HEDGING

• Risk: A chance of an unfavorable outcome

• Two major types of risks
  – Production risk
    • Yield, efficiency, death loss, fire, spoilage
  – Price risk

• For most commodity producers and handlers, price risk is greater than production risk
HEDGING

• Risk Management
  – Management is not avoidance
    • No risk, no reward
    • Too much risk and you may not be in business to receive the reward

• Production
  • Management practices
  • Crop insurance

• Price
  • Alternative contractual arrangements
  • Hedging

FUTURES: HEDGING

• HEDGING with Futures:
  – Buying or selling futures contracts to protect from losses due to adverse movements in spot prices
FUTURES: HEDGING

• Hedgers:
  – Either “produce” or “consume” the commodity
  – Face “spot price risk”
    • Risk of losses from unfavorable spot price movements
  – Buy or sell futures in an attempt to reduce their spot price risk

FUTURES: HEDGING

• Spot price risks
  – FALL in spot price
    • People/firms committed to sell commodity
      – Long in the spot market

FUTURES: HEDGING

Position Diagram:
Net Profits for Long Spot Position

Spot Price at Time of Selling Commodity

Production Cost

Net Profit per Unit of Commodity
FUTURES: HEDGING

Position Diagram:
Net Profits for Long Spot Position

Spot Price at Time of Selling Commodity

FUTURES: HEDGING

Position Diagram:
Net Profits for Long Spot Position

Spot Price at Time of Selling Commodity

FUTURES: HEDGING

Position Diagram:
Net Profits for Long Spot Position

Spot Price at Time of Selling Commodity
FUTURES: HEDGING

• Spot price risks
  – FALL in spot price
    • People/firms committed to sell commodity
      – Long in the spot market
  – RISE in spot price
    • People/firms committed to buy commodity
      – Short in the spot market

FUTURES: HEDGING

Position Diagram:
Net Profits for Short Spot Position

Revenue per Unit of Commodity

Net Profits per Unit of Commodity

Futures Price at Time of Buying Commodity

FUTURES: HEDGING

Position Diagram:
Net Profits for Short Spot Position

Revenue per Unit of Commodity

Net Profits per Unit of Commodity

Futures Price at Time of Buying Commodity
FUTURES: HEDGING

Position Diagram: Net Profits for Short Spot Position

Revenue per Unit of Commodity

Futures Price at Time of Buying Commodity

FUTURES: HEDGING

Position Diagram: Net Profits for Short Spot Position

Revenue per Unit of Commodity

Futures Price at Time of Buying Commodity

FUTURES: HEDGING

- Short (Selling) Hedge
  - Protects from FALL in spot price
  - “Locks in” a SELLING price

- Long (Buying) Hedge
  - Protects from RISE in spot price
  - “Locks in” a PURCHASING price
FUTURES: HEDGING

• “Lock in” spot price:

\[
\text{Futures \ Price} \times \text{Expected Basis} = \text{Expected Spot Price}
\]

Actual spot price differs from expected spot price only by the amount that actual basis differs from expected basis.

---

SHORT HEDGE

<table>
<thead>
<tr>
<th>SPOT MARKET ACTIVITY</th>
<th>FUTURES MARKET ACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOW</td>
<td></td>
</tr>
<tr>
<td>Committed to sell</td>
<td>Sell futures</td>
</tr>
<tr>
<td>(Long in spot)</td>
<td>(Short in futures)</td>
</tr>
</tbody>
</table>
SHORT HEDGE

SPOT MARKET ACTIVITY  
NOW: Committed to sell long in spot 

FUTURES MARKET ACTIVITY  
NOW: Sell futures short in futures 

LATER: Sell commodity (Spot position cleared) 

Buy back futures (Futures position cleared)

SHORT HEDGE: WHY DOES IT WORK?

Position Diagram: Net Profits for Long Spot Position

- Production Cost
- Spot Price at Time of Selling Commodity

Position Diagram: Net Profits for Short Position in Futures

- Futures Price at which Short Position is Open
- Futures Price
- Net Profits per Unit of Commodity
SHORT HEDGE: WHY DOES IT WORK?

