K-STATE
Kansas State University
Research and Extension

The Basics of Marketing

A Workshop for Agriculture Producers

Topics Covered

Basis | Forward Contracting | Hedging | Options

December 10, 10 a.m. to 3 p.m.
Douglas County Extension Office
2110 Harper, Lawrence, KS

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www.agmanager.info

Today's workshop

- Learn about some basic concepts and pricing tools associated with marketing agricultural commodities
  - Basis
  - Forward contracts
  - Hedging with futures
  - Hedging with options
  - Other (LRP, LGM, etc)?
- Work through some example problems to help learn and understand marketing concepts
- See demonstrations on several different decision-aid tools related to marketing

Before we get started…

- Game rules…
  - Keep it informal
  - Ask questions if you have them
  - Recognize that knowledge levels vary
  - Feel free to wander around as necessary
  - Lots of material – we might not get through all of it
- Brief introductions…
  - Who am I
  - Who are you
- Questions???

Why do we need a futures market?

- To "discover" price
- To provide a location where ALL market participants can interact
- To disseminate information

How are futures prices determined?

- The futures price is simply what a buyer is willing to pay and a seller is willing to accept for a product.
- The exchange (KCBT, CBOT, CME) itself does not set prices.

CBOT soybean futures prices (12-09-09) …

Futures Detail

Refresh

DAY SOYBEANS (S) [10 minute delay] Future Symbol Search | Symbol Lookup

More Info	Month	Last	Chg	Open	High	Low	Volume	Open Int	Trade Time
chart options	Jan-10	1028'4s	-15'4	1043'0	1050'4	1022'0	95941	188546	12/09/09 13:41
chart options	Mar-10	1037'6s	-15'0	1052'0	1058'4	1031'0	52973	130011	12/09/09 13:41
chart options	May-10	1045'6s	-15'2	1059'0	1066'0	1041'0	18706	47119	12/09/09 13:41
chart options	Jul-10	1052'0s	-15'6	1052'0	1052'0	1051'0	11015	43785	12/09/09 13:41
chart options	Aug-10	1048'0s	-16'0	---	---	---	158	1791	12/09/09 13:41
chart options	Sep-10	1030'0s	-17'0	---	---	---	127	477	12/09/09 13:41
chart options	Nov-10	1020'0s	-17'0	1033'0	1038'0	1014'0	6668	63817	12/09/09 13:41
chart options	Jan-11	1028'0s	-17'6	1042'0	1046'0				
chart options	Mar-11	1035'6s	-17'2	1029'0	1029'0				
chart options	May-11	1035'2s	-16'0	---	---				
chart options	Jul-11	1037'2s	-14'2	---	---				
chart options	Aug-11	1035'0s	-14'0	---	---				
chart options	Sep-11	1025'0s	-14'0	---	---				
chart options	Nov-11	1017'0s	-14'0	1025'0	1025'0				

Nov-10 is trading at $10.20

This is the market's forecast as to what prices will be. How much confidence do we have in this forecast?

A. What is the probability price will be $9.70 to $10.70 (+/- $0.50) in late Oct?

B. What is the probability price will be $8.70 to $11.70 (+/- $1.50) in late Oct?

C. What is the probability price will be < $7.70 (down $2.50) in late Oct?

D. What is the probability price will be > $12.70 (up $2.50) in late Oct?

Methods of pricing commodities…

- Cash sales (purchases)
- Forward basis contract
- Forward cash contract
- Hedge with futures contract, i.e., sell (buy) futures
- Buy put (call) option
- Other option market strategies
- Other???

Cash sales/purchases…

- Characteristics –
  - easy to understand
  - retain price and basis risk (basis = cash price – futures price)
  - no quantity or quality obligations (within reason)
  - no futures broker or margin calls
  - financial risk (i.e., risk of not getting paid) depends on financial strength/integrity of buyer

Forward basis contract…

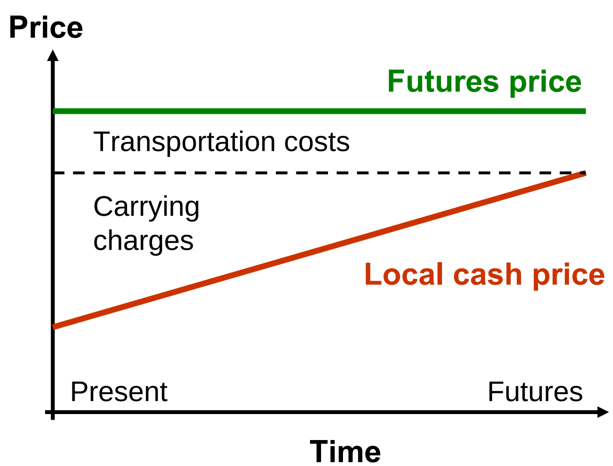
What is basis?

