Derivatives Strategies

Changing Risk Exposures With Swaps, Futures, and Forwards

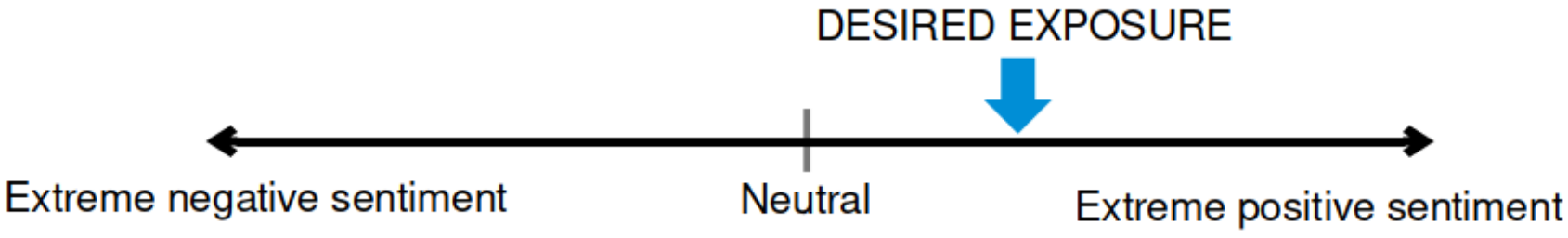
Derivative strategies can be:

- **speculative**, designed to make a profit, or
- **defensive**, providing protection against an adverse event.

An investment manager should be able to explain how derivative strategies might logically be used in an investment portfolio.

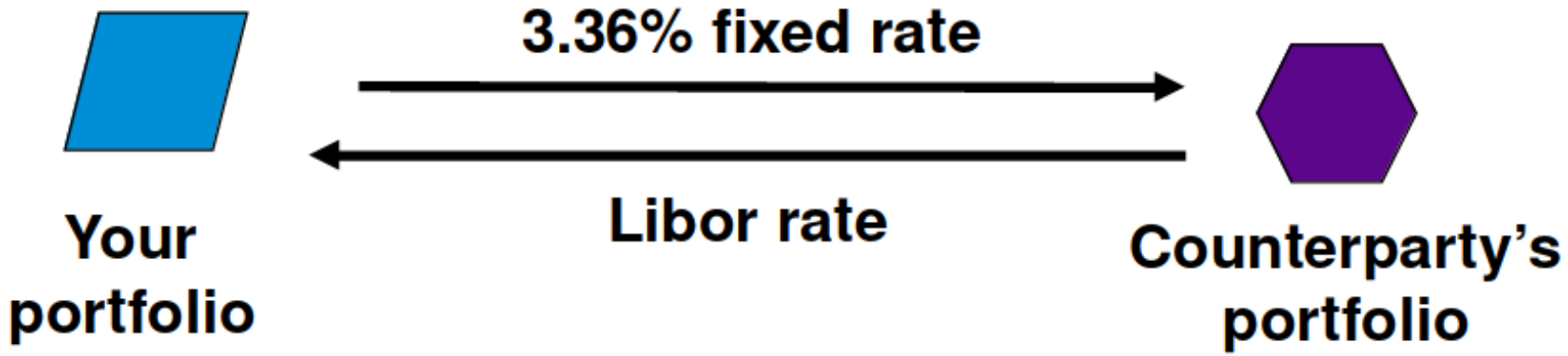
Changing Risk Exposures With Swaps, Futures, and Forwards

- A primary use of derivatives is to change a portfolio's risk exposure. This can be done using:
  - swaps (interest rate, currency, or equity)
  - futures
  - forwards
- Derivatives permit the portfolio manager to select any point along the bullish/bearish spectrum.



Changing Risk Exposures With Swaps, Futures, and Forwards

Swaps are used to substitute the investment characteristics of a new asset for those of an asset already in the portfolio. For example, in an interest rate swap the periodic cash flows might be:



Changing Risk Exposures With Swaps, Futures, and Forwards

These derivatives can be useful in managing different types of risk.

- **Interest rate swap**: The two parties exchange the returns on a high duration asset for the returns on a low duration asset, reducing *interest rate risk*.
- **Currency swap**: The two parties exchange one currency for another currency and periodically pay each other interest at a fixed interest rate, reducing *foreign exchange risk*.
- **Equity swap**: The two parties trade the return on an equity portfolio for the return on another asset, reducing *market risk*.

Equivalent Asset Sell for the Same Price

Stock Price at Option Expiration	0	20	50	80	100
ALTERNATIVE 1:					
Long 50-strike call payoff	0	0	0	30	50
Short 50-strike put payoff	–50	–30	0	0	0
Total Value	–50	–30	0	30	50
ALTERNATIVE 2:					
Buy stock at 50					
Gain/Loss	-50	-30	0	30	50

A long call and a short put with the same strike replicate the returns on the underlying asset.

