Homework 1 FE-620

I pledge my honor that I have abided by the Stevens Honor System. [signature]

Problem 1.1

Spot price $5050 / ounce

$r = 3.5\%$

forward on gold w/ delivery in 1 year $5200

i) $F_0^{\text{theoretical}} = S_0(1+r) = 5050(1.035) = 5226.75$

theoretical price is larger than market forward price

↳ the forward is underpriced

time 0: - short gold, get $5050
- put 5050 in MM
- enter forward contract to buy gold in 1yr

time 1: - MM grows to $5050(1+r) = 5226.75$
- buy gold for 5200 w/ forward contract
- cover the short w/ share

→ profit $26.75 ∴ there is an arbitrage opportunity

ii) $F_0^{\text{theoretical}} = 5226.75$

theoretical future price is less than market forward price

↳ forward is overpriced

time 0: - borrow 5050 from MM
- buy gold for 5050
- enter a short forward contract to sell gold for 5300

time 1: - sell gold for 5300 w/ short forward
- owe MM $(1+r)5050 = 5226.75$
- repay MM and **profit $73.25** ← there is an arbitrage opportunity

Problem 1.2

$R_2 = 3.25\%$

i) annual compounding R_1?

$$\left(1 + \frac{.0325}{2}\right)^2 = (1 + R_1)^1$$

$$R_1 = \left(1 + \frac{.0325}{2}\right)^2 - 1 \approx 0.03276$$

$$R_1 \approx 3.276\%$$

ii) quarterly compounding R_4?

$$\left(1 + \frac{.0325}{2}\right)^2 = \left(1 + \frac{R_4}{4}\right)^4$$

$$\left(1 + \frac{.0325}{2}\right)^{1/2} = 1 + \frac{R_4}{4}$$

$$4\left(1 + \frac{.0325}{2}\right)^{1/2} - 4 = R_4 \approx 0.03237$$

$$R_4 \approx 3.237\%$$