and the measurement of how these strategies can effect the value of a portfolio. While the individual investor does not need to learn about option pricing models, it is still pertinent to know the basics.

Option pricing

There are two main approaches that are used to replicate an option position and, thus, price an option. The most commonly used is an analytical formula known as the Black-Scholes model. The second widely used approach is a methodology known as the binomial model from Ross, Cox and Rubinstein. The binomial option pricing model is more like a process than a formula, in that it is a series of steps that can be used to price an option. Although the two pricing models appear to be very different, mathematicians have proven their equivalency through calculations.

The Black-Scholes model

The Black-Scholes option pricing model has been one of the most influential formulas in finance since its initial publication in 1973. In 1997, Myron Scholes and Robert Merton won the Nobel Prize in Economics for their work in developing the formula. Unfortunately, Fischer Black, the other major contributor, passed away before the announcement of the Nobel awards. Although it has its limitations, the formula is widely used.

The original Black-Scholes model is based on the following assumptions:

1. The option is European style.
2. The evolution of share prices follows a continuous random process.
3. The model is based on a lognormal distribution of stock prices.
4. No commissions or taxes are charged.
5. Short-selling is permitted and the proceeds of such a sale are immediately available for use.

6. Stock prices move in smooth increments (there are no stock market crashes or bubbles).

7. We can borrow or lend at the risk-free interest rate and this rate is constant.

8. Markets are efficient and there are no arbitrage possibilities.

9. The stock pays no dividends during the life of the option.

Robert Merton later modified the last assumption and introduced a variable to the original model accounting for continuous stock dividend payments.

Development of the mathematics behind the formula is beyond the scope of this reference manual. The equations below show the formula for pricing a European call and put option, respectively. These equations apply for a stock that pays a continuous dividend.

$$c = Se^{-qt}N(d_1) - Xe^{-rt}N(d_2)$$

$$p = Xe^{-rt}N(-d_2) - Se^{-qt}N(-d_1)$$

where: **c** is the call option price

p is the put option price

S is the stock price

X is the strike price

r is the risk-free interest rate (continuously compounded)

q is the dividend yield (continuously compounded)

t is the time to maturity (in years)

and **e** is the operator for the exponential function (equal to approximately 2.718)

N(•) is the operator for the cumulative normal distribution function

$$d1 = \frac{\ln [S/X] + (r - q + \sigma^2/2)t}{\sigma\sqrt{t}}$$

$d2 = d_1 - \sigma t$, where σ is the volatility

The formula's complexity makes it obvious why traders use computer programs to perform calculations. Although it is the standard for pricing options, the Black-Scholes formula does have its limitations. Here are the major ones:

The formula is based on a simplistic representation of the real world.
Like the binomial model, the Black-Scholes model is based on a model or approximation of how the real world operates (which at times can deviate significantly from how things actually are). Despite this, the model has been proven to be very robust and reliable.

The model only applies for European-style options.
This limitation can be significant for stocks that pay a large dividend, or for long-term put options. For short-term options and for options on stocks that do not pay a dividend, this drawback is not significant.

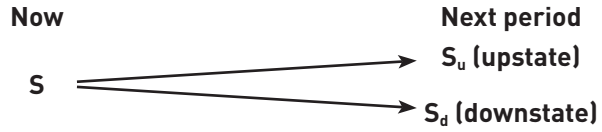
You cannot calculate the Black-Scholes model value of an option using a simple calculator.
The Black-Scholes model is not as simple to understand or utilize as the binomial option pricing model. Option traders use hand-held computers that have the formula built in. Bank-based option traders use the formula in powerful computer programs that are supported by a team of mathematicians.

There is a second major use of the Black-Scholes option pricing formula beside pricing options. The formula is also used to calculate the level of "implied volatility". All of the option pricing variables, including the stock price, the strike price, the time to maturity, the risk-free interest rate and the dividend are known and readily observable, with the sole exception of the volatility. Remember that volatility is very crucial in option pricing because higher volatility means higher option prices, forcing option buyers to pay higher premiums. Although there are ways to estimate the volatility, there is no way to directly, and unambiguously, measure the level of volatility.

The binomial model

The binomial option pricing model (Cox, Ross and Rubinstein) is an easy-to-understand pricing methodology that closely emulates the actions that an option trader takes to "create" options. This model breaks down the time to expiration into a potentially very large number of steps. The greater the number of steps, the more accurate the option price estimation. The binomial model's name is derived from the underlying assumption that the stock price can only take on one of two values in the next period. In other words, at each step, the stock price can rise from a current price (denoted by S) to an "up-price" (S_u) or fall to a "down-price" (S_d) by an amount that depends on its anticipated future volatility. The difference between the two prices (up and down) represents the future stock price volatility. The tree shows all the possible prices that the stock could take during the life of the option. At the end of the tree, upon expiration of the option, the final option price is simply its intrinsic value. Next, the initial option value is estimated by back calculation of its intermediate values. This model is shown below.

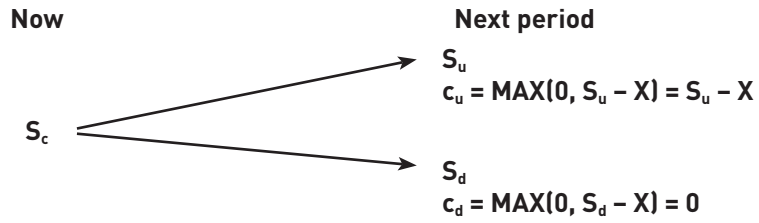
Binomial option pricing model



The model above is called a "one-step tree". Although it represents an oversimplification of reality, we will use this model to price a "one-period" call option that expires in the next period.

To price our call option, we must first find its value at each step using the strike price of the option, signified by X. In the upstate, the call option is worth $S_u - X$ (since $S_u > X$), and in the downstate it is worth 0 (since $X > S_d$). The value of the call option at maturity in the upstate and the downstate is labeled cu and cd, respectively. The current value of the option is labeled c.

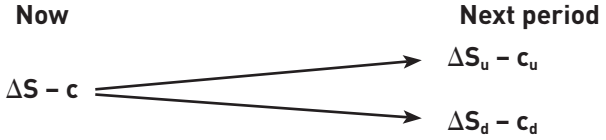
One-step tree (Step 1)



An investor is considering selling a call option. The investor, however, is very risk averse, and, thus, asks the question: "Is it possible to create a riskless option position?" The investor knows that if the upstate occurs, then an amount $S_u - X$ will have to be paid. Otherwise, the investor would cash in the premium from the buyer.

The investor then asks a slightly more complicated question: "Is it possible to create a riskless position by selling the call option and buying a certain number of shares?" To test this, we assume that the investor sells one call option, for the price of c, and buys a certain number of shares (which we will label with the Greek letter delta, Δ). The investor's initial cash position is thus, $\Delta S - c$. In the upstate, the investor's cash position is $\Delta Su - cu$, which is equivalent to $\Delta S_u - (S_u - X)$. In the downstate, the trader's cash position is $\Delta S_d - c_d$, which is equivalent to $\Delta S_d - 0$. These positions are shown below.

One-step tree (step 2)



For the investor's position to be riskless, the value of the position in the upstate and the downstate must be equal. With some algebra, this relationship becomes:

Delta formula

$$\Delta S_u - c_u = \Delta S_d - c_d$$
$$\rightarrow \Delta S_u - \Delta S_d = c_u - c_d \rightarrow \Delta(S_u - S_d) = c_u - c_d$$
$$\rightarrow \Delta = \frac{c_u - c_d}{S_u - S_d}$$

Hence, if the investor sells a call option, and buys Δ shares of the underlying, the investor will know with certainty what his cash position will be at the end of the next period.

The investor has now created a riskless position and knows the position's value at the end of next period. However, the investor still has some work to do in order to calculate the present value of the position by discounting at the prevailing interest rate. To calculate the initial value of the option, this present value must be equal to value of the initial position.

Again, we will not review in depth all the steps to the mathematical explanation of the model. The model can be extended to two or more steps. The most important feature of the binomial model is that it is possible to create a riskless position by selling a call option and buying Δ shares of the underlying.

The binomial option pricing model is very flexible, and can price many different types of options, including options that cannot be priced using the better-known Black-Scholes option pricing formula. The procedure for pricing put options is the exactly same as for call options, except that the terminal values for the payout of the option differ. With minor changes, the model can also be used to price American-style options, and can be modified to allow for dividends.

The "Greeks"

The "Greeks" measure the change in value of an option due to a change in one of the pricing variables. Earlier in this manual, we discussed the six variables used to determine an option price: the underlying stock price, the strike price, the time before expiry, the volatility, the risk-free interest rate and the dividends. The "Greeks"—also called measures of sensitivity—measure how changes in each variable affect the option price. The option "Greeks" are important for two reasons: 1) they are used by professional option traders to create and hedge option positions and 2) they are used by investors to estimate how a change in market conditions will affect the value of their option positions. The "Greeks" are also used to help select appropriate options for implementing various option strategies.

The following Greek letters are derived from the Black-Scholes option pricing model and represent the stochastic calculus derivatives with respect to the variables below.