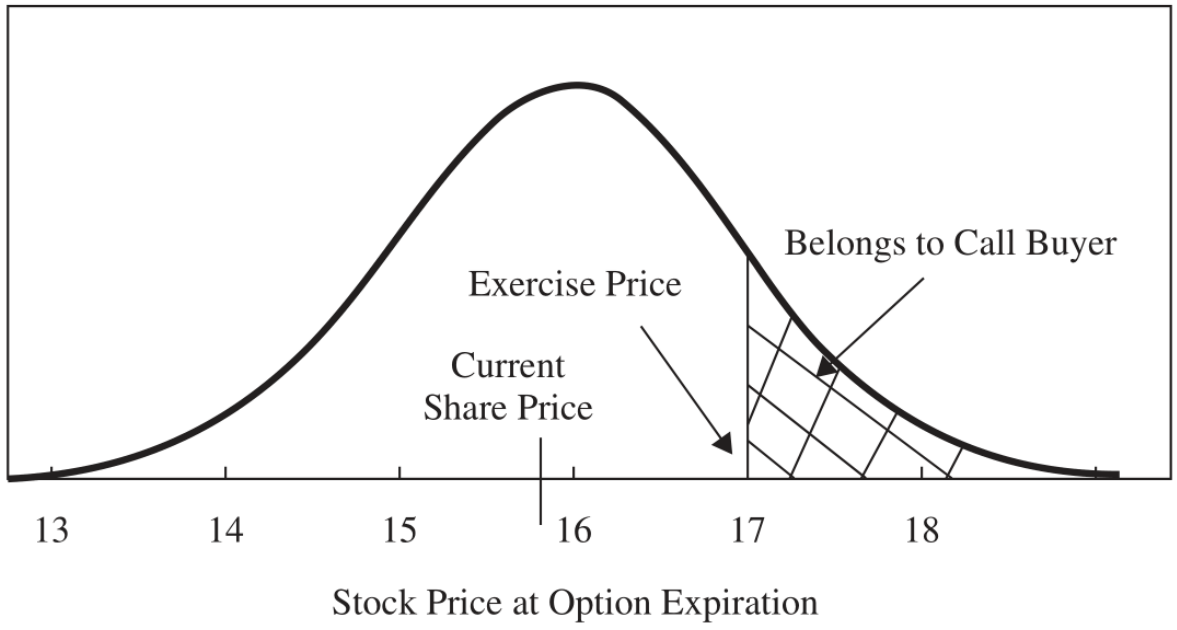
Covered Call Investment Objectives

- **Covered Call**: Strategy in which the owner of the underlying shares sells a call option giving the call buyer the right to buy the shares at the exercise price.
- **Income Generation**: A stock is at 33; the owner expects it to be stable for the next month. She writes an out-of-the-money call with strike price of 36 for a premium of 1.15, which she keeps regardless of the future stock price. If the stock remains stable, as expected, the option expires worthless.
- **Improving on the Market**: An investor owns 1,000 shares of stock worth 45 and needs to sell shares to raise cash. A near-term 35 strike call sells for 10.50. The investor writes ten contracts. Because the calls are deep in-the-money they are very likely to be exercised for net proceeds to the investor of $(35 + 10.50) \times 1,000 = 45,500$. This is 500 more than the outright sale at 45.
- **Target Price Realization**: A stock sells for 37, above the investor's target price of 34. The investor sells a near-term 34 strike call for 3.75. The call is likely to be exercised, giving the investor $34 + 3.75 = 37.75$, a better price than the current stock price of 37.

Covered Call Risk

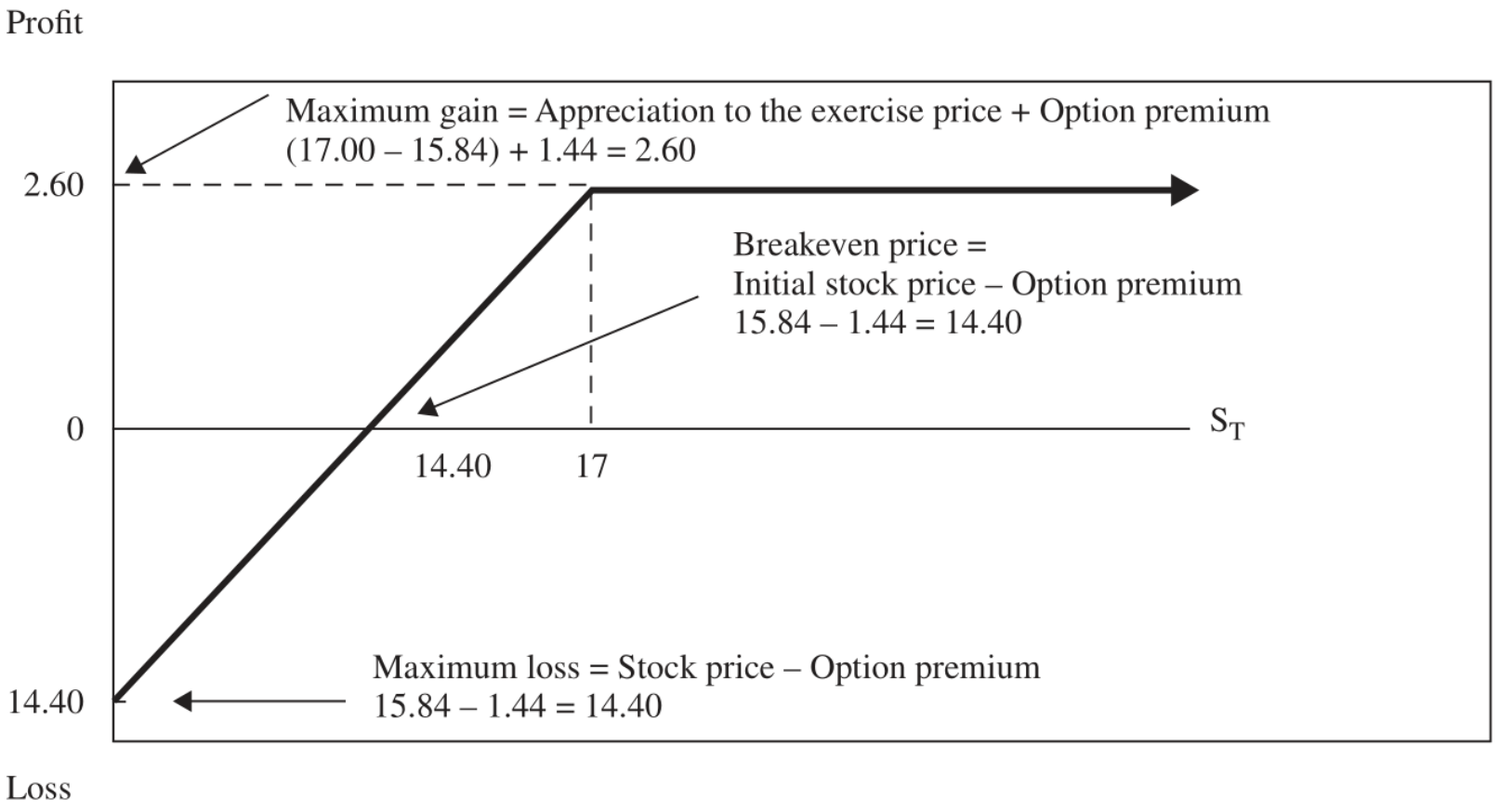
- Writing a covered call means the call writer has sold the most desirable part of the expected return distribution.
- If the owner of the call option exercises it, this usually results in an opportunity loss for the covered call writer.

