OVERVIEW, TRADING STRATEGIES

1. Trading strategies involving a single option on a stock and the stock itself:

i) Covered call; ii) Protective put

2. Trading strategies involving taking a position in two or more options of the same type:

i) Bull spreads; ii) Bear spreads; iii) Butterfly spreads

3. Combinations: Option trading strategies that involve taking a position in both calls and puts on the same stock:

i) Straddles; ii) Strips; iii) Straps; iv) Strangles

COVERED CALL

Consider a portfolio that consists of a long position (buy) in a stock plus a short position (sell) in a call option

The investment strategy represented by this portfolio is known as writing a covered call

This is because the long stock position "covers" or protects the investor from the possibility of a sharp rise in the stock price.

lp on S_t and a sp on C

Profit (Π): $\overbrace{S_T - \max(S_T - X, 0)}^{\text{payoff}} \overbrace{-S_t + C}^{\text{cost}}$

$S_T < X$: $S_T - S_t + C$

When $S_T < X$ the profit is a positive function of S_T (slope $+1$)

When $S_T = 0$: $\Pi = -S_t + C$ (maximum loss). From upper bound of a call this is negative: $C \leq S_t$

$S_T > X$: $S_T - (S_T - X) - S_t + C = X - S_t + C$

When $S_T > X$ the profit is not affected by changes in S_T (slope 0)

When $S_T = X$: $\Pi = X - S_t + C$ (maximum gain). From lower bound of a call this is positive:

$C \geq S_t - Xe^{-r(T-t)} \Longrightarrow C + Xe^{-r(T-t)} - S_t \geq 0 \Rightarrow C + X - S_t \geq 0$

Finally, the profit is zero when $\Pi = S_T - S_t + C = 0 \Rightarrow S_T = S_t - C$

An investor will invest in this strategy if he/she believes that $S_T \geq S_t - C$

See graph covered call

Covered call: Lp on S_t and a sp on C

But from the put call parity we have:

$$C+Xe^{-r(T-t)} = P+S_t \Longrightarrow S_t-C = Xe^{-r(T-t)}-P$$

That is why the profit of this strategy is similar to the one of selling a put

The reverse of writing a covered call is a short position (sell) in a stock combined with a long position (buy) in a call option

$$\begin{array}{ll} \text{Profit } (\Pi): & \overbrace{-[S_T - \max(S_T - X, 0)]}^{\text{payoff}} \overbrace{-(S_t - C)}^{\text{cost}} \\ S_T < X: & -(S_T - S_t + C) \\ S_T > X: & \begin{array}{l} -[S_T - (S_T - X, 0) - S_t + C] \\ = -(X - S_t + C) \end{array} \end{array}$$

See graph reverse covered call

PROTECTIVE PUT STRATEGY

An investment strategy that involves buying a put option on a stock and the stock itself is referred to as a protective put

lp on S_t and lp on P

Profit (Π): $\overbrace{S_T + \max(X - S_T, 0)}^{\text{payoff}} \overbrace{- S_t - P}^{\text{cost}}$

$S_T < X$: $S_T + X - S_T - S_t - P = X - S_t - P$

When $S_T < X$ the profit is independent of changes in S_T (slope 0): $X - S_t - P$

When $S_T = 0$: $\Pi = X - S_t - P$ (the maxim loss)

This must be negative otherwise this strategy will involve only gain

(regardless from the future price of the stock)

$S_T > X$: $S_T - S_t - P$

When $S_T > X$ the profit is a positive function of S_T (slope $+1$): $S_T - S_t - P$

$\Pi = 0$ when $\Pi = S_T - S_t - P = 0 \Rightarrow S_T = S_t + P$

This strategy has no upper limit

An investor will invest in this strategy if she/he believes that $S_T > S_t + P$

See graph protective put

Recall that from the put call parity we have:

$$C + Xe^{-r(T-t)} = P + S_t$$

The above equation shows that a long position in a put combined with a long position in the stock

is equivalent to a long call position plus an amount of cash: $Xe^{-r(T-t)}$

This explain why the profit pattern for a protective put strategy is similar to the profit pattern from a long call position