- Suppose basis at time of selling the commodity is known with certainty (e.g., -$0.50/bu):

<table>
<thead>
<tr>
<th>Spot</th>
<th>1.00</th>
<th>2.00</th>
<th>3.00</th>
<th>4.00</th>
<th>5.00</th>
<th>6.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Futures</td>
<td>1.50</td>
<td>2.50</td>
<td>3.50</td>
<td>4.50</td>
<td>5.50</td>
<td>6.50</td>
</tr>
<tr>
<td>Basis</td>
<td>-0.50</td>
<td>-0.50</td>
<td>-0.50</td>
<td>-0.50</td>
<td>-0.50</td>
<td>-0.50</td>
</tr>
</tbody>
</table>

SHORT HEDGE: WHY DOES IT WORK?

Position Diagram:
Net Profits for Long Spot Position

Net Profits for Short Futures Position

Net Profits for Long Spot and Short Futures Positions

Futures price at which short position is open
Basis
“Lock-in” Selling Price

Spot Price at Time of Selling Commodity
SHORT HEDGE: 
WHY DOES IT WORK?

- Net profits for different spot prices:

<table>
<thead>
<tr>
<th>SPOT PRICE</th>
<th>1.0</th>
<th>1.5</th>
<th>2.0</th>
<th>2.5</th>
<th>3.0</th>
<th>3.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profits Long Spot</td>
<td>-1.0</td>
<td>-0.5</td>
<td>0.0</td>
<td>0.5</td>
<td>1.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Profits Short Futures</td>
<td>1.5</td>
<td>1.0</td>
<td>0.5</td>
<td>0.0</td>
<td>-0.5</td>
<td>-1.0</td>
</tr>
<tr>
<td>Profits Short Hedge</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
</tbody>
</table>

SHORT HEDGE: 
WHY DOES IT WORK?

- Position Diagram: Net Profits for Short Hedge

SHORT HEDGE 
Example 1: MIDDLEMEN

- “Storage” Hedge:
  - It is March. You own a grain elevator and must decide whether to buy and store soybeans until July
    - Current soybeans spot price = $5.75/bu
    - Storage cost = $0.13/bu
**SHORT HEDGE**
**Example 1: MIDDLEMEN**

- Soybean Contract Months:
  - March
  - May
  - July
  - September
  - November
  - January

- Current August futures = $6.30/bu
- Expected July basis = $0.25/bu UNDER August

<table>
<thead>
<tr>
<th>Expected Local Spot Price Next July</th>
</tr>
</thead>
<tbody>
<tr>
<td>$6.30/bu + (- $0.25/bu)</td>
</tr>
<tr>
<td>$6.05/bu</td>
</tr>
</tbody>
</table>

**SHORT HEDGE**
**Example 1: MIDDLEMEN**

<table>
<thead>
<tr>
<th>Expected profits from storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>$6.05/bu - $5.75/bu - $0.13/bu</td>
</tr>
<tr>
<td>$0.17/bu</td>
</tr>
</tbody>
</table>

- Storage is expected to be profitable
  - BUT
  - Risky because price of soybeans may fall
- Decision: Storage and short hedge

**SHORT HEDGE**
**Example 1: MIDDLEMEN**

<table>
<thead>
<tr>
<th>SPOT ACTIVITY</th>
<th>FUTURES ACTIVITY</th>
<th>BASIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAR</td>
<td>Buy @ $5.75</td>
<td>Sell Aug. @ $6.30</td>
</tr>
</tbody>
</table>
SHORT HEDGE
Example 1: MIDDLEMEN

• Scenario 1: Prices FALL

<table>
<thead>
<tr>
<th>SPOT ACTIVITY</th>
<th>FUTURES ACTIVITY</th>
<th>BASIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAR Buy @ $5.75</td>
<td>Sell Aug. @ $6.30</td>
<td>Expected -$0.25</td>
</tr>
<tr>
<td>JUL Sell @ $4.25</td>
<td>Buy back @ $4.50</td>
<td>Actual -$0.25</td>
</tr>
</tbody>
</table>

