CHAPTER 11
TRADING STRATEGIES INVOLVING OPTIONS

Derivatives Securities
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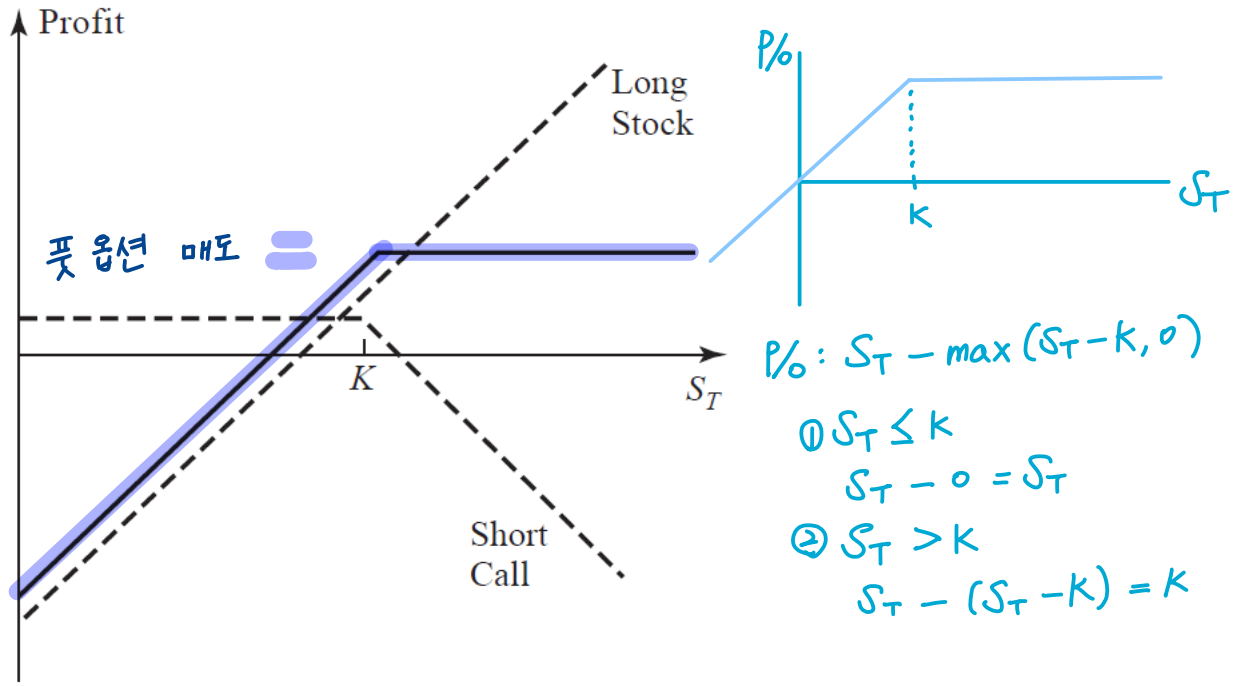
Chapter Outline

- Options with stocks.
- Spreads. → 같은 종류 옵션끼리 섞는 전략 (콜-콜, 풋-풋)
- Combinations. → 다른 종류 옵션끼리 섞는 전략 (콜-풋)

Covered Calls 콜 옵션 팔고 주식은 보유 (주식 롱 + 숏콜)

- A **covered call** is the portfolio consisting of a long position in a stock and a short position in a European call option.



Covered Calls

- The payoff from a covered call is as same as a short position in a naked put.