The reverse of a protective put is a short position in a put option combined with a short position in the stock

$$\begin{array}{ll} \text{Profit } (\Pi)\text{:} & \overbrace{-[S_T + \max(X - S_T, 0)]}^{\text{payoff}} \overbrace{- (-S_t - P)}^{\text{cost}} \\ S_T < X\text{:} & \begin{array}{l} -(S_T + X - S_T - S_t - P) \\ = -(X - S_t - P) \end{array} \\ S_T > X\text{:} & -(S_T - S_t - P) \end{array}$$

See graph selling a protective put

BULL SPREAD (CREATED FROM CALLS)

A bull spread can be created by buying a call on a stock with a certain strike price and selling a call on the same stock with a higher strike price.

Both options have the same expiration date.

lp in $C(X_1)$ and a sp in $C(X_2)$ where $X_2 > X_1$

$$\Pi: \overbrace{\max(S_T - X_1, 0) - \max(S_T - X_2, 0)}^{\text{Revenue}} \overbrace{- C_1 + C_2}^{\text{Cost}}$$

$S_T < X_1 < X_2$: $-C_1 + C_2$

That is, Π is fixed (does not depend on S_T). Further, we have: $X_2 > X_1 \Rightarrow C_2 < C_1$. Hence $\Pi < 0$

$X_1 < S_T < X_2$: $S_T - X_1 - C_1 + C_2$

In this case Π is a positive function S_T. When $\Pi = 0 \Rightarrow S_T = X_1 + C_1 - C_2$

$X_1 < X_2 < S_T$: $S_T - X_1 - (S_T - X_2) - C_1 + C_2 = X_2 - X_1 - C_1 + C_2$

In this case Π is fixed (does not depend on S_T).

$X_2 - X_1 > 0, C_2 - C_2 < 0$. Overall, $X_2 - X_1 - C_1 + C_2$ is positive. Otherwise Π will always be negative.

See graph Bull Spread (Created using Calls)

MAIN POINTS

- A bull spread, when created from calls, requires an initial investment

- An investor entering into a bull spread is hoping that the stock price will increase

- A bull spread strategy limits both the investor's upside potential and his or her downside risk

- Symmetric strategy with respect to S_T: unlimited gain from lp in $C(X_1)$ and unlimited loss from sp in $C(X_2)$

BEAR SPREAD (CREATED USING CALLS). THE REVERSE OF BULL SPREAD

A bear spread can be created by selling a call on a stock with a certain strike price and buying a call on the same stock with a higher strike price.

Both options have the same expiration date.

sp in $C(X_1)$ and a lp in $C(X_2)$ where $X_2 > X_1$

$$\Pi\text{: } \overbrace{-[\max(S_T - X_1, 0) - \max(S_T - X_2, 0)]}^{\text{Revenue}} \overbrace{-(-C_1 + C_2)}^{\text{Cost}}$$

$S_T < X_1 < X_2$:$-(-C_1 + C_2)$

That is, Π is fixed (does not depend on S_T). Further, we have: $X_2 > X_1 \Rightarrow C_2 < C_1$. Hence $\Pi > 0$

$X_1 < S_T < X_2$: $-(S_T - X_1 - C_1 + C_2)$

In this case Π is a negative function S_T. When $\Pi = 0 \Rightarrow S_T = X_1 + C_1 - C_2$

$X_1 < X_2 < S_T$: $-[S_T - X_1 - (S_T - X_2) - C_1 + C_2] = -(X_2 - X_1 - C_1 + C_2)$

In this case Π is fixed (does not depend on S_T).

$X_2 - X_1 > 0$, $C_2 - C_2 < 0$. Overall, $-(X_2 - X_1 - C_1 + C_2)$ is negative. Otherwise Π will always be positive.

MAIN POINTS

- A bear spread created from calls involves an initial cash inflow since the price of the call sold is greater than the price of the call purchased

- An investor who enters into a bear spread is hoping that the stock price will be decline

- Like bull spreads, bear spreads limit both the upside profit potential and the downside risk.

