University of Texas at Austin

Problem Set # 0

Problem 0.1. (5 points) A non-dividend-paying stock sells for \$100 per share today. The continuously compounded risk-free interest rate equals 0.05. You are the seller in a one-year forward contract. Find your profit if the stock's spot price in one year equals \$130 per share.

(a) 5.13 loss
(b) 5.13 gain
(c) 24.87 loss
(d) 24.87 gain
(e) None of the above.

Solution: (c)
The forward contract has no initial cost, so its profit equals its payoff.

$$F_{0,1}(S) - S(1) = S(0)e^r - S(1) = 100e^{0.05} - 130 = -24.87$$

Problem 0.2. The price of a stock is \$52.00. Lacking additional information, what is the difference between the prices of at-the-money put options and call options on this stock? Assume 38 days to expiration and 6.0% continuously compounded interest rate.

(a) 0.16
(b) 0.32
(c) 0.48
(d) 0.64
(e) None of the above.

Solution: (b)
In our usual notation,

$$V_C(0) - V_P(0) = 52(1 - e^{-0.06 \cdot \frac{38}{365}}) \approx 0.32.$$

Problem 0.3. The current price of a non-dividend-paying stock is \$80 per share. You observe that the price of a three-month, at-the-money European put option on this stock equals \$2.50.

The continuously compounded risk-free interest rate is 0.08.

Find the premium of the European three-month, at-the-money call option on the same underlying asset.

(a) About \$3.08
(b) About \$4.08
(c) About \$4.75
(d) About \$5.46
(e) None of the above.

Solution: (b)
Put-call parity yields

$$V_C(0) = V_P(0) - Ke^{-rT} + S(0) = 2.50 - 80(e^{-0.02} - 1) = 4.0841.$$

Problem 0.4. (5 points)

The current price of a non-dividend paying stock is given to be \$100 per share. A six-month, at-the-money European call option on this stock is currently priced at \$6.96.

The continuously compounded risk-free interest rate is given to be 0.04.

What is the price of the otherwise identical European put option?

Solution: We can use put-call parity to obtain:

$$\begin{aligned} V_P(0) &= V_C(0) + Ke^{-rT} - S(0) \\ &= 6.96 + 100(e^{-0.02} - 1) = 8.94. \end{aligned}$$

Problem 0.5. (2 points) The payoff of a chooser option with the choice date coinciding with the exercise date T and with the strike K is given as $|S(T) - K|$. *True or false?*

Solution: TRUE