Ch10 選擇權交易策略

Trading Strategies Involving Options

Notations

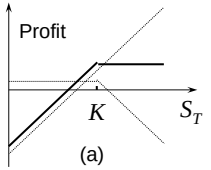
- S(T) : Stock price at time T
- C(K,T) : the price of the call option with maturity T and strike price K
- T1 < T2 < T3 < T4
- K1 < K2 < K3 < K4

單一選擇權加上單一股票的交易策略

Strategies involving a single option and a Stock

出售備兌買權 (Writing a Covered Call)

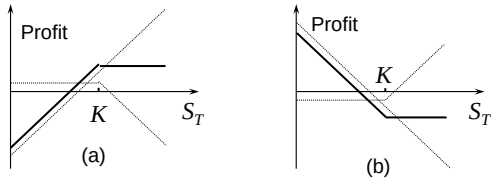
- 出售備兌買權：- C + S
- 由 Put-Call Parity 可知：-C+S = K × exp(-rT) – P
  因此，出售備兌買權的到期損益形式與賣出賣權相同。



出售備兌買權的相反部位

- 出售備兌買權的相反部位：+ C - S
- 由 Put-Call Parity 可知：+ C -S = P – K × exp(-rT)

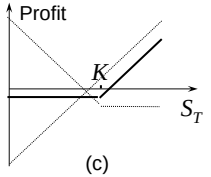
  因此，出售備兌買權的相反部位，到期損益形式與買進賣權相同。



保護賣權 (Protective Put)

- 保護賣權：+ P + S
- 由 Put-Call Parity 可知：＋P + S = C＋K × exp(-rT)

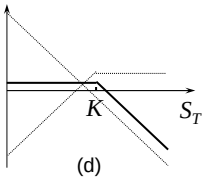
  因此，保護賣權的到期損益形式與買進買權相同。



保護賣權相反部位

- 保護賣權相反部位：- P - S
- 由 Put-Call Parity 可知：- P - S = - C - K × exp(-rT)

  因此，保護賣權的相反部位，到期損益形式與賣出買權相同。

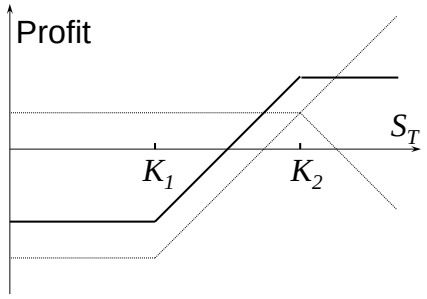


價差交易

Spreads

牛市價差 （Bull Spreads）

- 牛市價差： + C (K1, T) – C(K2, T)



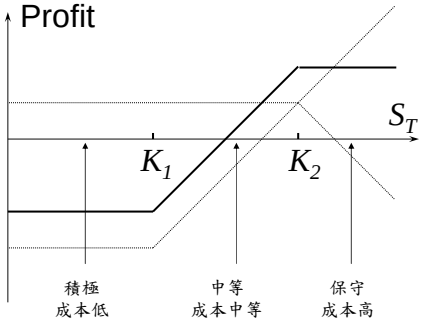
牛市價差 （Bull Spreads）

- 牛市價差： + C (K1, T) – C(K2, T)
- 因為 C (K1, T) > C(K2, T) ，所以期初需要建構成本。
- 時機：預期股價上漲時。
- 牛市價差的到期 Payoff：

Strike Price Range	Payoff from Long Call Option	Payoff from Short Call Option	Total Payoff
S(T) ≦ K1	0	0	0
K1 <S(T) ≦ K2	S(T) - K1	0	S(T) - K1 >0
S(T) ≧ K2	S(T) - K1	K2 - S(T)	K2 - K1 > 0