Spot Price + Futures Gain (Loss) = Net Selling Price
$4.25 + $1.80 = $6.05

as expected

SHORT HEDGE
Example 1: MIDDLEMEN

• Scenario 2: Prices RISE

<table>
<thead>
<tr>
<th>SPOT ACTIVITY</th>
<th>FUTURES ACTIVITY</th>
<th>BASIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAR Buy @ $5.75</td>
<td>Sell Aug. @ $6.30</td>
<td>Expected -$0.25</td>
</tr>
<tr>
<td>JUL Sell @ $7.50</td>
<td>Buy back @ $7.75</td>
<td>Actual -$0.25</td>
</tr>
</tbody>
</table>
SHORT HEDGE

Example 1: MIDDLEMEN

- Scenario 2: Prices RISE

<table>
<thead>
<tr>
<th>SPOT ACTIVITY</th>
<th>FUTURES ACTIVITY</th>
<th>BASIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAR</td>
<td>Buy @ $5.75</td>
<td>Sell Aug. @ $6.30</td>
</tr>
<tr>
<td>JUL</td>
<td>Sell @ $7.50</td>
<td>Buy back @ $7.75</td>
</tr>
</tbody>
</table>

\[
\text{Spot Price} + \text{Futures Gain (Loss)} = \text{Net Selling Price}
\]

\[
\text{\$7.50} + (-\$1.45) = \text{\$6.05}
\]

as expected

SHORT HEDGE

SHORT HEDGING with futures protects from fall in spot price

BUT

prevents one from making profits when spot price rises

SHORT HEDGE

Ex. 2: PRIMARY PRODUCER

- It is June. You will have 115,000 lbs [LIVE weight] of hogs ready for market in September.

- You want protection against fall in hog prices
  - Hedge using CME Lean Hogs futures
    - 1 CME Lean Hogs futures contract = 40,000 lbs [CARCASS weight]
**SHORT HEDGE**

Ex. 2: PRIMARY PRODUCER

**Weight conversion factor:**

1 lb LIVE weight = 0.74 lb CARCASS weight

• Hence:

115,000 lbs LIVE weight = (0.74) × (115,000) = 85,100 lbs CARCASS weight

~ 2 LEAN hogs contracts of 40,000 lbs each

---

**SHORT HEDGE**

Ex. 2: PRIMARY PRODUCER

• To hedge, you need 2 LEAN HOGS futures contracts of 40,000 lbs each

• Lean Hogs Contract Months:
  - July
  - August
  - October
  - December
  - February
  - April
  - May
  - June

---

**SHORT HEDGE**

Ex. 2: PRIMARY PRODUCER

• In June:

Lean Hogs Oct. futures = $56.15/cwt CARCASS weight

**Price conversion factor:**

$1.00/lb CARCASS weight = $0.74/lb LIVE weight
SHORT HEDGE
Ex. 2: PRIMARY PRODUCER

• Expected Sep. basis =
$2.00/cwt CARCASS weight UNDER Oct.

Expected Local Spot Price Next September
$58.15/cwt + (- $2.00/cwt) = $56.15/cwt CARCASS weight

SHORT HEDGE
Ex. 2: PRIMARY PRODUCER

SPOT FUTURES BASIS
ACTIVITY ACTIVITY
JUN Expect. $54.15 Sell Oct. @ $56.15 Expected -$2.00

SHORT HEDGE
Ex. 2: PRIMARY PRODUCER

• Scenario 1: Basis WEAKENS

SPOT FUTURES BASIS
ACTIVITY ACTIVITY
JUN Expect $54.15 Sell Oct. @ $56.15 Expected -$2.00
SEP Sell @ $39.70 Buy back @ $42.30 Actual -$2.60
SHORT HEDGE
Ex. 2: PRIMARY PRODUCER