Delta

- If the price of the stock rises, the call option premium will tend to rise and the put option premium will decrease, all else being equal. However, the prices for all options will not increase or decrease at the same rate.

Delta, Δ, is the fourth letter of the Greek alphabet, and generally thought of as the most important "Greek" for the measure of hedging sensitivity. Delta is the change in option price for a small change in the underlying stock price, assuming that all of the other option pricing variables remain constant.

$$\Delta = \frac{c_t - c_o}{S_t - S_o} = \frac{\text{rate of change of option price}}{\text{rate of change of stock price}}$$

where: c_o is the original option price

c_t is the price of the option after the price of the underlying changes to S_t

S_o is the original price of the underlying

S_t is the new price of the underlying

As the above equation indicates, delta estimates how much the option price will change if the value of the underlying changes.

Example:
Suppose a stock, XYZ is currently trading at $36.00. The XYZ September 37.50 call options are valued at $2.65 and have a delta of 0.47. A $1.00 (one unit) increase in the price of XYZ will increase the option premium by $0.47.

For call options, delta is a positive value in the range (0; +1); for put options, delta is negative and in the range (–1; 0). For in-the-money options, delta tends toward +1 for a call and –1 for a put. At-the-money options have a delta of ±0.50. Lastly, out-of-the-money options have a delta that nears zero.

- Delta as a hedge ratio

Delta has one other interpretation that is very important for professional option traders, or for investors who are using options to hedge their portfolio value. This second interpretation is that delta is the hedge ratio for creating a riskless portfolio.

It is this interpretation of delta that we used when working backward through the binomial option tree. You may recall that the trader who sold a call option could create a riskless portfolio over the next period by simultaneously buying D shares of the underlying stock. At each node of the binomial pricing tree, an option trader would calculate the delta for the next period, and then buy D shares of stock to make sure that he was hedged over the next period.

Example:
An investor holds 600 shares of ABC trading at $50.00. The ABC 50 put options have a delta of –0.50.

To calculate the number of put options to buy for a delta-hedge, the investor must divide the number of shares by the delta. Then, he must divide the result by 100. In our example, the investor must buy :

$$\frac{600}{0{,}50} \div 100 = 12 \text{ options}$$

Gamma

- Gamma as a rate of change in delta

  After delta, gamma is one of the most used parameters. Gamma, γ, is the rate of change of delta, for a given change in the price of the underlying.

$$\gamma = \frac{\Delta t - \Delta o}{St - So} = \frac{\text{rate of change of } \Delta}{\text{rate of change of stock price}}$$

  Let's go back to our previous example. The XYZ September 37.50 call options are at $2.65. Delta is 0.47 and gamma is 0.04. A $1.00 (one unit) increase in the price of the XYZ will increase the option premium by $0.47 and delta will increase from 0.47 to 0.51.

- Uses for gamma

  Gamma has two main uses. The first use of gamma is that it gives a measure of the accuracy of the delta equation for estimating the change in price of an option for a small change in price of the underlying. The second use of gamma is that it gives traders a gauge for determining how frequently they need to update or renew their delta hedges on their option positions. The higher the gamma of a position, the more frequently (and carefully) traders would recalculate their deltas and rehedge their positions.

Vega

Interestingly, unlike the other option "Greeks", vega is not an actual Greek letter. Vega, ν, measures the change in price of an option for a small change in the level of implied volatility.

$$\nu = \frac{c_t - c_o}{\sigma_t - \sigma_o} = \frac{\text{change in price of option}}{\text{change in level of volatility}}$$

Vega gives an idea of an option's sensitivity to perceived changes in market volatility. An option position with a high vega will have a high sensitivity to changes in volatility. The higher the vega of an option, the greater the increase in the option price if the volatility increases.

Like delta and gamma, vega is also an important measure for hedging option positions. To hedge their position against changes in volatility, traders will calculate the vega of their option position, and buy or sell other options with an offsetting vega value. There is one aspect of vega hedging that differs from delta or gamma hedging. With delta and gamma hedging, traders can hedge their position by buying or selling shares of the underlying asset. The only way to vega hedge, however, is to buy or sell other options.

Theta

Theta, Θ, is the rate of change in price of an option for a small change in time to maturity. Theta is sometimes called the "rate of decay" of an option, since the value of an option declines (all else being equal) as the time to maturity approaches.

$$\Theta = \frac{c_t - c_{to}}{t - t_o} = \frac{\text{change in price of option}}{\text{change in time to maturity}}$$

Like the other option "Greeks", theta can be used to estimate how the value of an option will change as the time to maturity changes. Although theta is not a major factor when there is a long time remaining to maturity, it becomes increasingly important as the time to maturity nears. The implication for investors is that they should expect the value of their options to fall more quickly as the maturity date approaches.

Rho

Rho, ρ, is the final "Greek" that we will examine. Rho is the change in value of an option for a 1% change in value of the risk-free interest rate.

$$\rho = \frac{c_{r1} - c_{r2}}{r_1 - r_2} = \frac{\text{change in price of option}}{\text{change in risk-free interest rate}}$$

For stock options, r is relatively unimportant. The value of stock options changes very little for reasonable changes in interest rates. Rho is much more important for currency options, as changes in the interest rate can directly affect the exchange rate between two currencies.

In this chapter, we had a general view of the pricing basics of options as well as the option "Greeks", which measure how the value of an option changes as the pricing variables change. However, it is much more important (and profitable) to know how to implement option strategies than it is to know how to price options.

In summary, why trade options?

A variety of available strategies are attached to this guide. The reader should always bear in mind that his broker will charge commission fees for the execution of equity option orders. Though not considered in this brochure's examples, these fees may have a material effect on the profitability of a strategy. The next few paragraphs summarize many of the reasons investors have adopted and continue to use the equity option market.

- Option buyers face a limited capital investment as opposed to an outright position in the underlying stock. This, in turn, means options offer the investor very high leverage in the case where stock prices move in the forecasted direction.
- The buyer of put or call options has a limited and known risk. Unlike the investor who buys and short-sells stock, the equity option buyer knows he cannot lose more than the original premium paid.
- Put option buyers can take a short position on the underlying stock with fewer complications than are involved with actually short-selling a stock. And, of course, the put option buyer has potentially large leverage should the stock price decline.
- Put options can be used to lock in profits accumulated due to a rise in the price of previously acquired stock without actually liquidating the stock position. Further, "protective puts" enable the investor to retain upside potential should the value of his stocks continue to rise while being protected against a potential drop.
- Equity options enable the investor to profit from stable stock prices. Writing call options against existing stock positions is a means of generating incremental revenues during stable price periods or of obtaining limited protection against modest price declines.
- Writing put options may enable the investor to acquire stock at an effective price well below the present price.

The variety of possible strategies and options applications is alone sufficient justification for the existence of equity options market. But the economic justification for equity options also can be summarized on a broader conceptual scale.

The basic economic function of options is to provide investors with a convenient and efficient means of transferring the risks of owning stocks. Options spread among investors the inherent risks of owning stocks in order to better fulfill each investor's specific needs.

For example, an investor writes (sells) a call option on shares held in his portfolio. By doing so, he enables the option buyer to profit if the market price of the stock increases to more than the strike price plus the premium. The writer reduces the risk of incurring a loss from a decline in the market price of his shares equal to the value of the premium. The call option buyer acquires an opportunity to realize a gain without a large investment. His risk is limited to the amount of the premium. Options thus provide the means of sharing the inherent risks of stock ownership for both writers and buyers.

The risks taken by each option contract participant will depend upon each party's investment goals and their evaluation of the risk/return ratio of each investment. By spreading the risks and profit opportunities inherent to stock ownership, the options market provides investors with alternatives not otherwise available except by completely overhauling their portfolios. Once again, options help transfer risks between investors who want to reduce their risk and those who want to assume risk in return for potentially higher profits.

Options are not for every investor in every circumstance. But the wise investor must be aware of all the tools available to him as he seeks to maximize the value of his holdings.

Appendix

Role of the Canadian Derivatives Clearing Corporation (CDCC)

The CDCC is the issuer, clearinghouse and guarantor of interest rate, currency, equity and index derivative contracts traded on the Montréal Exchange. It also offers clearing services to other exchanges and partners. Established in 1975, the CDCC is a for-profit company owned by Bourse de Montréal Inc. The CDCC requires each member to maintain margin deposits with the clearinghouse in order to cover the market risk associated with their positions. The assessment of this risk is based on a set of well-defined criteria established by the clearinghouse. Margins are collected daily or more frequently during periods of market volatility.

For example, if a buyer wants to exercise his option, he must contact the CDCC through his broker, not the seller of the option. The CDCC ensures that the stocks are delivered in exchange for the final payment.

Because only one organization, the CDCC, looks after clearing, it is not necessary to evaluate the risk related to whether the parties are solvent. Thanks to the standards established by the CDCC with regard to having sufficient equity and complying with the daily coverage requirements, the contracts traded are always based on solid guarantees. Furthermore, in terms of clearing and regulations, the CDCC ensures that the parties act in a disciplined manner when they trade and take a position.

