END OF CHAPTER EXERCISES

Chapter 12 : Futures Options

Financial Engineering : Derivatives And Risk Management

(Keith Cuthbertson, Dirk Nitzsche)

1. Why might you hedge your future heating oil purchases using a call futures option on heating oil rather than a call option on heating oil?

2. Intuitively, what is the link between the original Black-Scholes option pricing formula on an underlying asset, S, paying a continuous "dividend yield" δ and Black's formula for the price of a futures option?

Data for Questions 3 and 4
A European futures option with 6 months to expiration has a strike price K = 100, the current futures price F = 98, the risk free rate r = 12% and volatility σ = 20%.

3. Calculate the call and put premia using Black's formula.

4. Show that the (European) call and put premia calculated in Question 3 above, satisfy put-call parity.

Data for Questions 5, 6 and 7
You hold a long put option on a futures contract. The current futures price is F_0 = 100 and the futures price can move to either F_u = 115 or F_d = 90. The futures option has a strike price K = 100, T = 1 period to maturity and the risk-free rate is 10% (continuously compounded).

5. Create a riskless portfolio consisting of one long put and the futures contract and hence calculate the put premium using the BOPM.

6. Using the BOPM formula, calculate the price of a European call on the futures (i.e. a European call futures option).

7. Show that the above call and put premia satisfy put-call parity.