Practice Problem Set

BUSS386 Futures and Options

1 Margin Account

A trader buys two July futures contracts on frozen orange juice. Each contract is for the delivery of 15,000 pounds. The current futures price is 160 cents per pound, the initial margin is $6,000 per contract, and the maintenance margin is $4,500 per contract. What price change would lead to a margin call? Under what circumstances could $2,000 be withdrawn from the margin account?

2 Trading Futures

Suppose that on October 24, 2015, a company sells one April 2016 live-cattle futures contract. It closes out its position on January 21, 2016. The futures price is 121.20 cents when it enters into the contract, 118.30 cents when it closes out its position, and 118.80 cents at the end of December 2015. One contract is for the delivery of 40,000 pounds of cattle. What is the total profit?

3 Forwards vs. Futures

Trader A enters into futures contracts to buy 1 million euros for 1.3 million dollars in three months. Trader B enters in a forward contract to do the same thing. The exchange rate (dollars per euro) declines sharply during the first two months and then increases for the third month to close at 1.3300. Ignoring daily settlement, what is the total profit of each trader? When the impact of daily settlement is taken into account, which trader does better?

4 Arbitrage with Futures

Suppose there are no storage costs for crude oil and the interest rate for borrowing or lending is 5% per annum. How could you make money if the June and December futures contracts for a particular year trade at $80 and $86?

5 Minimum-Variance Hedge Ratio

Under what circumstances does a minimum-variance hedge portfolio lead to no hedging at all?

6 Minimum-Variance Hedge Ratio

Suppose that the standard deviation of quarterly changes in the prices of a commodity is \$0.65, the standard deviation of quarterly changes in a futures price on the commodity is \$0.81, and the coefficient of correlation between the two changes is 0.8. What is the optimal hedge ratio for a three-month contract? What does it mean?

7 Minimum-Variance Hedge Ratio

A company has a \$20 million portfolio with a beta of 1.2. It would like to use futures contracts on a stock index to hedge its risk. The index futures is currently standing at 1080, and each contract is for delivery of \$250 times the index. What is the hedge that minimizes risk? What should the company do if it wants to reduce the beta of the portfolio to 0.6?

8 Hedging with Futures

The standard deviation of monthly changes in the spot price of live cattle is 1.2 (in cents per pound), and the standard deviation of monthly changes in the futures price of live cattle for the closest contract is 1.4. The correlation between the futures price changes and the spot price changes is 0.7. It is now October 15. A beef producer is committed to purchasing 200,000 pounds of live cattle on November 15. The producer wants to use the December live-cattle futures contracts to hedge its risk. Each contract is for the delivery of 40,000 pounds of cattle. What strategy should the beef producer follow?

9 Futures

A futures contract is used for hedging. Explain why the daily settlement of the contract can give rise to cash flow problems.

10 Minimum-Variance Hedge Ratio with Data

The table below gives data on monthly changes in the spot price and the futures price for a certain commodity. Use the data to calculate a minimum variance hedge ratio.

Month	1	2	3	4	5
Spot Price Change	+0.50	+0.61	-0.22	-0.35	+0.79
Futures Price Change	+0.56	+0.63	-0.12	-0.44	+0.60
Month	6	7	8	9	10
Spot Price Change	+0.04	+0.15	+0.70	-0.51	-0.41
Futures Price Change	-0.06	+0.01	+0.80	-0.56	-0.46

11 Forward Price

What is the difference between the forward price and the value of a forward contract?

12 Forward Price

A stock index currently stands at 350. The risk-free interest rate is 8% per annum (continuous compounding) and the dividend yield is 4% per annum. What should the futures price be for a four-month contract?

13 Forward Pricing

A one-year long forward contract on a non-dividend-paying stock is entered into when the stock price is \$40 and the risk-free rate is 10% per annum (continuous compounding).

a) What are the forward price and the initial value of the forward contract?

b) Six months later, the stock price is \$45 and the risk-free rate remains 10%. What are the forward price and the value of the forward contract?

14 Forward Pricing

Suppose that the risk-free rate is 10% per annum (continuous compounding) and the dividend yield on a stock index is 4% per annum. The index is at 400, and the futures price for a contract deliverable in four months is 405. What arbitrage opportunities exist?

15 Arbitrage

In early 2012, the spot exchange rate between the Swiss Franc and U.S. dollar was 1.0404 (\$ per franc). The U.S. and Swiss interest rates were 0.25% and 0% per annum (continuously compounded), respectively. The three-month forward exchange rate was 1.0300 (\$ per franc).

What arbitrage strategy was possible? How does your answer change if the exchange rate is 1.0500 ($ per franc)?

16 Forward Pricing

A stock is expected to pay a dividend of $1 per share in two months and in five months. The stock price is $50, and the risk-free rate is 8% per annum (continuous compounding). An investor has just taken a short position in a six-month forward contract on the stock.

a) What are the forward price and the initial value of the forward contract?

b) Three months later, with the stock price $48 and the risk-free rate still 8%, what are the forward price and the value of the short forward position?

17 Forward Pricing)

A trader owns a commodity with no income and no storage costs, with an ask price of $1250 and a bid price of $1249 per ounce. The borrowing rate is 6% (ask) and the investment rate is 5.5% (bid) per annum. For what range of one-year forward prices does no arbitrage occur?

18 Forward Pricing

A company enters a forward contract with a bank to sell a foreign currency for a price K_1 at time T_1. At T_1, the spot rate S_1 exceeds K_1. The company asks to roll the contract forward to time T_2 with a new delivery price K_2. How should K_2 be calculated?