Trading Strategies Involving Options

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I. Covered Calls and Protective Puts

II. Spread Strategies – bull, bear, butterfly and calendar

III. Straddles, Strips, Straps, and Strangles

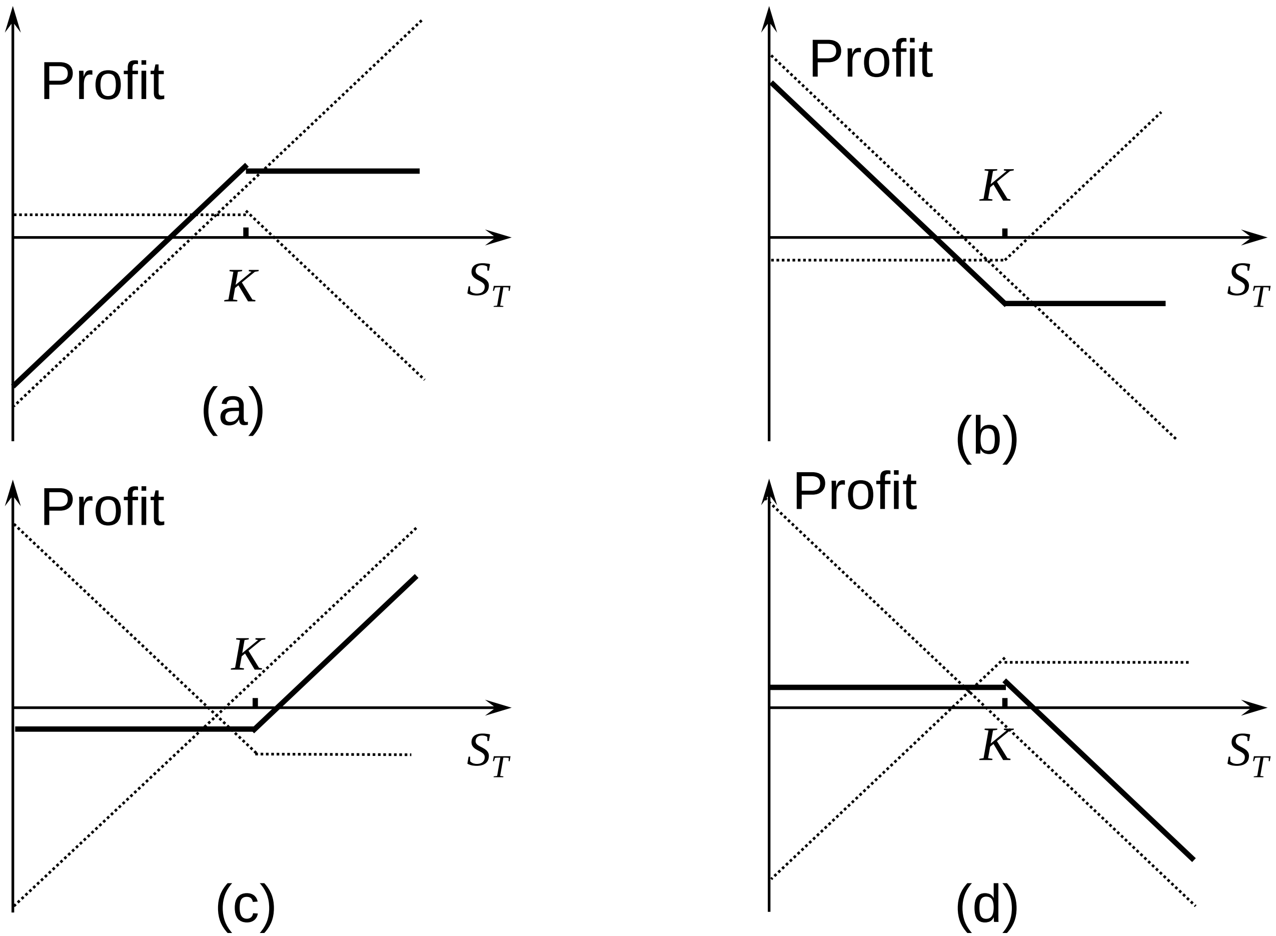
Assumptions

- Zero interest rate;
- Options are European, not American; and
- Underlying stock doesn't pay a dividend.

