

PUT-CALL PARITY (2)

King Saud University
Mathematics Department | ACTU461
Exercise's Lecture (10)
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HEDGING AND INV. STRATEGIES

- **Floor**
- **CAP**
- **Covered Call**
- **Covered Put**

FLOOR STRATEGY

Suppose that you buy some asset. If the asset loses value in the future, you lose money. So, A way to insure this long position is to buy a put position. The purchase of a put option is called a **floor**.

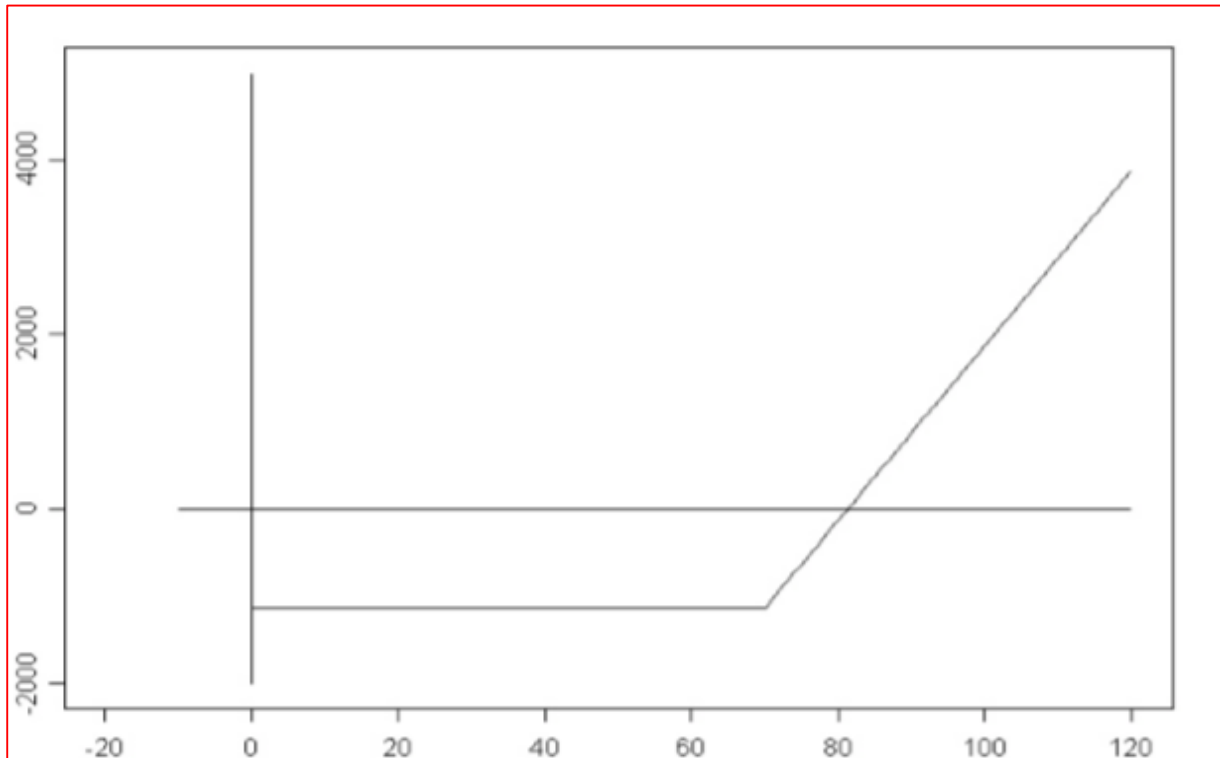
Floor guarantees a minimum sale price of the value of an asset.

Floor = Buy Stock + Long Put Option

$$\text{Profit: } S_t - S_0 e^{rT} + \text{Max}(K - S_T, 0) - \text{Put}(K, T) e^{rT}$$

$$\begin{cases} S_t - S_0 e^{rT} - \text{Put}(K, T) e^{rT} & , \quad S_t \geq K \\ S_t - S_0 e^{rT} + K - S_t - \text{Put}(K, T) e^{rT} & , \quad S_t < K \end{cases}$$