- Basis is the difference between two prices.
- In commodity marketing, basis is generally referred to the difference between a specific cash price and a specific futures price.
- Mathematically: Basis = Cash - Futures
- Nearby and Deferred

Basis

- Generally is more predictable than cash or futures prices due to:
  - Convergence
  - Futures and cash prices move together (same fundamental conditions generally affect both markets)
  - Year-to-year stability implies the ability to rely upon historical data for predictions
- Last several years have definitely challenged some our traditional thinking concerning basis

Cash and futures convergence (storable commodity)



Is this how things worked in 2008?
What else was going on?

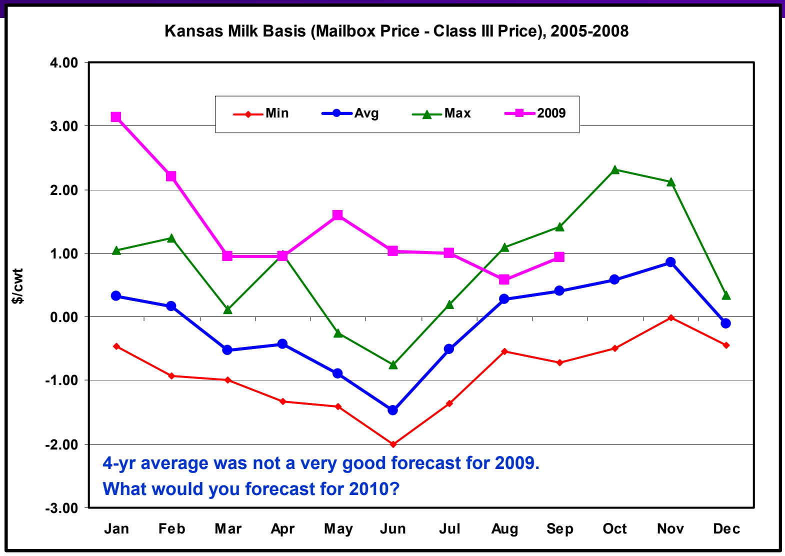
How should basis be calculated?

- Determine:
  - Relevant cash price(s) you are interested in (e.g., location, dates/times of year, quality)
  - Futures contract price that matches up with cash price
- Daily vs. weekly vs. monthly
  (grain vs. livestock vs. milk)
- Nearby vs. deferred
  - Deferred basis allows you to examine returns to storage on storable commodities
  - Nearby basis for relevant times during the year will tell you all you need to know (i.e., tracking deferred is not necessary)

Forecasting basis…

- Expected value = Average
  - Optimal number of years to include in average may vary depending on commodity
- Measure variability (risk)
  - Historical range (highs and lows), standard deviation
  - Variability measure indication of risk
- Other forecast methods
  - Econometric models
  - "Adjusted" historical average
  - Forward contract bid implied basis

Milk basis…



Basis terminology

- Strong
- Weak

- Narrow
- Wide

- Over
- Under

Several basis forecasts/data resources…

- Crops – www.agmanager.info/marketing/basis/
- Livestock -- www.agmanager.info/livestock/marketing/graphs/
- Feeder cattle – www.beefbasis.com

Uses of basis information…

- Judge cash/contract bids
- Storage decisions
- Lifting hedges
- Projecting cash prices
- Picking marketing strategies

Before we move on…

Questions / discussion

Forward basis contract…

- Characteristics –
  - locks in a "fixed" basis
  - price risk still exists
  - pay a premium for transferring basis risk
  - no margin account or maintenance required
  - contract specifications and size flexible (within reason)
  - obligated to deliver (or accept delivery)
  - risk of other party not honoring contract
  - not always available
  - not very transparent

Forward cash contract…

- Characteristics –
  - locks in a "fixed" price
  - basis risk is eliminated
  - pay a premium for transferring basis risk
  - no margin account or maintenance required
  - contract specifications and size flexible (within reason)
  - obligated to deliver (accept delivery)
  - risk of other party not honoring contract
  - not always available
  - prices are less transparent

Hedge with futures contract…

- Characteristics –
  - locks in a "fixed" price (futures price)
  - subject to basis risk
  - fixed contract specifications and size
  - deal with broker / brokerage commission
  - margin account and maintenance required
  - easy to enter and liquidate
  - transparent price quotes
  - no risk of other party "backing out"

Risk management using futures

Hedging defined…

Use of the futures market as a temporary substitute for an intended transaction in the cash market which will occur at a later date.