(D=0) S_0 − c = $K \cdot e^{-rT}$ − p
주식매수 + 콜옵션 매도 = 무위험 자산 + 풋옵션 매도

$$S_0 - c = Ke^{-rT} + D - p$$

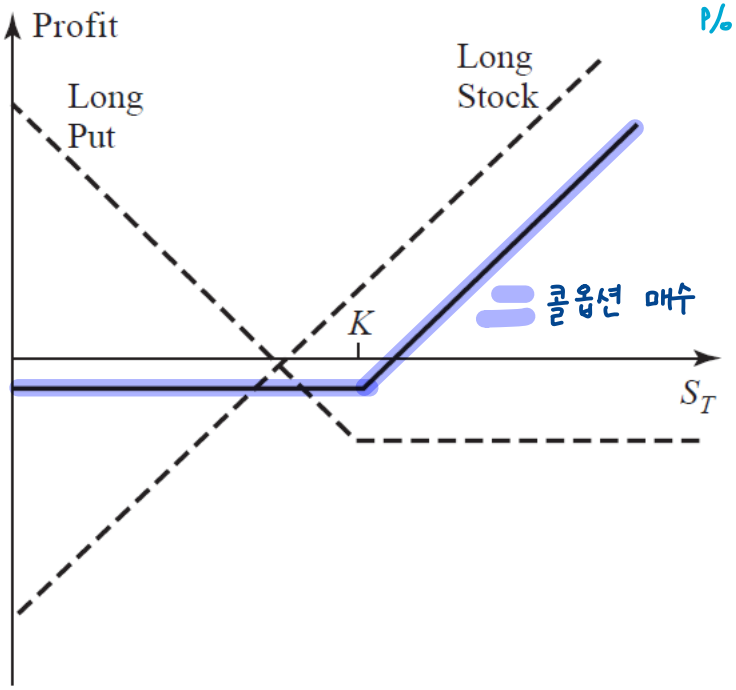
- The long position in a stock provides the protection for the loss in short call.
- Covered calls are used by financial institutions when they write call options.

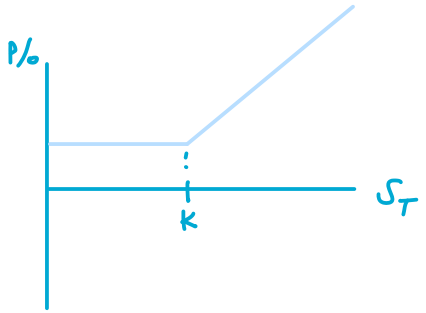
<사용 경우>
콜 옵션을 팔 일이 생겼을 때. (기관) → 옵션 위험 헷지 위해 주식 매수

Protective Puts

풋옵션 사고 주식도 함께 보유 (주식 롱 + 롱풋

- A **protective put** is the portfolio consisting of a long position in a stock and a long position in a European put option.





P/o : $S_T + \max(K - S_T, 0)$

① $K \geq S_T$

$S_T + K - S_T = K$

② $K < S_T$

$S_T + 0 = S_T$

Protective Puts

- The payoff from a protective put is as same as a long position in a naked call.

(D=0) S_0 + P = $K \cdot e^{-rT}$ + C

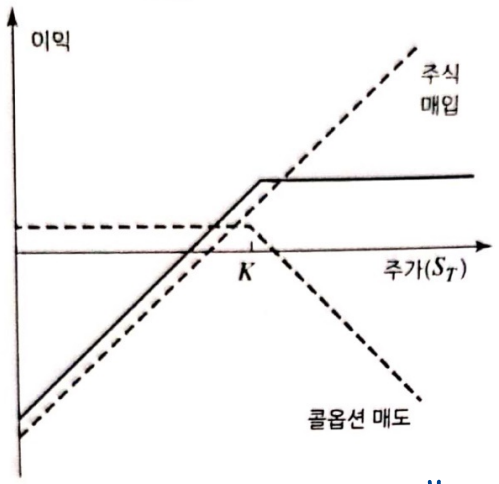
주식 매수 + 풋옵션 매수 = 무위험자산 매수 + 콜옵션 매수

$$p + S_0 = c + Ke^{-rT} + D$$

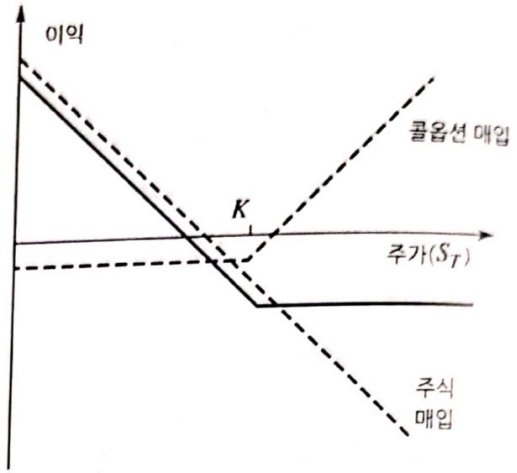
- The long position in a put option provides the protection for the loss in long stock.
- Protective puts are used by investors when they invest in stocks.