Finally, the CDCC ensures that option holders can take and dispose of a position. Thus, everyone has the opportunity to trade options on a liquid, transparent market.

Glossary

The options market has its own terminology. When talking to your financial advisor, broker or agent, do not hesitate to ask for an explanation if they use terms or expressions you do not understand.

EXPRESSIONS USED	Synonyms and explanations
American option	Option that the holder may exercise at any time up to and including the expiry date.
Assignment	An assignment takes place when a holder exercises an option. The option writer receives an exercise notice that obliges him to sell (in the case of a call option) or buy (in the case of a put option) the shares at the stipulated strike price.
At-the-money option	When the option strike price and share price are identical.
Bear spread	This strategy can be used with both call and put options. In both cases, you buy an option with a higher strike price and sell an option with a lower strike price; the two options usually have the same expiry date.
Break-even point	The point of activity at which the investor earns zero profit.
Bull spread	You buy an option with a lower strike price and sell an option with a higher strike price; the two options usually have the same expiry date. You can use call or put options.
Call	Option contract that gives the holder the right to buy and obliges the writer to sell a specified number of shares at a specified strike price, any time before the contract expiry date.
Collar	Purchase of a put option and simultaneous sale of a call option having the same expiry date but a different strike price.
Combination	Simultaneous purchase or sale of call and put options on the same stock with different expiry months and strike prices.

Covered write	The writer of a call option is covered if he holds an equivalent quantity of the underlying security for each option contract he sells or writes.
European option	Option which the holder can only exercise on the expiry date
Expiry cycle	Cycle that determines when the options expire. There are three expiry cycles for equity options: **Cycle 1**: Four maturities—two near months and the next two months from the January, April, July, October cycle. **Cycle 2**: Four maturities—two near months and the next two months from the February, May, August, November cycle. **Cycle 3**: Four maturities—two near months and the next two months from the March, June, September, December cycle.
Ex-dividend date	Date on which the buyer of a stock is not entitled to an upcoming already-declared dividend, but is entitled to future dividends
Expiry date	Date on which the option ceases to exist. Options expire at noon on the Saturday following the third Friday of the expiry month.
In-the-money option	When the strike price of a call (or put) option is lower (or higher) than the share price.
Intrinsic value	Positive difference between the stock price and the strike price of a call option or between the strike price of a put option and the stock price. By definition, the intrinsic value cannot be negative.
Last trading day	Date on which the option ceases trading; a business day, usually the third Friday of the expiry month, at 4:00 p.m. ET.
Leverage	Means of enhancing return or value without increasing investment. Rights, warrants and option contracts provide leverage, not involving borrowings but offering the prospect of high return for little or no investment.
Liquidating operation	Sale of an option you originally bought or purchase of an option you originally sold.
Margin requirement	Or coverage. The amount or the securities you must deposit with your broker to guarantee purchase or delivery of the shares when you sell an option.
Naked write	Selling or writing a call (or put) option without holding an equivalent quantity of the underlying security or the cash to fulfill the selling or buying obligation.
Open interest	This is an important concept but it has no direct impact on the price of an option. It indicates the number of option contracts on a particular share that have not yet been exercised or closed. An opening transaction increases the open interest whereas a liquidating transaction reduces it. The greater the open interest, the greater the liquidity in the market, therefore the easier it is to take or dispose of a position.
Option class	All option contracts (call and put options) on the same security.
Option series	All options in the same class that have the same strike price and same expiry date.
Option type	Classification of an option contract as a call option or a put option.
Out-of-the-money option	When the strike price of a call (or put) option is higher (or lower) than the share price.
Premium, option premium	Price of the option. Price the buyer pays the seller for the rights associated with the option contract.

Put	Option contract that gives the holder the right to sell and obliges the writer to buy a specified number of shares at a specified strike price, any time before the contract expiry date.
Straddle	Simultaneous purchase or sale of a call and put option with the same characteristics (same expiry month and same strike price).
Strangle	Purchase (or sale) of call and put options on the same stock, with same expiry months and different strike prices.
Strike price	Or exercise price. Specified price at which the holder of an option can buy (call option) or sell (put option) the underlying stock
Time value	Or time premium. Portion of the premium that represents the remaining time until the expiry of the option contract and the fact that the factors which determine the value of the option premium can change during this period. The time value is equal to the difference between the option premium and the intrinsic value. The time value is usually positive and decreases with the passage of time.
To exercise an option	To exercise an option represents the process by which the holder exercises his right to buy (in the case of a call option) or sell (in the case of a put option) according to the terms specified in the contract.
Volatility	Variability of a stock as measured by the standard deviation of its return. A measure of the tendency of the share price to rise or fall.
Writer	Or seller. The person who sells or issues an option.

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Strategies

Buying call options instead of buying stocks

Situation

In many cases, an investor will be reluctant to commit large amounts of capital to the purchase of a stock and yet want to be in a position to profit should the price of the stock rise. Call options offer an attractive strategy to an investor who is bullish on a stock but reluctant—due to cash flow constraints or overall risk considerations—to actually buy common shares of the company. Thus, this strategy enables an investor to profit from the leverage provided by options when he forecasts an increase in price, limiting the loss to the call option premium.

Objective

Purchase of call options to take advantage of a rise in stock prices.

Strategy

An investor feels that the MNO BANK shares, which are priced at $16.00, are undervalued. He does not own any MNO Bank stock but believes the shares will rise over the coming months.

To profit from his forecast, he could, of course, buy MNO Bank common stock. 200 shares would cost $3,200. Alternatively, six-month call options to buy MNO Bank stock at $17.00 per share are available at a premium per share of $0.75. Our investor decides to buy 2 MNO OCT 17 call options at a total cost of $150.00 (i.e. 2 x 100 x $0.75), considerably less than the cash outlay of buying 200 shares.

Six months later, MNO Bank stock has indeed risen, closing at $20.00 on October 7, 2003. The MNO OCT 17 call options are now selling for a premium of $3.00. Feeling that MNO Bank stock is not likely to rise further, the investor decides to sell his 2 MNO OCT 17 call options for revenues of $600.00 (2 x 100 x $3.00).

Results

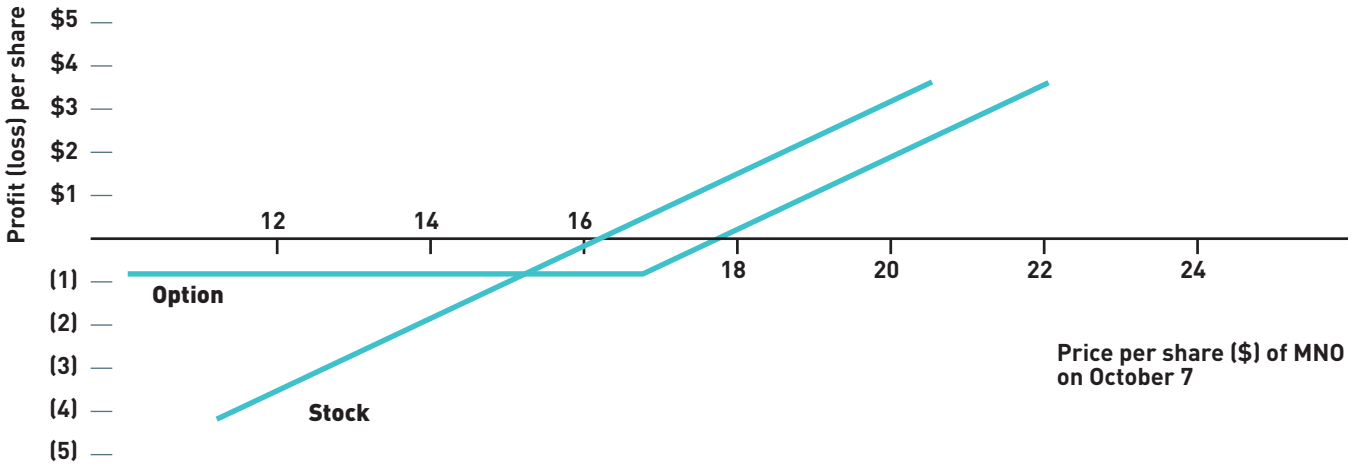
The resale of the 2 calls enables the investor to realize profits of $450.00 since the options purchased for $150.00 are resold six months later for $600.00. Had he instead purchased 200 shares of MNO Bank stock on April 1 at a price of $3,200.00, he would have realized profits of $800.00, as the 200 shares would be worth $4,000.00 on October 7.

Returns on investment are quite different due to the difference in original capital outlays, as the following table illustrates:

DATE AND TRANSACTION	Price per share of MNO	Options	Shares
April 1: buy 2 MNO OCT 17 calls at $0.75 or buy 200 shares	$16.00	$(150.00)	$(3,200.00)
October 7: sell 2 MNO OCT 17 calls at $3.00 or sell 200 shares	$20.00	$600.00	$4,000.00
Net profit		$450.00	$800.00
Return on investment		300%	25%

Had the investor purchased shares of MNO Bank stock instead of the call options, the rate of return on capital would have been considerably lower. Further, the call buyer's risk is limited to the premium paid, regardless of any decline in the market price of the MNO shares.