- It is a symmetric strategy with respect to S_T

See Graph Bear Spread (Created using Calls)

BULL SPREAD (CREATED USING PUTS)

A bull spread can be created by buying a put on a stock with a certain strike price and selling a put on the same stock with a higher strike price.

Both options have the same expiration date.

lp in $P(X_1)$ and a sp in $P(X_2)$ where $X_2 > X_1$

$$\Pi: \overbrace{\max(X_1 - S_T, 0) - \max(X_2 - S_T, 0)}^{\text{Revenue}} \overbrace{- P_1 + P_2}^{\text{Cost}}$$

$S_T < X_1 < X_2$: $X_1 - S_T - (X_2 - S_T) - P_1 + P_2 = X_1 - X_2 - P_1 + P_2$

That is, Π is fixed (does not depend on S_T). Further, we have: $X_2 > X_1 \Rightarrow P_2 > P_1$.

Overall $X_1 - X_2 - P_1 + P_2$ is negative. Otherwise Π will always be positive

$X_1 < S_T < X_2$: $-(X_2 - S_T) - P_1 + P_2 = S_T - X_2 - P_1 + P_2$

In this case Π is a positive function of S_T. When $\Pi = 0 \Rightarrow S_T = X_2 + P_1 - P_2 < X_2$

$X_1 < X_2 < S_T$: $-P_1 + P_2 > 0$

In this case Π is fixed (does not depend on S_T).

The profit pattern for this strategy is similar to the profit pattern from a Bull spread created using calls.

See Graph Bull Spread (Created using Puts)

BEAR SPREAD (CREATED USING PUTS). THE REVERSE OF A BULL SPREAD

A bull spread can be created by selling a put on a stock with a certain strike price and buying a put on the same stock with a higher strike price.

Both options have the same expiration date.

sp in $P(X_1)$ and a lp in $P(X_2)$ where $X_2 > X_1$

$$\Pi\text{: } \overbrace{-[\max(X_1 - S_T, 0) - \max(X_2 - S_T, 0)]}^{\text{Revenue}} \overbrace{-(-P_1 + P_2)}^{\text{Cost}}$$

$S_T < X_1 < X_2$:$-[X_1 - S_T - (X_2 - S_T) - P_1 + P_2] = -(X_1 - X_2 - P_1 + P_2)$

That is, Π is fixed (does not depend on S_T). Further, we have: $X_2 > X_1 \Rightarrow P_2 > P_1$.

Overall $-(X_1 - X_2 - P_1 + P_2)$ is positive. Otherwise Π will always be negative

$X_1 < S_T < X_2$: $-[-(X_2 - S_T) - P_1 + P_2] = -(S_T - X_2 - P_1 + P_2)$

In this case Π is a negative function of S_T. When $\Pi = 0 \Rightarrow S_T = X_2 + P_1 - P_2 < X_2$

$X_1 < X_2 < S_T$: $-(-P_1 + P_2) < 0$

In this case Π is fixed (does not depend on S_T).

The profit pattern for this strategy is similar to the profit pattern from a Bear spread created using calls.

See Graph Bear Spread (Created using Puts)

BUTTERFLY SPREAD (CREATED USING CALLS)

A butterfly spread can be created by buying a call option with a relatively low strike price, X_1, buying a call option with a relatively high strike price, X_3, and selling two call options with a strike price, X_2, halfway between X_1 and X_2: $X_2 = (X_1 + X_3)/2$

lp in $C(X_1)$, sp in $2C(X_2)$, and lp in $C(X_3)$

$$\Pi: \overbrace{\max(S_T - X_1, 0) - 2\max(S_T - X_2, 0) + \max(S_T - X_3, 0)}^{\text{Revenue}}$$

$$\overbrace{-C_1 + 2C_2 - C_3}^{\text{Cost}}$$

$S_T < X_1, X_2, X_3$: $-C_1 + 2C_2 - C_3 = C^*$

In this case the profit is equal to the cost (it can be shown that $C^* < 0$)