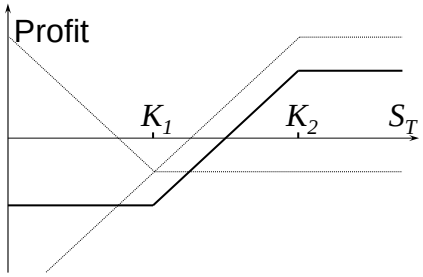
牛市價差 （Bull Spreads）

- 牛市價差可以分為三種：
  - 兩個買權皆是 OTM (積極)
  - 一個買權OTM；一個賣權 ITM （中等）
  - 兩個買權皆是 ITM （保守）



牛市價差 （Bull Spreads）

- 牛市價差也可以由賣權組成：+ P(K1,T) - P(K2,T)



牛市價差 （Bull Spreads）

- 牛市價差也可以由賣權組成：+ P(K1,T) - P(K2,T)
- 期初會有現金流入： P(K2,T) > P(K1,T)
- 到期 Payoff ≦ 0。

Strike Price Range	Payoff from Long Put Option	Payoff from Short Put Option	Total Payoff
S(T) ≧ K2	0	0	0
K1 ≦ S(T) < K2	0	-(K2 - S(T))	-(K2 - S(T)) < 0
S(T) ≦ K1	+(K1- S(T))	-(K2 - S(T))	K1 – K2 < 0

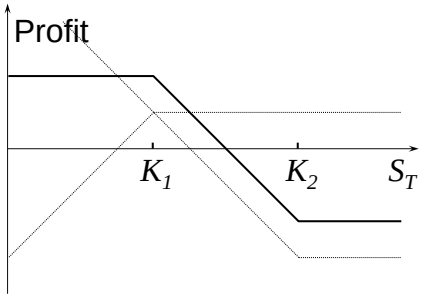
Example 10.1

- An investor buys for $3 a call with a strike price of $30 and sells for $1 a call with a strike price of $35. The cost of the strategy is $3-$1=$2. The profit is as follows:

Strike Price Range	Payoff from Long Call Option	Payoff from Short Call Option	Total Payoff
S(T) ≦ 30	0	0	0
30 <S(T) ≦ 35	S(T) - 30	0	S(T) - 30 > 0
S(T) ≧ 35	S(T) - 30	35 - S(T)	35 - 30 > 0

熊市價差 (Bear Spreads)

- 熊市價差： + P (K2, T) – P(K1, T)



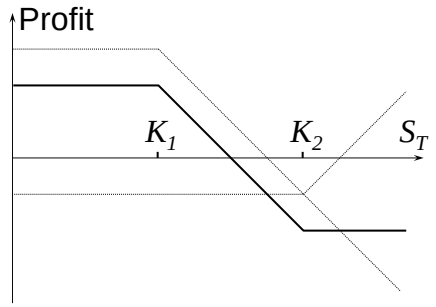
熊市價差 (Bear Spreads)

- 熊市價差： + P (K2, T) – P(K1, T)
- 因為 P (K2, T) > P(K1, T)，所以期初需要建構成本。
- 時機：股價下跌時。
- 熊市價差到期 Payoff:

Strike Price Range	Payoff from Long Put Option	Payoff from Short Put Option	Total Payoff
S(T) ≦ K1	K2 - S(T)	S(T) – K1	K2 - K1
K1 <S(T) ≦ K2	K2 - S(T)	0	K2 - S(T)
S(T) ≧ K2	0	0	0

熊市價差 (Bear Spreads)

- 熊市價差也可以由買權組成： - C (K1, T) + C(K2, T)



熊市價差 (Bear Spreads)

- 熊市價差也可以由買權組成： - C (K1, T) + C(K2, T)
- 因為 C (K1, T) > C(K2, T)，所以期初有現金流入。
- 到期 Payoff ≦ 0。

Strike Price Range	Payoff from Long Call Option	Payoff from Short Call Option	Total Payoff
S(T) ≦ K1	0	0	0
K1 <S(T) ≦ K2	0	- (S(T) – K1)	- (S(T) – K1) ≦ 0
S(T) ≧ K2	S(T) – K2	- (S(T) – K1)	K1 - K2 ≦ 0

