UNIVERSITY OF TEXAS AT AUSTIN

Quiz #13

Arbitrage. Put-call parity.

Provide your **final answer only** to the following problem(s):

Problem 13.1. (5 points) Consider a non-dividend-paying stock whose current price equals \$54 per share. A pair of one-year European calls on this stock with strikes of \$50 and \$60 is available in the market for the observed prices of \$6 and \$2, respectively.

The continuously compounded, risk-free intrest rate is given to be 10%.

George suspects that there exists an arbitrage portfolio in the above marke consisting of the following components:

- **short-sale** of one share of stock,
- **buy** the \$50-strike call,
- **buy** the \$60-strike call.

What is the minimum **gain** from this suspected arbitrage portfolio?

(a) The above is **not** an arbitrage portfolio.
(b) \$0.84
(c) \$4.00
(d) \$4.84
(e) None of the above.

Solution: (b)
The lower bound on the gain is

$$46e^{0.1} - 50 = 0.8378.$$

Problem 13.2. (5 points) 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 13.3. The current stock price is \$50 and its dividend yield is 0.02. The continuously compounded, risk-free intrest rate is 0.05. Calculate the strike price at which the price of a quarter-year European call option equals the price of the otherwise identical put option.

(a) 50
(b) 50.38
(c) 50.63
(d) 50.94
(e) None of the above.

Solution: (b)
That particular strike must be equal to the forward price for delivery of the stock in three months, i.e.,

$$50e^{(0.05-0.02)(0.25)} = 50.3764$$