UNIVERSITY OF TEXAS AT AUSTIN

Quiz 7

Leveraging.

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

Problem 7.1. (5 points) Write down the definition of a *fully-leveraged portfolio*.

Solution: We say that a portoflio is *fully leveraged* if its value at time 0 equals zero, i.e., if its initial cost equals zero.

Problem 7.2. (10 points) **"Partially-leveraged" purchase.**
Consider a continuous-dividend-paying stock with the dividend yield δ whose market price at any time$-t$ is denoted by $S(t)$. You decide to purchase one share of this stock at time-0 and you partially finance your purchase by borrowing a portion φ of the initial stock price at the continuously-compounded, risk-free interest rate r to be repaid in full at time$-T$.

(i) (2 points) What is the initial cost of your portfolio?
Solution:

$$S(0) - \varphi S(0) = (1-\varphi)S(0)$$

(ii) (3 points) What is the payoff of your portflio?
Solution:

$$e^{\delta T} S(T) - \varphi S(0) e^{rT}$$

(iii) (3 points) What is the profit of your portfolio?
Solution:

$$e^{\delta T} S(T) - \varphi S(0) e^{rT} - e^{rT}(1-\varphi)S(0) = e^{\delta T} S(T) - e^{rT} S(0)$$

(iv) (2 points) How does the profit curve of your portfolio compare to the profit curve of an outright purchase of the same asset? How about the fully-leveraged purchase of the same asset?
Solution: They are all identical.