2027 CFA® EXAM PREP

SchweserNotes™

Derivatives, Risk Management, and Ethical and Professional Standards

Level III Book 3

KAPLAN SCHWESER

Book 3: Derivatives, Risk Management, and Ethical and Professional Standards

SchweserNotes™ 2027

Level III CFA®

SCHWESERNOTES™ 2027 LEVEL III CFA® BOOK 3: DERIVATIVES, RISK MANAGEMENT, AND ETHICAL AND PROFESSIONAL STANDARDS

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ETHICAL AND PROFESSIONAL STANDARDS

Learning Outcome Statements (LOS)

16. Options Strategies

The candidate should be able to:

a. demonstrate how an asset's returns may be replicated by using options.
b. discuss the investment objective(s), structure, payoff, risk(s), value at expiration, profit, maximum profit, maximum loss, and breakeven underlying price at expiration of a covered call position.
c. discuss the investment objective(s), structure, payoff, risk(s), value at expiration, profit, maximum profit, maximum loss, and breakeven underlying price at expiration of a protective put position.
d. compare the delta of covered call and protective put positions with the position of being long an asset and short a forward on the underlying asset.
e. compare the effect of buying a call on a short underlying position with the effect of selling a put on a short underlying position.
f. discuss the investment objective(s), structure, payoffs, risk(s), value at expiration, profit, maximum profit, maximum loss, and breakeven underlying price at expiration of the following option strategies: bull spread, bear spread, straddle, and collar.
g. describe uses of calendar spreads.
h. discuss volatility skew and smile.
i. identify and evaluate appropriate option strategies consistent with given investment objectives.
j. demonstrate the use of options to achieve targeted equity risk exposures.

17. Swaps, Forwards, and Futures Strategies

The candidate should be able to:

a. demonstrate how interest rate swaps, forwards, and futures can be used to modify a portfolio's risk and return.
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c. demonstrate how equity swaps, forwards, and futures can be used to modify a portfolio's risk and return.
d. demonstrate the use of volatility derivatives and variance swaps.
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18. Currency Management: An Introduction

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a. analyze the effects of currency movements on portfolio risk and return.
b. discuss strategic choices in currency management.
c. formulate an appropriate currency management program given financial market conditions and portfolio objectives and constraints.
d. compare active currency trading strategies based on economic fundamentals, technical analysis, carry-trade, and volatility trading.
e. describe how changes in factors underlying active trading strategies affect tactical trading decisions.
f. describe how forward contracts and fx (foreign exchange) swaps are used to adjust hedge ratios.
g. describe trading strategies used to reduce hedging costs and modify the risk–return characteristics of a foreign-currency portfolio.
h. describe the use of cross-hedges, macro-hedges, and minimum-variance-hedge ratios in portfolios exposed to multiple foreign currencies.
i. discuss challenges for managing emerging market currency exposures.

19 & 20. Code of Ethics and Standards of Professional Conduct, Guidance for Standards I–

The candidate should be able to:

19a. describe the structure of the CFA Institute Professional Conduct Program and the disciplinary review process for the enforcement of the CFA Institute Code of Ethics and Standards of Professional Conduct.

19b. explain the ethical responsibilities required by the Code and Standards, including the subsections of each standard.

20a. demonstrate a thorough knowledge of the CFA Institute Code of Ethics and Standards of Professional Conduct by interpreting the Code and Standards in various situations involving issues of professional integrity.

20b. recommend practices and procedures designed to prevent violations of the Code and Standards.

21. Application of the Code and Standards: Level III

The candidate should be able to:

a. evaluate practices, policies, and conduct relative to the CFA Institute Code of Ethics and Standards of Professional Conduct.
b. explain how the practices, policies, or conduct does or does not violate the CFA Institute Code of Ethics and Standards of Professional Conduct.

22. Asset Manager Code of Professional Conduct

The candidate should be able to:

a. explain the purpose of the Asset Manager Code and the benefits that may accrue to a firm that adopts the Code.
b. explain the ethical and professional responsibilities required by the six General Principles of Conduct of the Asset Manager Code.
c. determine whether an asset manager’s practices and procedures are consistent with the Asset Manager Code.
d. recommend practices and procedures designed to prevent violations of the Asset Manager Code.