A comparison of profits and losses from the two strategies (call options versus purchasing shares) is presented below in graph form using a variety of possible MNO share prices at the call options' expiration. The vertical axis shows the profits or losses on a per share basis. To convert to net profits or losses for the two strategies, multiply by 200.



This graph illustrates the relative advantages of each strategy. For example, the break-even point of the options strategy (the point at which the options graph crosses the horizontal axis) is at $17.75 per share (the MNO OCT 17 call strike price plus premium of $0.75 paid on April 1) while the stock strategy break-even is at $16.00, the original April 1 share price. If MNO stock rises, the investor's total profits are slightly more favourable when owning shares, since he will not have paid a time premium for the options. But profits are unlimited in either strategy.

On the other hand, note the horizontal line in the loss area. This is due to the fact that the options trader cannot lose more than the $150.00 in premiums he paid. Of course, the owner of 200 shares stands to lose considerably more should the stock price decline substantially. He loses dollar for dollar if share prices decline; the call options buyer cannot lose more than $0.75 per underlying share.

Buying call options as protection for future purchases

Situation

Many times, investment decisions may be hindered by cash flow considerations. That is, funds to acquire stockmay not be available at the time that prices appear most favourable.

Objective

Buying call options to determine a future purchase price on a stock.

Strategy

An investor finds the shares of ABC Inc. at a price of $21.00 to be an excellent portfolio investment for the long term. But the investor's funds are committed to term deposits expiring in October and he does not want to pay the penalty of early withdrawal in order to acquire ABC shares. On the other hand, the investor is concerned that the share price may rise considerably over the next few months such that the planned purchase of ABC stock might cost considerably more than $21.00 per share.

The investor could purchase ABC OCT 20 call options at a premium of $2.00, assuring him of an effective ceiling price of $22.00 (strike price plus premium) for ABC stock at any time until the third Friday of October.

Results

A call option on ABC stock can protect the investor against a rise in the price of the stock before his planned purchase. The buyer of a call option sets the maximum effective price he will have to pay for an underlying security during the life of the option, i.e. no greater than the strike price of the option plus the premium paid. The option can therefore be considered as "insurance" against a market price increase of the security he wishes to acquire at a later date. By purchasing options now, he can set the maximum price he is willing to pay and insure himself against a rising market. If, at the option's expiry, the price of ABC Inc. is below $20.00, the investor will lose the premium paid to acquire this insurance.

Buying call options to hedge a short sale (protective calls)

Situation

An investor having made a short sale of shares can use a call option on the underlying security to protect himself from unfavourable price fluctuations. The call option constitutes effective protection against a rise in the market price of the security sold short, since it establishes the maximum price to be paid to buy back the shares.

Objective

Buying call options to hedge a short sale of shares.

Strategy

Suppose an investor "shorts" 1,000 shares of DEF Corporation when it is trading at $20.25. The investor is hoping to make a profit on a forecasted decline of the shares since this will enable him to buy back the shares sold short at a total price below the revenue of $20,250.00 (= 1,000 x $20.25). Note that for simplicity, the financing costs of short-selling are not considered (readers unfamiliar with stock short-selling should consult their broker for more details).

He risks, however, a rise in DEF shares that could cause him to incur substantial losses. To hedge this risk, he decides to buy 10 DEF JUN 20 call options at $1.10 per share or $1,100.00 total. He has, thus, assured himself of a purchase price of $20.00 per share for the underlying stock in case it should rise.

Results

On June 13, the price of DEF Corporation shares had risen to $22.00 (= $22,000.00) and the investor decides to close out his short position before a further rise in the share price causes additional losses.

Rather than trying to buy back his shares on the open market, he simply exercises his 10 DEF JUN 20 calls and delivers an order to his broker to close out his short obligation. But note that the investor's total losses on his misforecast of the future price of DEF are limited to $850.00 (i.e. the call premium paid $1,100.00 minus $250.00, the difference between the price at which the shares were shorted, $20.25 and the strike price $20.00). Had he not hedged with the 10 calls, his losses would have totaled $1,750.00 due to the impact of a rise of $1.75 in the price of the 1,000 shares he shorted. Losses on an unhedged short sale are theorically unlimited.

Writing covered call options

Situation

A conservative investor will generally write covered call options only, i.e. options on securities he already owns in his portfolio. Covered writing provides the investor with additional income from his investment portfolio, which protects his securities, at least partially, from a decline in market price. Covered options writing provides a reasonable rate of return while limiting possible risks. In many cases, a conservative options writer, having sold a covered option, will do nothing more than wait for the option to be exercised or to expire.

Objective

To skew the risk/reward ratio in the investor's favour by collecting premium income from the sale of call options. This income reduces the volatility of a portfolio, and studies have shown that it actually increases the yield on a portfolio in a neutral or bearish market.

Strategy

An investor holds 100 shares of ABC common stock. The current price is $14.00 per share. Concerned about stable-to-slightly weakening prices, he decides to write 1 ABC JUN 15 call option at a premium of $0.50.

The investor has protected his ABC shares against moderate declines in share price down to $13.50 (i.e. $14.00 – $0.50) since losses on his stock position will be compensated by the option premium he has received.

Results

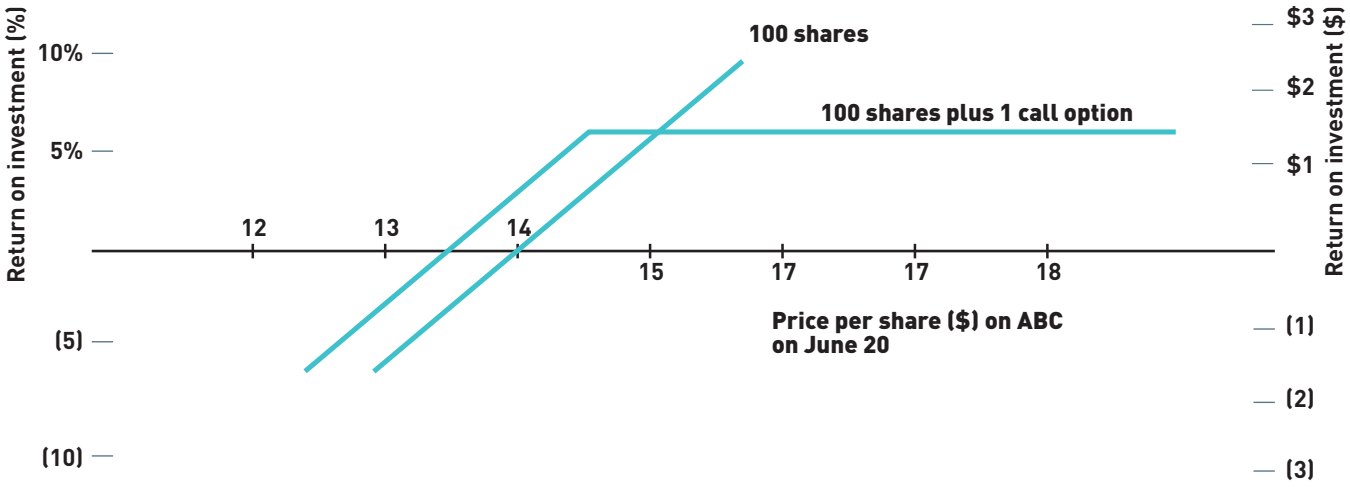
Scenario 1: ABC's stock price rises above $15.00.

If the price of ABC shares increases above $15.00, the investor will find his shares "called" by the investor who bought the call. In this case, the call writer will realize a net effective selling price of $15.50 per share, the strike price of $15.00 plus the $0.50 premium received. Of course, the investor will experience an "opportunity cost" if the price of ABC shares rises above $15.50, since he will not be able to sell his ABC shares at the higher price, having committed himself to deliver at $15.00.

Scenario 2: ABC's stock price stays below $15.00.

If the share price is stable and remains below $15.00 (the call strike price), the investor will retain all of his call premium income, thereby substantially increasing the yield on his investment over what it would have been without the calls.

The graph below illustrates the investor's profit or loss per ABC share and his return on investment over the period covered by the strategy.



Several points are worth noting:

- The option writer accepts a limited profit and return on his investment. If he is assigned, his profit is limited to $1.50 per share (stock price appreciation of $1.00 per share up to option strike price plus premium of $0.50) and he foregoes all incremental profits arising from a price increase in ABC shares above $15.00, as illustrated by the horizontal portion of the "covered write" line.
- The covered writer's break-even point is substantially below the unhedged shareholder. The covered write and "shares only" strategies cross the horizontal break-even axis at, $13.50 and $14.00, respectively.
- The "covered write" strategy is superior to the "shares only" strategy at any ABC price below $15.50 per share because of the premium received.
- This strategy can also be moderately bullish, depending on the strike price of the option sold. The investor can do a covered call write as an alternative to an open sell order at a limit price. He would choose in this case an out-of-the-money strike reflecting the price to which he thinks the stock will increase.

