END OF CHAPTER EXERCISES

Chapter 13 : Portfolio Insurance

Financial Engineering : Derivatives And Risk Management

(Keith Cuthbertson, Dirk Nitzsche)

1. Why is a 'long stock plus long put' known as a 'covered call' ?

2. Why undertake dynamic portfolio insurance when puts are available, since you can use the 'real thing', to protect your portfolio?

3. Why does portfolio insurance cause rapid buying and selling of stocks, bills or futures when the market moves up or down very rapidly ?

4. You hold $675,000 in a diversified portfolio that tracks the S&P500 index which currently stands at 1,500. The value of an index point on the S&P500 is currently $250. You would like to buy puts to insure your portfolio so that the minimum value is $600,000.
   (a.) What strike price will your puts have ?
   (b.) What is the total cost of the puts if P = 16 ?

5. You hold N index units of the S&P500 in a portfolio of stocks and N index units in puts. How can you ensure that the change in value of this stock-put portfolio (for small changes in S) will equal that of a call + T-bill portfolio ? (Hint: use the put-call parity condition.)

6. You hold a portfolio that mimics the S&P500 with a current value of $9,750,000. The current (1st June) value of the S&P500 is 1500. (Value of an index point is currently $250). You want to insure the portfolio until 1st December (i.e. 6 months), using 1400-index puts which have a premium of 31. Assume you purchase the puts by selling off some of the shares.
   (a.) How many puts and shares should you hold and what is the minimum insured value ?
   (b.) What is the value of the portfolio if the S&P500 on 1st September is (i.) 1300 (ii.) 1600 ?
   (c.) What is the upside capture for S_T = 1600 and what is the cost of the insurance?

7. Use the information in Question 6 to set up a dynamic hedge using stock index futures to "track" the price action of a portfolio of N_0 stocks and puts. Additional information is as follows :

Index Futures Multiple z_f = \$250
F_0 = 1538
Δ_c = 0.77
r = 5% p.a. (continuously compounded)

Time to maturity of futures and option contracts is T= ½ year

Demonstrate by comparing changes in stock-put and stock + futures portfolios for dS = +1