< 사용 경우 >

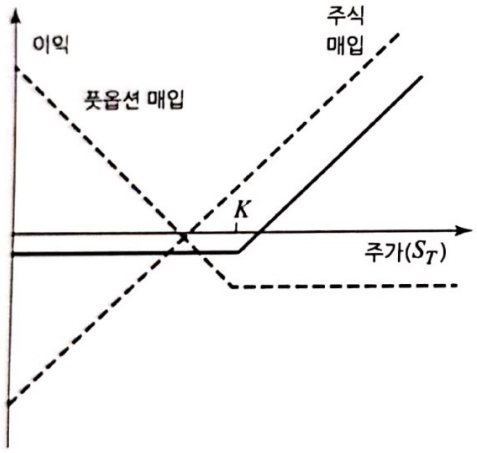
주식을 보유하고 있을 때 (투자자) → 주가 하락 헷지용으로 풋옵션 매수



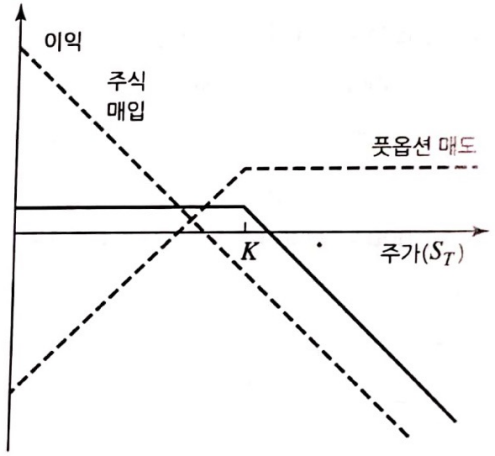
(a) covered calls



(b)



(c) protective put



(d)

Spreads

- A **spread** is a trading strategy which involves taking a position in two or more options if the same type.
- Some well-known spreads are:
  - Bull spreads. (강세 스프레드)
  - Bear spreads. (약세 스프레드)
  - Butterfly spreads.

→ 방향성 전략

행사가가 다른 같은 종류 옵션 매수·매도
→ 이익 손해 한정 시킴

Bull Spreads

- A **bull spread** is a portfolio consisting of:
  - A long position in a call option with strike price K_1 and a short position in a call option with strike price K_2.
  - A long position in a put option with strike price K_1 and a short position in a put option with strike price K_2.
  - In any case, $K_1 < K_2$.
- An investor with a bull spread has net profits when the stock price increases. → 주가가 상승할 때 이익을 보는 구조

만기가 같고 행사가 다른 두 콜옵션 or 풋옵션

< 행사가 작은(K_1) 옵션 매수

< 행사가 큰(K_2) 옵션 매도

Example: Bull Spreads

- Suppose that:
  - An investor buys for $3 a 3-month call with a strike price of $30.
  - She sells for $1 a call with a strike price of $35.
- Then, her initial investment is (초기 비용)

$$3 - 1 = \$2$$

Example: Bull Spreads

- If $S_T < 30$, then the payoff is $-\$2$.
- If $30 \leq S_T \leq 35$, then the payoff is

$$(S_T - 30) - 2 = S_T - \$32$$

- If $35 < S_T$, then the payoff is

$$(S_T - 30) - (S_T - 35) - 2 = \$3$$

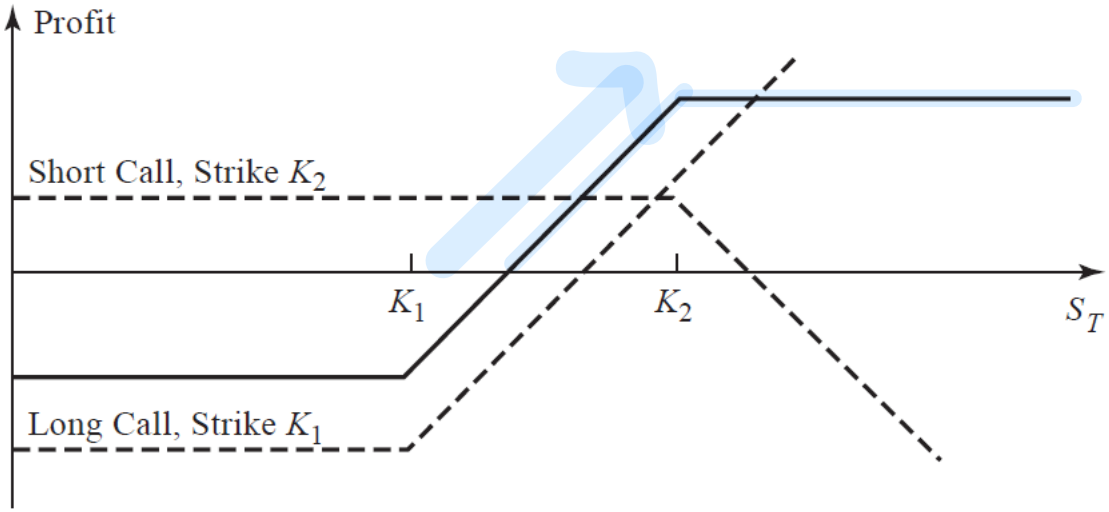
P/o : $\max(S_T - K_1, 0) - \max(S_T - K_2, 0)$