Furthermore, note that the uncovered call writer is prepared to take greater risks than the conservative writer in the hope of making larger profits. The risks involved in the "naked" call writing strategy are the potentially unlimited losses if the price of the stock rises significantly, whereas the potential gains are limited to the premium received. A sudden increase in the stock price, following the announcement of some favourable information, for example, would result in substantial losses since the uncovered writer is obligated to sell the shares at the strike price. Since the writer does not own the shares, he has to buy them at market value, which is higher.

Buying put options instead of short selling stocks

Situation

One of the major advantages of options contracts over transactions in the actual stock market is the high leverage provided by equity options in the case where the investor has correctly forecasted the future price fluctuation of the equity. Put options offer such advantages in the case of anticipated stock price declines.

Objective

Buying put options to take advantage of a drop in stock prices.

Strategy

ABC Bank common stock is selling at $33.50 and ABC AUG 35 put options are available at a premium of $2.75 per share ($275.00 per contract). Forecasting a drop in market price of ABC shares, the investor could either buy ABC AUG 35 put options or "sell short" shares of ABC stock. Note that for simplicity, the financing cost of shortselling is not considered (readers unfamiliar with stock short-selling should consult their broker for more detail).

For purposes of illustration, consider the two strategies in parallel, the purchase of 1 put option or the short-sale of 100 shares. On July 21, the price of ABC stock had fallen to $28.50 and ABC AUG 35 puts were trading at a premium of $7.50 per share. The investor decides to liquidate his position.

DATE AND TRANSACTION	Price per Share of ABC	Options	Shares
April 28: buy 1 ABC AUG 35 put at $2.75 or sell short 100 shares of ABC	$33.50	$(275.00)	$(3,350.00)
July 21: sell 1 ABC AUG 35 put at $7.50 or buy back 100 shares of ABC	$28.50	$750.00	$(2,850.00)
Net Profit		$475.00	$500.00
Return on Investment		172.7%	14.9%

In terms of return, the main difference between these two strategies is the amount invested or the leverage of options. The investment in the options position corresponds to the premium paid, whereas the short-sale requires the maintenance of a minimum margin in the customer's account.

The buyers of puts also face limited risks compared with their counterparts in the actual stock market. What if the price of ABC stock had risen instead? The holder of a short stock position would have experienced losses. The put buyer, on the other hand, could not lose more than the $275.00 premium originally paid. This limited risk feature is very valuable to the investor unable to withstand potentially large losses. Unlike short sellers of stocks, put buyers pay the contract premium and have no further financial obligation.

Buying put options as an insurance policy (protective puts)

Situation

The covered call writer's stocks are protected against moderate declines in value since the loss arising from a depreciation of his stock portfolio would be wholly or partially offset by the sold call option premium revenue. There are, however, shortcomings to hedging positions by writing call options:

- The investor's stocks are protected only to the extent of the call option premiums received. Thus, the investor is not protected against large drops in the price of these shares unless he writes call options with consecutively lower strike prices, thereby assuming a greater risk of being assigned.
- Since the investor may have to sell his stock if exercised by the call option holder, he must forego the benefits of a rise in the value of the stock above the strike price of the option sold, so long as the call option positions he has written are still "open".

Put options alleviate many of these problems, since they enable the holder to obtain unlimited downside protection while retaining most of his upside potential. Further, the investor's stock will not be called away since he is the holder of the option.

Objective

Locking in a profit or hedging the value of existing portfolio positions.

Strategy

An investor holds 1,000 shares of MNO Bank. The MNO shares have increased substantially in value since the investor acquired them and are now worth $32.00 per share or $32,000.00 (1,000 x $32.00). The investor wants to continue to hold the shares for their long-term potential but is concerned that they may decline over the summer if a widely-forecasted market correction occurs.

To hedge his MNO stocks, the investor buys 10 MNO JUN 32 put options at a premium of $1.60 per share or $1,600.00 total for the 10 puts. He has, therefore, assured himself of a selling price of $30.40 per share (i.e. strike price of $32.00 minus premium paid of $1.60) if MNO stock drops in value.

Results

Scenario 1: MNO's stock price falls to $26.00 and put options can be sold at a premium of $6.00.

The loss of $6.00 per share on the drop in stock price is partially offset by an option profit of $4.40 (i.e. $6.00 – $1.60) if the investor sells 10 puts.

DATE AND TRANSACTION	Price per Share of MNO	Options	Shares
February 26: buy 10 MNO JUN 32 puts at $1.60	$32.00	$(1,600.00)	$(32,000.00)
May 20: sell 10 MNO JUN 32 puts at $6.00	$26.00	$6,000.00	$26,000.00
Loss on stock			$(6,000.00)
Options profit		$4,400.00	
Net loss		$(1,600.00)	

Note that the options profits substantially cushion the investor's stock losses. He could have obtained better protection by purchasing an in-the-money series like the MNO JUN 34.5 but at a higher premium cost. It should

be noted that the investor could exercise his 10 puts (rather than reselling them) and sell his 1,000 shares of MNO stock at $32.00 each. The choice would be made according to his feelings regarding the future price of the stock and commission fee consideration.

Scenario 2: MNO's stock price increases to $40.00.

In this case, the 10 puts would be worthless. The investor's 1,000 shares would have appreciated by $8,000.00 (i.e. 1,000 x ($40.00 – $32.00)), more than offsetting the cost of the 10 puts. Had the investor's hedge consisted of writing calls rather than buying puts, he would not have participated in the full benefits of this increase.

Had MNO stock risen to $40.00 per share, the investor might want to consider purchasing puts with a $40.00 strike price to lock in the profits arising from the latest appreciation in MNO stock. Many investors use this strategy on an ongoing basis to protect their investment profits without liquidating their stock position.

Writing secured put options

Situation

When writing put options, the investor must be prepared to actually acquire the shares underlying the put options if he is assigned by the put option holder. Thus, he "secures" his put options by a cash deposit or by the proceeds of short-selling the stock.

Even with such a constraint, writing put options can still be a useful means of acquiring stock at below market prices. Indeed, many investors prefer to write put options rather than place limit buy orders at below market rates and wait for a "fill" if the stock should drop in value.

Objective

To allow an investor to acquire stock at a net cost below market price. This strategy also increases the return of a portfolio because of the premium received.

Strategy

XYZ shares are trading at $27.00. An investor feels the shares are slightly overvalued in the present market but is very positive regarding XYZ shares over the long term. Instead of putting in a limit order to buy XYZ at a price slightly lower than market price, he decides to write put options with an strike price of $27.00.

Accordingly, the investor writes 10 XYZ JUN 27 put options at a premium of $1.15 per share. His revenues are $1,150.00.

Results

Scenario 1: XYZ's stock price drops below $27.00.

At the put option's expiration, XYZ shares are at $26.00. The investor is "assigned" to take delivery of XYZ shares at $27.00 since the holder of 10 XYZ JUN 27 puts decided to exercise his options.

As a result, the investor acquires 1,000 shares of XYZ at a net effective price of $25.85 (i.e. $27,000.00 for the 1,000 shares "put to him" at $27.00 each, minus the previously received revenue of $1,150.00), which is still below the prevailing market price of $26.00. If the XYZ shares drop below $25.85 (i.e. strike price minus premium on February 11), the investor may be obliged to buy XYZ shares at a price that is suddenly well above market prices. This could result in large losses if he did not close out his 10 short XYZ JUN 27 put options position.

Note that, in the case of the uncovered sale of put options, the investor has large downside risks if the stock falls substantially.

Scenario 2: XYZ's stock price stays above $27.00.

The investor retains his option premium revenues but might regret not having purchased XYZ shares at $27.00. He will be in a net favourable situation, however, so long as XYZ shares remain below $28.15 (i.e. price of $27.00 plus premium of $1.15).

Here, the uncovered investor will realize the same profit as the covered investor since both options will expire worthless and will not be assigned.

Writing covered straddles

Situation

An investor "sells a straddle" when he sells both put and call options on the same stock with identical strike prices and expiration months. This strategy is a means of profiting when the investor is confident of a stable stock price. For this strategy to be covered, the investor should hold the underlying shares to cover the calls sold, and the necessary cash to buy the shares in case he is assigned on the puts sold. The writer of a straddle is always subject to the risk, however small it may be, of being assigned on both legs of the straddle, in the event, for example, of a large drop in the price of a stock followed by a rapid recovery.

The straddle writer collects premium revenue from both the call buyer and the put buyer but has obligated himself to either make or take delivery (or, in rare cases, both) of the underlying stock at the strike price. The premiums collected reduce the investor's purchase price and increase his selling price in the case he is assigned.

Objective

Take in revenues that are proportionate with the yields available in the stock market and consequently increase the return of the portfolio. This strategy is used to take advantage of a non-volatile stock.

Strategy

An investor holds 1,000 shares of RST common stock. The current price is $30.00 per share and the investor feels that it is likely to be stable for the next few months. The investor decides to write a straddle of RST stock by simultaneously writing 10 RST JUN 30 call options at a premium of $1.50 (or $150.00 per contract) and 10 RST JUN 30 put options at a premium of $1.00 (or $100.00 per contract). His total premium income is $2,500.00 (or $2.50 per share).