READING 16

OPTIONS STRATEGIES

EXAM FOCUS

The primary focus of this reading is on the ways in which derivative contracts (i.e., instruments whose values derive from the economic performance of underlying securities, currencies, or other instruments or factors) may be used to hedge, or change the degree of exposure to, existing positions (e.g., a holding of a stock, or the exposure to a foreign currency caused by the ownership of an asset or liability in that currency). We will also see how derivatives, particularly options, can be used to obtain exposures to instruments and factors that cannot be obtained directly from the instruments and factors themselves (e.g., strategies such as straddles and spreads).

This reading deals with options, mainly focusing on options on individual stocks, although the principles apply equally well to options on any other instruments. Reading 17 looks at the principles and uses of futures and forward contracts. Reading 18 is concerned with currency management, beginning with the various approaches to currency along the passive-active spectrum. It then discusses active currency strategies (including volatility trading via options), before considering currency hedging using futures and forwards (mainly the latter), and options.

The sequence of content in our coverage of this reading differs from the LOS order. We start by looking at the payoffs and profits associated with holding option positions to expiration. Because value at expiration is purely reflective of intrinsic value, the calculations involved are simple (but highly examinable, so worth getting clear before the complicating issue of time value is addressed). Only then do we move on to the more theory-heavy areas associated with time value—the option "Greeks" and strategies derived from them.

MODULE 16.1: OPTIONS BASICS—VALUE AT EXPIRATION AND PROFIT AT EXPIRATION

PROFESSOR'S NOTE

Options have already been covered at the previous levels, so the material in this first module is largely review. However, we recommend that you don't skip it, as it is vital to everything that follows.

In particular, distinguishing between option value and profit (respectively pre- and post-initial premium), and the graphical representation of how they vary with differing values of the underlying price, is very helpful when we move on to analyze more complex strategies.

A Refresher on Options Terminology

Here is a refresher on calls and puts:

- A *call* is a right to *buy*.
- A *put* is a right to *sell*.

Each option contract will specify the **underlying** to which the right relates:

- Underlyings include stocks and stock indexes, bonds and bond futures, currencies, commodities, and more abstract factors such as stock volatility.

The contract will specify the **exercise** (**strike**) **price** at which the right can be exercised, and the **expiration** (**expiry**) **date** (and time) at which the right can be exercised (or not):

- **European-style options** may only be exercised at the point of expiration, while **American-style options** may be exercised on any trading day up to and including the point of expiration.
  - Note that European style and American style are just labels for the two main styles of option and have nothing to do with where the options are traded (there are other, more exotic, styles, such as Bermudan, but the details of such exotics are beyond the scope of the syllabus).

The buyer of an option pays a **premium** (the value of the option) to the seller:

- The *buyer* (who takes the **long position** in the option) has the right.
- The *seller* (taking the **short position**) receives the premium as payment for taking on the contingent liability associated with the buyer's right.
  - In the case of a **call option**, the short has undertaken to deliver the underlying if the buyer chooses to exercise (receiving the strike price in exchange).

– In the case of a **put option**, the short has undertaken to take delivery of the underlying if the buyer chooses to exercise (paying the strike price).

Symbols and Formulas

PROFESSOR'S NOTE

We must minimize the use of formulas, where possible. The curriculum text does include some formulas and, if they help your understanding, learn and use them. However, our experience is that it is more reliable to focus on the underlying principles embedded in the formulas. None of the strategies tested are greatly complex, and in all cases, answers can be determined from the basic principles of in/out the moneyness that follow in the next section.

When symbols are used, we will follow the notation in the curriculum:

- X = the e**x**ercise (strike) price.
- S = the underlying (**s**tock) price.
- p and c = the prices (premiums) of the **p**ut and **c**all options.
- Subscripts on S, p, and c will stand for time, with 0 = the point at which the position is entered and T = option expiration.

Intrinsic Value and Time Value

At any point in time, any given option will have a value. This is set, as are all values, by supply and demand, but is likely to be determined by reference to one of the many option pricing models, of which the Black-Scholes-Merton (BSM) was the first (introduced in 1973), and is still widely used.

