AGBE 321

Problem Set 6

1. In your own words (i.e., in a manner that you would explain it to someone who has not taken this course) explain how local price risk can be hedged using futures markets?

2. Suppose that you are a Montana farmer growing winter wheat. You intend to sell the wheat to local elevators after it's harvested, but you don't know the price you will be quoted by the elevator at the time of sale (many things can change in the span of several months). It costs you $6.00/bu to produce the wheat and you are only interested in earning a profit on your product (that is, you're not interested in using the futures market to speculate on prices). Respond to the following:

   (a) What position would you take in the futures market to offset local price variability risk? Why?

   (b) What is the lowest futures contract price you would need to observe in order to guarantee a per bushel profit?

   (c) Suppose that in May you take a position on a July futures contract that is priced at $7.50/bu. Explain what you would do in July just before the contract expires.

   (d) Assume that futures and local prices converge (are exactly the same in July). Given that you took a May-July futures contract priced at $7.50, calculate your per bushel profits *in the local* and *in the futures* markets if the price in July was one of the following (construct a table to summarize your results):

      i. $5.50/bu
      ii. $6.75/bu
      iii. $7.50/bu
      iv. $9.25/bu

3. Consider the scenario in problem (2). In addition to the given information, you know that you operate a 2,500 acre farm that, on average, yields 45 bushels per acre. However, there is also yield risk, and you know that you typically observe production on 2,200 of the 2,500 acres. You are risk averse and wish to hedge as much risk as possible. Additionally, you wish to sell your wheat in August, rather than July. Respond to the following:

   (a) How much wheat (in bushels) do you expect to produce?

   (b) How much wheat can you hedge using futures markets? Is there any wheat that will not be hedged?

(c) How many futures contracts will you need to establish?

(d) What position would you take in the futures market to offset local price variability risk? Why?

(e) Given that you want to sell the wheat in a local market in August, which futures contract month will you choose? Why?

(f) Explain what you would do just before the contract expires in order to offset your futures contract obligations. 6b2'

    i. Local: \$5.50/bu; Futures: \$6.25/bu

    ii. Local: \$6.75/bu; Futures: \$7.20/bu

    iii. Local: \$9.15/bu; Futures: \$9.50/bu

    iv. Local: \$9.75/bu; Futures: \$10.25/bu

4. You are a feedlot operator that purchases feeder cattle. You will purchase 2,000 head of feeders in August, and each feeder is on average 700 lbs. You will raise these cattle to a weight of 1,200 lbs. and the variable feed costs are \$0.70 per pound of weight gain. Feed acquisition has been forward contracted and, therefore, feed price will not change. It will take four months to raise the cattle to weight and you will sell them in December. Assume that all of the cattle will be raised to weight.

You wish to hedge both the input (feeder cattle) price and the output (fed cattle) price. The current feeder cattle futures contract is trading at \$1.45/lb. and the fed cattle futures contract is trading at \$1.30/lb. You will purchase feeder cattle at a stockyard for the established price and you will sell the fed cattle to a local processing plant at the going local market price. Respond to the following:

(a) What are the contract specifications for feeder and for fed cattle? That is, how many pounds are contracted using a futures contract?

(b) How many pounds of fed cattle do you expect to produce with the acquired feeder cattle? What is the expected net revenue (profit) if current conditions do not change?

(c) How much (in pounds) of the feeder cattle can you hedge? How many contracts will be required?

(d) How much (in pounds) of the fed cattle can you hedge? How many contracts will be required?

(e) What positions would you take in the futures market to offset local price variability risk for feeder cattle and for fed cattle? Why?

(f) Explain what you would do in just before the contracts expire in order to offset your futures contract obligations.

(g) Calculate your net profits *in the local* and equity *in the futures* markets for the following price scenarios:

    i. Local feeders: $1.00/lb; Futures feeders: $1.05/lb Local fed: $0.95/lb; Futures fed: $0.90/lb.

    ii. Local feeders: $1.15/lb; Futures feeders: $1.20/lb Local fed: $1.10/lb; Futures fed: $1.05/lb.

    iii. Local feeders: $1.45/lb; Futures feeders: $1.55/lb Local fed: $1.30/lb; Futures fed: $1.30/lb.

    iv. Local feeders: $1.55/lb; Futures feeders: $1.60/lb Local fed: $1.40/lb; Futures fed: $1.25/lb.

5. In your own words (i.e., in a manner that you would explain it to someone who has not taken this course) explain the intuition behind basis. Why does a basis occur? (Provide some specific factors in answering the latter question.)

6. Using the table below, calculate the basis for the first week of April in the Great Falls, MT region for ordinary winter hard red wheat (HRW). Then, using these calculations, predict the local prices in the Great Falls region in 2015, 2016, and 2017 based on the known April futures contract prices.