• Scenario 1: Basis **WEAKENS**

<table>
<thead>
<tr>
<th>SPOT ACTIVITY</th>
<th>FUTURES ACTIVITY</th>
<th>BASIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>JUN Expect $54.70</td>
<td>Sell Oct. @ $56.15</td>
<td>Expected -$2.00</td>
</tr>
<tr>
<td>SEP Sell @ $39.70</td>
<td>Buy back @ $42.30</td>
<td>Actual -$2.55</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spot Price</th>
<th>Futures Gain (Loss)</th>
<th>Net Selling Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>$39.70</td>
<td>$13.85</td>
<td>$53.55</td>
</tr>
</tbody>
</table>

$0.60 LESS than expected

• Scenario 2: Basis **STRENGTHENS**

<table>
<thead>
<tr>
<th>SPOT ACTIVITY</th>
<th>FUTURES ACTIVITY</th>
<th>BASIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>JUN Expect $54.70</td>
<td>Sell Oct. @ $56.15</td>
<td>Expected -$2.00</td>
</tr>
<tr>
<td>SEP Sell @ $40.80</td>
<td>Buy back @ $42.30</td>
<td>Actual -$1.50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spot Price</th>
<th>Futures Gain (Loss)</th>
<th>Net Selling Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>$40.80</td>
<td>$13.85</td>
<td>$54.65</td>
</tr>
</tbody>
</table>

$0.50 MORE than expected
SHORT HEDGE

Net selling price differs from expected spot price only by the amount that actual basis differs from expected basis.

LONG HEDGE

<table>
<thead>
<tr>
<th>SPOT MARKET ACTIVITY</th>
<th>FUTURES MARKET ACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOW</td>
<td></td>
</tr>
<tr>
<td>Committed to buy</td>
<td>Buy futures</td>
</tr>
<tr>
<td>(Short in spot)</td>
<td>(Long in futures)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPOT MARKET ACTIVITY</th>
<th>FUTURES MARKET ACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOW</td>
<td></td>
</tr>
<tr>
<td>Committed to buy</td>
<td>Buy futures</td>
</tr>
</tbody>
</table>

| LATER                |                          |
| Buy commodity        | Sell back futures        |
| (Spot position cleared) | (Futures position cleared) |
LONG HEDGE: WHY DOES IT WORK?

- Suppose basis at time of selling the commodity is known with certainty (e.g., -$0.50/bu):

<table>
<thead>
<tr>
<th></th>
<th>Spot</th>
<th>Futures</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.00</td>
<td>1.50</td>
<td>-0.50</td>
</tr>
<tr>
<td></td>
<td>2.00</td>
<td>2.50</td>
<td>-0.50</td>
</tr>
<tr>
<td></td>
<td>3.00</td>
<td>3.50</td>
<td>-0.50</td>
</tr>
<tr>
<td></td>
<td>4.00</td>
<td>4.50</td>
<td>-0.50</td>
</tr>
<tr>
<td></td>
<td>5.00</td>
<td>5.50</td>
<td>-0.50</td>
</tr>
<tr>
<td></td>
<td>6.00</td>
<td>6.50</td>
<td>-0.50</td>
</tr>
</tbody>
</table>
LONG HEDGE: WHY DOES IT WORK?

**Position Diagram:** Net Profits for Short Spot Position

- Futures price at which short position is open
- Basis = “lock-in” buying price
- Spot price at time of buying commodity

**Position Diagram:** Net Profits for Short Spot and Long Futures Positions

**Position Diagram:** Net Profits for Long Position in Futures

- Futures price at which long position is open

**Net Profits per Unit of Commodity**

<table>
<thead>
<tr>
<th>SPOT PRICE</th>
<th>2.0</th>
<th>2.5</th>
<th>3.0</th>
<th>3.5</th>
<th>4.0</th>
<th>4.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profits Short Spot</td>
<td>1.5</td>
<td>1.0</td>
<td>0.5</td>
<td>0.0</td>
<td>-0.5</td>
<td>-1.0</td>
</tr>
<tr>
<td>Profits Long Futures</td>
<td>-0.5</td>
<td>0.0</td>
<td>0.5</td>
<td>1.0</td>
<td>1.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Profits Long Hedge</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**Net profits for different spot prices:**

- Futures price at which long position is open
- Basis = “lock-in” buying price
- Spot price at time of buying commodity
LONG HEDGE: WHY DOES IT WORK?