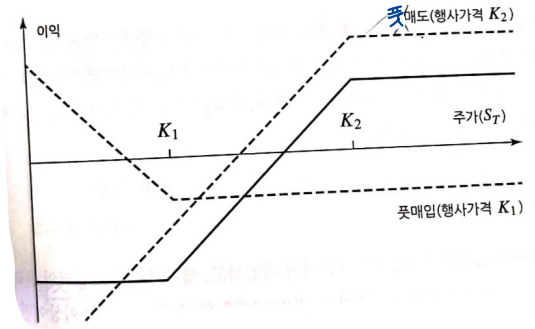
profit : $\max(S_T - 30, 0) - \max(S_T - 35, 0) - 2$

Example: Bull Spreads

주가가 상승할거라고 예상하는 사람이 고정적인 수익을 얻고 싶을 때 사용

Figure 11.2 Profit from bull spread created using call options.





Bear Spreads

- A **bear spread** is a portfolio consisting of:
  - A short position in a call option with strike price K_1 and a long position in a call option with strike price K_2.
  - A short position in a put option with strike price K_1 and a long position in a put option with strike price K_2.
  - In any case, $K_1 < K_2$.
- An investor with a bear spread has net profits when the stock price decreases. → 주가가 하락할 때 이익을 보는 구조

만기가 같고 행사가 다른 두 콜옵션 or 풋옵션

행사가 작은(K_1) 옵션 매도

행사가 큰(K_2) 옵션 매수

Example: Bear Spreads

- Suppose that:
  - An investor buys for \$3 a put with a strike price of \$35.
  - She sells for \$1 a put with a strike price of \$30.
- Then, her initial investment is

$$3 - 1 = \$2$$

Example: Bear Spreads

- If $S_T < 30$, then the payoff is

$$(35 - S_T) - (30 - S_T) - 2 = \$3$$

- If $30 \leq S_T \leq 35$, then the payoff is

$$(35 - S_T) - 2 = \$33 - S_T$$

- If $35 < S_T$, then the payoff is $-\$2$.