The key determinants of an option's value are:

- The strike price.
- The current level of the underlying (e.g., stock price, currency rate).
- The remaining time to expiration.
- The volatility of the underlying (the *expected* annualized standard deviation of the underlying over the period to option expiration).
- The annualized risk-free interest rate over the period to expiration.
- The annualized yield expected from the underlying (if any) over the period to expiration.

- Whether it is European style or American style (in principle, the latter might be worth more because they give the right to exercise before expiration, in addition to at expiration).

Market participants may not agree on what an option is worth—most likely because they disagree on the appropriate figure to use for volatility. However, note that all options that trade on exchanges will have a value, which is reflective of the consensus at that point in time. The current value of an option can be used to infer the consensus estimate of volatility for the underlying, known as **implied volatility**. This is done by working backward through a pricing model, given the other factors can be directly observed.

Note that implied volatility is not the same as **historical (realized) volatility**, which is the square root of the *actual* realized variance of returns to date.

It is important to note that the volatility used to determine the option value is a forward-looking estimate, which is not the same as the actual movement in the stock price. For example, the implied volatility for a stock option could well rise, even though the stock price is currently stable, if the consensus view changes on the potential for price moves during the period to expiration.

The value of an option can be decomposed into its intrinsic value and its time value, the total premium being the sum of these two:

- **Intrinsic value** is the value of immediate exercise.[1] It reflects the degree to which the option is in the money (ITM).
- **Time value** is the additional value reflective of *what might happen* between now and the point of expiration (i.e., over the option's remaining life).

An option is ITM if the long would derive a benefit from immediate exercise:

- *A call option is ITM if the current price of the underlying > strike price*, so the long has the right to pay less than the current market price for the underlying.

  The intrinsic value in such a case equals the underlying price minus the strike price (the extent to which the underlying price exceeds the strike price, which is the amount the long could gain by exercising their right, then immediately selling the underlying in the market). Note that here, and throughout, we will ignore transaction costs.
- *A put option is ITM if the current price of the underlying < strike price*, so the long has the right to receive more than the current market price for the underlying.

The intrinsic value in such a case equals the strike price minus the underlying price (the extent to which the strike price exceeds the underlying price, which is the amount the long could gain by buying the underlying in the market, then immediately exercising their right to sell at the strike price).

Note that the intrinsic value is not the same as the profit to the long, which would have to factor in the premium that the long originally paid for the option. This means that it is perfectly possible for an option to be ITM, but for exercise to result in a loss to the long (if the intrinsic value < initial premium paid).

Note also that we are not saying that the long will *choose* to exercise, just that (ignoring premium paid) exercise would lead to a gain.

An option that is not ITM will have zero intrinsic value. It could be at the money (ATM), with the underlying = strike price, or out of the money (OTM):

- *A call option is OTM if current price of the underlying < strike price.*
- *A put option is OTM if current price of the underlying > strike price.*

At any point before expiration, an option also has time value, which reflects what might happen over its remaining life. This is a much more complex concept, which explains why the first option pricing formula only appeared in 1973. Time to expiry, volatility, the risk-free rate, and the yield on the underlying all have a part to play, in addition to the underlying price and the strike price.

The details of pricing models are beyond the scope of the Level III curriculum—you will not be plugging figures into the BSM model, for example—but a couple of general principles are worth remembering, namely that with all other factors held constant:

- *Higher* volatility means *higher* option premiums (both for calls and puts).
- *Less* time to expiry means *lower* option premiums (both for calls and puts).

Data for Examples

For most of the examples in this reading, we will use the following options on XYZ stock (current stock price = $52.14). The premiums are quoted as of “now” (assumed to be 20 March), and the April, May, and June expiration dates are respectively 31, 61, and 91 days in the future. The risk-free interest rate is 3%, and volatility has been assumed to be a constant 60% (we will see later that this is unrealistic, but this is not in itself a problem). The XYZ stock pays no dividends.

Each option contract is a right over 100 shares, but this table shows prices per share (in $), and we will work in per-share terms, unless otherwise stated:

Call Price			Strike	Put Price		
APR	MAY	JUN	Price	APR	MAY	JUN
4.80	6.26	7.40	**50**	2.53	3.87	4.88
3.53	5.05	6.22	**52.5**	3.75	5.14	6.19
2.52	4.02	5.20	**55**	5.24	6.61	7.65

We refer to the May expiry call with a strike price of 50 as the MAY 50 call, for instance.