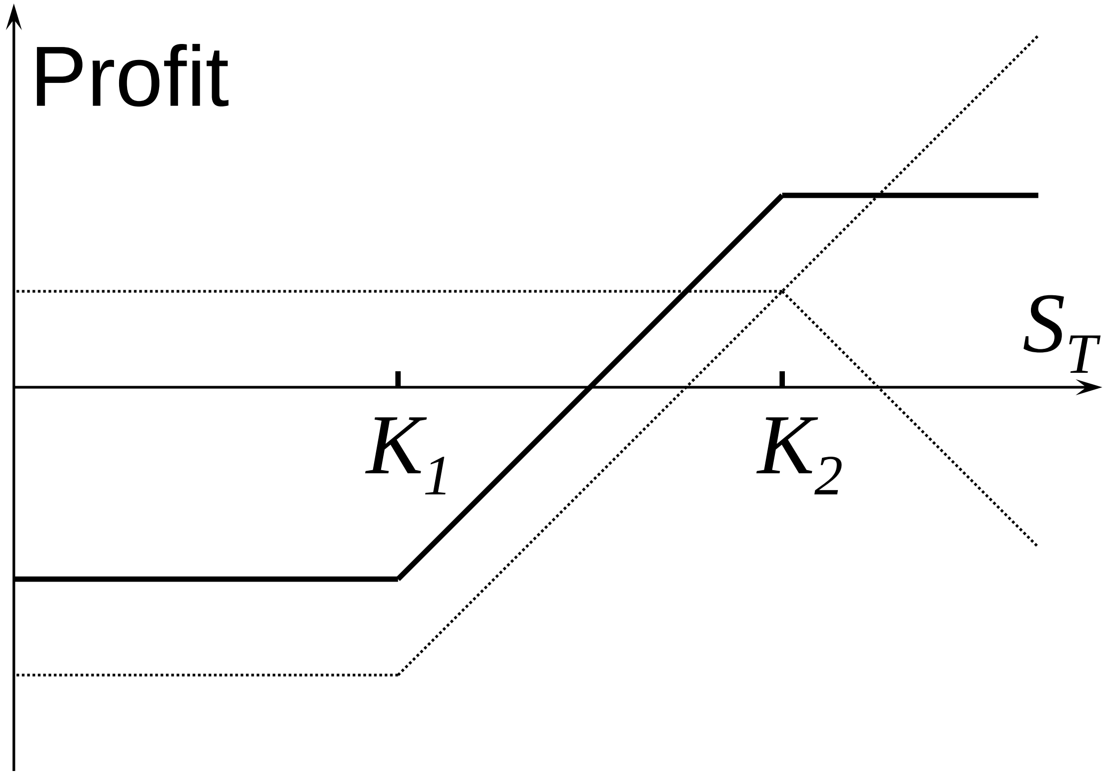
Three Alternative Strategies

- Take a position in the option and the underlying.
- Take a position in 2 or more options of the same type (a spread).
- Take a position in a <u>mixture</u> of calls and puts (a combination).

Positions in an Option & the Underlying



Bull Spread Using Calls

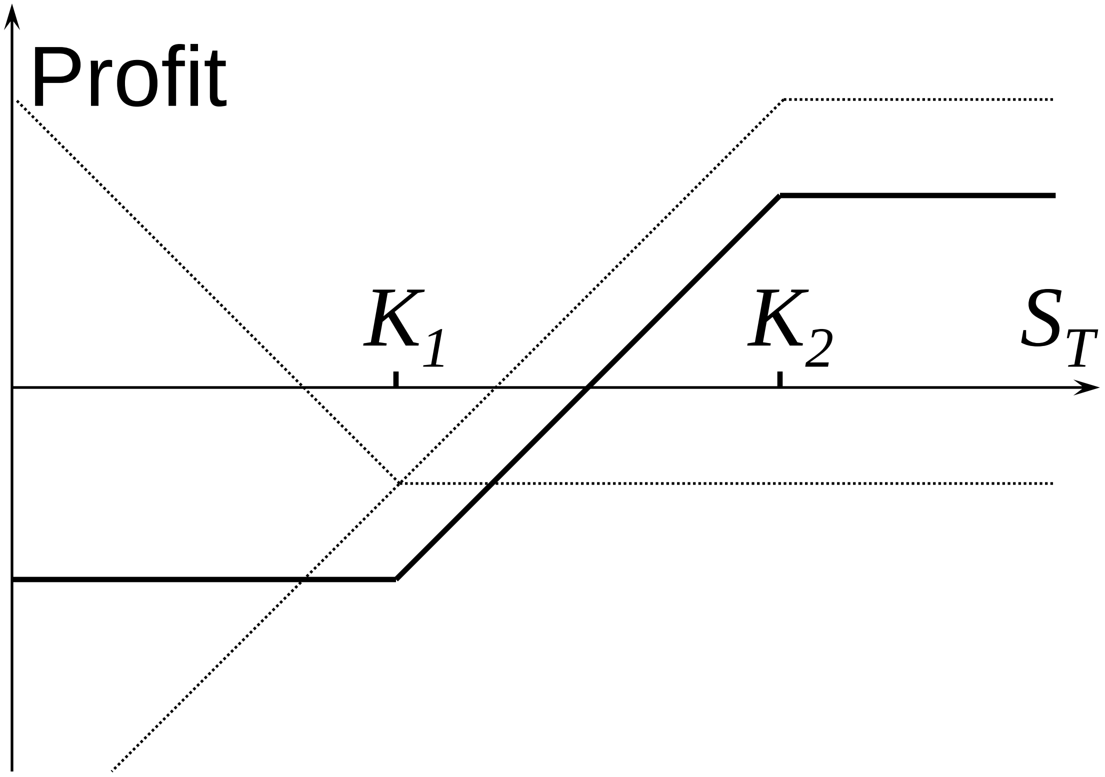


Bull Spread Using Calls

Suppose an investor buys a call with a strike price of $30 for $3 and sells a call with a strike price of $35 for $1. Then the payoffs and profits from this spread are as follows:

Stock Price Range	***Payoff from long call option***	***Payoff from short call option***	***Total Payoff***	***Profit***
$S_T \geq 35$	$S_T - 30$	$35 - S_T$	$35 - 30$	3
$30 < S_T < 35$	$S_T - 30$	0	$S_T - 30$	$S_T - 32$
$S_T \leq 30$	0	0	0	-2