$X_1 < S_T < X_2, X_3 : S_T - X_1 + C^*$

In this case Π is a positive function of S_T. When $\Pi = 0 \Rightarrow S_T = X_1 - C^* > X_1$

$X_1, X_2 < S_T < X_3 : S_T - X_1 - 2(S_T - X_2) + C^* = 2X_2 - X_1 - S_T + C^* = X_3 - S_T + C^*$

In this case Π is a negative function of S_T. When $\Pi = 0 \Rightarrow S_T = X_3 + C^* < X_3$

$X_1, X_2, X_3 < S_T : S_T - X_1 - 2(S_T - X_2) + S_T - X_3 + C^* = 2X_2 - X_1 - X_3 + C^* = C^*$

In this case the profit is equal to the cost (it can be shown that $C^* < 0$)

See Graph Butterfly Spread

A butterfly spread leads to a profit if the stock price stays close to X_2 $[X_1 - C^* < S_T < X_3 + C^*]$

but gives rise to a small loss if there is a significant stock price move in either direction

It is therefore an appropriate strategy for an investor who feels that large stock price movements are unlikely

The strategy requires a small investment initially ($C^* < 0$)

THE REVERSE OF A BUTTERFLY SPREAD (CREATED USING CALLS)

A butterfly spread can be created by selling a call option with a relatively low strike price, X_1, selling a call option with a relatively high strike price, X_3, and buying two call options with a strike price, X_2, halfway between X_1 and X_2: $X_2 = (X_1 + X_3)/2$

sp in $C(X_1)$, lp in $2C(X_2)$, and sp in $C(X_3)$

$$\Pi\text{: } \overbrace{-[\max(S_T - X_1, 0) - 2\max(S_T - X_2, 0) + \max(S_T - X_3}^{\text{Revenue}}$$

$$\overbrace{+\max(S_T - X_3, 0)]}^{\text{Revenue}} \overbrace{-(-C_1 + 2C_2 - C_3)}^{\text{Cost}}$$

$S_T < X_1, X_2, X_3$: $-(-C_1 + 2C_2 - C_3) = -C^*$

In this case the profit is equal to minus the cost (it can be shown that $-C^* > 0$)

$X_1 < S_T < X_2, X_3 : -(S_T - X_1 + C^*)$

In this case Π is a negative function of S_T. When $\Pi = 0 \Rightarrow S_T = X_1 - C^* > X_1$

$X_1, X_2 < S_T < X_3 : -[S_T - X_1 - 2(S_T - X_2) + C^*] = -(2X_2 - X_1 - S_T + C^*) = -(X_3 - S_T + C^*)$

In this case Π is a positive function of S_T. When $\Pi = 0 \Rightarrow S_T = X_3 + C^* < X_3$

$X_1, X_2, X_3 < S_T : -[S_T - X_1 - 2(S_T - X_2) + S_T - X_3 + C^*] = -(2X_2 - X_1 - X_3 + C^*) = -C^*$

In this case the profit is equal to minus the cost (it can be shown that -$C^* > 0$)

See Graph Reverse Butterfly Spread

The reverse of a butterfly spread leads to a loss if the stock price stays close to X_2 $[X_1 - C^* < S_T < X_3 + C^*]$

but gives rise to a small profit if there is a significant stock price move in either direction

It is therefore an appropriate strategy for an investor who feels that large stock price movements are likely

The strategy gives rise to a small profit initially $(-C^* > 0)$

If $C^* > 0$ then a butterfly spread will always give rise to a profit

BUTTERFLY SPREAD (CREATED USING PUTS)

A butterfly spread can be created by buying a put option with a relatively low strike price, X_1, buying a put option with a relatively high strike price, X_3, and selling two put options with a strike price, X_2, halfway between X_1 and X_2: $X_2 = (X_1 + X_3)/2$

lp in $P(X_1)$, sp in $2P(X_2)$, and lp in $P(X_3)$

$$\Pi\text{: } \overbrace{\max(X_1 - S_T, 0) - 2\max(X_2 - S_T, 0)}^{\text{Revenue}}$$

$$\overbrace{+\max(X_3 - S_T, 0)}^{\text{Revenue}} \overbrace{-P_1 + 2P_2 - P_3}^{\text{cost}}$$