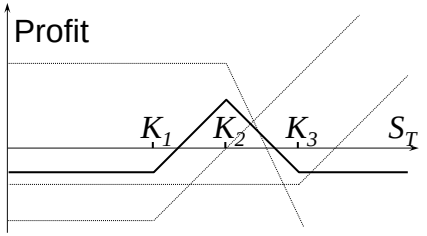
盒型價差 (Box Spreads)

- A box spread is a combination of a bull spread with strike prices K1 and K2 and a bear spread with the same two strikes.
- Box spread Arbitrage:
  - If the market price of the box spread is too low, it is profitable to buy the box.
  - If the market price of the box spread is too high, it is profitable to sell the box.
- A box arbitrage only works with European options.

Strike Price Range	Payoff from Long Call Option	Payoff from Short Call Option	Total Payoff
S(T) ≦ K1	0	K2 - K1	K2 – K1
K1 <S(T) ≦ K2	S(T) - K1	K2 – S(T)	K2 – K1
S(T) ≧ K2	K2 – K1	0	K2 – K1

蝶式價差 (Butterfly Spreads)

- 蝶式價差：+ C(K1) – 2 x C(K2) + C(K3)
- 一般來說， K2 會接近現貨價格。
- 適用時機：當投資人認為股價不會大幅波動時。



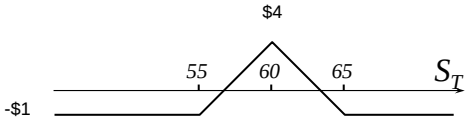
蝶式價差 (Butterfly Spreads)

- 蝶式價差： + C(K1) – 2 × C(K2) + C(K3),
  where K2 =0.5(K1+K3).

Strike Price Range	Payoff from first long call	Payoff from second long call	Payoff from short calls	Total Payoff
S(T) < K1	0	0	0	0
K1 < S(T) < K2	S(T) – K1	0	0	S(T) – K1
K2 < S(T) < K3	S(T) – K1	0	-2(S(T) - K2)	K3 – S(T)
S(T) > K3	S(T) – K1	S(T) - K3	-2(S(T) - K2)	0

蝶式價差 (Butterfly Spreads)

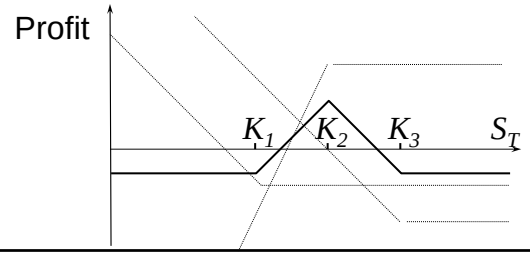
- Butterfly Spread 建購成本 = C1 + C3 – 2 × C2
  = 10 + 5 – 2 × 7
  =$1



K	Call Price
$55	C1=10
$60	C2= 7
$65	C3= 5

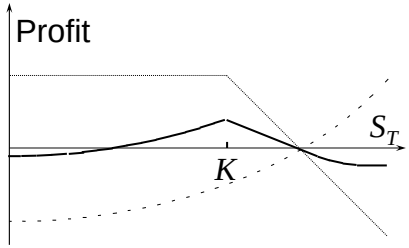
蝶式價差 (Butterfly Spreads)

- Butterfly spreads can be created using put options, which is the same as the spreads created using call options.
- Butterfly spread = P(K1) + P(K3) – 2 × P(K2)



時間價差（Calendar Spreads）

- Calendar spreads or time spreads are created by two options with the same strike price and different expiration dates.
- Calendar spread = + C(K, T2) – C(K, T1)



時間價差（Calendar Spreads）

- Calendar spread = + C(K, T2) – C(K, T1)
- 因為 C(K, T2) > C(K, T1)，所以需要期初建構成本。
- 當短期的買權到期時，長期的買權也一起結束部位，結算損益。
- 與蝶式價差相似，當股價在K附近，沒有大幅波動，則時間價差到期時有收益。然而當股價偏離K時，則有損失。