FLOOR STRATEGY



We could deduct from Put-Call Parity,

$$\text{Profit [Floor]} = [\text{Profit Long Call}]$$

*Note :

$$\text{Payoff [Floor]} = \text{Payoff [Buy ZCB + Long Call]}$$

CAP STRATEGY

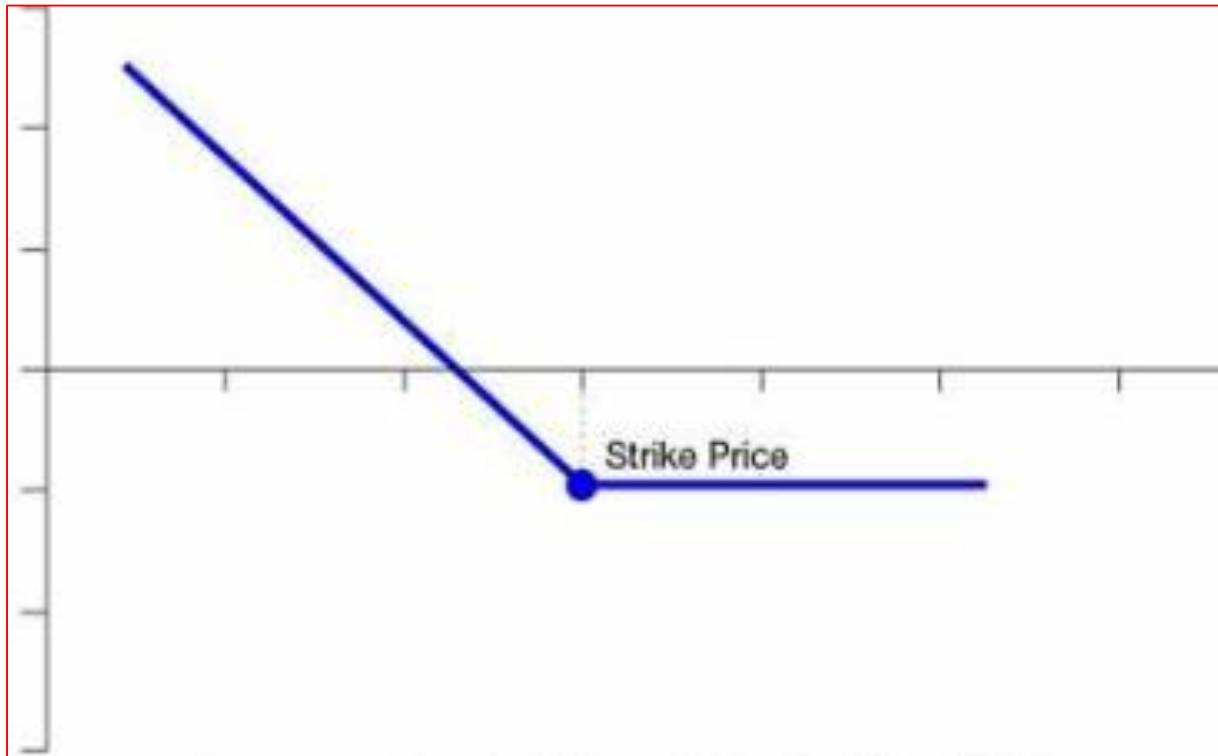
Suppose you short sale the stock. So in the future you have to buy to return the stock. You will experience a loss, when the price of the stock price rises. You can insure a short position by purchasing a call option. Buying a call option when you are in a short position is called a **cap**.

$CAP = \text{Short stock} + \text{Long Call Option}$

Profit: $-S_t + S_0e^{rT} + \text{Max}(S_T - K, 0) - \text{Call}(K, T)e^{rT}$

$$\begin{cases} -S_t + S_0e^{rT} + S_T - K - \text{Call}(K, T)e^{rT} & , \quad S_t \geq K \\ -S_t + S_0e^{rT} - \text{Call}(K, T)e^{rT} & , \quad S_t < K \end{cases}$$

CAP STRATEGY



We could deduct from Put-Call Parity,

$$\text{Profit [CAP]} = [\text{Profit Long Put}]$$

*Note :