$S_T < X_1, X_2, X_3$: $X_1 - S_T - 2(X_2 - S_T) + X_3 - S_T - P_1 + 2P_2 - P_3 = X_1 - 2X_2 + X_3 + P^* = P^*$

In this case the profit is equal to the cost (it can be shown that $P^* < 0$)

$X_1 < S_T < X_2, X_3 : -2(X_2 - S_T) + X_3 - S_T - P_1 + 2P_2 - P_3 = S_T + X_3 - 2X_2 + P^* = S_T - X_1 + P^*$

In this case the profit is a positive function of S_T. When $\Pi = 0 \Rightarrow S_T = X_1 - P^* > X_1$

$X_1, X_2 < S_T < X_3 : X_3 - S_T - P_1 + 2P_2 - P_3 = X_3 - S_T + P^*$

In this case the profit is a negative function of S_T. When $\Pi = 0 \Rightarrow S_T = X_3 + P^* > X_3$

$X_1, X_2, X_3 < S_T : -P_1 + 2P_2 - P_3 = P^*$

See Graph Butterfly Spread (Created Using Puts)

A butterfly spread leads to a profit if the stock price stays close to X_2 $[X_1 - P^* < S_T < X_3 + P^*]$

but gives rise to a small loss if there is a significant stock price move in either direction

It is therefore an appropriate strategy for an investor who feels that large stock price movements are unlikely

The strategy requires a small investment initially ($P^* < 0$)

THE REVERSE OF A BUTTERFLY SPREAD (CREATED USING PUTS)

sp in $P(X_1)$, lp in $2P(X_2)$, and sp in $P(X_3)$

$$\Pi\text{: } \overbrace{-[\max(X_1 - S_T, 0) - 2\max(X_2 - S_T, 0)}^{\text{Revenue}}$$

$$\overbrace{+\max(X_3 - S_T, 0)]}^{\text{Revenue}} \overbrace{-(-P_1 + 2P_2 - P_3)}^{\text{Cost}}$$

$S_T < X_1 < X_2, X_3$: $-P^*$

$X_1 < S_T < X_2, X_3 : -(S_T - X_1 + P^*)$

In this case the profit is a negative function of S_T. When $\Pi = 0 \Rightarrow S_T = X_1 - P^* > X_1$

$X_1, X_2 < S_T < X_3 : -(X_3 - S_T + P^*)$

In this case the profit is a positive function of S_T. When $\Pi = 0 \Rightarrow S_T = X_3 + P^* > X_3$

$X_1, X_2, X_3 < S_T : -P^*$

COMBINATIONS

A combination is a strategy that involves taking a position in both calls and puts on the same stock. We will consider what are known as straddles, strips, straps, and strangles

STRADDLE

A straddle involves buying a call and a put with the same strike price and expiration date

lp $C(X)$ and a lp $P(X)$

$$\Pi\text{: } \overbrace{\max(S_T - X, 0) + \max(X - S_T, 0)}^{\text{Revenue}} \overbrace{-C - P}^{\text{Cost}}$$

$S_T < X : X - S_T - C - P$

When $S_T = 0 : \Pi = X - C - P$ (Intercept with the vertical axis)

In this case the profit is a negative function of S_T. When $\Pi = 0 \Rightarrow S_T = X - C - P$

It can be shown that $X > C + P$

$S_T > X$: $S_T - X - C - P$

In this case the profit is a positive function of S_T. When $\Pi = 0 \Rightarrow S_T = X + C + P$

If the stock price is close to the strike price at expiration of the options, the straddle leads to a loss $(X - C - P < S_T < X + C + P)$

A straddle is appropriate when an investor is expecting a large move in a stock price but does not know in which direction the move will be

The above straddle is sometimes referred to as a bottom straddle or a straddle purchase

