FINA 1082 –Financial Management
Derivatives II
Tutorial Solutions for Lecture 13

Note that detailed answers to tutorial questions will only be provided in tutorials. The following abridged answers are intended as a guide to these detailed answers. This policy is in place to ensure that you attend your tutorial regularly and receive timely feedback from your tutor. If you are unsure of your answers you should check with your tutor, a pit stop tutor or the lecturer.

A. Short Answer Questions

A1. The correct answer is "*the stock price rises significantly*". A call option allows the buyer to buy the underlying stock at a specified price. Therefore, if the stock price appreciates significantly, the call option holder has the right to buy the stock at the pre-determined, lower strike (strike price).

A2. A derivative is an instrument whose value depends on the price of some other underlying commodity, security or an index.

A3. An arbitrage opportunity is defined as the ability to make a riskless profit without requiring any net investment. Because derivative contracts trade in different marketplace than the assets that underlie them, arbitrage opportunities do exist. However, they are quickly exploit and thus short-lived.

B. Problems

B1.

a) Protective put strategy.

b) The maximum profit is infinite.
Maximum loss = Premium Paid + Purchase Price of Underlying - Put Strike
Maximum loss = 500 ((54-57.8)-2.75) = -\$3,275

c) Protective put option breakeven point = **Purchase Price of Underlying + Premium Paid**
Protective put option strategy breakeven point = 57.8 + 2.75 = \$60.55
Long put breakeven point = Put Strike - Premium Paid
Long put breakeven point = 54 – 2.75 = 51.25

d) The premium of one call option = 2.75 + 57.8-54*$e^{-5\%*0.5}$ = \$7.88

B2. The put-call parity relation states that
$P = C – S_0 + X / (1 + r_f)^T$
If F = X, then $P = C – S_0 + F / (1 + r_f)^T$
But spot-futures parity tells us that $F = S_0 (1 + r_f)^T$. Substituting, we find that:
$P = C – S0 + [S_0 (1 + r_f)^T]/(1 + r_f)^T = C – S_0 + S_0$,
Which implies that P = C.

B3. The expiration value of a put option is equal to Max (0, X – S) = Max (0, \$30 - \$27) = \$3.00

B4. Sell the stock and the put buy the call and a bond that pays \$4.00 in three months.

Put-Call parity says:
(Protective put) $S_0 + P_0 = X / (1+r_F)^T + C0$ (fiduciary call)
Plugging in the values in the problem and calculating
$X / (1+rF)^T = 4 / (1.01)^{0.25} = 3.99$, we have
3.95 + 0.5 = 3.99 + 0.35
4.45 > 4.34

B5.
a) The price of the three month future is:
$Ft = St\ (1+t)^{T-t} = 80 \times 1.01^3 = 82.42$

b). The fair value of the 6 month future should be:
$Ft = St\ (1+t)^{T-t} = 80 \times 1.01^6 = 84.92$

Given the trading price $90, we know that it is overvalued. Hence, to make arbitrage profit, we want to short the future.
At t=0, we short one unit of the future, borrow $80 to buy one unit of the stock at spot market. The net cash flow is zero.
At t=1, we deliver the unit to the buyer, receive payment of $90 on the future, and repay the bank loan 84.92. The net cash flow is 90 – 84.92 = 5.08. This is our arbitrage profit.

c) The fair value of the 1 year future should be:
$Ft = St\ (1+t)^{T-t} = 80 \times 1.01^{12} = 90.146$
Given the trading price $90, we know it is undervalued. Hence, to make arbitrage profit, we want to long the future.
At t=0, we long one unit of the future, borrow and short one unit of the stock at spot market, and save the $80 proceeds from stock selling in bank. The net cash flow is zero.
At t=1, we acquire one unit of the stock from the seller of the future and return the stock to lender. We have to pay $90 according to the future contract. On the other hand, we withdraw from the bank $0 \times 1.01^{12} = 90.146$. The net cash flow 0.146 is our arbitrage profit.