Why hedge?

- To ensure price protection against adverse market moves.
- To reduce the risk of price fluctuations that can affect the value of a commodity.

Hedging - as defined by Webster

- to protect oneself from losing by a counterbalancing transaction
- to protect oneself financially as
  a. to buy or sell commodity futures as a protection against loss due to price fluctuation
  b. to minimize the risk of a bet

How are futures hedges used?

To ensure:

- A selling price for growing crops or livestock.
- A selling price for crops in inventory.
- A purchase price for crops, feed or livestock needed in the future.

How does hedging work?

1) Hedging involves taking a futures position opposite, but equal in size to, a cash position.

2) ***Selling*** a futures contract(s) in advance of future cash market ***sales***.

3) ***Buying*** a futures contract(s) in advance of future cash market ***purchases***.

What is a futures contract?

An agreement between a buyer and a seller to receive or deliver a product on a future date at a price they have negotiated TODAY.

Most contracts are not actually delivered on (for some commodities this is not even an option) – rather the position is "offset" on paper.

The agreement is standardized as to…

- Delivery period
- Contract size
- Quality of the product

The only negotiable terms are ***price*** and the ***number*** of contracts involved in each trade.

How does this differ from a forward cash contract?

Futures contracts and specs

Commodity	Size	Months
Corn	5,000 bu	3,5,7,9,12
Soybeans	5,000 bu	1,3,5,7,8,9,11
Wheat	5,000 bu	3,5,7,9,12
SBM	100 tons	1,3,5,7,8,9,10,12
Milk	200,000 lbs	All
Feeder cattle	50,000 lbs	1,3,4,5,8,9,10,11
Fed cattle	40,000 lbs	2,4,6,8,10,12
Market hogs	40,000 lbs	2,4,5,6,7,8,10,12
Crude oil	1,000 barrels	All

Entering and exiting a futures position

Initial or **Entry Position**	How to **Exit**
Buy (long)	Sell
Sell (short)	Buy

What happens as futures prices change?

Once you've established a "buy" or "sell" position in the futures market, the "value" of your position (gain or loss) changes each time prices change.

What is margin?

Margin is a deposit of earnest money similar to the performance bond required in some business transactions.

Your margin account:

- must be established before trading
- must be maintained
- will reflect the gains (losses) incurred as futures prices change

Margin requirements vary over time…

Corn Margin Requirements (per contract) Selected Dates

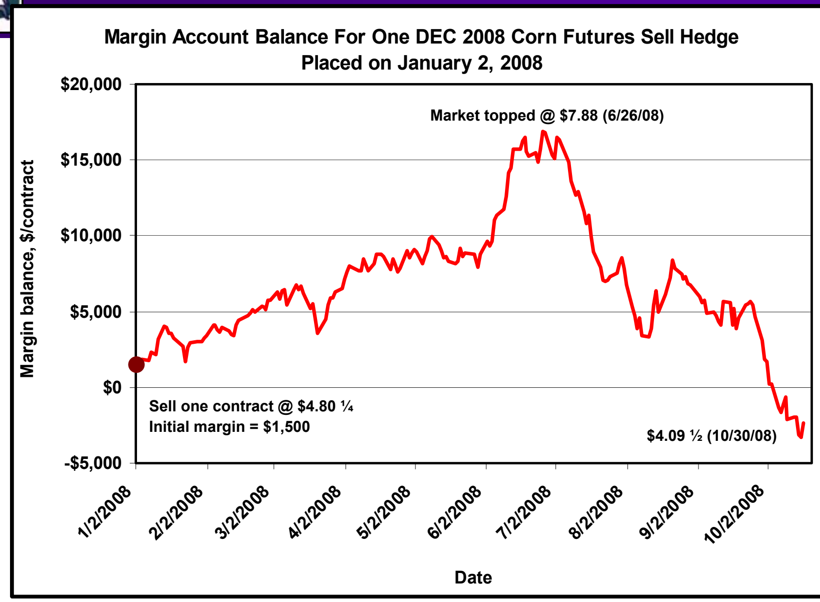
Date	Speculative Intial	Maintenance	Hedging
1/25/2005	$439	$325	$325
8/5/2005	$810	$600	$600
9/29/2005	$506	$375	$375
12/5/2005	$338	$250	$250
4/4/2006	$473	$350	$350
8/25/2006	$608	$450	$450
10/12/2006	$878	$650	$650
10/16/2006	$1,013	$750	$750
11/14/2006	$1,148	$850	$850
12/20/2006	$1,013	$750	$750
1/17/2007	$1,215	$900	$900
1/29/2007	$1,350	$1,000	$1,000
9/24/2007	$1,080	$800	$800
5/25/2008	$1,350	$1,000	$1,000
8/8/2008	$2,025	$1,500	$1,500