TOP STRADDLE

A top straddle or a straddle write is the reverse position

It is created by selling a call and a put with the same exercise price and expiration date

sp $C(X)$ and a sp $P(X)$

$$\Pi\text{: } \overbrace{-[\max(S_T - X, 0) + \max(X - S_T, 0)]}^{\text{Revenue}} \overbrace{-(-C - P)}^{\text{Cost}}$$

$$S_T < X : -(X - S_T - C - P)$$

When $S_T = 0 : \Pi = X - C - P$ (Intercept with the vertical axis)

In this case the profit is a positive function of S_T. When $\Pi = 0 \Rightarrow S_T = X - C - P$

It can be shown that $X > C + P$

$S_T > X : -(S_T - X - C - P)$

In this case the profit is a negative function of S_T. When $\Pi = 0 \Rightarrow S_T = X + C + P$

If the stock price is close to the strike price at expiration of the options, the top straddle leads to a profit ($X - C - P < S_T < X + C + P$)

It is a highly risky strategy. The loss arising from a large stock movement in a positive direction is unlimited

STRIP

A strip consists of a long position in one call and two puts with the same strike price and expiration date

lp in $C(X)$ and lp $2P(X)$

$$\Pi:\ \overbrace{\max(S_T - X, 0) + 2\max(X - S_T, 0)}^{\text{Revenue}}\overbrace{-C - 2P}^{\text{Cost}}$$

$S_T < X : 2(X - S_T) - C - 2P$

When $S_T = 0 : \Pi = 2X - C - 2P$ (Intercept with the vertical axis)

In this case the profit is a negative function of S_T. When $\Pi = 0 \Rightarrow S_T = X - C/2 - P$

It can be shown that $2X > C + 2P$

$S_T > X : S_T - X - C - 2P$

In this case the profit is a positive function of S_T. When $\Pi = 0 \Rightarrow S_T = X + C + 2P$

If the stock price is close to the strike price at expiration of the options, the straddle leads to a loss $(X - C/2 - P < S_T < X + C + 2P)$

A strip is appropriate when an investor is expecting a large move in a stock price and considers a decrease in the stock price to be more likely than an increase.

STRAP

A strap consists of a long position in two calls and one put with the same strike price and expiration date

lp in $2C(X)$ and lp $P(X)$

$$\Pi: \overbrace{2\max(S_T - X, 0) + \max(X - S_T, 0)}^{\text{Revenue}} \overbrace{-2C - P}^{\text{Cost}}$$

$S_T < X : (X - S_T) - 2C - P$

When $S_T = 0 : \Pi = X - 2C - P$ (Intercept with the vertical axis)

In this case the profit is a negative function of S_T. When $\Pi = 0 \Rightarrow S_T = X - 2C - P$

It can be shown that $X > 2C + P$

$S_T > X$: $2(S_T - X) - 2C - P$

In this case the profit is a positive function of S_T. When $\Pi = 0 \Rightarrow S_T = X + C + P/2$

If the stock price is close to the strike price at expiration of the options, the straddle leads to a loss ($X - 2C - P < S_T < X + C + P/2$)

A strap is appropriate when an investor is expecting a large move in a stock price and considers a decrease in the stock price to be more likely than an decrease

STRANGLE

In a strangle, sometimes called a bottom vertical combination, an investor buys a put and a call with the same expiration date and different strike prices

The call strike price, X_2, is higher than the put strike price, X_1

lp $C(X_2)$ and a lp $P(X_1)$

$$\Pi\text{: } \overbrace{\max(S_T - X_2, 0) + \max(X_1 - S_T, 0)}^{\text{Revenue}} \overbrace{- C - P}^{\text{Cost}}$$

$S_T < X_1 < X_2 : X_1 - S_T - C - P$

When $S_T = 0 : \Pi = X_1 - C - P$ (Intercept with the vertical axis)

In this case the profit is a negative function of S_T. When $\Pi = 0 \Rightarrow S_T = X_1 - C - P$