Bull Spread Using Puts

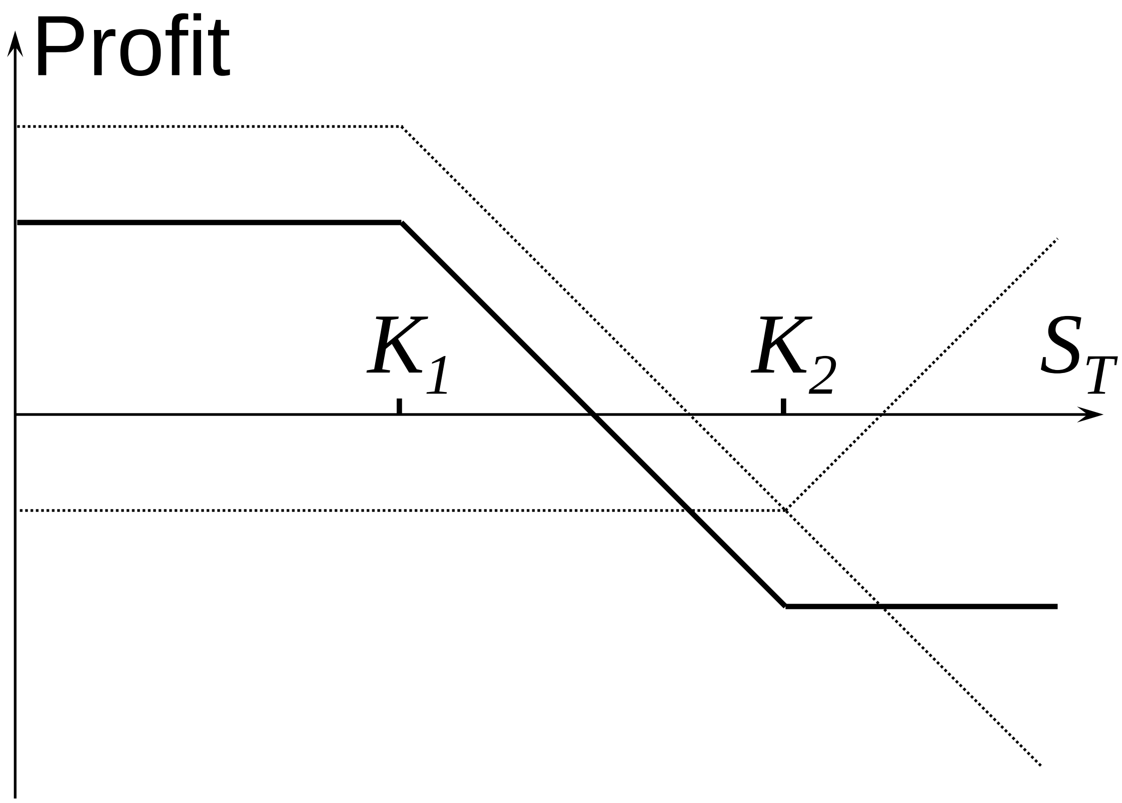


Bull Spread Using Puts

Suppose an investor buys a put with a strike price of \$30 for \$1 and sells a put with a strike price of \$35 for \$3. Then the payoffs and profits from this spread are as follows:

Stock Price Range	***Payoff from long put option***	***Payoff from short put option***	***Total Payoff***	***Profit***
$S_T \geq 35$	0	0	0	2
$30 < S_T < 35$	0	$S_T - 35$	$S_T - 35$	$S_T - 33$
$S_T \leq 30$	$30 - S_T$	$S_T - 35$	$30 - 35$	-3