$$\text{Payoff [CAP]} = \text{Payoff [Sale ZCB + Long Put]}$$

COVERED CALL STRATEGY

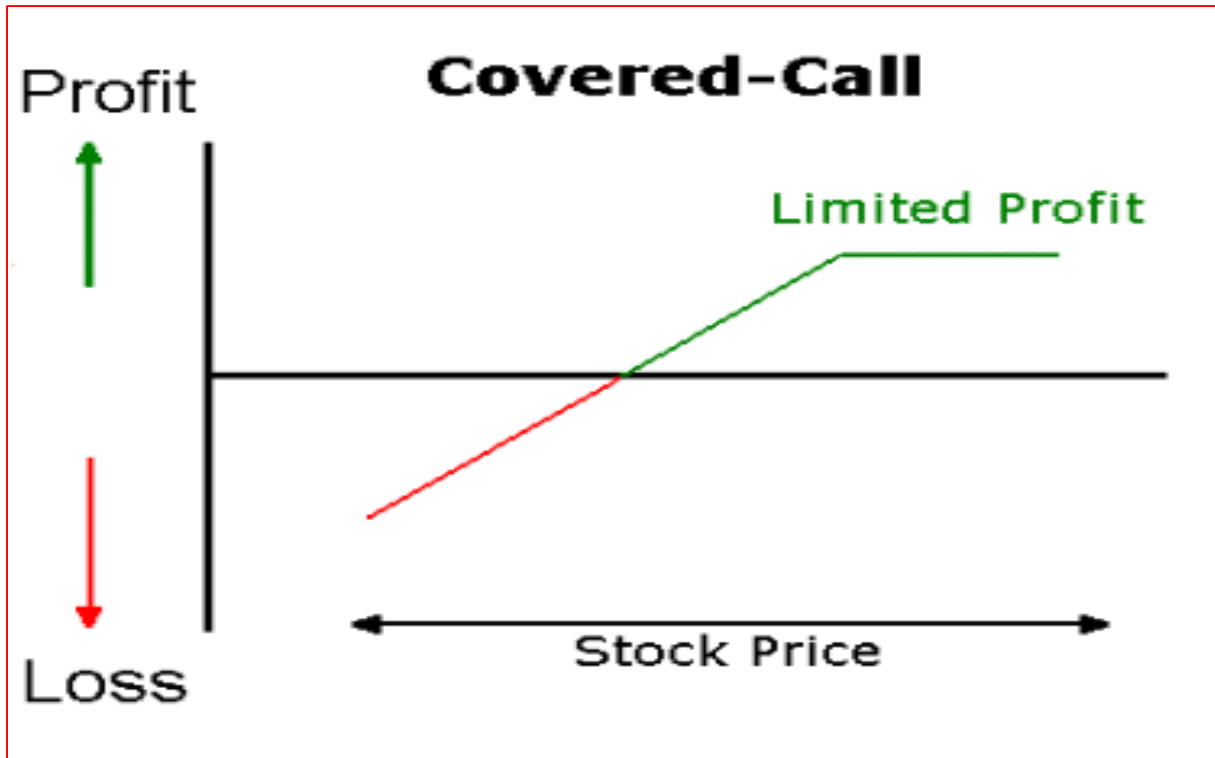
A covered call refers to transaction in the financial market in which the investor selling call options owns the equivalent amount of the underlying security. To execute this an investor holding a long position in an asset then writes (sells) call options on that same asset to generate an income stream.

Covered Call = Buy stock + Short Call Option

$$\text{Profit: } S_t - S_0 e^{rT} - [\text{Max}(S_T - K, 0) - \text{Call}(K, T) e^{rT}]$$

$$\begin{cases} S_t - S_0 e^{rT} - S_T + K + \text{Call}(K, T) e^{rT} & , \quad S_t \geq K \\ S_t - S_0 e^{rT} + \text{Call}(K, T) e^{rT} & , \quad S_t < K \end{cases}$$

COVERED CALL STRATEGY



We could deduct from Put-Call Parity,

$$\text{Profit [Covered Call]} = [\text{Profit Written Put}]$$

Covered Call is the opposite of CAP

COVERED PUT STRATEGY

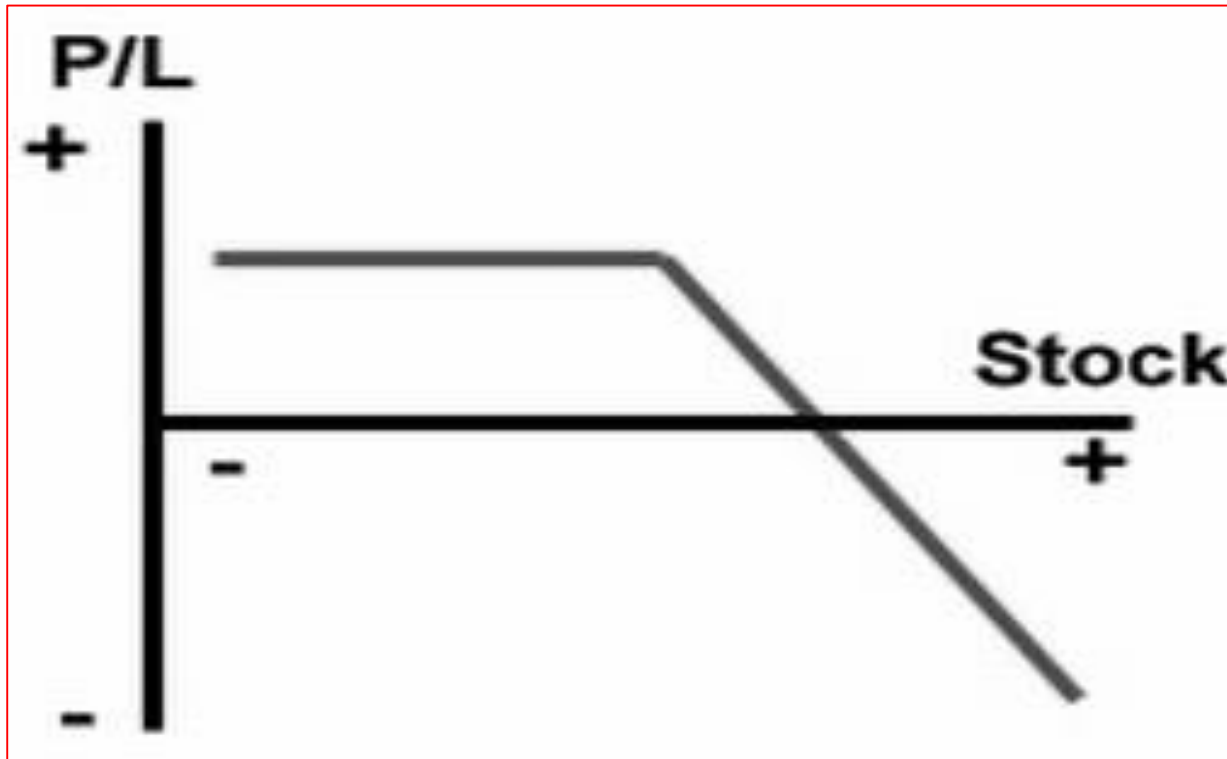
A covered Put refers to transaction in the financial market in which the investor selling Put options owns the equivalent amount of the underlying security. To execute this an investor holding a short position in an asset then writes (sells) put options on that same asset to generate an income stream.

