
Hedging with Futures

Professor Fortenbery

AAE 322 February 3, 2009

Trading Strategies

Speculation -

- You go **short** if you believe price will **fall**.
- You go **long** if you believe price will **rise**.

Hedging -

- long hedge - protecting against a rise in price
 - e.g. for an input to production
- short hedge - protecting against a fall in price
 - e.g. for an output commodity

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The basis allows a market participant to “localize” all the information in the futures market. because basis is reasonably predictable, the cash market can offer forward pricing opportunities.

Cash Pricing Opportunities

- Only exist because there are futures contracts
- Cash prices offered are based on an expectation of future basis levels

Hedging simply involves substituting a position in the futures market today for a position you expect to take in the cash market at some later date. That means we now care about the difference between the futures and the spot price.

If you want to sell a commodity at some later date, you can “lock in” the final sales price by selling a futures contract with a delivery date just after the expected cash sale today (go short the futures market).

Basis

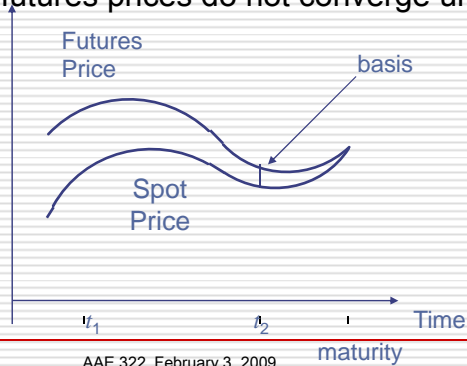
Basis is the difference between a spot price at a specific location and the price of a particular futures contract.

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Basis Risk

- Consider a hedge initiated at time t_1 and closed out at time t_2 .
- The spot and futures prices do not converge until maturity.



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Hedging trades price risk for basis risk.

Assume it is currently May 15, and you decide to price corn for November delivery using a hedge. The first step is to sell a December corn futures contract. This is the first contract to expire after the expected cash delivery date.

The expected Net Selling Price is calculated

as:

Futures Selling Price
+ Expected Basis
- Futures Brokers Commission

Expected Net Selling Price

Sell Hedge Example

May 15

- Sell 1 Dec futures corn contract @ \$5.30/bu
- Expected harvest basis – 0.35/bu
- Expected net selling price in November \$4.94/bu

\$5.30	futures price
+ (-0.35)	basis
- 0.01	broker's commission
<hr/>	
\$4.94	

November 15

- Buy 1 Dec futures corn contract @ \$4.30
- Sell cash corn @ \$3.95 (basis is as expected)

□ Net Price:

\$3.95	cash sale
+ \$1.00	futures profit
	(sold at \$5.30, bought at \$4.30)
- \$0.01	broker's commission
<hr/>	
Net Price = \$4.94	

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The only thing that will make the actually realized price from a hedge different from the expected net selling price is a different basis than expected.

- A weaker than expected basis results in a realized price less than the expected net selling price
- A stronger than expected basis results in a realized price higher than the expected net selling price

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Date	Price per Bushel	Action	Margin/Action	Account Balance
Initial margin = \$500				
Maintenance margin = \$350				
17-Jan	\$2.50	Sell July corn	Deposit \$500	\$500
18-Jan	\$2.52			\$400
19-Jan	\$2.54			\$300
			Margin Call \$200	\$500
20-Jan	\$2.53			\$650
21-Jan	\$2.60			\$200
			Margin Call \$300	\$500
24-Jan	\$2.57			\$650
25-Jan	\$2.55			\$750
26-Jan	\$2.51			\$950
			Withdraw \$450	\$500
27-Jan	\$2.49			\$600
28-Jan	\$2.44	Buy July corn		\$800

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Assume it is currently November 15, and you decide to price corn for April delivery using a hedge. The first step is to buy a May corn futures contract. This is the first contract to expire after the expected cash purchase date. The expected Net Purchase Price is calculated as:

Futures Purchase Price
+ Expected Basis
+ Futures Brokers Commission

Expected Net Purchase Price

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Buy Hedge Example

Nov 15

- Buy 1 May futures corn contract @ \$5.40/bu
- Expected basis -0.15/bu
- Expected net purchase price in November \$5.26/bu

	\$5.40	futures price
+	(-0.15)	basis
+	0.01	broker's commission
	\$5.26	

April 15

- Sell 1 May futures corn contract @ \$6.00
- Buy cash corn @ \$5.85 (basis is as expected)

□ Net Price:

	\$5.85	cash purchase
-	\$0.60	futures profit (bought at \$5.40, sold at \$6.00)
+	\$0.01	broker's commission

Net Price = \$5.26

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Table 1. Margin Account Maintenance

Date	Price per Bushel	Action	Margin Action	Account Balance
Initial margin = \$500				
Maintenance margin = \$350				
17-Jan	\$2.50	Buy July corn	Deposit \$500	\$500
18-Jan	\$2.48			\$400
19-Jan	\$2.48			\$300
20-Jan	\$2.47		Margin Call \$200	\$500
21-Jan	\$2.40			\$200
			Margin Call \$300	\$500
24-Jan	\$2.43			\$650
25-Jan	\$2.45			\$750
28-Jan	\$2.49			\$950
			Withdraw \$450	\$500
27-Jan	\$2.51			\$600
28-Jan	\$2.55	Sell July corn		\$600

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The only thing that will make the actually realized price from a hedge different from the expected net ~~selling price is a different basis than expected.~~

- A weaker than expected basis results in a realized price less than the expected net purchase price
- A stronger than expected basis results in a realized price higher than the expected net purchase price

Most cash contracts only exist because the risk associated with offering a cash contract can be laid off to a speculator in the futures market. If you understand the relationship between the cash contract and the futures price, you are in a position to evaluate the quality of any cash offering.

A cash forward contract is an agreement between a buyer and a seller for delivery of a specific amount of grain at a predetermined price at some futures date.

Advantages

- ✓ Eliminates price and basis risk
- ✓ Easily understood
- ✓ Flexible in terms of quantity sold
- ✓ Seller maintains title to grain until payment is received

Disadvantages

- ✓ Increases production risk
- ✓ Cannot benefit from strengthening basis
- ✓ Cannot benefit from improved prices
- ✓ Usually involves a substantial penalty for failure to deliver

A fixed futures contract is just like a forward cash contract, except that the basis is not established

Advantages

- ✓ Eliminates price risk
- ✓ A strengthening basis improves final cash price
- ✓ No margin calls
- ✓ Can be used to price out more than one crop year

Disadvantages

- ✓ Increases production risk
- ✓ Contains basis risk
- ✓ Usually not flexible in terms of amount contracted

A basis contract is similar to a forward cash contract, except only the basis is established. This might be attractive if you expect the futures price to increase, but are concerned the basis could weaken. Often done at harvest for grain to be stored.

Advantages

- ✓ Eliminates basis risk
- ✓ Often receive a payment before final price is set
- ✓ Profit from storage opportunities without storage facilities

Disadvantages

- ✓ Increases production risk before harvest.
- ✓ Contains price risk
- ✓ Elevator takes title to grain at delivery
- ✓ If prices deteriorate, could owe the elevator more than the initial payment

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A delayed price contract allows you to deliver at harvest, but not establish the price until later in the year.

Advantages

- ✓ Can deliver at harvest and still benefit from profitable storage opportunities
- ✓ Lengthens the grain marketing year
- ✓ No need for storage facilities
- ✓ Usually receive an up front payment at delivery

Disadvantages

- ✓ Contains both price and basis risk
- ✓ Elevator takes title to grain before payment is received
- ✓ Results in an un-secured loan to the elevator
- ✓ If prices deteriorate you may owe the elevator some of the initial payment

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Risk Ranking of Marketing Alternatives

Less Risky

- Forward Cash Contract
- Hedge on the Futures Market
- Fixed Futures Contract

More Risky

- Delayed Price Contracts
- Basis Contracts
- Routine Storage

Assume it is currently May 15, and you decide to price corn for November delivery using a hedge. The first step is to sell a December corn futures contract. This is the first contract to expire after the expected cash delivery date.