時間價差（Calendar Spreads）

- Calendar spread = + C(K, T2) – C(K, T1)
- 因為 C(K, T2) > C(K, T1)，所以需要期初建構成本。
- 當短期的買權到期時，長期的買權也一起結束部位，結算損益。
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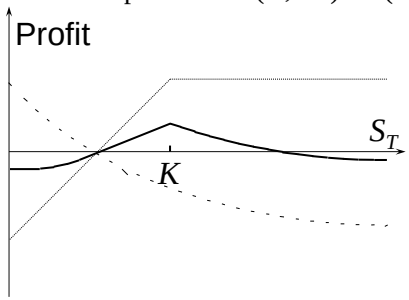
時間價差（Calendar Spreads）

- 蝶式價差亦可由賣權建構：

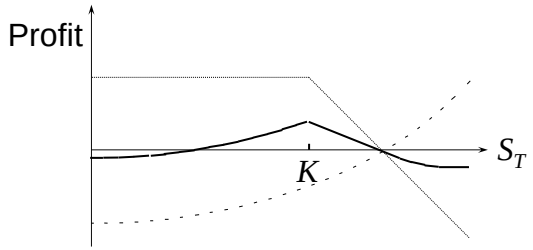
Calendar spread = + P(K, T2) – P(K, T1)



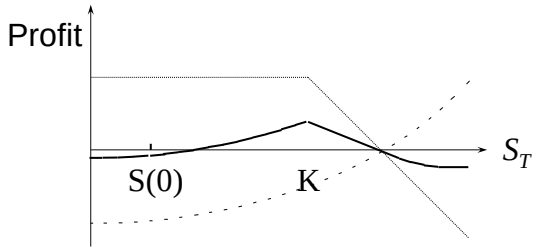
時間價差（Calendar Spreads）

- 三種時間價差：
  - Neutral Calendar Spread: S(0) = K
  - Bullish Calendar Spread: S(0) < K
  - Bearish Calendar Spread: S(0) > K

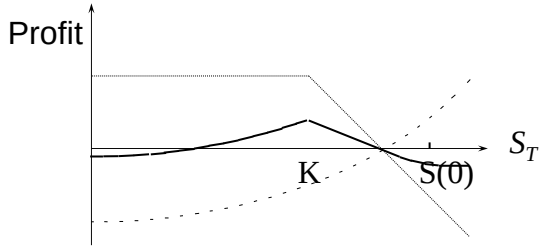
Neutral Calendar Spread: S(0) = K



Bullish Calendar Spread: S(0) < K



Bearish Calendar Spread: S(0) > K



時間價差（Calendar Spreads）

- Option Value = Intrinsic Value + Time Value
  - Intrinsic Value = Max (S(T) – K , 0)
- Calendar spread = + C(K, T2) – C(K, T1)
  = TV2(0) –TV1(0)

---- 所以時間價差的建構成本為時間價值的差！

時間價差（Calendar Spreads）

- See Fig. 15.6 on P. 337.
- At time 0:
  - C1(0) = I1(0) + TV1(0)
  - C2(0) = I2(0) + TV2(0)
  - CS = C2(0) - C1(0) = TV2(0) – TV1(0) = $5 - $2 = $3
- At time T1: CS = TV2(T1) – TV1(T1)
  - ATM : TV2(0) = $5 → TV2(T1) = $4; TV1(0) = $2 → TV1(T1) = 0
    CS = $4 - 0 =$4
    Net Profit = 4 - 3 = $1
  - ITM and OTM : TV2(0) = $5 → TV2(T1) = $2; TV1(0) = $2 → TV1(T1) = 0
    CS = $2 -$0 =$2
    Net Profit = 2-3 = $-1

對角價差 (Diagonal Spreads)