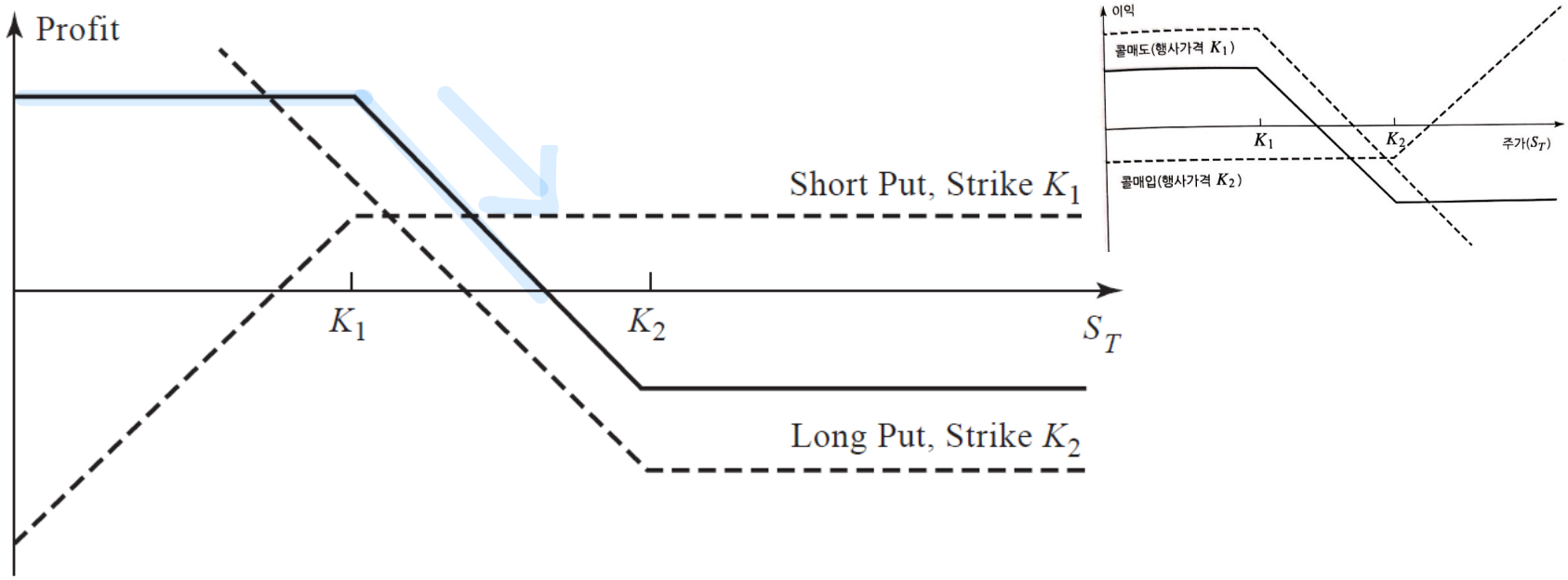
P/o : $\max(K_2 - S_T, 0) - \max(K_1 - S_T, 0)$

profit : $\max(35 - S_T, 0) - \max(30 - S_T, 0) - 2$

Example: Bear Spreads

주가가 하락할거라고 예상하는 사람이 고정적인 수익을 얻고 싶을 때 사용

Figure 11.4 Profit from bear spread created using put options.



Box Spreads

확정적인 Pay off 가짐. (무위험 자산처럼 일정한 수익 줌)

- A box spread is a combination of a bull call spread and a bear put spread with the same two strike prices. 똑같은 금액으로 bull spread와 bear spread 지닐 때.
- The payoff from a box spread is always $K_2 - K_1$.

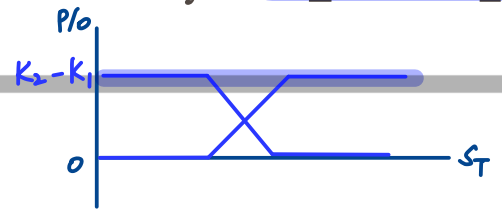


Table 11.3 Payoff from a box spread.

Stock price range	*Payoff from bull call spread*	*Payoff from bear put spread*	*Total payoff*
$S_T \leqslant K_1$	0	$K_2 - K_1$	$K_2 - K_1$
$K_1 < S_T < K_2$	$S_T - K_1$	$K_2 - S_T$	$K_2 - K_1$
$S_T \geqslant K_2$	$K_2 - K_1$	0	$K_2 - K_1$

Butterfly Spreads

- A **butterfly spread** is a portfolio consisting of:
  - A long position in a call with strike price K_1, a short position in two calls with strike price K_2, and a long position in a call with strike price K_3.
  - A long position in a put with strike price K_1, a short position in two puts with strike price K_2, and a long position in a put with strike price K_3.
  - In any case, $K_2 = \frac{1}{2}(K_1 + K_3)$.

만기가 같고 행사가 다른 세 콜옵션 or 풋옵션

행사가 작은(K_1) 옵션 & 큰(K_3) 옵션 매수

행사가 중간(K_2) 옵션 매도

- An investor with a butterfly spread has net profits when there is no significant change in the stock price. → 주가가 만기시점에 중간 행사가격 (K_2)으로 수렴할 것 예상될 경우 취함