EXHIBIT 8 Covered Calls and the Return Distribution: With stock at 15.84, write 17-strike call



Covered Call Profit and Loss Diagram

EXHIBIT 9 Covered Call Profit and Loss Diagram: With stock at 15.84, write 17 call at 1.44



Protective Puts Are Analogous To Buying an Insurance Policy

Protective Put: The simultaneous holding of shares and a long put position on those same shares.

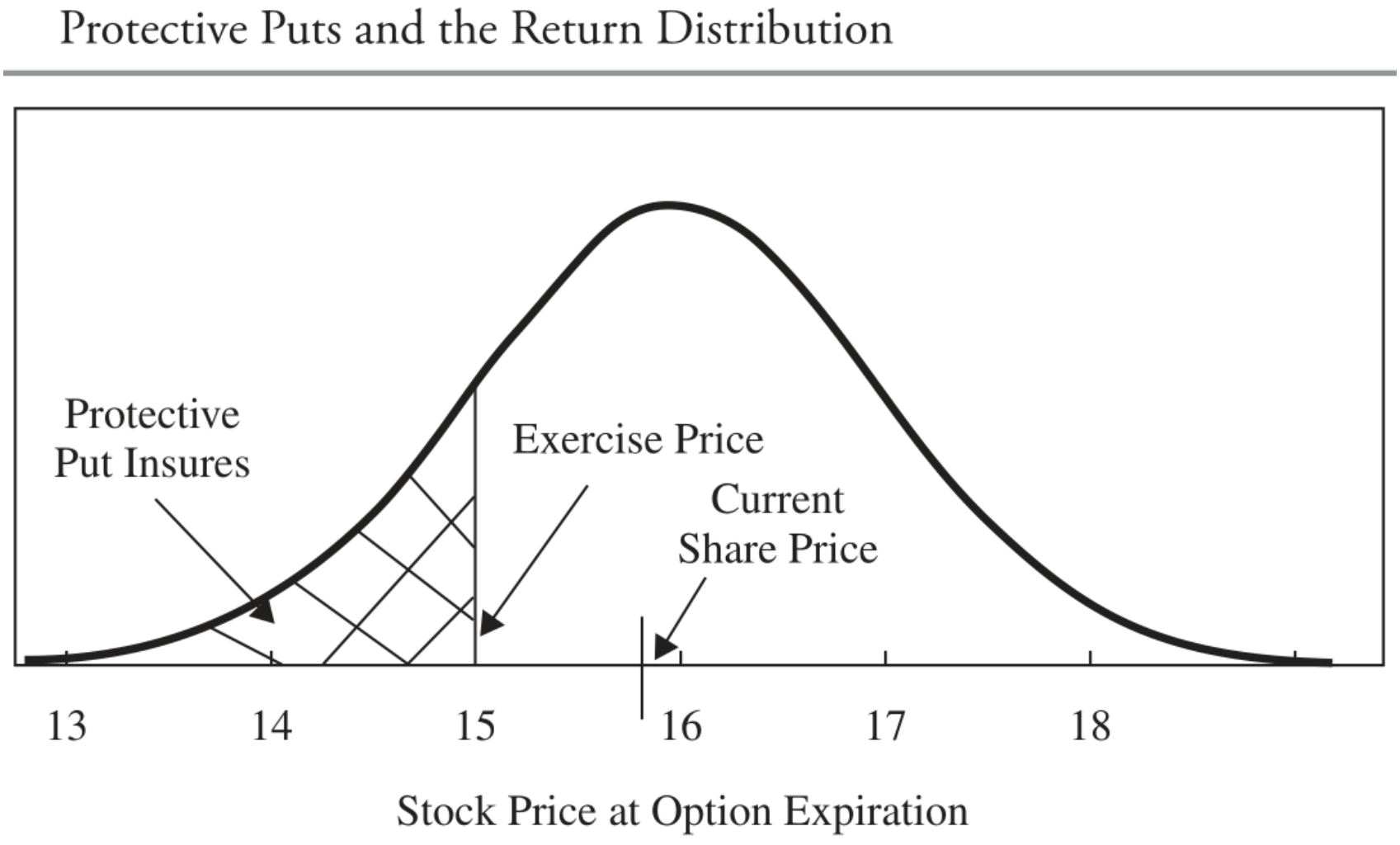
Insurance Policy

- Premium
- Value of an asset
- Face value
- Term of policy
- Likelihood of loss

Put Option

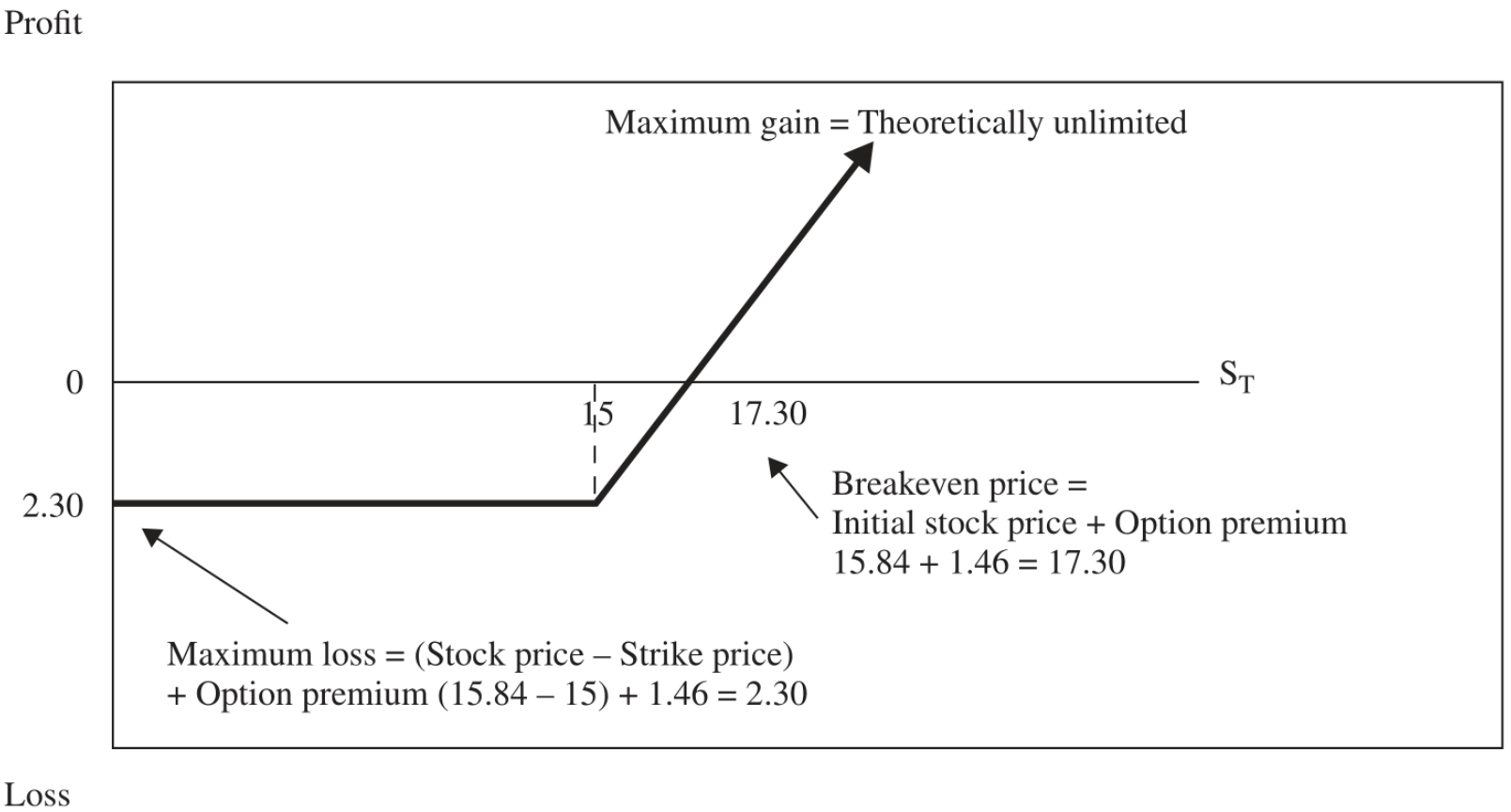
- Time value
- Price of stock
- Exercise price
- Time until option expiration
- Volatility of stock

The Put Provides Protection Against a Decline in the Price of the Underlying Asset



Protective Put Profit and Loss Diagram

EXHIBIT 12 Protective Put Profit and Loss Diagram: With stock at 15.84, buy 15 put at 1.46



Delta measures how an option price changes with changes in the underlying asset.

Long Option Position	Short Option Position
Call delta ranges from 0 to +1	Call delta ranges from -1 to 0
Put delta ranges from -1 to 0	Put delta ranges from 0 to +1

This means a long call (short call) and a short put (long put) might have the same delta and therefore the same sensitivity to a change in the value of the underlying asset.

Position Equivalences

- A long stock position can be combined with a short forward position to create a position delta equal to either a covered call or a protective put.