- 所謂對角化 (Diagonalization) 是指將某一價差策略中，長部位到的期日加以延長。
- 時間價差已是對角化價差。
- 對角化牛式價差 = + C(K1, T2) – C(K2, T1)
- 對角化熊式價差 = + P (K2, T2) – P(K1, T1)

組合式交易策略 (Combinations)

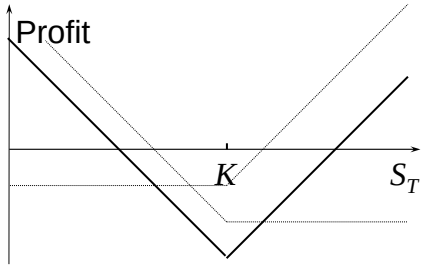
A combination is an option trading strategy that involves taking a position in both calls and puts on the same stock.

跨式交易策略 (Straddle)

- 跨式可分為兩種：
  - 下跨式 (Bottom straddle or straddle purchase)
    Bottom Straddle = + C(K,T) + P(K,T)
    時機：預期股票大漲大跌。
  - 上跨式 (Top straddle or straddle write)
    Top Straddle = - C(K,T) - P(K,T)
    時機：預期股票盤整。

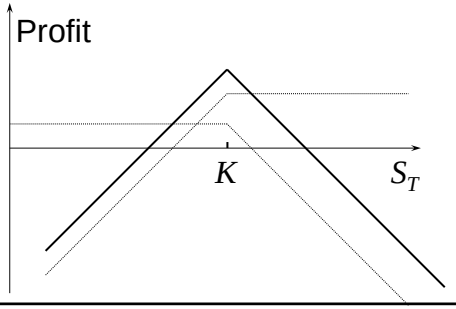
下跨式 (Bottom straddle)

- Bottom Straddle = + C(K,T) + P(K,T)



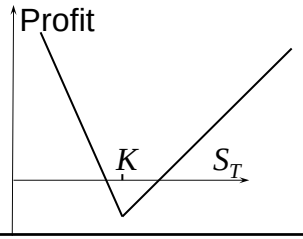
上跨式 (Top straddle)

- Top Straddle = - C(K,T) - P(K,T)



Strip

- Strip = C(K,T) + 2 × P(K, T)
- 時機： 股價將大漲大跌，但大跌機會較高。



Strap

- Strip = 2 × C(K,T) + P(K, T)
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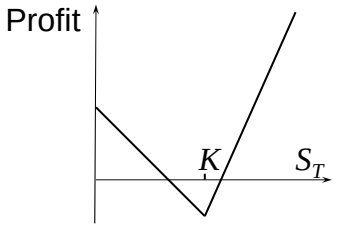
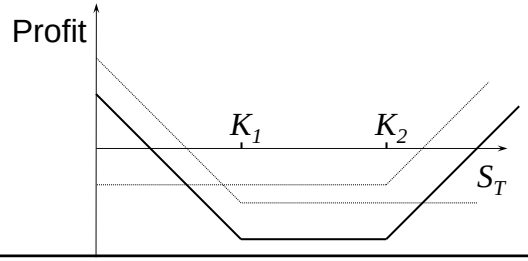


勒式策略 (Strangle)

- 下勒式策略 (Bottom Strangle)

Bottom Strangle = + C(K2, T) + P(K1, T)

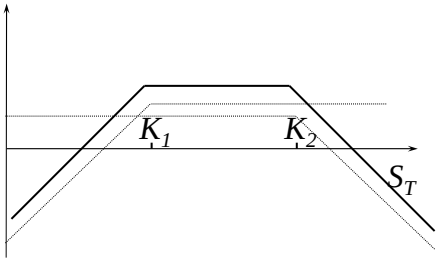


勒式策略 (Strangle)

- 上勒式策略 (Top Strangle)

Bottom Strangle = - C(K2, T) - P(K1, T)

- Profit



Exercises

- 4,7,10,12,19,20,21,22