

Practice problems for Lecture 5.

1. Forward and Futures Prices

A forward contract and a futures contract on silver are both one day to maturity. Suppose the futures price is \$7.00/ounce but the forward price is \$6.90/ounce. Assume the spot price tomorrow will be either \$6.85 or \$7.05. Assume futures have cash settlement. Construct an arbitrage.

	cash today	cash tomorrow up state	cash tomorrow down state	ounces AG tomorrow
buy/sell AG forward				
buy/sell AG futures				
buy/sell AG spot				
net				

2. Concepts (short answer) Which of the following situations can be expected to be an arbitrage. Explain briefly why or why not.

a. July wheat futures are 30% more expensive than September wheat futures.

b. July wheat futures are 30% cheaper than September wheat futures.

c. July gold is 30% more expensive than September gold.

d. July electricity is 30% cheaper than September electricity (at the same location).

3. Futures option pricing (single period)

Riskless bond (interest rate is 20%):

100 \longrightarrow 120

Futures price:

50 $\begin{cases} \nearrow 80 \\ \searrow 30 \end{cases}$

Derivative security (call futures option with strike= 50)

a. What is the portfolio of the futures contract and the bond that replicates the option? (Reminder: you do not put up any money to enter a futures position.)

b. What is the price of the replicating portfolio?

c. What are the risk-neutral probabilities of the two states? (Warning: the formula using stock up and down probabilities does not work for futures.)