… and by commodity

Soybeans Margin Requirements (per contract) Selected Dates

Date	Speculative Intial	Maintenance	Hedging
2/25/2005	$1,485	$1,100	$1,100
3/4/2005	$1,823	$1,350	$1,350
7/7/2005	$2,295	$1,700	$1,700
8/5/2005	$2,498	$1,850	$1,850
12/5/2005	$1,013	$750	$750
1/11/2006	$1,148	$850	$850
12/20/2006	$1,080	$800	$800
1/18/2007	$1,350	$1,000	$1,000
6/12/2007	$1,215	$900	$900
7/3/2007	$1,823	$1,350	$1,350
7/17/2007	$2,430	$1,800	$1,800
9/24/2007	$2,700	$2,000	$2,000
8/8/2008	$4,725	$3,500	$3,500

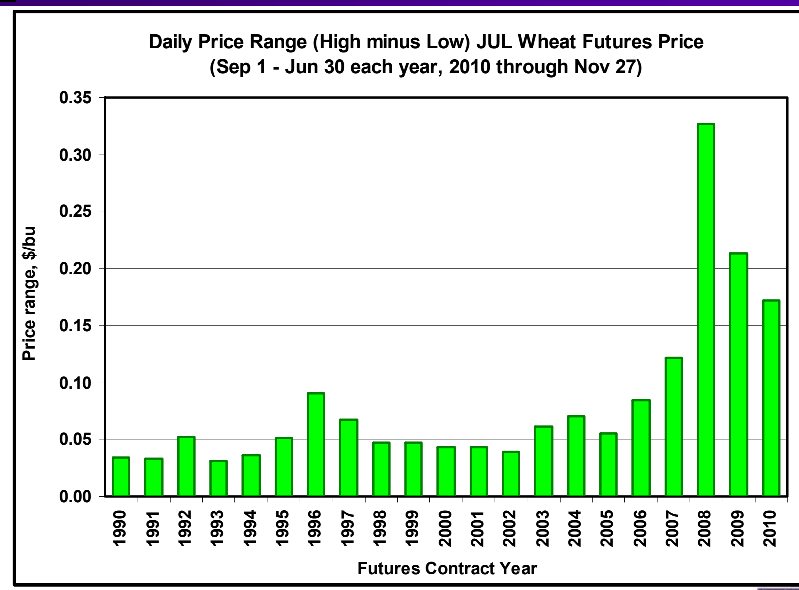
How much can I gain or lose in the futures market?



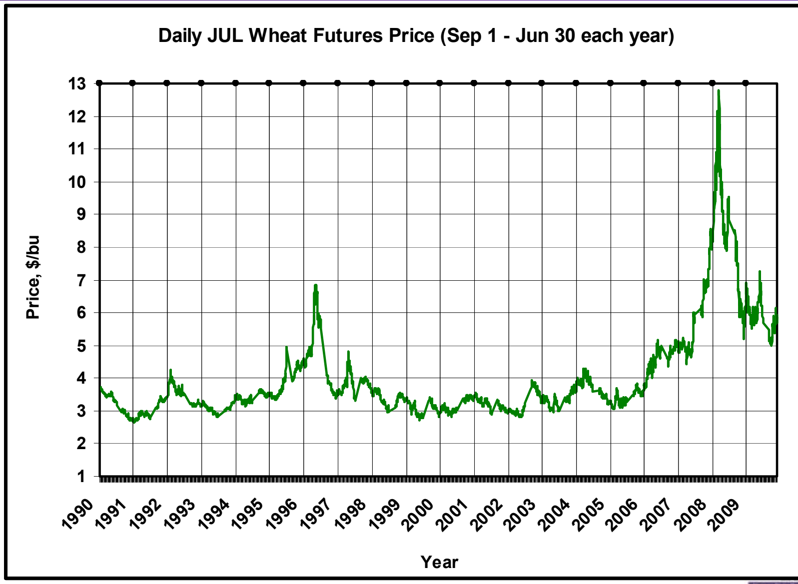
Would you have stayed with this hedge the whole time?

Are we in a new era of agricultural market risk?