Example: Butterfly Spreads

- Suppose that:
  - An investor buys for \$10 a call with a strike price of \$55.
  - She sells for \$7 two calls a strike price of \$60.
  - She buys for \$5 a call with a strike price of \$65.
- Then, her initial cost is

$$10 - 7 \times 2 + 5 = \$1$$

Example: Butterfly Spreads

- If $S_T < 55$, then the payoff is $-\$1$.
- If $55 \leq S_T \leq 60$, then the payoff is

$$(S_T - 55) - 1 = S_T - \$56$$

- If $60 \leq S_T \leq 65$, then the payoff is

$$(S_T - 55) - 2(S_T - 60) - 1 = \$64 - S_T$$

- If $65 < S_T$, then the payoff is

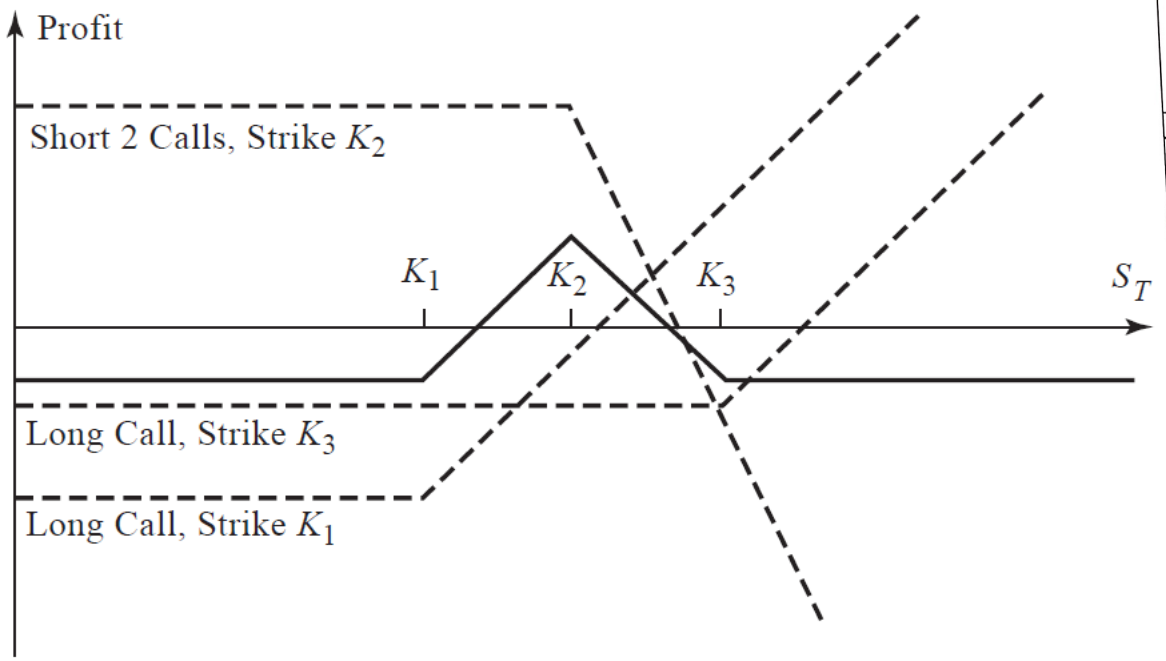
$$(S_T - 55) - 2(S_T - 60) + (S_T - 65) - 1 = -\$1$$

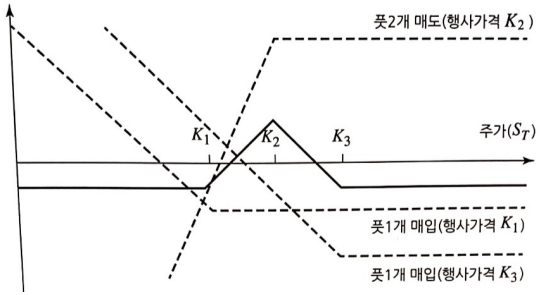
P/o : $\max(S_T - K_1) - 2\max(S_T - K_2) + \max(S_T - K_3)$

profit : $\max(S_T - 55) - 2\max(S_T - 60) + \max(S_T - 65) - 1$

Example: Butterfly Spreads

Figure 11.6 Profit from butterfly spread using call options





Combinations 콜&풋 섞음

- A combination is a trading strategy that involves taking a position in both calls and puts.
- Some popular types of combinations include:
  - Straddles.
  - Strangles.

→ 변동성 전략
(주가 방향성은 알수 없으나, 변동성은 예상 될 경우)

Straddles

- A **straddle** is a portfolio consisting of a long position in a call option and a long position in a put option with the same strike price and the same expiration date.