- Positions with equal position deltas will show approximately the same change in value for small movements in the underlying asset.

Covered call + 50	Protective Put +50	Hedged stock + 50
Long stock + 100	Long stock + 100	Long stock + 100
Short call – 50	Long put – 50	Short forward – 50

For small changes in the stock price, the three positions will show a similar gain or loss.

Option Collar

- A collar is a position in which an investor owns the underlying stock, writes an out-of-the-money call option, and buys an out-of-the-money put option.
- Often the options are selected such that the respective premiums nearly offset.
- The collar provides downside protection by sacrificing upside potential.
- Collars are usually established on an existing stock position that has risen in value.

Option Collar Profit and Loss Example I

EXHIBIT 14 Collar Profit and Loss Worksheet: Stock purchased at 12, NOV 15 put purchased at 1.46, NOV 17 call written at 1.44

Stock price at expiration →	5	10	15	16	17	20
Profit/loss from long stock	–7.00	–2.00	3.00	4.00	5.00	8.00
Profit/loss from long 15 put	8.54	3.54	–1.46	–1.46	–1.46	–1.46
Profit/loss from short 17 call	1.44	1.44	1.44	1.44	1.44	–1.56
Total	2.98	2.98	2.98	3.98	4.98	4.98

Option Collar Profit and Loss Example II

EXHIBIT 15 Collar Profit and Loss Diagram: Stock purchased at 12, NOV 15 put purchased at 1.46, NOV 17 call written at 1.44