It can be shown that $X_1 > C + P$

$X_1 < S_T < X_2 : -C - P$

In this case the profit is independent of changes in stock price

$X_1, X_2 < S_T : S_T - X_2 - C - P$

In this case the profit is a positive function of S_T.When $\Pi = 0 \Rightarrow S_T = X_2 + C + P$

A strangle is a similar strategy to a straddle. The investor is betting that there will be a large price move but is uncertain whether it will be an increase or a decrease

As $X_2 \uparrow \rightarrow C \downarrow$; As $X_1 \downarrow \rightarrow P \downarrow$:

The further the strike prices are apart, the less the downside risk and the further the stock price has to move for a profit to be realized

SALE OF A STRANGLE

In a sale of a strangle an investor sells a put and a call with the same expiration date and different strike prices

The call strike price, X_2, is higher than the put strike price, X_1

sp $C(X_2)$ and a sp $P(X_1)$

$$\Pi\text{: } \overbrace{-[\max(S_T - X_2, 0) + \max(X_1 - S_T, 0)]}^{\text{Revenue}} \overbrace{-(-C - P)}^{\text{Cost}}$$

$S_T < X_1 < X_2 : -(X_1 - S_T - C - P)$

When $S_T = 0 : \Pi = -(X_1 - C - P)$ (Intercept with the vertical axis)

In this case the profit is a negative function of S_T. When $\Pi = 0 \Rightarrow S_T = X_1 - C - P$

$X_1 < S_T < X_2 : -(-C - P)$

In this case the profit is independent of changes in stock price

$X_1, X_2 < S_T : -(S_T - X_2 - C - P)$

In this case the profit is a negative function of S_T.When $\Pi = 0 \Rightarrow S_T = X_2 + C + P$

The sale of a strangle is sometimes referred to as a top vertical combination

It can be appropriate for an investor who feels that large stock price movements are unlikely. However, like the sale of a straddle, it is a risky strategy since the investor's potential loss is unlimited

SUMMARY

Trading strategies:

A. Involving a single option on a stock and the stock itself:

i) Covered call: lp S_t, sp $C(X)$; Protective put: lp S_t, lp $P(X)$

B. Spreads: Involve a position in two or more options of the same type:

i) Bull spread: lp $C(X_1)$, sp $C(X_2)$, $X_2 > X_1$; lp $P(X_1)$, sp $P(X_2)$, $X_2 > X_1$

ii) Bear Spread: sp $C(X_1)$, lp $C(X_2)$, $X_2 > X_1$; sp $P(X_1)$, lp $P(X_2)$, $X_2 > X_1$

iii) Butterfly Spread: lp $C(X_1)$, sp $2C(X_2)$, lp $C(X_3)$; $X_2 = (X_1 + X_3)/2$

lp $P(X_1)$, sp $2P(X_2)$, lp $P(X_3)$; $X_2 = (X_1 + X_3)/2$

C. Combinations: Involves taking a position in both calls and puts on the same stock:

i) Straddle: lp $C(X)$, lp $P(X)$; ii) Strip: lp $C(X)$, lp $2P(X)$; iii) Straps: lp $2C(X)$, lp $P(X)$

iv) Strangle: lp $C(X_2)$, lp $P(X_1)$, $X_2 > X_1$

METHODOLOGY

Steps:

1. Write down the profit in a general form

Recall that payoffs for calls and puts

	Call	Put
Buy	max($S_T - X, 0$)	max($X - S_T, 0$)
Sell	-max($S_T - X, 0$)	-max($X - S_T, 0$)

2. Write down the profit for special case:

If $S_t < X$, then max($S_T - X, 0$) $= 0$ and max($X - S_T, 0$) $= S_T$

If $S_t > X$, then max($S_T - X, 0$) $= S_T$ and max($X - S_T, 0$) $= 0$

3. Draw the graph for the profit. Important points in the graph:

i) Intercept with the vertical axis: $S_T = 0 \rightarrow \Pi =?$

ii) Intercept(s) with horizontal axis: $\Pi = 0 \rightarrow S_T =?$

iii) maximum profit; iv) maximum loss

4. Comment on the properties of the profit