PROFESSOR'S NOTE

We will initially be limiting ourselves to evaluating values and profits at expiration. This simplifies things because at expiration, there will be no time value—only intrinsic value (which may be referred to as the option's payoff).

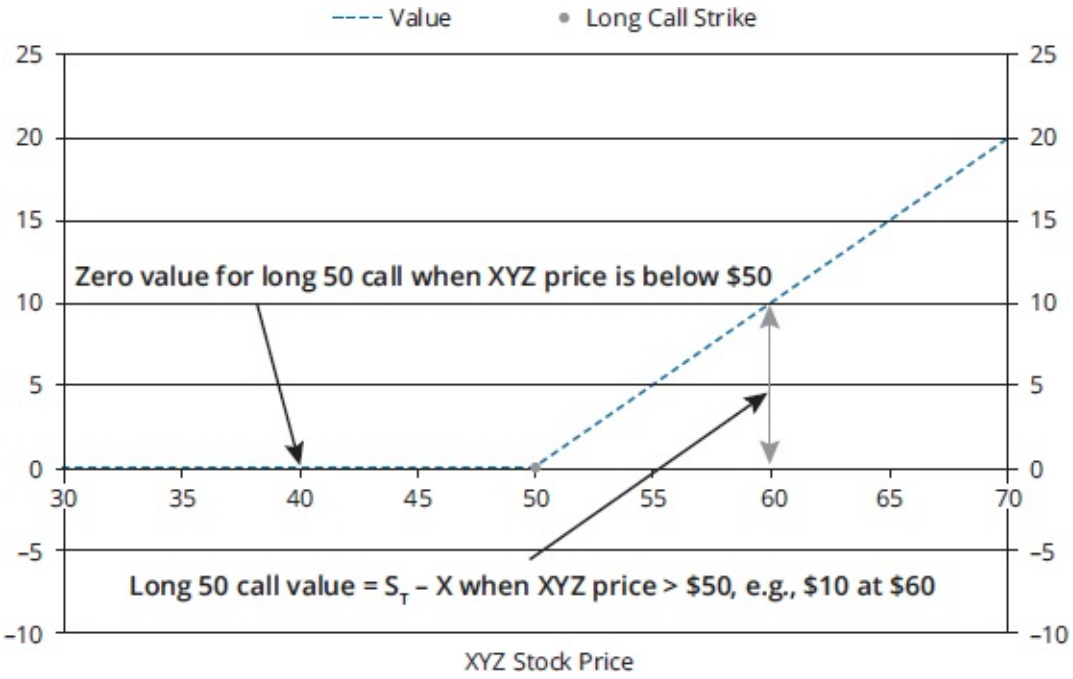
Basic At-Expiration Payoff Diagrams for Calls and Puts

Calls

Let us use the example of a long call to illustrate the way in which option values and profits can be depicted graphically.

Consider an investor who buys (goes long) an XYZ MAY 50 call, paying the $6.26 premium.

At the May expiration the option will either be ITM or OTM, dependent on whether the stock price then is above or below $50. Below $50 it will be OTM, with no (intrinsic) value, while above $50, the intrinsic value will equal stock price –$50:



In all such diagrams, the horizontal axis represents the value of the underlying, while the vertical axis represents the value or profit of the position [which it is will be clear from the labelling of the line(s)] corresponding to that underlying value.

For example, if the XYZ stock price at expiry is $40 then the 50 call will expire OTM, with zero value, while if the stock price at expiry is $60 then the 50 call will expire ITM, with a value of $60 – $50 = $10.

The initial cost of the option was $6.26 (per the table), so the profit at expiration will equal the value of the call minus $6.26, implying:

- If XYZ stock price = $40, profit = $0 – $6.26 = loss of $6.26.
- If XYZ stock price = $60, profit = $10 – $6.26 = $3.74.