Position Diagram: Net Profits for Long Hedge

Net Profit per Unit of Commodity

Spot Price at Time of Buying Commodity

LONG HEDGE Example: END USER

• It is October. You plan to purchase 160 feeder steers @ 700 lbs each in January, to place in the feedlot
  
  112,000 lbs

• You want protection against rise in feeder steers
  – Hedge using CME Feeder Cattle futures
    • 1 CME Feeder Cattle futures contract = 50,000 lbs

LONG HEDGE Example: END USER

• To hedge, you need 2 FEEDER CATTLE futures contracts of 50,000 lbs each

• Feeder Cattle Contract Months:
  • January
  • March
  • April
  • May
  • August
  • September
Example: END USER

**LONG HEDGE**

- In October:
  - Feeder Cattle March futures = $82.75/cwt
  - Expected basis in January = $5.00/cwt UNDER March

\[
\text{Expected Local Spot Price Next January} = \text{March price} - \text{basis} = \$82.75/cwt - \$5.00/cwt = \$77.75/cwt
\]

---

**LONG HEDGE**

Example: END USER

<table>
<thead>
<tr>
<th>SPOT ACTIVITY</th>
<th>FUTURES ACTIVITY</th>
<th>BASIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCT</td>
<td>Expect. $77.75</td>
<td>Buy Mar. @ $82.75</td>
</tr>
</tbody>
</table>

---

**LONG HEDGE**

Example: END USER

- Scenario 1: Basis **WEAKENS**

<table>
<thead>
<tr>
<th>SPOT ACTIVITY</th>
<th>FUTURES ACTIVITY</th>
<th>BASIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCT</td>
<td>Expect. $77.75</td>
<td>Buy Mar. @ $82.75</td>
</tr>
<tr>
<td>JAN</td>
<td>Buy @ $75.30</td>
<td>Sell back @ $80.50</td>
</tr>
</tbody>
</table>

---
LONG HEDGE Example: END USER

• Scenario 1: Basis WEAKENS

<table>
<thead>
<tr>
<th>SPOT ACTIVITY</th>
<th>FUTURES ACTIVITY</th>
<th>BASIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCT</td>
<td>Expect $77.75</td>
<td>Buy Mar. @ $82.75</td>
</tr>
<tr>
<td>JAN</td>
<td>Buy @ $75.50</td>
<td>Sell back @ $80.50</td>
</tr>
</tbody>
</table>

Spot Price | Futures Gain (Loss) | = Net Buying Price
$75.30 | (-$2.25) | $77.55

$0.20 LESS than expected

• Scenario 2: Basis STRENGTHENS

<table>
<thead>
<tr>
<th>SPOT ACTIVITY</th>
<th>FUTURES ACTIVITY</th>
<th>BASIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCT</td>
<td>Expect $77.75</td>
<td>Buy Mar. @ $82.75</td>
</tr>
<tr>
<td>JAN</td>
<td>Buy @ $75.80</td>
<td>Sell back @ $80.50</td>
</tr>
</tbody>
</table>

Spot Price | Futures Gain (Loss) | = Net Buying Price
$75.80 | (-$2.25) | $78.05

$0.20 MORE than expected
LONG HEDGE

LONG HEDGING with futures protects from rise in spot price
BUT
prevents one from making profits when spot price falls

Net buying price differs from expected spot price only by the amount that actual basis differs from expected basis

NOTE ON HEDGING!!!

• Short Hedge:
  – Net SELLING Price = Spot Price + Futures Gain (Loss)

• Long Hedge:
  – Net BUYING Price = Spot Price - Futures Gain (Loss)