Covered Put = Sell stock + Short Put Option

Profit: $-S_t + S_0 e^{rT} - [Max(K - S_T, 0) - Put(K, T)e^{rT}]$

$$\begin{cases} -S_t + S_0 e^{rT} + Put(K, T)e^{rT} & , \quad S_t \geq K \\ -S_t + S_0 e^{rT} - K + S_t + Put(K, T)e^{rT} & , \quad S_t < K \end{cases}$$

COVERED PUT STRATEGY



We could deduct from Put-Call Parity,

$$\text{Profit [Covered Put]} = [\text{Profit Written Call}]$$

Covered Put is the opposite of Floor

TO SUM UP,

Strategy	Transactions	Profit Equal To?
CAP	Short Stock + Long Call	Long Put
Floor	Long Stock + Long Put	Long Call
Covered Call	Long Stock + Short Call	Short Put
Covered Put	Short Stock + Short Put	Short Call

An investor bought a 70-strike European put option on an index with six months to expiration. The premium for this option was 1. The investor also wrote an 80-strike European put option on the same index with six months to expiration. The premium for this option was 8. The six-month interest rate is 0%.

Calculate the index price at expiration that will allow the investor to break even.

- (A) 63
- (B) 73
- (C) 77
- (D) 80
- (E) 87

A trader shorts one share of a stock index for 50 and buys a 60-strike European call option on that stock that expires in 2 years for 10. Assume the annual effective risk-free interest rate is 3%. The stock index increases to 75 after 2 years.

Calculate the profit on your combined position, and determine an alternative name for this combined position.

Profit Name :

- (A) –22.64 Floor
- (B) –17.56 Floor
- (C) –22.64 Cap
- (D) –17.56 Cap
- (E) –22.64 “Written” Covered Call

An investor has written a covered call.

Determine which of the following represents the investor's position.

- (A) Short the call and short the stock
- (B) Short the call and long the stock
- (C) Short the call and no position on the stock
- (D) Long the call and short the stock
- (E) Long the call and long the stock

Suppose that you purchase one share of a stock index for 50, and that you also short a 60-strike European call option that expires in 1 year for 3.2. The effective annual interest rate is 4%.

If the stock index increases to 65 after 1 year, what is the profit on your combined position, and what is an alternative name for the call in this context?

- A. 11.328, cap
- B. 11.328, covered call
- C. 11.328, naked call
- D. -11.328, floor
- E. -11.328, protected call

Investor C buys the S&R index at time 0 for 1100 and buys an 1100-strike put with $T=.25$ for a price of 81.51. If the annual interest rate compounded continuously is $r=.04$, what is his minimum profit (loss)?

- A. -93.38
- B. -63.015
- C. -57.64
- D. -48.50
- E. There is no minimum

Suppose that you buy a share of a stock for 40 and you also buy a 38-strike put that expires in one year for 1.73. The continuously compounded interest rate is 4%. If the stock falls to 35 after one year, what is the profit on your combined position, and what is the name used for your option position?

- A) -5.36 profit on a floor.
- B) -5.43 profit on a floor.
- C) -5.36 profit on a cap
- D) -5.43 profit on a cap
- E) -5.36 profit on a written call