Bear Spread Using Calls

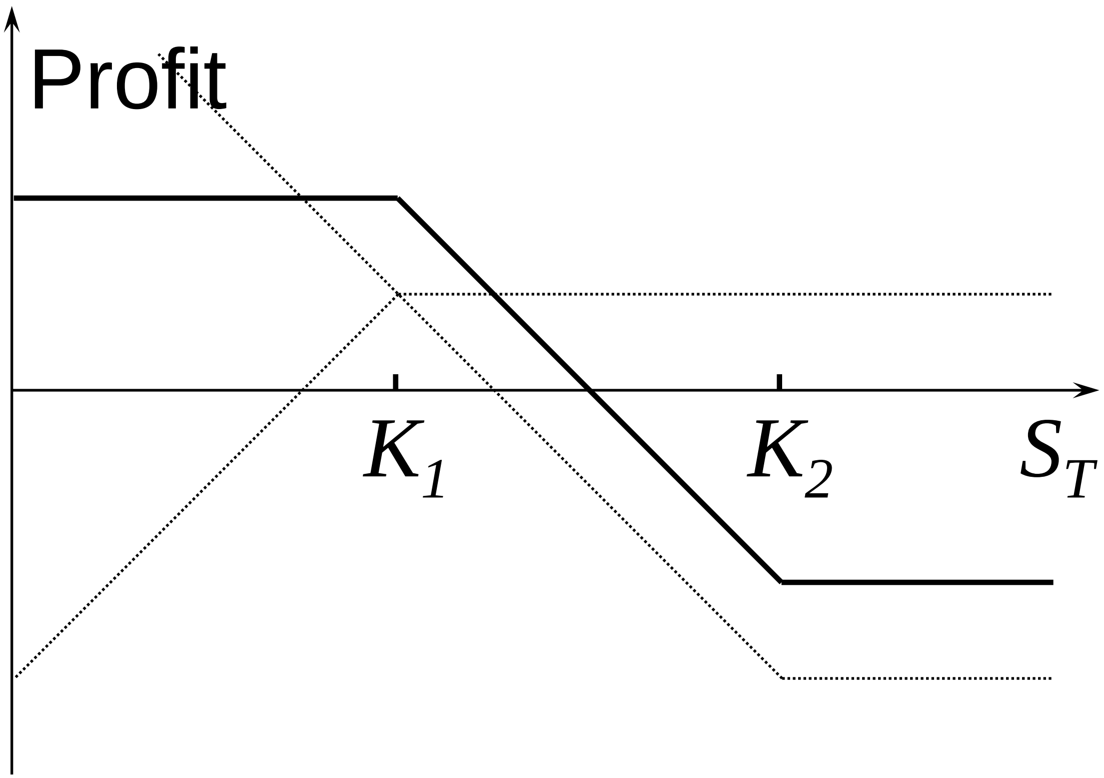


Bear Spread Using Calls

Suppose an investor buys a call with a strike price of \$35 for \$1 and sells a call with a strike price of \$30 for \$3. Then the payoffs and profits from this spread are as follows:

Stock Price Range	*Payoff from long call option*	*Payoff from short call option*	*Total Payoff*	*Profit*
$S_T \geq 35$	$S_T - 35$	$30 - S_T$	$30 - 35$	-3
$30 < S_T < 35$	0	$30 - S_T$	$30 - S_T$	$32 - S_T$
$S_T \leq 30$	0	0	0	+2

Bear Spread Using Puts

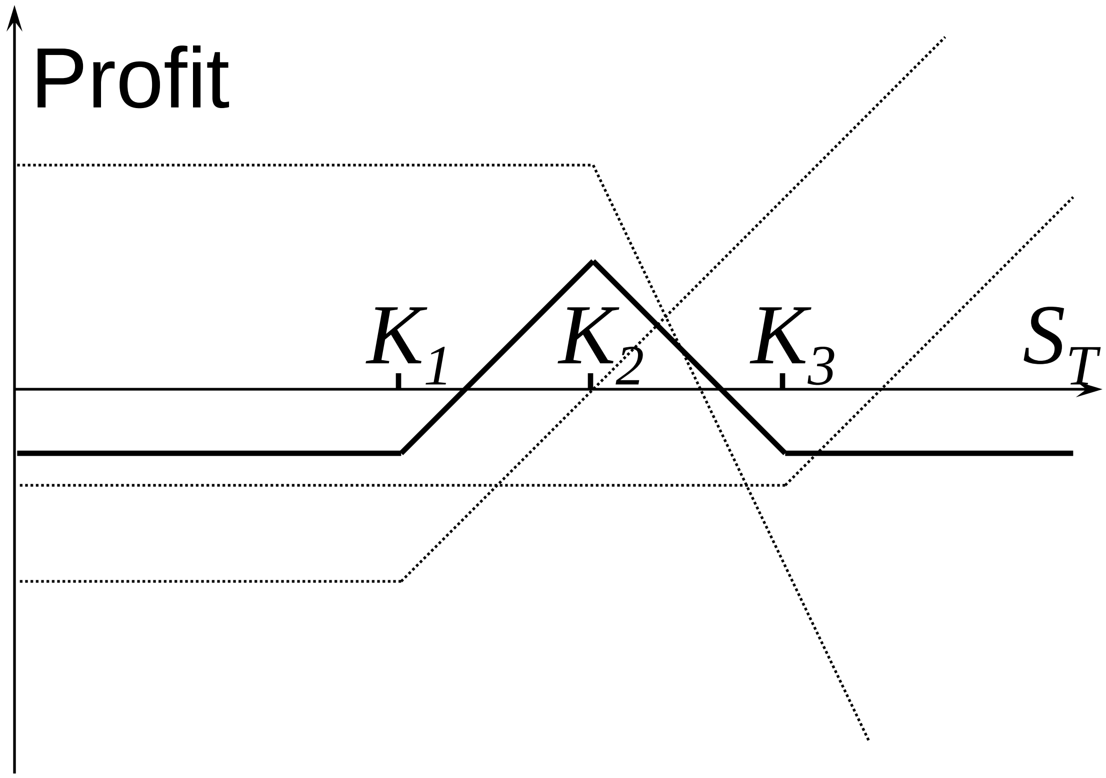


Bear Spread Using Puts

Suppose an investor buys a put with a strike price of \$35 for \$3 and sells a put with a strike price of \$30 for \$1. Then the payoffs and profits from this spread are as follows:

Stock Price Range	*Payoff from long put option*	*Payoff from short put option*	*Total Payoff*	*Profit*
$S_T \geq 35$	0	0	0	-2
$30 < S_T < 35$	$35 - S_T$	0	$35 - S_T$	$33 - S_T$
$S_T \leq 30$	$35 - S_T$	$S_T - 30$	$35 - 30$	3

Butterfly Spread Using Calls



Butterfly Spread Using Calls

Suppose that a stock is worth \$61, and an investor implements a butterfly call spread strategy using the following set of call options:

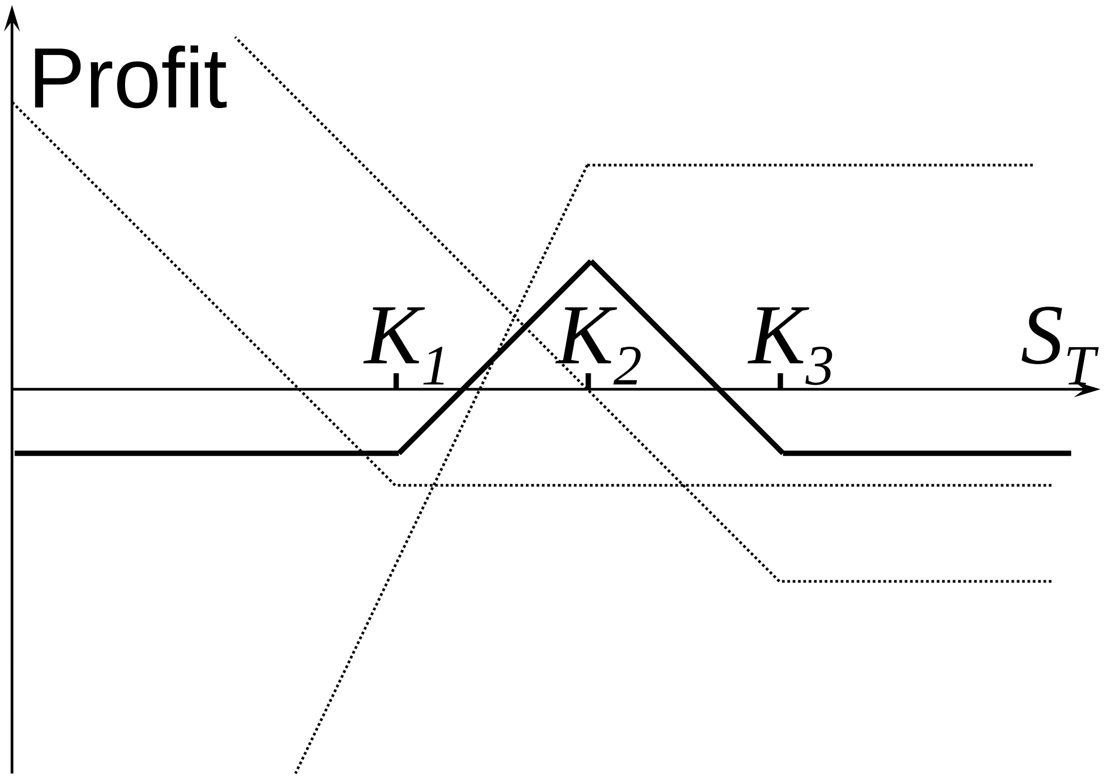
Exercise Price	Call Price
\$55	\$10 (buy 1)
\$60	\$7 (sell 2)
\$65	\$5 (buy 1)
Total Cost	\$1

Butterfly Spread Using Calls

Stock Price Range	*Payoff from 1st long call option*	*Payoff from 2nd long call option*	*Payoff from 2 short calls*	*Total Payoff*
$S_T < K_1$	0	0	0	0
$K_1 < S_T < K_2$	$S_T - K_1$	0	0	$S_T - K_1$
$K_2 < S_T < K_3$	$S_T - K_1$	0	$-2(S_T - K_2)$	$K_3 - S_T$
$S_T > K_3$	$S_T - K_1$	$S_T - K_3$	$-2(S_T - K_2)$	0

Stock Price Range	*Payoff from 1st long call option*	*Payoff from 2nd long call option*	*Payoff from 2 short calls*	*Total Payoff*
$S_T < 55$	0	0	0	0
$55 < S_T < 60$	$S_T - 55$	0	0	$S_T - 55$
$60 < S_T < 65$	$S_T - 55$	0	$-2(S_T - 60)$	$65 - S_T$
$S_T > 65$	$S_T - 55$	$S_T - 65$	$-2(S_T - 60)$	0

Butterfly Spread Using Puts



Butterfly Spread Using Puts

Suppose that a stock is worth \$61, and an investor implements a butterfly put spread strategy using the following set of put options:

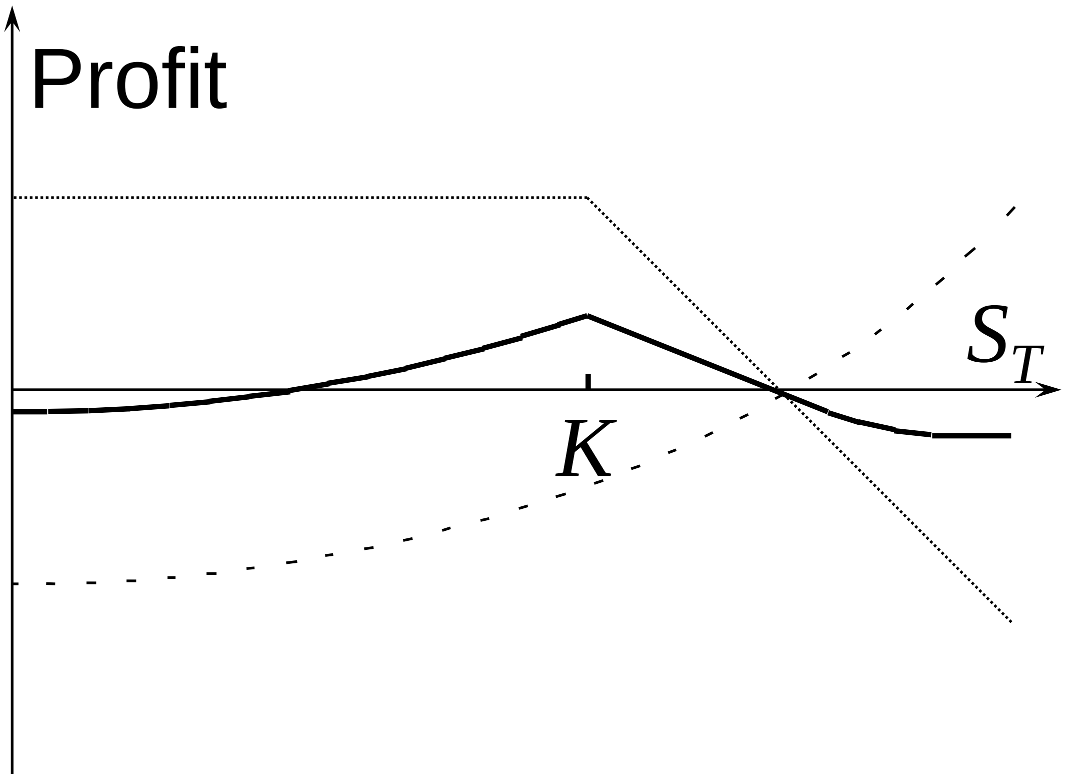
Exercise Price	Call Price
\$55	\$5 (buy 1)
\$60	\$7 (sell 2)
\$65	\$10 (buy 1)
Total Cost	\$1

Butterfly Spread Using Puts

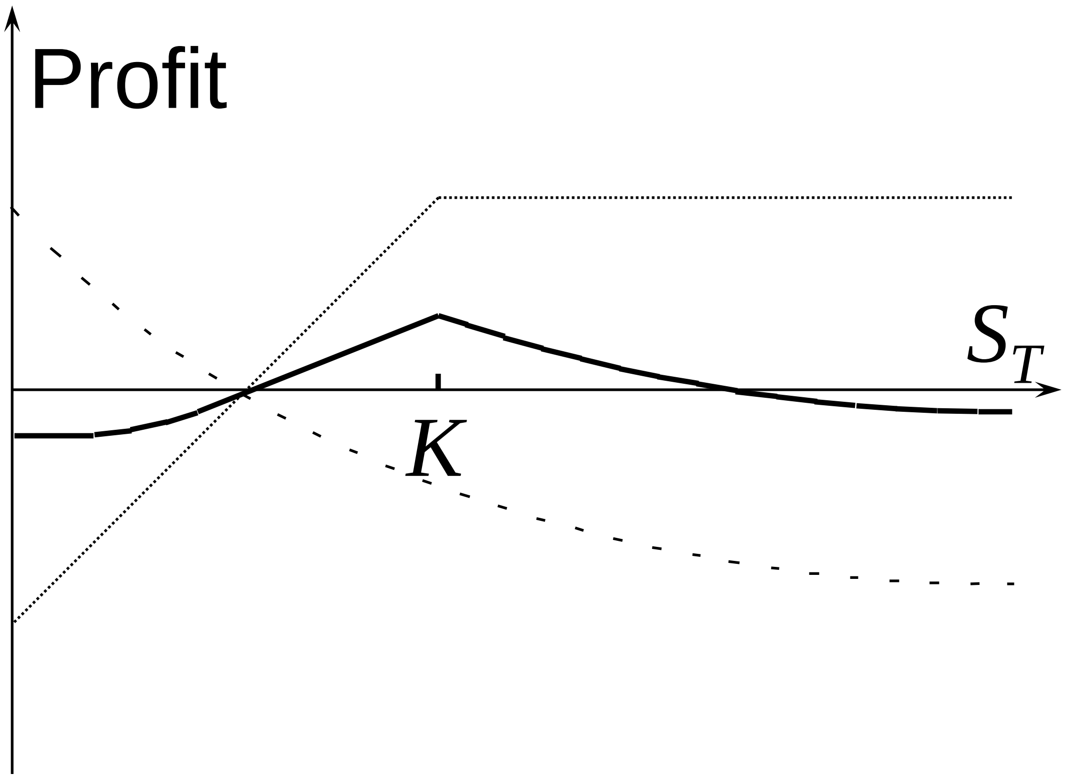
Stock Price Range	*Payoff from 1st long put option*	*Payoff from 2nd long put option*	*Payoff from 2 short puts*	*Total Payoff*
$S_T < K_1$	$K_1 - S_T$	$K_3 - S_T$	$-2(K_2 - S_T)$	0
$K_1 < S_T < K_2$	0	$K_3 - S_T$	$-2(K_2 - S_T)$	$S_T - K_1$
$K_2 < S_T < K_3$	0	$K_3 - S_T$	0	$K_3 - S_T$
$S_T > K_3$	0	0	0	0