(주가 상승) 콜옵션 매수
(주가 하락) 풋옵션 매수
→ 상승 시에도, 하락 시에도 수익 낼 수 있음.
(주가 변동성이 크다면)

- An investor with a straddle has net profits when there is a significant changes in the stock price.

Example: Straddle

- Suppose that:
  - An investor buys for \$4 a call with a strike price of \$70.
  - She also buys for \$3 a put with a strike price of \$70.
- Then, her initial cost is

P/o : $\max(S_T - K, 0) + \max(K - S_T, 0)$

profit : $\max(S_T - 70, 0) + \max(70 - S_T, 0) - 7$

$$4 + 3 = \$7$$

- If $S_T < 70$, the payoff is

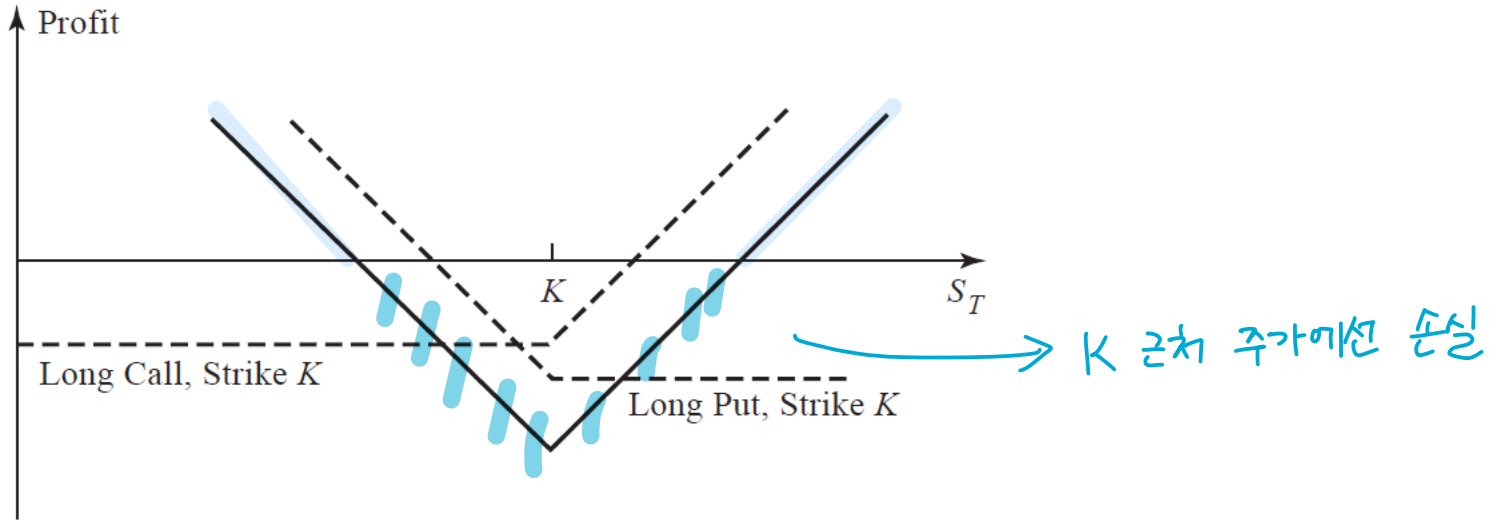
$$(70 - S_T) - 7 = \$63 - S_T$$

- If $70 < S_T$, the payoff is

$$(S_T - 70) - 7 = S_T - \$77$$

Example: Straddle

Figure 11.10 Profit from a straddle.



Strangles

- A **strangle** is a portfolio consisting of a long position in a call option with strike price K_2 and a long position in a put option with strike price K_1, where

(주가 상승) 콜옵션 매수 (K_2)
(주가 하락) 풋옵션 매수 (K_1)
→ 상승 시에도, 하락 시에도 수익 낼 수 있음.
(주가 변동성이 매우 크다면)

$$K_1 < K_2$$

- An investor with a strangle has net profits when there is a sufficiently large move in the stock price.

Strangles

스트러들은 스트랭글에 비해 수익 내기 더 쉬우나, 초기비용이 더 많이 들음.

Figure 11.12 Profit from a strangle.