The expected Net Selling Price is calculated as:

$$\begin{array}{r} \text{Futures Selling Price} \\ + \text{Expected Basis} \\ - \text{Futures Brokers Commission} \\ \hline \end{array}$$

Expected Net Selling Price

Sell Hedge Example

May 15

- Sell 1 Dec futures corn contract @ \$2.65/bu
- Expected harvest basis – 0.35/bu
- Expected net selling price in November \$2.29/bu

\$2.65	futures price
+ (-0.35)	basis
- 0.01	broker's commission
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\$2.29	

November 15

- Buy 1 Dec futures corn contract @ \$1.95
- Sell cash corn @ \$1.65 (basis is as expected)

• Net Price:	\$1.60 cash sale
	+ \$0.70 futures profit
	(sold at \$2.65, bought at \$1.95)
	- \$0.01 broker's commission
	Net Price = \$2.29

The only thing that will make the actually realized price from a hedge different from the expected net selling price is a different basis than expected.

A weaker than expected basis results in a realized price less than the expected net selling price

A stronger than expected basis results in a realized price higher than the expected net selling price

Basis Risk

- ❑ Remember, hedging is just a matter of buying one asset to cancel out the risks of the other.
- ❑ Once you have determined that you have exposure, it is important to examine if the instrument you have chosen to hedge is in fact reducing your risk.
- ❑ It may not be because of imperfect movements in the BASIS as interest rates or spot currencies changes.
- ❑ BASIS = the difference between the prices of the hedge instrument and the spot commodity.
- ❑ Basis risk arises because of the uncertainty about the basis when the hedge is closed out

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A Simple Business Example

- ❑ American Lumber sells a significant quantity of pre-fabricated housing units in Japan.
- ❑ These units sell for ¥10,000 per square foot.
- ❑ The exchange rate is currently 85 ¥ /\$ but may fluctuate between 80 ¥ /\$ and 100 ¥ /\$ over the coming year.
- ❑ American Lumber can guarantee the dollar price of the pre-fab units by entering into futures contracts to exchange yen for dollars at a specific rate, say 100 ¥ /\$.
- ❑ Then when American Lumber sells the units, it is paid in yen, but then exchanges the yen for dollars at the pre-contracted rate.

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WHY HEDGE? (a story)

- ❑ August 2, 1990: Iraq invades Kuwait.
- ❑ Within months jet fuel prices more than double.
- ❑ Continental Airlines' fuel bill increases by \$81 million a month.
- ❑ December 3, 1990: Continental files for Chapter 11 bankruptcy, citing rising fuel costs as the primary cause.

WHY HEDGE?

(a story)

- Bankruptcy would have been avoided if Continental had hedged the risk associated with increased oil prices.
 - They could have hedged using long positions in futures contracts on oil prior to the Iraqi invasion.
 - In retrospect, hedging seems like a good idea, but what about at the time.
 - This is what we want to find out.....
-

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WHY HEDGE?

-
- Protect profit margins
 - Accurately anticipate future cash flows
 - Eliminate (reduce) the possibility of an adverse event destroying the business

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Arguments Against Hedging

- For IOF, shareholders can hedge themselves, and since they have unique portfolios they are in a better position to decide what their individual hedge positions should be.
- If competitors do not hedge, they will incur higher returns in times of advantageous price movement.

Arguments Against Hedging

- If only one side of the profit margin can be hedged the firm may increase overall risk exposure.
- Explaining a situation where there is a loss on the hedge and a gain on the underlying can be difficult.
 - If you are an ethanol producer and are hedging against fluctuations in the price of steel, you will not get any of the upside gain when steel prices rise.