Stock Price Range	*Payoff from 1st long put option*	*Payoff from 2nd long put option*	*Payoff from 2 short puts*	*Total Payoff*
$S_T < 55$	$55 - S_T$	$65 - S_T$	$-2(60 - S_T)$	0
$55 < S_T < 60$	0	$65 - S_T$	$-2(60 - S_T)$	$S_T - 55$
$60 < S_T < 65$	0	$65 - S_T$	0	$65 - S_T$
$S_T > 65$	0	0	0	0

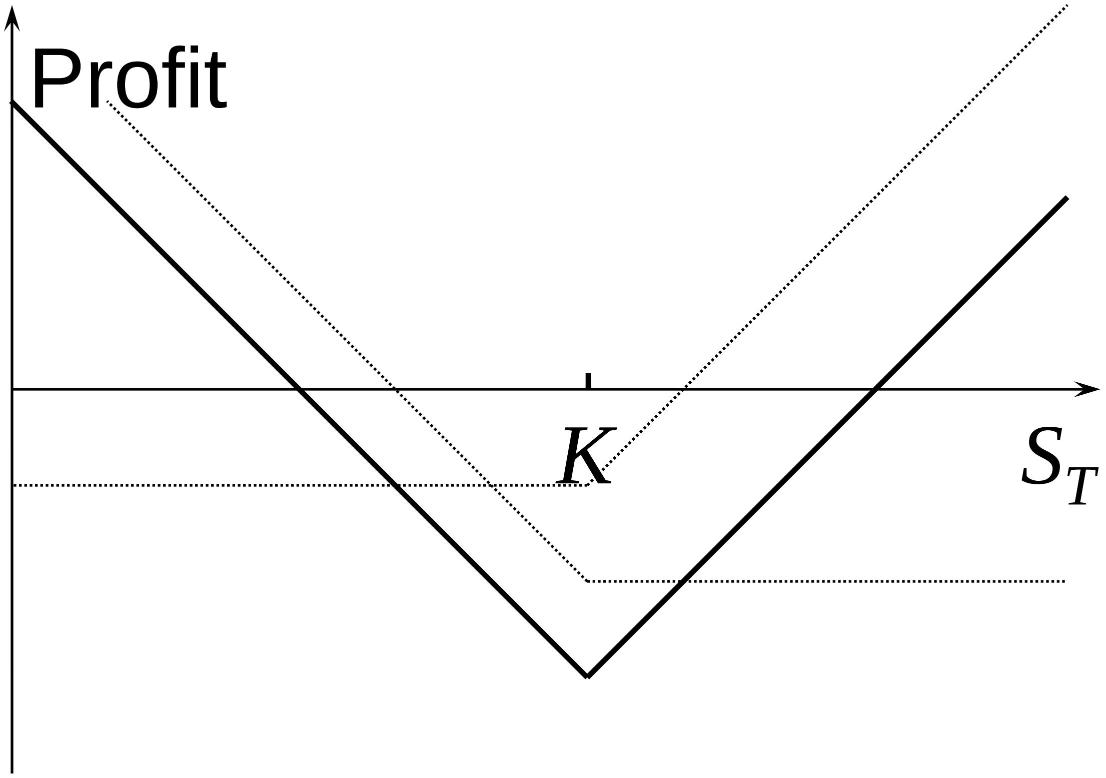
Calendar Spread Using Calls



Calendar Spread Using Puts



A Straddle Combination



Payoff from a Straddle

Stock Price Range	***Payoff from call***	***Payoff from put***	***Total Payoff***
$S_T \leq K$	0	$K - S_T$	$K - S_T$
$S_T > K$	$S_T - K$	0	$S_T - K$

