PUT-CALL PARITY (1)

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Mathematics Department | ACTU461
Exercise's Lecture (8)
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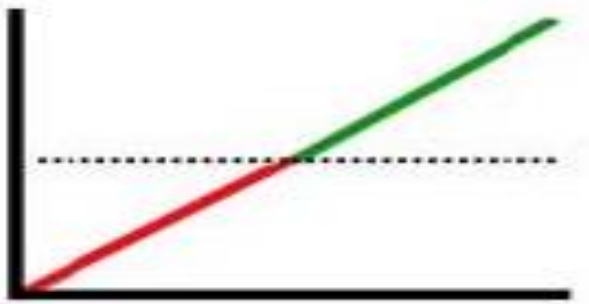
PUT-CALL PARITY

Put-call parity is a principle that defines the relationship between the price of European put options and European call options of the same class, that is, with the same underlying asset, strike price, and expiration date.

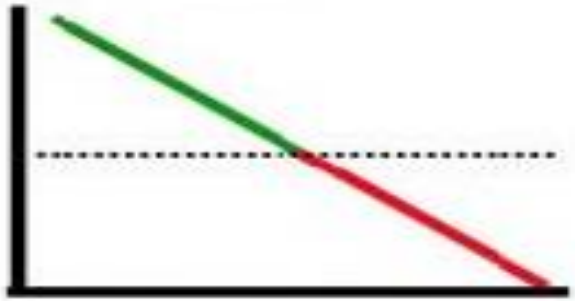
RECALL IMPORTANT GRAPHS



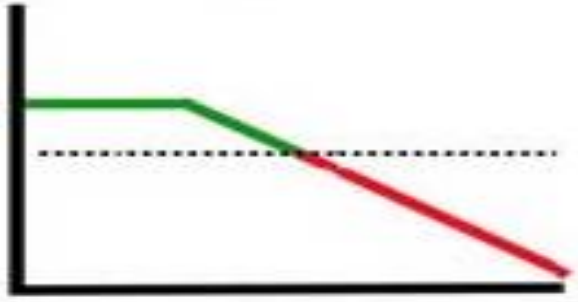
Long Stock

Long Call

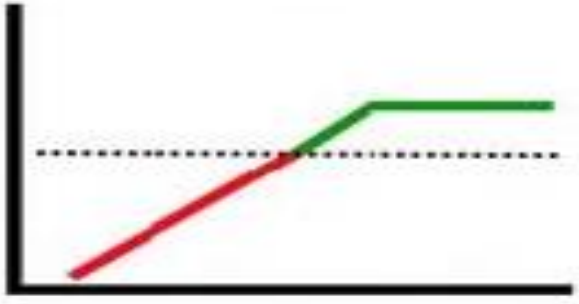
Long Put



Short Stock



Short Call



Short Put

SYNTHETICS

As we take before, synthetics are created to offset or hedge the risk of our current position.

Syn. Long Forward = Long Call + Short Put

Syn. Short forward = Short Call + Long Put

K = $F_{0,T}$

	If $S_T < K$	If $K < S_T$
long call	0	$S_T - K$
short call	0	$-(S_T - K)$
long put	$K - S_T$	0
short put	$-(K - S_T)$	0

Put-Call Parity theorem:

$$(Call(K,T) - Put(K,T))e^{rT} + K = F_{o,T}$$

Arbitrage could exist in two main ways

And each way has two cases.

$$(Call(K,T) - Put(K,T))e^{rT} + K > F_{o,T}$$

Long Forward ; [Market price < theoretical price]
Create Syn. Short Forward = Short Call + Long Put

$Call(K,T) > Put(K,T)$

$Call(K,T) < Put(K,T)$
Call premium < Long premium
We borrow the difference

$$(Call(K,T) - Put(K,T))e^{rT} + K < F_{o,T}$$

Short Forward ; [Market price > theoretical price]
Create Syn. Long Forward = Long Call + Short Put

$Call(K,T) > Put(K,T)$
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$Call(K,T) < Put(K,T)$

The current price of a non-dividend-paying stock is 40 and the continuously compounded annual risk-free rate of return is 8%. You are given that the price of a 35-strike call option is 3.35 higher than the price of a 40-strike call option, where both option expires in 3 months. Calculate the amount by which the price of an otherwise equivalent 40-strike put option exceeds the price of an otherwise equivalent 35-strike put option.

ACTEX VOL. I | Q 3

XYZ stock pays no dividends and its current price is 100. Assume the put, the call and the forward on XYZ stock are available and are priced so there are no arbitrage opportunities. Also, assume there are no transaction costs. The current risk-free annual effective interest rate is 1%. Determine which of the following strategies currently has the highest net premium.

A) Long a six-month forward on the stock 100-Strike put and short a six-month 100-strike call.
B) Long a six-month 101-strike put and short a six-month 101-Strike call
C) Short a six-month forward on the stock
D) Long a six-month 100-strike put and short a six-month 100-strike call200
E) Long a six-month 105-strike put and short a six-month 105-strike call

ACTEX VOL. I | Q 5

24. The current price of a stock is 40. The price of a 35-strike call is 6.13 and the price of a 45 strike call is 0.97. Consider buying n 35-strike calls and selling m 45-strike calls. What ratio $\frac{n}{m}$ gives you a zero premium for this position?

A) 0.158
B) 0.172
C) 0.567
D) 5.814

The Ps index has the following characteristics:

- One share of the PS index currently sells for 1,000.
- The PS index does not pay dividends.

Sam wants to lock in the ability to buy this index in one year for a price of 1025.
He can do this by buying or selling European put and call options with strike prices of 1025

The annual effective risk-free interest rate is (5%.)

Determine which of the following gives the hedging strategy that will achieve Sam;s objective and also gives the cost today of establishing this position.

A) Buy the put and sell the call, receive 23.81
B) Buy the put and sell the call, spend 23.81
C) Buy the put and sell the call, no cost 23.81
D) Buy the call and sell the put, receive 23.81
E) Buy the call and sell the put, spend 23.81

ACTEX VOL. I | Q 7

The current price of a non-dividend paying stock is 30. The continuously compounded risk-free rate is .03. The premium for a 6-month 31-strike put option is 1.99, and the premium for a 6-month 34 strike put option is 4.05. You sell 2 of the 31-strike puts and buy 3 of the 34-strike puts. What is the maximum profit and loss for the combined position at maturity?

	Maximum	Minimum
A)	Unlimited	-8.29
B)	Unlimited	-8.17
C)	8.29	Unlimited
D)	31.79	Unlimited
E)	31.79	-8.29

ACTEX VOL. II | Q 7

The current value of a stock is 30. It pays a continuously compounded dividend rate of =.01. The continuously compounded risk-free rate r =0.04 .
For an exercise price of K= 30 you can buy a 3 month European call on the stock for 1.60 and 3 month Europe put for 1.40. Which of the following is true?

A) There is an arbitrage with an immediate gain of .024 per share.
B) There is an arbitrage with an immediate gain of .036 per share
C) There is an arbitrage with a future profit of .026 per share
D) There is an arbitrage with a future profit of .029 per share
E) There is no arbitrage.

ACTEX VOL. II | Q 34