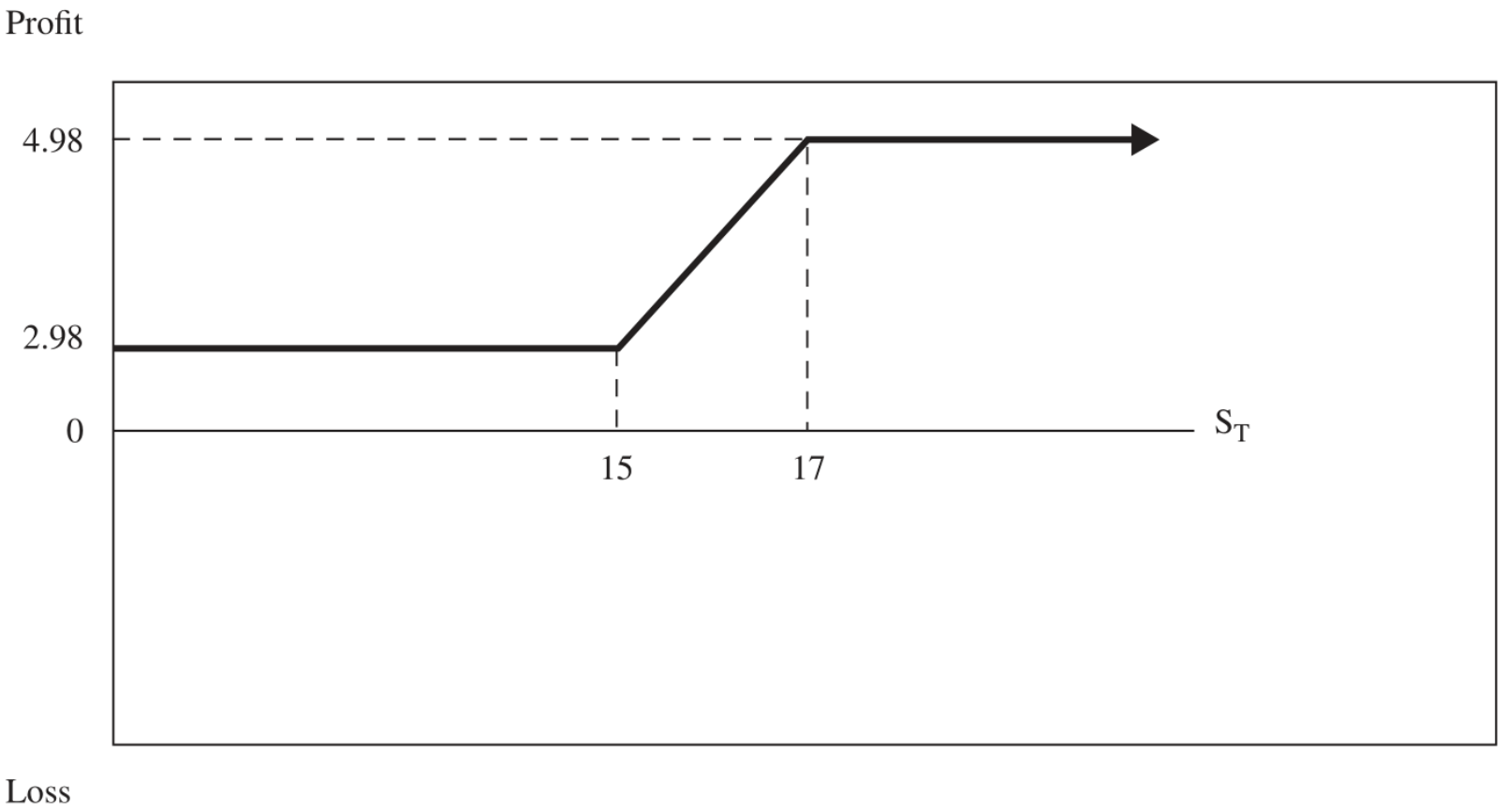
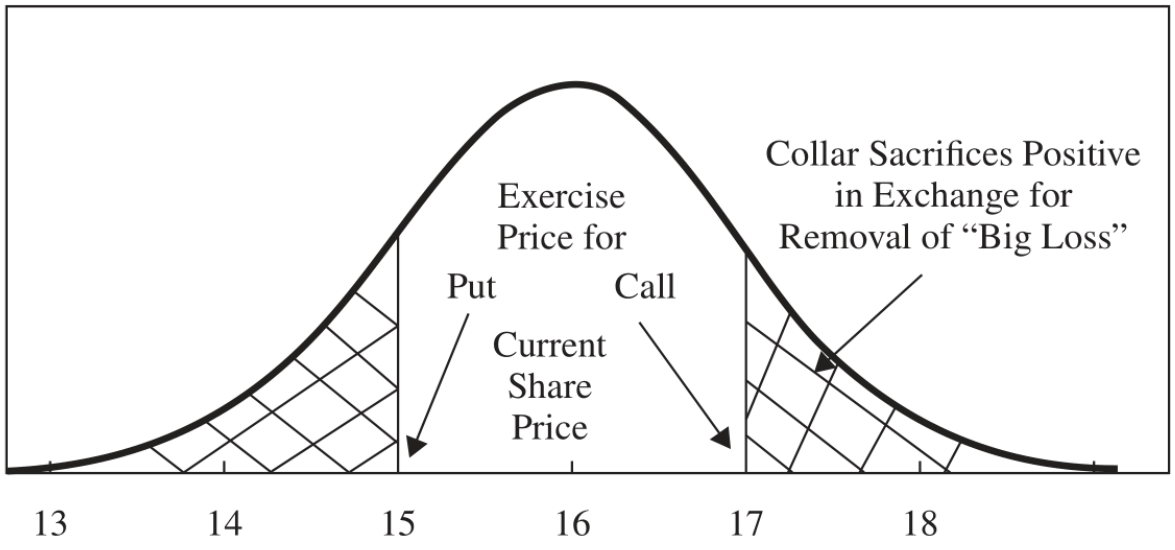