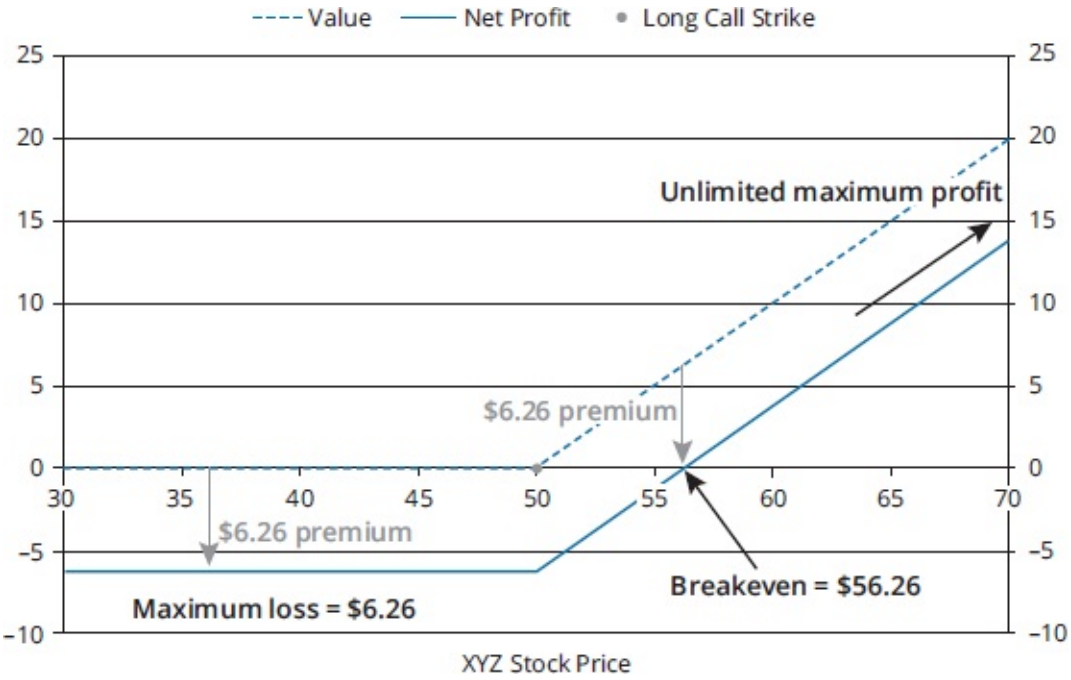
Overall, the profit line will be the value line shifted downward uniformly by the $6.26 initial premium.

As a rule, for each and every strategy we consider, the profit line will be the value line shifted:

- *Downward* by the amount of the (net) initial premium – if the (net) initial premium is an outflow (as here).
- *Upward* by the amount of the (net) initial premium – if the (net) initial premium is an inflow.

This means that if we know the shape of the value line for a strategy, the profit line will have exactly the same shape.

For the long XYZ MAY 50 call:



It is clear that the maximum loss from a long call occurs when the option expires OTM with zero value, thus equals the premium paid.

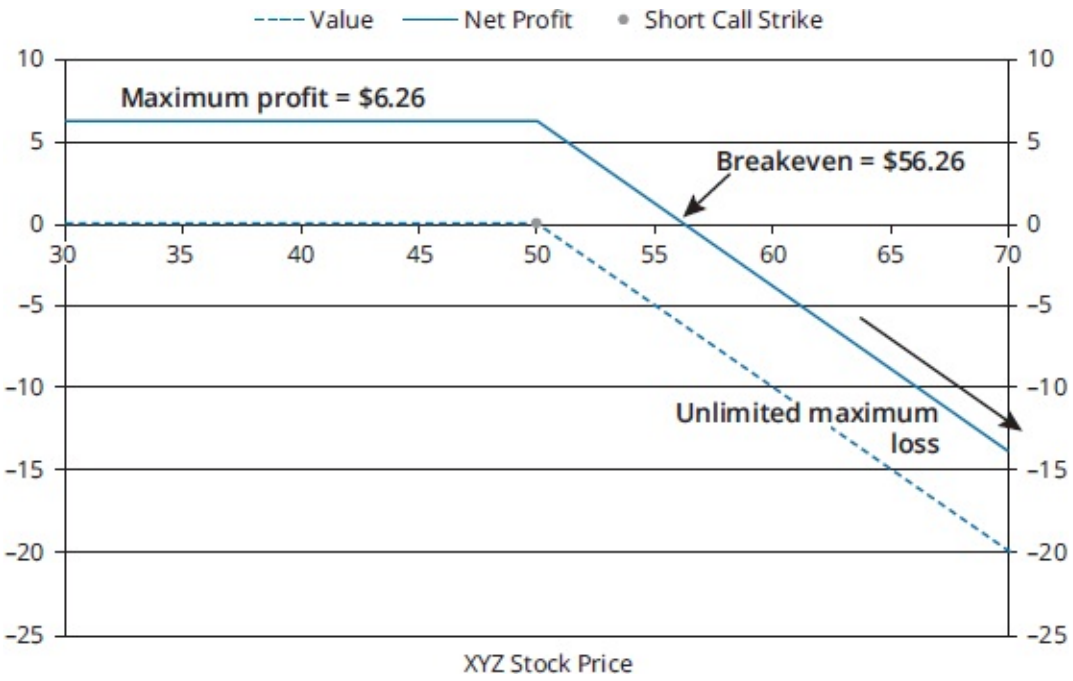
The long call position will break even at expiration if the value at expiration is exactly equal to the premium paid. This will happen when the stock price expires at the sum of the strike and the premium, $50 + $6.26 = $56.26 as shown on the previous diagram.

