

UNBSJ
BA 4455 Derivatives: Options and Futures
Group Assignments
2017

Submission Deadline: 430 PM, Wednesday, April 5, 2017

1. Answer ALL:
 - a. "When a futures contract is traded on the floor of the exchange, it may be the case that the open interest increases by one, stays the same, or decreases by one." Explain this statement very carefully.
 - b. "The risk of a futures contract is its basis risk. The risk of the basis is less than the risk of the underlying asset." Discuss.
 - c. Typically, why is $F > S$ for a gold futures, whereas $F < S$ for a bond futures?
 - d. Suppose that on October 24, 2013, a company sells one April 2014 live-cattle futures contract. It closes out its position on January 21, 2014. The futures price (per pound) is 91.20 cents when it enters into the contract, 88.30 cents when it closes out the position, and 88.80 cents at the end of December 2013. One contract is for the delivery of 40,000 pounds of cattle. What is the profit? How is it taxed if the company is (a) a hedger and (b) a speculator? Assume the company has a December 31 year end.
 - e. Write a one-page note on hedge funds.

2. Today is August 1, 2012. Referring to Table 2.2 at page 35 of your text book, your friend has told you that you could make money by trading September 2012 and March 2013 futures contracts on wheat. Assume you can borrow and lend at 5% per annum, compounded continuously. Is your friend right? If so, how much profit could you make per one contract, if there was no storage costs for wheat? Note that quotes are in cents per bushel. Could you also make money by trading similar futures on soybeans? Ignore the effects of daily settlement procedures. [Hint: consider taking offsetting positions in the two contracts!]

3. It is June 25, 2010. The futures price for the June 2010 CBOT bond futures contract is 118-23.
 - a. Calculate the conversion factor for a bond maturing on January 1, 2026, paying a coupon of 10% with semi-annual payment.
 - b. Calculate the conversion factor for a bond maturing on October 1, 2013, paying a coupon of 7%.
 - c. Suppose that the quoted prices of the bonds in (a) and (b) are 169.00 and 136.00 respectively. Which bond is cheaper to deliver?
 - d. Assuming that the cheapest to deliver bond is actually delivered, what is cash price received for the bond?

[Hint: You can find the dates of the last coupon payment for the bond; recall that the final coupon payment is at maturity.]

4. Companies A and B face the following interest rates (adjusted for the differential impact of taxes):

	A	B
US Dollars (floating rate)	LIBOR+0.5%	LIBOR+1.0%
Canadian dollars (fixed rate)	5.0%	6.5%

Assume that A wants to borrow U.S. dollars at a floating rate of interest and B wants to borrow Canadian dollars at a fixed rate of interest. A financial institution is planning to arrange a swap and requires a 50-basis-point spread. What rates of interest will A and B effectively pay under this arrangement, if the swap is structured to be equally attractive to A and B? If the notional principal is \$1,000,000, how much will A and B save on their borrowing costs? Draw a figure showing this swap.

5. Consider a European call option on a non-dividend-paying stock where the stock price is \$40, the strike price is \$40, the risk-free rate is 4% per annum, the volatility is 30% per annum, and the time to expiration is six months.

- a. Calculate u , d , and p for a two-step tree
- b. Value the option using a two-step tree.
- c. Verify that DerivaGem gives the same answer
- d. Use DerivaGem to value the option with 5, 50, 100, and 500 time steps.

6. Suppose that the price of a non-dividend paying stock is \$32, its volatility is 30%, and the risk-free rate for all maturities is 5% per annum. Use DerivaGem to calculate the cost of setting up the following positions. In each case, provide a table showing the relationship between profit and final stock price. Ignore the impact of discounting.

- e. A bull spread using European call options with strike prices of \$25 and \$30 and a maturity of six months.
- f. A butterfly spread using European put options with strike prices of \$25, \$30, and \$35 and a maturity of one year.
- g. A straddle using options with a strike price of \$30 and a six-month maturity.
- h. A strangle using options with strike prices of \$25 and \$35 and a six-month maturity.