EXHIBIT 17 Collars and the Return Distribution: With stock at 15.84, write 17 call and buy 15 put



Long Position With Same Strike Collar

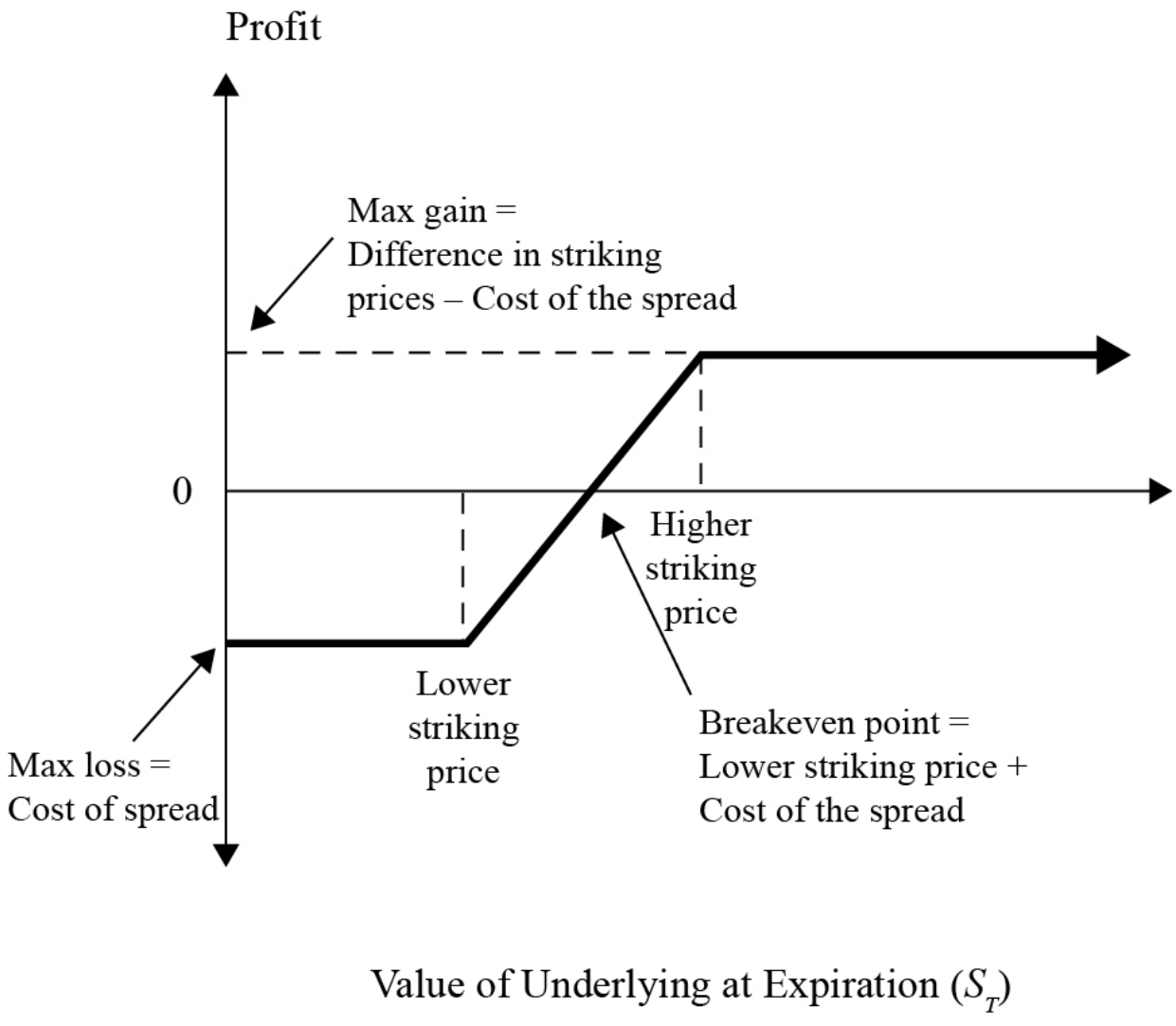
If the short call and the long put have the same striking price (here **50**), the collar will be worth the striking price at option expiration.

Stock price at expiration	0	25	50	75	100
Long stock value	0	25	50	75	100
Short **50** call value	0	0	0	–25	–50
Long **50** put value	50	25	0	0	0
Combined Position	**50**	**50**	**50**	**50**	**50**

Bull Spread

- Becomes more valuable as the underlying asset rises in price
- Involves buying one option and writing another with a higher striking price but the same expiration
- May be done with calls or with puts
- Typically a directional bet
- Gives up some profit potential for a lower cost