A long call has no maximum profit—the higher the stock price at expiry, the higher the profit on the call, with no upper limit.

The diagrams for a short call are identical, except that plus values, vertically, become minus, and vice versa (because, in the absence of transaction costs, a positive result for the long is a negative result for the short, and vice versa; in the jargon, it is a zero-sum game).

This means that equivalent long and short positions will have identical breakeven values for the underlying, while their maximum losses and profits will just swap around.

The short XYZ MAY 50 call has value and profit at expiration as here:



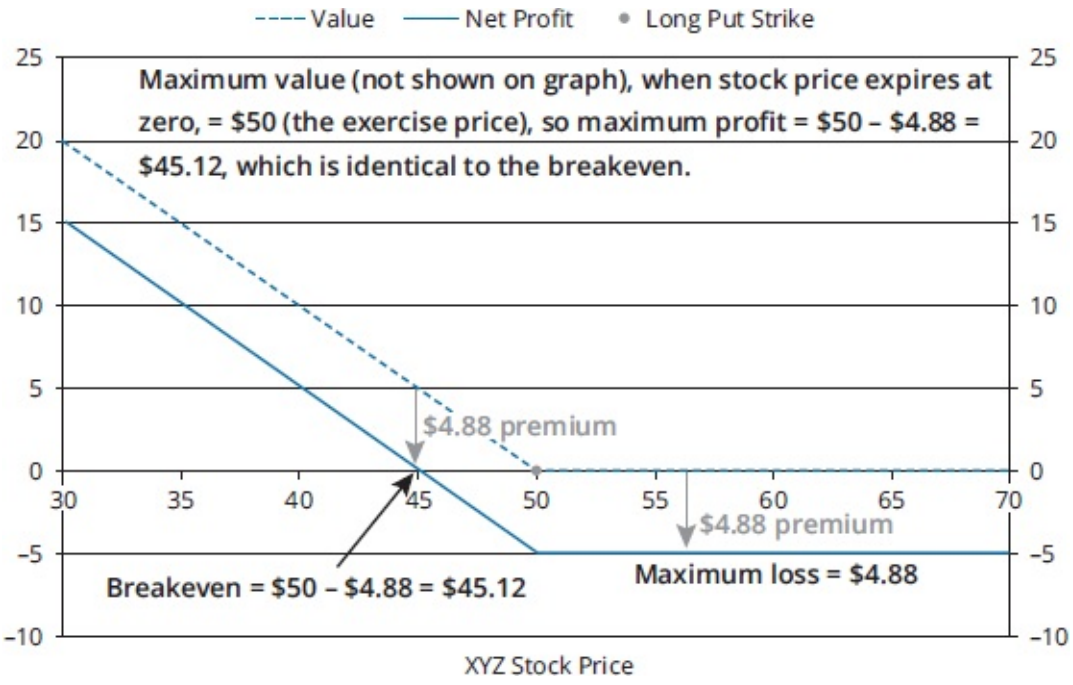
The basic motivation for buying a call is to profit from a rise in the underlying price, while limiting the downside.

