Corporate Finance, Module 20: “Introduction to Options”

Practice Problems: (representative of the final exam problems)

(The attached PDF file has better formatting.)

Exercise 20.1: Payoff and Profit

A one-year European call option has a premium of $15 and a strike price of $80. The risk-free rate is 8% with annual compounding and the stock price in one year is $92.

A. What is the payoff of the call option?
B. What is the accumulated value of the call option’s premium?
C. What is the net profit from the call option?

Solution 20.1:

Part A: The payoff at maturity is $92 – $80 = $12.

Part B: The accumulated value of the premium is $15 × 1.08 = $16.20.

Part C: The net profit is $12 – $16.20 = –$4.20.

Exercise 20.2: Put Call Parity Relation

The price of a European *call option* that expires in three months and has a strike price of $30 is $2. The underlying stock price is $29, the risk-free interest rate is 10% per annum with annual compounding, and the stock pays no dividends. What is the price of a European *put option* that expires in three months and has a strike price of $30?

Solution 20.2: The put call parity relation says

$$\text{put} + \$29 = \$2 + \$30 \times 1.10^{-1/4}$$
$$\text{or put} = \$30 \times 1.10^{-1/4} - \$27 = \$2.29$$

Exercise 20.3: Put Call Parity Relation

An investor sells a 1-year European call option on a non-dividend paying stock with a exercise price of $110 and buys a 1-year European put option with the same exercise price and term. The current risk-free rate is 12% and the value of the combined position is zero. (The combined position is a long put and a short call, or put value – call value.)

A. Given the value of $p - c$ (put option minus call option), what is the value of $S_0 - PV(K)$, the stock price minus the present value of the exercise price?
B. Given the exercise price and the time to maturity, what is *PV(K)*, the present value of the exercise price?
C. What is the current price of the stock (S_0)?

Solution 20.3: The put call parity relation says that

call + present value (exercise price) = put + stock, or
call – put = stock – PV (K), where K is the exercise price.

Part A: The value of the combined position of the put option minus the call option is zero, so S_0 – PV (K) = 0.

Part B: Since K = \$110 and the time to maturity is one year, the present value of the exercise price is \$110 / 1.12 = \$98.21.

Part C: The current stock price is also \$98.21.

{*Note:* If we use continuous compounding for the 12% risk-free rate, we get $S_0 = PV(K) = \$110e^{-0.12} = \$97.56$. The actuarial exam syllabi use continuous compounding for option pricing}