Finally, he sets $30,000.00 aside to buy 1,000 shares of RST should the stock's price drop.

Results

The investor will retain all of his premium revenues if he is not assigned on either leg before expiration and the price of RST is at $30.00 on the date of expiration.

A useful exercise is the calculation of the investor's break-even points (the strike price of $30.00 plus or minus the total premium revenue per share of $2.50)—the upper and lower limits of possible stock prices on the option's expiration date between which the investor will not lose money. In our example, the break-even points are $27.50 and $32.50, since the total premium revenue of $2.50 per share will protect the writer between those points.

Scenario 1: RST's stock price is below $30.00 at expiration.

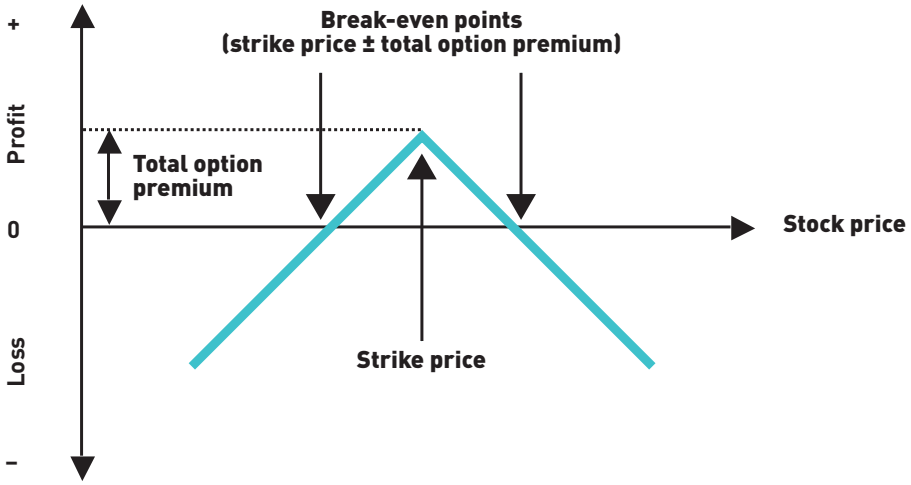
If the price of the stock drops, the calls expire worthless. The writer will be assigned on his JUN 30 puts and will be obliged to purchase 1,000 shares at $30.00. It is to be noted that the net purchase price is $27.50 ($30.00 – $2.50). Given that he had the funds set aside, this is a much less risky transaction.

Scenario 2: RST's stock price is above $30.00 at expiration.

If the price of the stock rises, the puts will expire worthless. The writer will be assigned on his JUN 30 calls and will be obliged to sell his shares at $30.00. He makes no gain on the sale of his shares but he keeps the $2.50 initially received for taking on this position and makes quite a handsome return. His final selling price is $32.50.

Note that the investor incurs losses if the stock price is outside the 27.50;32.50 range.

Payoff diagram at expiry
Short straddle



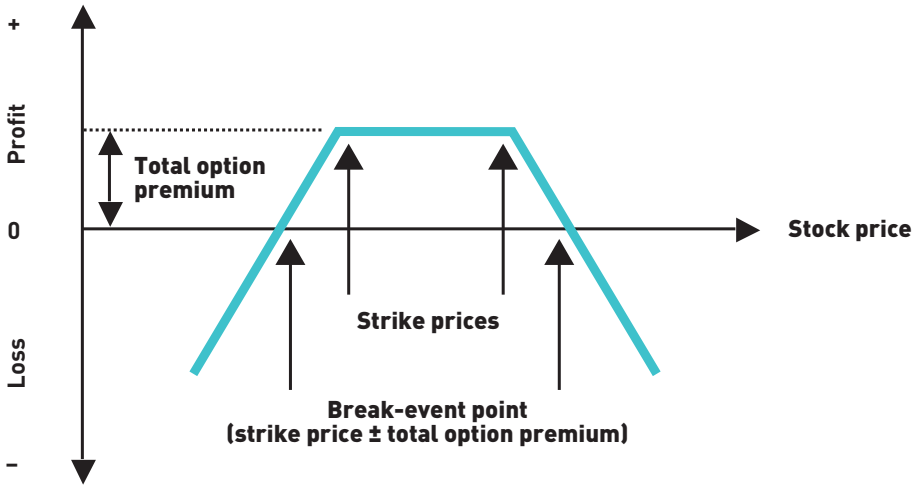
A few words on the strangle

The sale of a straddle is usually executed with at-the-money strike prices. An investor can also sell a combination with different strike prices through the sale of a strangle. This strategy implies selling out-of-themoney call and put options. As a result, the premium received from the sale of a strangle is lower than the premium of a straddle. However, the investor has more chances of keeping the maximum profit.

Like the straddle, a strangle establishes lower and upper break-even points. The investor will make the maximum profit if the price of the underlying stock is between the two strike prices at expiration since both options will be worthless. When the stock price is outside this bracket, the investor's profit decreases. There is a risk of loss when the break-even points are reached.

The diagram below shows that straddle writing is an interesting strategy when the market is fairly stable. The objective is to profit from stock price variation inside a range of prices.

Payoff diagram at expiry
Short strangle



Long straddle

Situation

Shrewd option traders execute transactions based on the volatility of the stock under option by buying a straddle. This trading strategy is primarily based on the price volatility of the underlying asset. The long straddle investor is said to be "buying volatility".

A long straddle consists of taking a long position in both a call option and a put option on the same asset with the same strike price and expiry date. By doing so, the investor sets lower and upper break-even points for his position. This strategy is useful when an event will have either a highly favourable or unfavourable impact on the price of the underlying asset, but the investor is unsure of the direction. The long straddle holder expects that the future price fluctuation of the underlying stock will be greater than the cost of buying the options.

Objective

To profit from future stock volatility when the market underestimates it.

Strategy

An investor feels that DEF options are undervalued and expects a large swing in the price of DEF following the expected release of earnings statement. DEF is trading at $29.35 a share.

To profit from his outlook, he buys a straddle on DEF: purchase of 10 DEF JUL 30 call options and purchase of 10 DEF JUL 30 put options. Calls are trading at $3.70, for an out-of-the-pocket cost of $3,700.00. Puts are worth $4.10, for an out-of-the-pocket cost of $4,100.00. His net out-of-the-pocket cost is $7,800.00 ($3,700.00 + $4,100.00).

- Buy 10 DEF JUL 30 calls at $3.70
- Buy 10 DEF JUL 30 puts at $4.10
- Net debit: $7.80

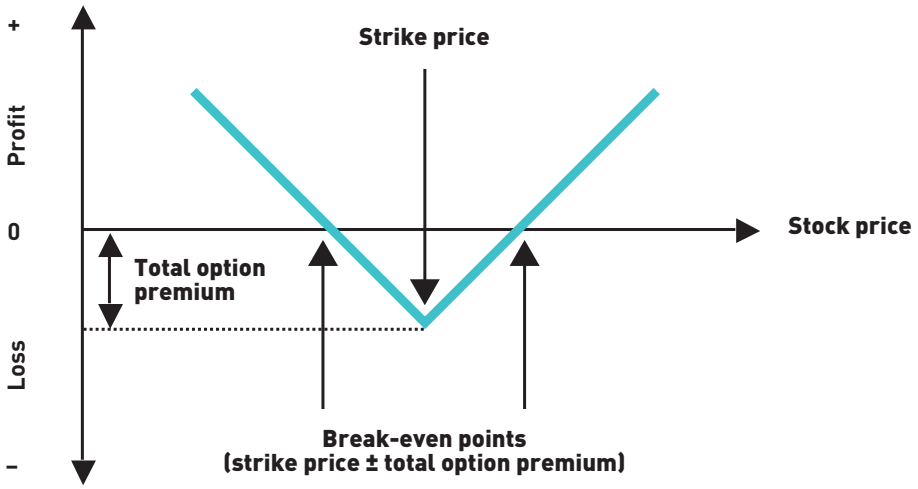
His lower break-even corresponds to the strike price minus the total option premium ($30.00 – $7.80 = $22.70); his upper break-even point is the strike price plus the total option premium ($30.00 + $7.80 = $37.80). This means that the trade will be profitable as long as the price of the stock moves outside this threshold.

Results

The downside risk of this strategy is known and limited. If the price of the stock remains inside the threshold, the investor may lose up to the total premium paid for the purchase of the options. Note that a straddle is doubly sensitive to the passage of time. Quite often, an investor will decide to cash in his profits if the price of the stock moves drastically even if a small amount of time has passed since he bought his straddle or if his position no longer reflects his initial intentions.

Conversely, this strategy attains its full potential when the fluctuation in the price of the stock goes outside the preset limits. The investor can exercise either the call or the put (depending on the direction of prices) and trade his DEF shares on the stock market to cash in his profit, or sell the favourable option in the market.