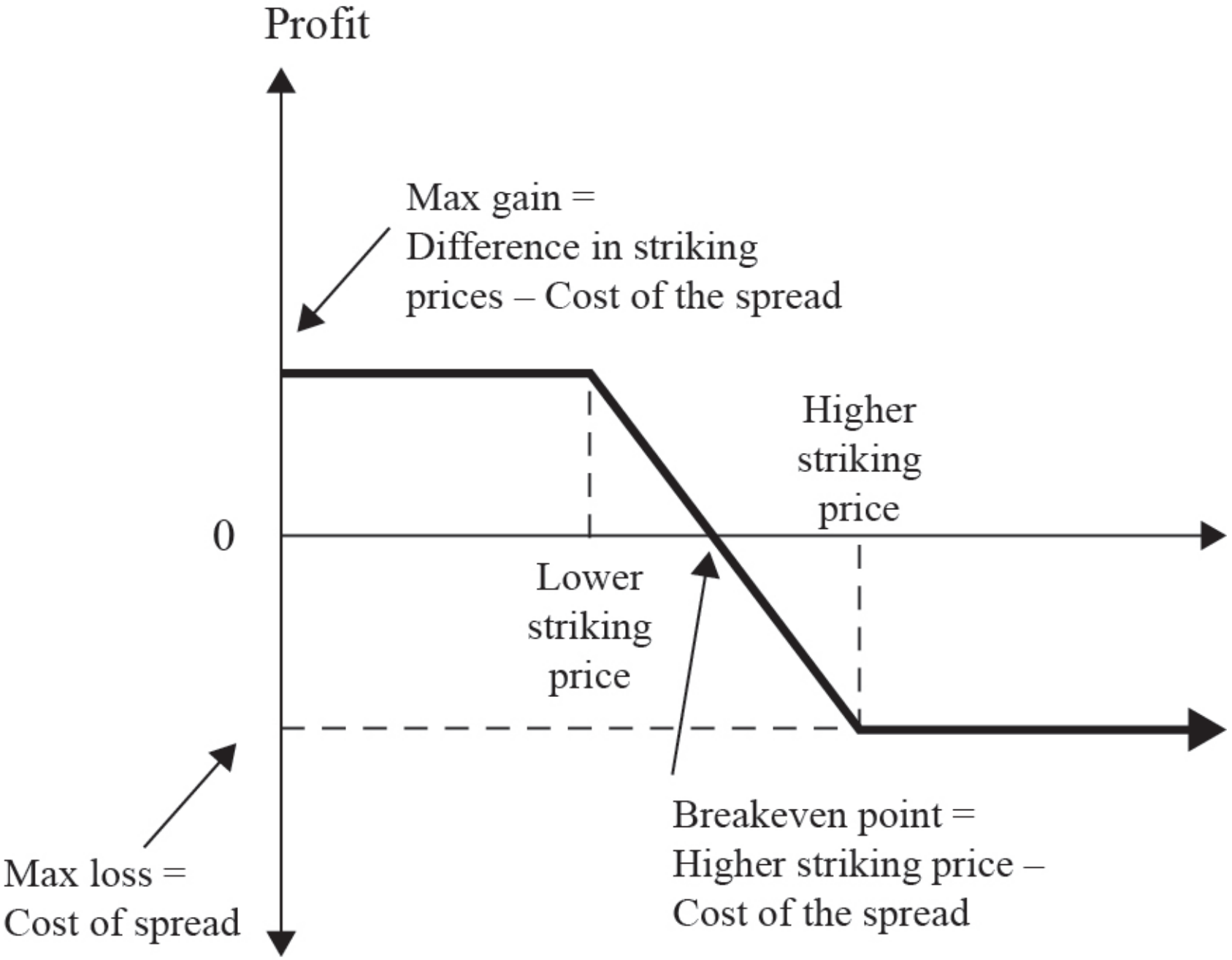
Call Bull Spread Profit and Loss Diagram



Bear Spread

- Becomes more valuable as the underlying asset falls in price
- Involves buying one option and writing another with a lower striking price, but the same expiration
- May be done with puts or with calls
- Typically a directional bet
- Gives up some profit potential for a lower cost

Put Bear Spread Profit and Loss Diagram



Calendar Spread

- May be done with either puts or calls
- Long calendar spread: buy distant option, write shorter-term option, each having the same striking price
- Short calendar spread: write distant option, buy shorter-term option, each having the same striking price
- Time decay is more pronounced for a short-term option than for one with a long time until expiration
- A long calendar spread trade seeks to exploit this time decay characteristic by purchasing the longer-term option and writing the shorter-term option

Calendar Spread Example

150 days until January option expiration
Underlying stock price = 45

Exercise Price	SEP	OCT	JAN
40	5.15	5.47	6.63
45	1.55	2.19	3.81
50	0.22	0.62	1.99

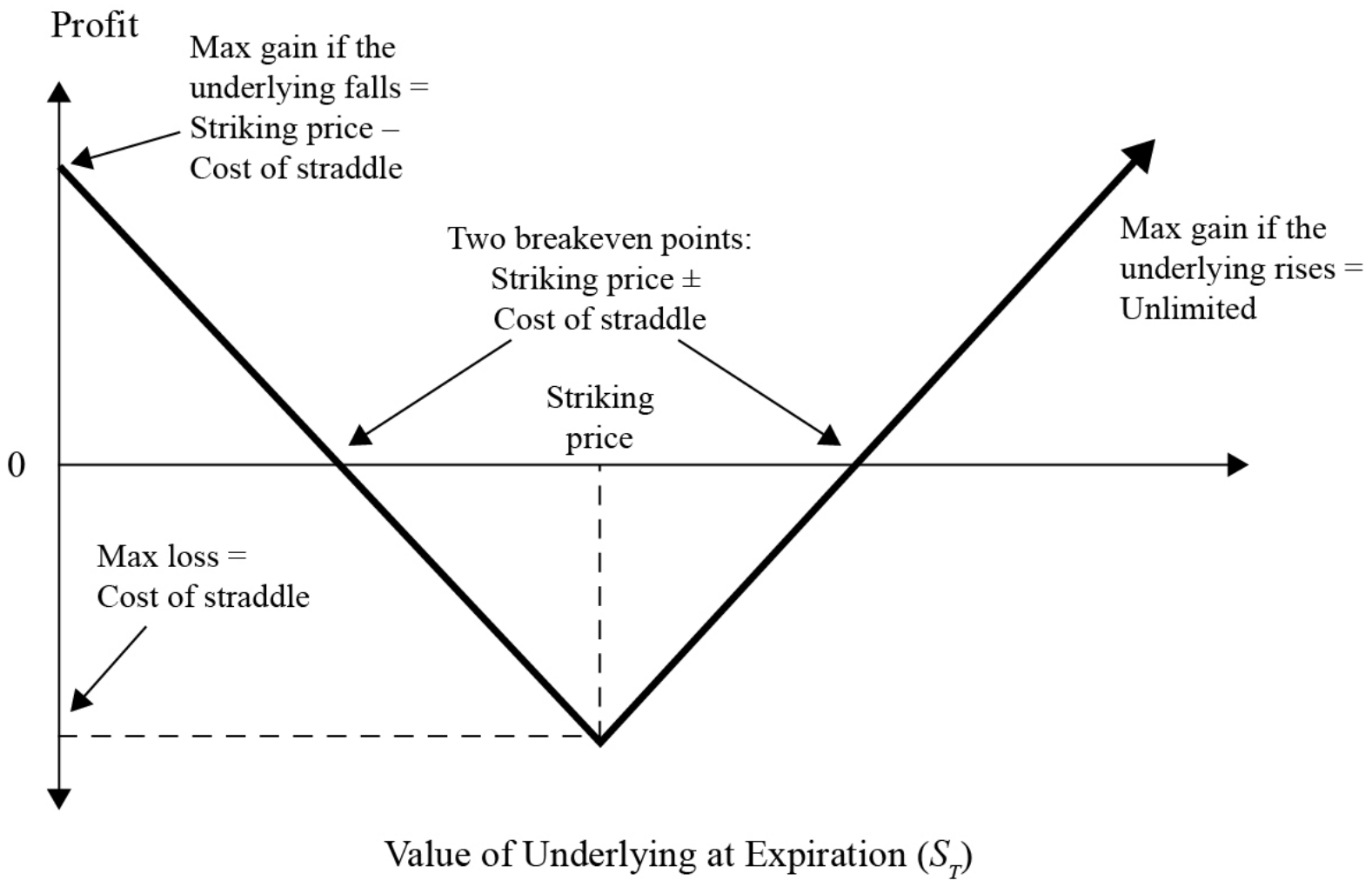
Just before September option expiration
Underlying stock price = 45