Market	Month	Year	July KCBT Contract	Local HRW $	Basis
Great Falls	April	2003	3.11	2.90	
Great Falls	April	2004	2.83	2.96	
Great Falls	April	2005	4.12	4.06	
Great Falls	April	2006	4.09	3.74	
Great Falls	April	2007	3.39	3.11	
Great Falls	April	2008	3.63	3.05	
Great Falls	April	2009	5.24	4.67	
Great Falls	April	2010	9.18	8.95	
Great Falls	April	2011	5.18	4.01	
Great Falls	April	2012	5.65	4.20	
Great Falls	April	2013	7.30	4.95	
Great Falls	April	2014	7.14	5.65	
Great Falls	April	2015	7.28		
Great Falls	April	2016	7.89		
Great Falls	April	2017	6.19		

You are a Montana winter wheat farmer who will seek to sell the wheat in July 2015 at the local cash price. You know that the historical July basis for your region is –$0.30/bu. In April, the July 2015 futures contract price is $7.55/bu. Your total production costs are $5.25/bu.

Complete the following:

7. Calculate the price at which you expect to sell in your local market.

8. Suppose that you don't hedge. That is, you fully take on price risk. Assuming that the historical basis holds, calculate your profits if the price of a July 2015 futures contract at expiration when prices are:

   (a) $4.25

   (b) $8.75

   (c) $10.50

9. Now, suppose that you do hedge, and therefore exchange price risk for basis risk. That is, you establish a futures hedge in April using the July 2015 contract. In April 2015, calculate your local market profit, futures equity, and total profit under the following scenarios (there are 9 total scenarios—3 basis scenarios associated with a particular futures price):

   (a) Futures: $4.25; Actual basis: –$0.15, –$0.25, –$0.30

10. Is basis risk *less* or *more* risky than price risk?

You are a feedlot operator who raises feeder cattle up to weight (1,200 lbs.) and then sells them to a processing facility. Each time that you sell a pen of animals to the processor, you need to replenish your feedlot with a new set of feeder cattle. When you replenish your feedlot, you also need to purchase enough feed (corn) to bring the new set of animals up to weight. The production of fed cattle requires labor, the costs of which you will have to incur at the time that you sell the fed cattle to the processing facility.

Because you purchase feeder cattle and corn on the local markets, you worry that price volatility in the price of these inputs can cause you to forgo profits. Because feeder cattle and corn futures contracts exist, you wish to hedge local price risk using futures markets. Feeder cattle contracts are sold in 50,000 pound increments and corn contracts are sold in 5,000 bushel increments.

It is now December 2014 and you will sell one of your fed cattle in May 2015. At that point, you will replenish your feedlot with the same number of animals. The number of animals that you will sell and replenish is determined by equilibrium market conditions.

The following list provides several additional assumptions and information (which may be relevant or irrelevant):

- In May, you will sell 200 steers to the processing plant at an agreed $1.60/lb.

- Assume that each feeder steer weighs 750 lbs. when it enters the feedlot.

- Assume that the number of pounds of feed necessary for a steer to reach weight is 2,750 lbs.

- Each bushel of corn weights 55 pounds.

- Assume that labor costs are $160 per steer.

- The current price of a May feeder cattle futures contract is: $F^{feeder}_{may} = \$1.60/lb$.

- The current price of a May corn futures contract is: $F^{corn}_{may} = \$4.75/bu$.

- The current price of an June fed cattle futures contract is: $F^{fed}_{june} = \$1.22/lb$.

- The margin requirement for hedgers is 8%.

- Historical price information is as follows:

Date	Corn Cash	Corn Futures	Feeders Cash	Feeders Futures	Fed Cash	Fed Futures
May 2008	$3.25	$3.10	$0.95	$0.90	$0.75	$0.85
May 2009	$6.50	$5.90	$0.85	$0.80	$0.75	$0.90
May 2010	$7.20	$6.80	$0.95	$0.95	$0.80	$0.95
May 2011	$6.80	$6.25	$1.10	$1.00	$0.90	$1.00
May 2012	$7.10	$7.20	$1.15	$1.05	$0.95	$1.00
May 2013	$6.10	$5.55	$1.30	$1.25	$1.10	$1.25
May 2014	$5.25	$5.00	$1.75	$1.70	$1.40	$1.55

11. Determine your expected profit in May. That is, the profit that you would expect to obtain (given the current market information) after you sell the fed cattle to processing plant, purchase feeder cattle and feed to replenish the feedlot, and pay for the labor.

12. Explain how you will use the futures market to hedge the price risks. Be specific in discussing which commodities you will want to hedge and what costs you would need to incur in order to be able to use futures markets for hedging price risk.

13. Determine what your actual May 2014 profits (or losses) if the following scenario occurs:

- Actual feeder cattle basis in May is: $B_{may}^{feeder} = 0.02/lb$.
- Actual corn basis in May is: $B_{may}^{corn} = 0.30/bu$.
- Actual fed cattle basis in May is: $B_{may}^{fed} = -0.15/lb$.
- The May price of a May feeder cattle futures contract is: $F_{may}^{feeder} = \$1.50/lb$.
- The May price of a May corn futures contract is: $F_{may}^{corn} = \$4.20/bu$.