Payoff diagram at expiry
Long straddle



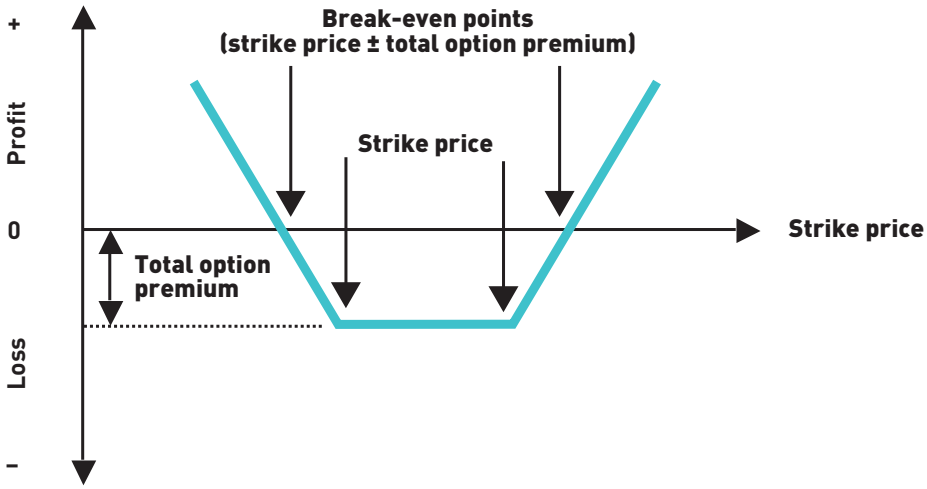
A few words on the strangle

The purchase of a straddle is normally executed with at-the-money strike prices. An investor can also purchase a combination with different strike prices through the purchase of a strangle. This strategy implies the purchase of out-of-the-money call and put options. As a result, the premium paid to execute a strangle is lower than the premium of a straddle.

Like the straddle, a strangle establishes lower and upper break-even points. The investor will start making profits when the price of the underlying stock is higher than the upper break-even point or lower than the break-even point on the downside.

Theoretically, the maximum downside risk is higher for a strangle. The maximum loss is incurred when the price of the stock is between the lower and upper strike prices at expiry. In comparison, the maximum loss on a straddle is incurred if the price of the stock at expiry is exactly equal to the strike price of the two options bought. However, as the cost of a strangle is lower, the maximum loss of the investor is lower than the loss on a straddle.

Payoff diagram at expiry
Long strangle



Bear call spread (credit call spread or vertical spread)

Situation

An investor enters into a bear call spread when he buys a call option and simultaneously sells another call option on the same stock having the same expiry but with a lower strike price.

This type of strategy is similar to buying call options to protect a short sale of shares but instead of selling the stock short, you sell in-the-money call options. The risk of loss with this strategy is limited since you hold call options to protect the sale of your in-the-money call options in the event the stock rises significantly. An investor who expects a stock to fall moderately will see the benefits of this option strategy. It enables him to set the gain and loss limits, avoid an initial outlay and take advantage of a drop in the stock down to the lower strike price. On the other hand, a margin is required to cover the potential loss.

Objective

To collect premium revenue as an option writer but reduce the risks associated with "naked" option writing.

Strategy

An investor feels that the current market price of QRS shares is likely to fall from its present price of $17.50 per share. He also believes that QRS options are overvalued. To profit from this forecast, the investor decides to write 10 QRS JUN 17.50 calls at a premium of $2.50 per share for an income of $2,500.00. To hedge the possibility that the shares of QRS might rise in value, the investor purchases 10 QRS JUN 20.00 calls at a premium of $1.00 per share. The net premium received is $1,500.00.

- Buy 10 QRS JUN 20.00 calls at $1.00
- Sell 10 QRS JUN 17.50 calls at $2.50
- Net credit: $1.50

Results

If the investor is wrong and the price of the stock underlying his short call should rise, the investor will have a "stop loss" position, since he holds another call to "buy back" the same stock.

Scenario 1: QRS' stock price is below $17.50.

At expiration, both call series expired unexercised. In this case, he keeps the original $1,500.00 received from this strategy. Thus, the investor's maximum profit of $1,500.00 is simply the difference in the premiums of the two "legs" of the strategy (i.e. $2.50 – $1.00 = $1.50) multiplied by the 1,000 shares underlying the 10 options.

Scenario 2: QRS' stock price is between $17.50 and $20.00

At expiration, the investor would be assigned on his JUN 17.50 calls and would thereby be obliged to sell 1,000 shares of QRS at $17.50. To obtain these shares, he would have to purchase them in the market at the going price, which is higher. It is to be noted that the investor's break-even point for this transaction is $19.00 ($17.50 + the $1.50 received from the strategy), so the strategy is profitable as long as the shares stay below $19.00. Above that price, the investor's original revenues do not offset the losses on QRS JUN 17.50 calls being exercised.

Scenario 3: QRS' stock price rises above $20.00.

If the stock rises above $20.00, both options are in-the-money. The investor would be assigned on his short JUN 17.50 call position and would be obliged to sell the shares at $17.50. He would then exercise his JUN 20.00 calls and thereby purchase 1,000 shares of QRS at $20.00. The net loss would therefore be limited to the difference between the strike prices (20.00 – 17.50) and the $1.50 premium, i.e. $2.50 – $1.50 = $1.00 per share.

Bull call spread (debit call spread or vertical spread)

Situation

An investor enters into a bull call spread when he buys a call option and simultaneously sells another call option on the same stock having the same expiry but with a higher strike price.

This strategy is similar to covered call writing but, instead of holding the shares, you have an in-the-money or at-the-money call option. There is less risk with this type of strategy because the worst case scenario is that the call option held will be worthless at expiry. Therefore, even if the stock drops substantially, the maximum loss will never exceed the net premium paid for the option position. An investor who expects a stock to rise moderately and wants to take advantage of it will see the benefits of this option strategy.

Objective

To reduce the purchase price of the call option bought while profiting from bullish views to a certain limit.

Strategy

An investor feels that the current market price of QRS shares is likely to increase from its present price of $50.00 per share. To profit from his prediction, the investor decides to buy 10 QRS OCT 50 calls at a premium of $2.25 for an amount of $2,250.00. He also sells 10 QRS OCT 55 calls at a premium of $1.00. His net outlay is $1,250.00. The strike price of the written call determines the bullishness of the strategy.

- Buy 10 QRS OCT 50 calls at $2.25
- Sell 10 QRS OCT 55 calls at $1.00
- Net debit: $1.25

Results

The sale of the QRS OCT 55 calls reduces the cost of buying the OCT 50 calls. It also limits the strategy's potential gains should it be profitable at expiration.

Scenario 1: QRS' stock price rises above $55.00.

At expiration, the investor exercises his OCT 50 calls and thereby purchases 1,000 shares of QRS at $50.00. He is also assigned on his short OCT 55 call position and therefore sells the shares at $55.00, locking-in a $5.00 gain. The net gain (considering the $1.25 per share outlay for the options) would therefore be $3.75 ($5.00 – $1.25). He realizes the maximum profit from this strategy, since the price of the stock is higher than the strike price of the option sold.

Scenario 2: QRS' stock price is between $50.00 and $55.00.

At expiration, the investor exercises his OCT 50 calls and thereby purchases 1,000 shares of QRS at $50.00. He then sells them in the market for the going price. It is to be noted that the investor break-even point for this transaction is $51.25 ($50.00 + the $1.25 cost of the transaction), but to reduce his loss, he would still exercise his option if the stock is trading between $50.00 and $51.25.

Scenario 3: QRS' stock price is below $50.00.

At expiration, the investor lets his options expire worthless. His net loss would be the cost of the transaction, or $1.25 per share.

Bear put spread (debit put spread or vertical spread)

Situation

An investor enters into a bear put spread when he buys a put option and simultaneously sells another put option on the same stock having the same expiry but with a lower strike price.

This strategy is similar to the bear call spread but, instead of receiving the net premium on the options, you have to pay it. If the stock rises substantially, the loss will be limited to the net premium paid to hold this position. This strategy reduces the purchase price of the long put and the investor can benefit from a price decrease within a certain limit.

Objective

To profit from bearish views while spending less than for the simple purchase of a put.

Strategy

QRS is trading at $17.50. An investor believes that the price of QRS will be falling in the near future. Since he has very little cash to put into a stock transaction, he buys 10 QRS JUN 17.50 puts at a premium of $2.50 and spends $2,500.00. He also sells 10 QRS JUN 12.50 puts and takes in $1,000.00. His net outlay is therefore $1,500.00 ($2,500.00 – $1,000.00).

- Buy 10 QRS JUN 17.50 puts at $2.50
- Sell 10 QRS JUN 12.50 puts at $1.00
- Net debit: $1.50

Results

The sale of the QRS JUN 12.50 puts reduces the cost of buying the JUN 17.50 puts. It also limits the strategy's potential gains should it be profitable at expiration.

Scenario 1: QRS' stock price drops below $12.50.

At expiration, the investor would be assigned on his short JUN 12.50 put position and would therefore purchase the shares at $12.50. He would also exercise his JUN 17.50 puts and thereby sell 1,000 shares of QRS at $17.50, locking in a $5.00 gain. The net gain (considering the $1.50 per share outlay for the options) would therefore be $3.50 ($5.00 – $1.50).

