UNIVERSITY OF TEXAS AT AUSTIN

Quiz 8

Two assets.

Provide your **complete solution** to the following problems. Final answers only, without appropriate justification, will receive zero points even if correct.

Problem 8.1. (5 points) The current price of a continuous-dividend paying stock is \$100 per share. Its dividend yield is 0.02. You spend \$20 of your own money to buy this stock. You also borrow \$80 at this time to be used towards the purchase of this stock. You do not intend to make any further trades over the next year. You intend to liquidate your investment at the end of the year.

The continuously compounded, risk-free interest rate is 0.06.

What is the break-even point of your investment?

(a) 94.18

(b) 100

(c) 104.8

(d) 106.18

(e) None of the above.

Solution: (c)
The profit for this partially leveraged investment is the same as the profit for the outright purchase. So, the break-even point is, in our usual notation,

$$s^* = S(0)e^{(r-\delta)T} = 100e^{(0.06-0.02)(1)} = 100e^{0.04} = 104.0811.$$

Problem 8.2. (10 points) The market in which Inaho trades has three possibilities for investment:

- a risk-free asset with the continuously compounded risk-free interest rateequal to r;
- a risky asset whose price is denoted by $S(t), t \geq 0$ and whose dividend yield is δ_S;
- a risky asset whose price is denoted by $Q(t), t \geq 0$ and whose dividend yield is δ_Q.

Initially, the market prices of assets S and Q are equal. Inaho opens a one-share short position in the asset S and uses the proceeds of the short sale to purchase a share of the asset Q. At time$-T$, Inaho sells the shares of asset Q she owns and closes the short sale of the asset S.

(i) (2 points) What is the initial cost of this portfolio?
Solution: The initial cost is equal to zero.

(ii) (5 points) What is the profit of this portfolio?
Solution:

$$e^{\delta_Q T}Q(T) - e^{\delta_S T}S(T)$$

(iii) (3 points) What is the condition on the ratio of the final prices of assets S and Q for Inaho to break even?
Solution:

$$\frac{Q(T)}{S(T)} = e^{(\delta_S - \delta_Q)T}$$