Exercise Price	SEP	OCT	JAN
40	5.00	5.15	6.39
45	0.00	1.55	3.48
50	0.00	0.22	1.69

Straddle

- In a long straddle, the investor buys both puts and calls on the same underlying asset, with both options having the same striking price
- In a short straddle, the investor writes both options
- The straddle buyer is usually motivated by one of two beliefs:
  - The price of the underlying asset is likely to either rise or fall sharply; or
  - The implied volatility of the options on the underlying asset is likely to rise

Long Straddle Profit and Loss Diagram



Strategy Selection

- The risk of a derivative product depends on what you do with it.
- Derivatives are neutral products that can be combined with other assets to create a more preferred risk–return trade-off.
- If used wisely, derivatives can help an investor or a portfolio manager quickly adapt to changing market conditions or client needs.

Two Markets: Direction and Speed

- Every trade should begin with an opinion on the underlying market.
- Option users need to think about both **direction** and **volatility**.
- An option buyer may be correct about the direction of a stock price change, but if it does not change quickly enough, the loss of time value may erode any gain from the delta effect.
- Volatility is sometimes referred to as the speed market. A volatile market is a fast market, while a stable market is a slow market.

Option Strategies: Direction and Volatility

Direction		**Bearish**	**Neutral**	**Bullish**
	High	Buy puts	Buy straddle	Buy calls
Volatility	**Average**	Write calls, buy puts	Spreads	Buy calls, write puts
	Low	Write calls	Write straddle	Write puts

Risk Adjustment Tools

- With derivatives there are many ways to accomplish a particular risk/return profile.
- A portfolio manager who seeks to reduce market exposure to a particular equity holding could:
  - Sell some of the equity (underlying)
  - Enter into a futures or forward contract to sell part of the underlying
  - Write covered calls
  - Buy protective puts
  - Enter into a collar

Summary I

- Interest rate, currency, and equity futures and swaps can be used to modify risk and return by altering the characteristics of the cash flows of an investment portfolio.
- Buying a call and writing a put with the same exercise price creates a synthetic long position.
- A long position plus a short futures position in the same underlying asset creates a synthetic risk-free asset earning the risk-free rate.
- A covered call, in which the holder of a stock writes a call giving someone the right to buy the shares, is one of the most common uses of options by individual investors.
- Covered calls can be used to generate income, to acquire shares at a lower- than-market price, or to exit a position when the shares hit a target price.

Summary II

- A covered call position has a limited maximum return because of the transfer of the right tail of the return distribution to the option buyer.
- The maximum loss of a covered call position is less than the maximum loss of the underlying shares alone, but the covered call carries the potential for an opportunity loss if the underlying shares rise sharply.
- A protective put is the simultaneous holding of a long stock position and a long put on the same asset. The put provides protection or insurance against a price decline.
- Although the continuous purchase of protective puts is expensive and probably suboptimal, the occasional purchase of a protective put to deal with a bearish short-term outlook can be a reasonable risk-reducing activity.

Summary III

- The maximum loss with a protective put is limited because the downside risk is transferred to the option writer in exchange for the payment of the option premium.
- With an option spread, an investor buys one option and writes another of the same type. This reduces the position cost but caps the maximum payoff.
- A bull spread is normally constructed by buying a call option and writing another call option with a higher exercise price.
- A bear spread is normally constructed by buying a put option and writing another put option with a lower exercise price.
- With either a bull spread or a bear spread, both the maximum gain and the maximum loss are known and limited.
- A collar is an option position in which the investor is long shares of stock and simultaneously writes a covered call and buys a protective put.

Summary IV

- A calendar spread involves buying a long-dated option and writing a shorter-dated option of the same type with the same exercise price, or vice versa. The primary motivation for such a spread is to take advantage of the faster time decay with the shorter-term option.
- A straddle is an option combination in which the investor buys puts and calls with the same exercise price. The straddle holder typically needs a substantial price movement in the underlying asset in order to make a profit.
- The risk of a derivative product depends on how it is used. Derivatives should always be used in connection with a well-defined investment objective.