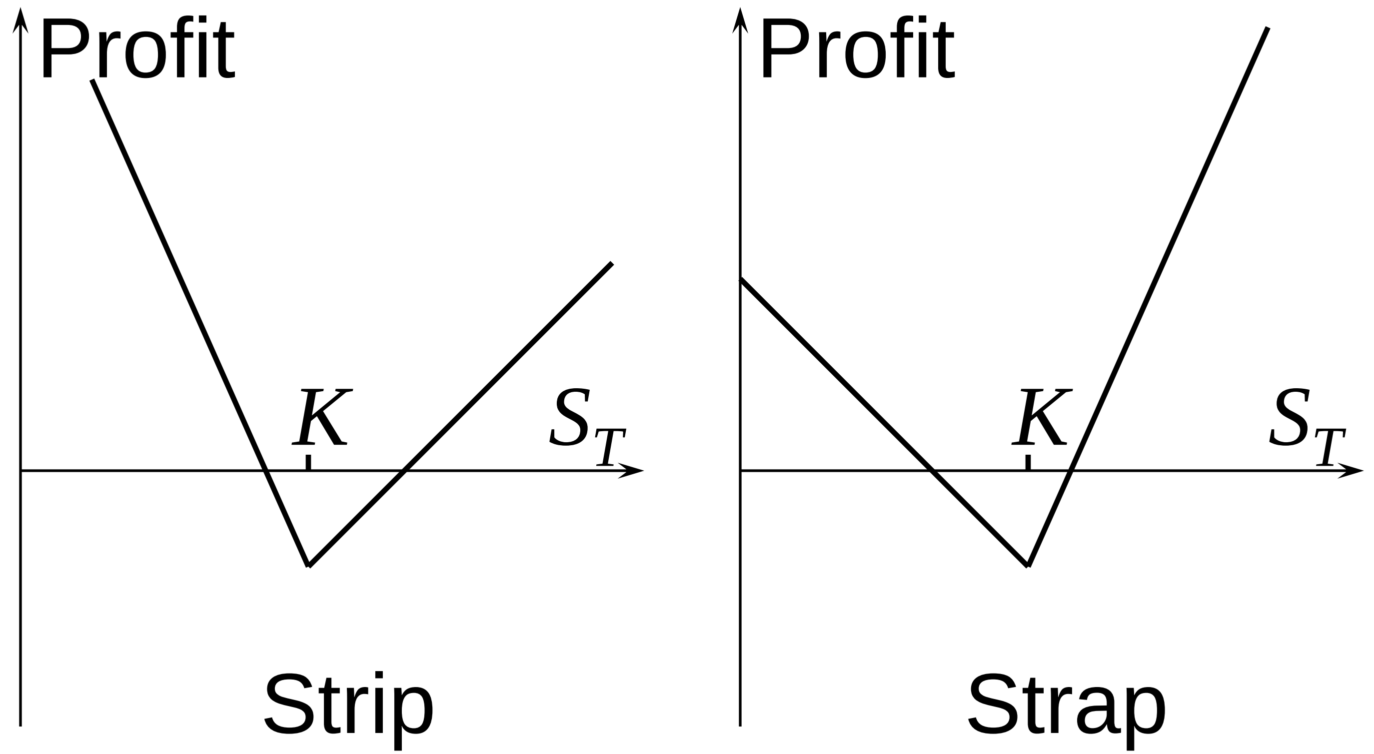
Straddle Numerical Example

Suppose that a stock is worth $69, and an investor implements the following straddle:

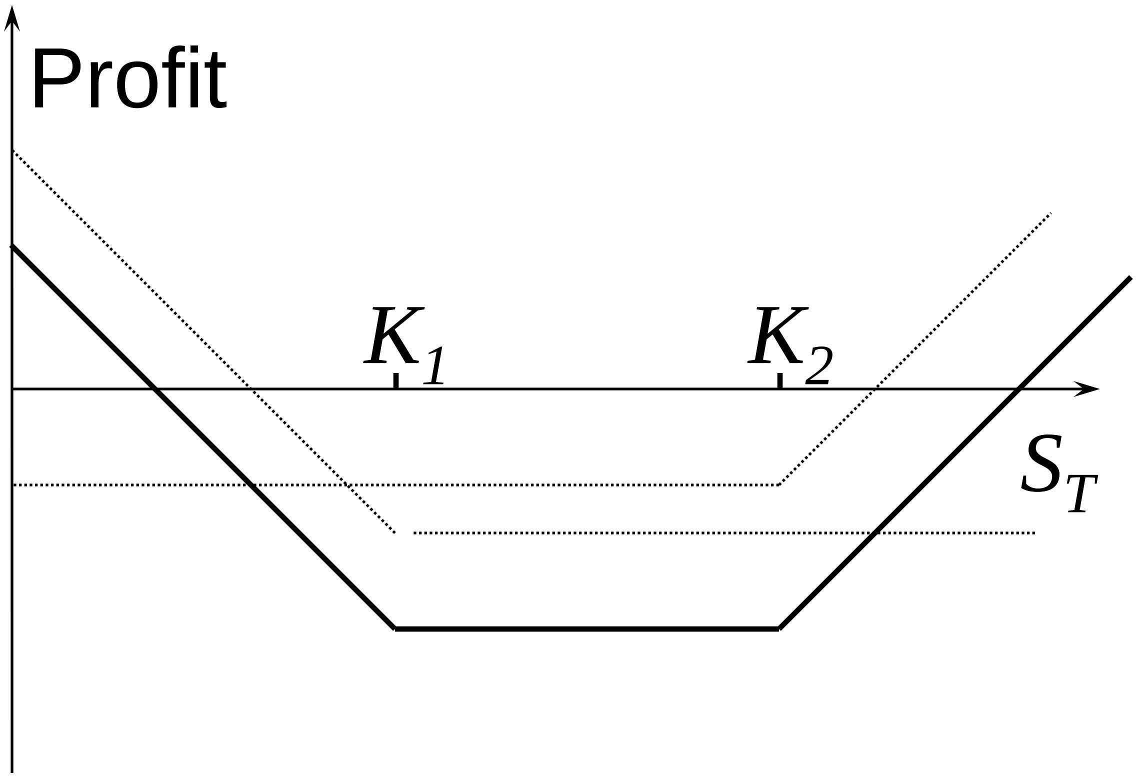
Stock Price	Exercise Price	Call Price	Put Price
$69	**$70**	**$4**	**$3**

Stock Price	Straddle Payoff = Call + Put	Straddle Profit
$69	$0 + $1	**-$7+$1 = -$6**
$70	$0 + $0	**-$7**
$75	$5 + 0	**-$7+$5 = -$2**
$80	**$10 + 0**	**-$7+$10 = $3**

Strip & Strap



A Strangle Combination



Payoff from a Strangle

Stock Price Range	Payoff from call	Payoff from put	Total Payoff
$S_T \leq K_1$	0	$K_1 - S_T$	$K_1 - S_T$
$K_1 \leq S_T < K_2$	0	0	0
$S_T > K_2$	$S_T - K_2$	0	$S_T - K_2$