When a call is sold (without any hedging position in place), then the position is described as a **naked (uncovered) call**, and limited upside from falls in the underlying price is balanced against unlimited potential losses from the underlying rising.

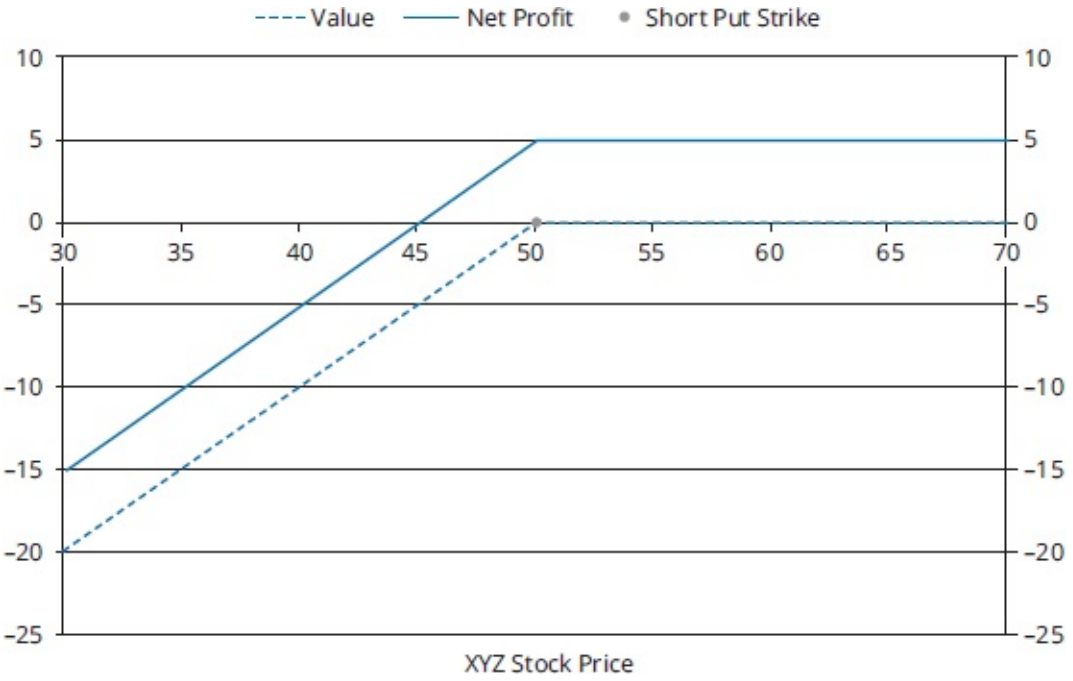
Puts

Puts are ITM on expiry when the underlying value ends below the strike price. This means that the graph for a put exposure will look like the call graph with left and right reversed.

For example, a long XYZ JUN 50 put (initial premium = $4.88) at expiration:



Here is the corresponding short XYZ JUN 50 put at expiration:



Confirm that you understand why the short XYZ JUN 50 put has maximum profit at expiration of $4.88, and breakeven = maximum loss = $45.12.

The basic motivation for buying a put is to profit from a fall in the underlying price, while limiting the downside.