Scenario 2: QRS' stock price is between $12.50 and $17.50.

At expiration, JUN 12.50 puts are worthless and JUN 17.50 puts are in-the-money. Note that the investor's breakeven point for this trade is $16.00 ($17.50 – $1.50). However, the investor will close his 17.50 put position even if QRS is above $16.00 to reduce his loss.

Scenario 3: QRS' stock price is above $17.50.

At expiration, he lets his options expire worthless. His net loss would be the cost of the transaction, or $1.50 per share.

Bull put spread (credit put spread or vertical spread)

Situation

An investor enters into a bull put spread when he buys a put option and simultaneously sells another put option on the same stock having the same expiry but with a higher strike price.

This strategy is similar to the bull call spread but, instead of paying the net option premium, you receive it. If the stock drops significantly, the maximum loss is limited to the difference between the higher and lower strike prices minus the net premium received. In this way, the investor knows his potential limits with his opening position.

This strategy is interesting because of its advantages to the investor. First, the initial position generates funds when the options are sold, which avoids any initial layout. On the other hand, a margin will be required to cover the potential loss. Second, it provides some insurance in the event of a significant drop in the stock. Finally, it enables you to benefit from a rise in the stock up to the strike price of the put option written. On the other hand, the potential profit is limited if the stock rises significantly because the options sold will be worthless at expiry. Thus, the advantage of obtaining an opening creditor position (receiving the premium for the options sold) is offset by the limited potential gain if the price of the underlying share rises.

Objective

To profit from views that QRS options are overvalued and that QRS will not be falling in the near term. The investor also wants to ensure that his risk is limited.

Strategy

QRS stock is trading at $23.25. An investor believes that the price of QRS will rise in the near future and that QRS options are overvalued. The investor decides to buy 10 QRS APR 20 puts at a premium of $0.35 and simultaneously sell 10 QRS APR 26 puts at a premium of $3.05; the net premium received is $2,700.00.

- Buy 10 QRS APR 20 puts at $0.35
- Sell 10 QRS APR 26 puts at $3.05
- Net credit: $2.70

Results

The income produced by selling the APR 26 puts also comes with almost unlimited risk should the stock fall. Therefore, the purchase of the APR 20 puts limits the risk of this strategy.

Scenario 1: QRS' stock price is above $26.00.

At expiration, both series would expire worthless. In this case, he keeps the initial $2,700.00 he received from the strategy and realizes the maximum profit for this spread.

Scenario 2: QRS' stock price is between $20.00 and $26.00.

At expiration, the investor would be assigned on his APR 26 puts and would thereby be obliged to buy 1,000 shares of QRS at $26.00. He would then have to sell them on the market at the going price, which is lower. Note that the investor's break-even point for this transaction is $23.30 ($26.00 – the $2.70 received from the strategy), so the strategy is profitable as long as the shares stay above $23.30.

Scenario 3: QRS' stock price drops below $20.00.

If the stock drops below $20.00, the investor would be assigned on his short APR 26 put position and he would be obliged to buy the shares at $26.00. He would also exercise his APR 20 puts and thereby sell 1,000 shares of QRS at $20.00, locking in a $6.00 loss. The net loss (including the $2.70 per share income from the strategy) would therefore be $3.30 ($2.70 – $6.00).

Repair strategy

Situation

An investor who has purchased a certain number of shares would sometimes face a situation where the price of his shares dropped due to a bear market or to disappointing news issued by the company. The investor in this case can either sell his shares at a loss and try to forget about his bad market experience, or he can try to reduce his average cost by doubling up his position. This strategy is interesting if the investor thinks that the price of the shares may rise again in the future to reach at least his new break-even point. The investor's objective has actually changed. He is aware that he will not make a profit with the purchased shares, but hopes at least to recuperate the amount invested in this purchase. However, doubling up a stock position requires investing more money, which may not be available. Also, by doubling up his position, the investor is doubling his downside risk with twice the number of shares.

Objective

Reduce the break-even point without investing more funds and without doubling the downside risk.

Strategy

An investor holds 1,000 shares of ABC for which he paid $27.50. ABC is now trading at $22.20. He thinks that the price of the stock may go up to $25.00, and that a good strategy would be to average down his break-even point from $27.50 to around $25.00. In order to do so, the investor has to buy 1,000 ABC shares at the actual market price of $22.20. This purchase needs the investment of $22,200.00, and by doubling his stock position he would be doubling his downside risk. He decides to do the following options strategy:

- Buy 10 ABC SEPT 22.50 calls at $2.50
- Sell 20 ABC SEPT 25 calls at $1.30
- Net credit: $0.10

Thus, the investor has purchased the right to double his position at $22.50, and he is committed to sell them $25.00, which is his new break-even point. The 20 calls sold are covered by the ABC shares held in the portfolio and by the 10 22.50-strike calls purchased in this strategy.

Results

- If the price of ABC stays unchanged or below $22.50, both series will expire worthless and the investor keeps the $0.10 premium collected.
- If ABC goes up to $24.00, the investor can recuperate $1.50 by selling the 22.50 calls at their intrinsic value. The ABC 25 calls will expire worthless.
- This strategy meets its objective if ABC goes up to $25.00. In this case, the investor will exercise his right to buy 1,000 shares of ABC at $22.50 — reducing his average purchase price to $25.00. He would break even by selling 2,000 shares of ABC on the market.
- What if ABC goes up suddenly to $27.50? He can always exercise his right to buy 1,000 shares at $22.50, but the investor is committed to selling his shares at $25.00. This strategy will not enable him to profit from a price increase above the break-even point.

However, when ABC is at $27.50, the investor can still unwind this strategy with zero or close-to-zero cost by buying back the 20 ABC SEPT 25 calls at $2.50 and selling the 10 ABC SEPT 22.50 calls at $5.00 for a total cost of $0.00.

Collar

Situation

The purchase of put options enables investors to get downside protection while retaining most of the upside potential of their shares. However, this insurance has a cost and can be quite expensive if the size of the stock position held is significant or if an investor wants to renew his protection on a regular basis.

Another alternative is available to investors wanting to protect the value of his shares, but finding the cost of put options too high: the collar. This strategy implies the purchase of put options and the simultaneous sale of call options having the same expiry. The call option premium revenue reduces the put option cost. So, this strategy allows buying insurance for a lower or near-zero total cost.

The disadvantage of this strategy is the obligation to sell the shares held if the call option is in-the-money at expiry unless the investor closes his position. An investor must fully understand the risks and rewards of each strategy (purchase of a collar v. purchase of put options as an insurance policy) and consider the market forecast that justifies each strategy.

Objective

Hedging the value of existing portfolio positions at a lower cost.

Strategy

An investor holds 4,000 shares of ABC Inc. worth $44.00. To hedge these stocks from a potential decline in share price, the investor buys out-of-the-money put options at a strike price of $42,00 expiring in 90 days. Put options are trading at $0.60, for an out-of-the-pocket cost of $2,400.00. Since he finds this insurance quite expensive, he decides to sell ABC call options having the same expiry at a strike price of $46.00. Call options are trading at $0.35, for revenue of $1,400.00. The premium collected from selling the call options substantially offsets the cost of put options. The total out-of-the-pocket cost for this strategy is reduced to $1,000.00.

- Buy 40 ABC APR 42 puts at $0.60
- Sell 40 ABC APR 46 calls at $0.35
- Net debit: $0.25

Note that since the options purchased are out-of-the-money, the investor assumes a downside risk of $2.25 (the market price of the shares of $44.00 minus the strike price of the put option of $42.00 plus the premium paid for the strategy of $0.25). At the same time, he limits his upside potential to $1.75 (the strike price of the call option of $46.00 minus the market price of the shares of $44.00 minus the premium paid for the strategy of $0.25).

Results

Scenario 1: ABC is trading at $48.00 at expiration of the options.

The ABC APR 42 puts expire worthless. Since the holder of the 40 ABC APR 46 calls has decided to exercise, the investor is obligated to sell his shares at $46.00. He experiences an opportunity cost since he could have sold his shares at $48.00. His profits are limited to $7,000.00 ($1.75 x 4,000) instead of $16,000.00.

A collar places a limit on the future potential profit since the investor must deprive himself of the gain from an increase in share price above the strike price of the call options sold.

Scenario 2: ABC is trading at $40.00 at expiration of the options.

The ABC APR 46 calls expire worthless. The puts purchased are now in-the-money. Thus, the investor decides to exercise his right to sell the shares at $42.00. He limits his losses to $9,000.00 ($2.25 x 4,000) instead of $16.000.00. As we can see, his losses would have been much more significant without this protection since he would be obligated to sell his shares at $40.00, a loss of $4.00 per share.

In the end, a collar enables an investor to acquire put options as an insurance policy at a lower or even zero cost. This strategy thus limits the downside risk but, at the same, caps time the upside potential. The choice of strike prices defines the risk the investor is willing to assume in case of falling prices, considering the return he wants to achieve in a rising market.

For more information

Please contact Montréal Exchange if you have any additional questions or require further clarification.

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