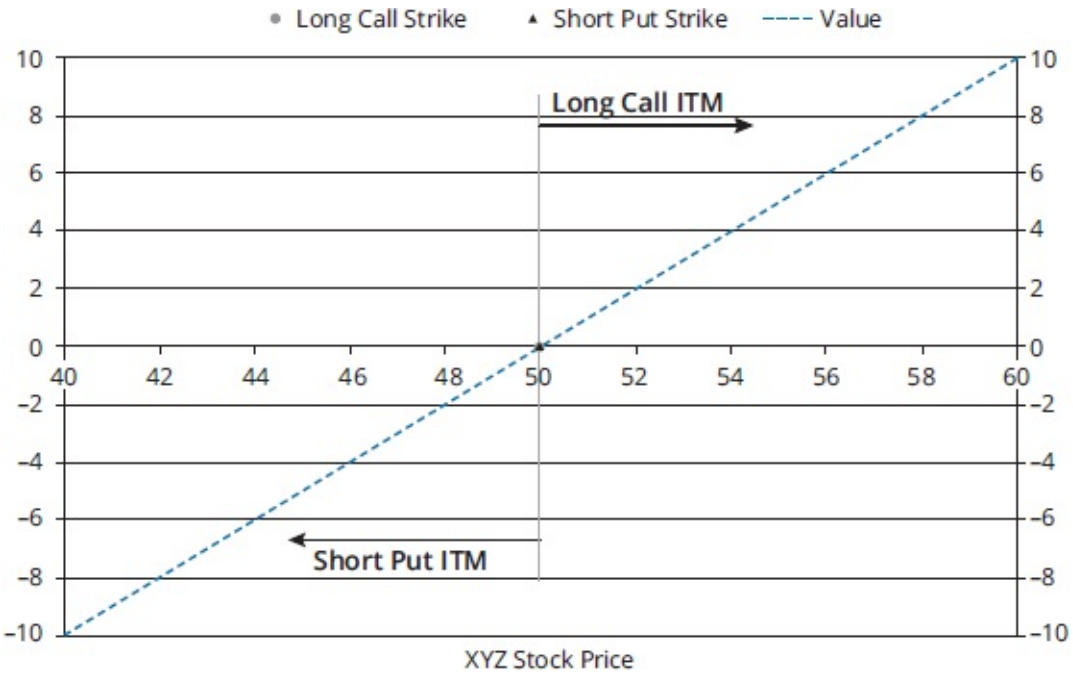
When a put is sold[2], limited upside from rises in the underlying price is balanced against large (although limited) potential losses from the underlying falling.

MODULE 16.2: SYNTHETIC POSITIONS USING OPTIONS

LOS 16.a: Demonstrate how an asset's returns may be replicated by using options.

If we combine a long call with a short put (both on the same underlying, with the same strike price and expiration) then we create a synthetic long forward position.

For example, here are the values at expiration from being long an XYZ 50 call and short an XYZ 50 put:



For values of the underlying above 50, the long call expires ITM (while the put is OTM), giving positive value, while if the underlying is below 50, the short put expires ITM (the call is OTM), giving negative value (it is exercised by the counterparty). Whatever happens to the stock price this position gives the same payoff at expiration as does an identical-maturity long forward contract on XYZ at 50—both result in buying the stock for 50.

- In symbols, the value at expiration = $S_T - X$.

Suppose both options were for May expiration. The premium paid for the call would have been $6.26, while the premium received on the put would have been $3.87, for a net initial payment of $6.26 – $3.87 = $2.39. The profit line would thus be $2.39 below the value line. The breakeven at expiration for the position is $50 + $2.39 = $52.39 (the call would be $2.39 ITM at this stock price, just covering the net premium paid).

This profit calculation has ignored the time value of money, as we do throughout this reading when we calculate net profits, but in this section let us be a bit more accurate. The premiums are paid "now" (assumed to be 20 March), whereas the value at expiration is in May, 61 days later, so we should not really just net them off.

As an alternative to buying the call and selling the put, consider buying the underlying XYZ stock in March (for $52.14) and holding it to the May expiration date. If we simultaneously borrow the PV of the strike price, then at the May expiration date, we will end up with a position with a net value exactly the same as the value of the long call + short put position we just examined: we will be able to sell the stock for the stock price at expiration and will have to repay the borrowing (the amount to repay will be the strike price, because the amount borrowed was its present value), leaving us with $S_T – X$, as before.

Because these two positions end up with identical values, irrespective of the stock price at expiration, they must cost the same, so:

- Call premium (paid initially) – put premium (received initially) = initial stock price paid – PV(X) received.
- In symbols, $c_0 – p_0 = S_0 – PV(X)$, which can be rearranged to $S_0 + p_0 = c_0 + PV(X)$.

This, of course, you will recognize as the **put-call parity** relationship. Note that this version of the put-call parity formula assumes that the underlying pays no yield (during the period to expiry).

In this case, we have $c_0 – p_0 = \$6.26 – \$3.87 = \$2.39$. The risk-free interest rate is 3%, so $PV(\$50) = \$50 / (1.03)^{61/365} = \$49.75$, and the equation works, because $S_0 – PV(X) = \$52.14 – \$49.75 = \$2.39$.

Were PV(X) exactly equal to S_0, then put-call parity tells us that the call and put should have identical premiums (because $c_0 – p_0$ would equal zero). X in that