Price swings within day have increased…



Price swings within crop year have increased…



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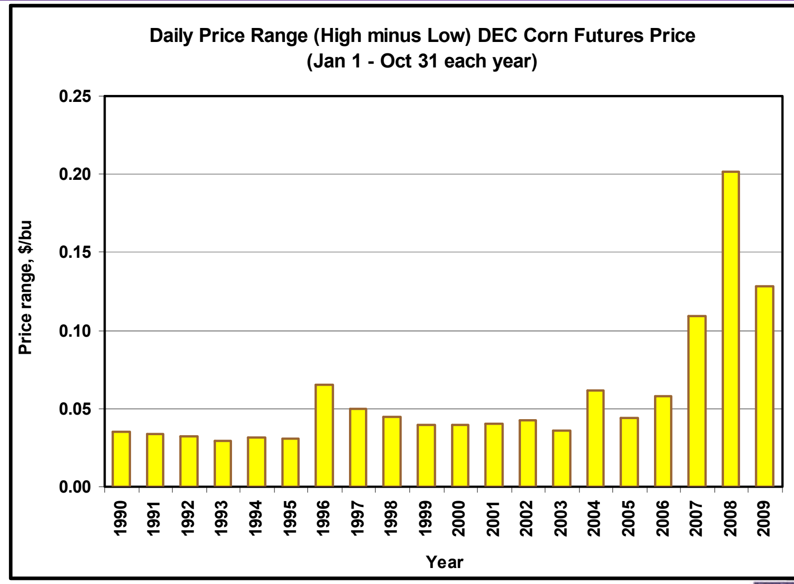

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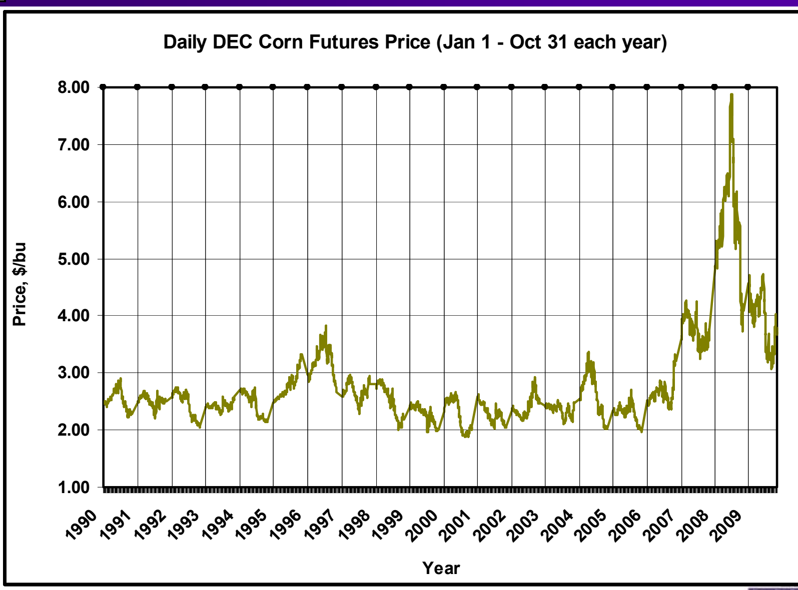

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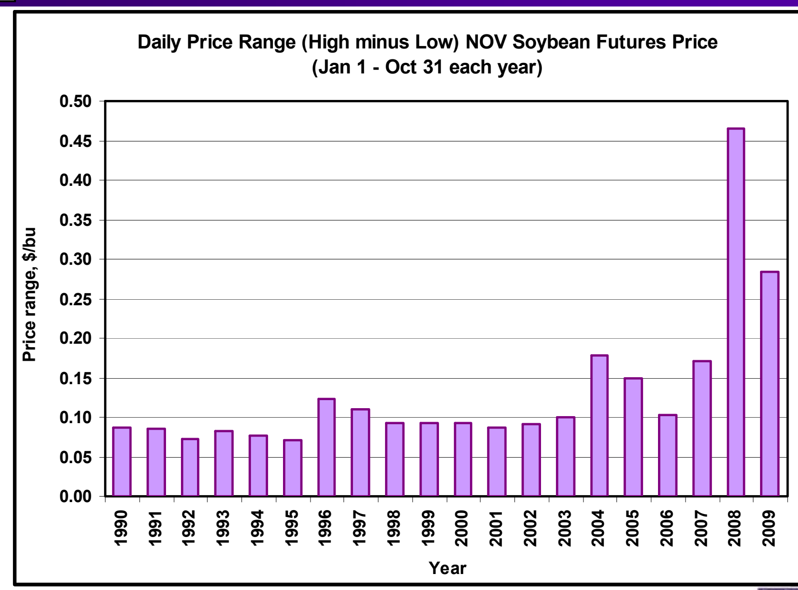

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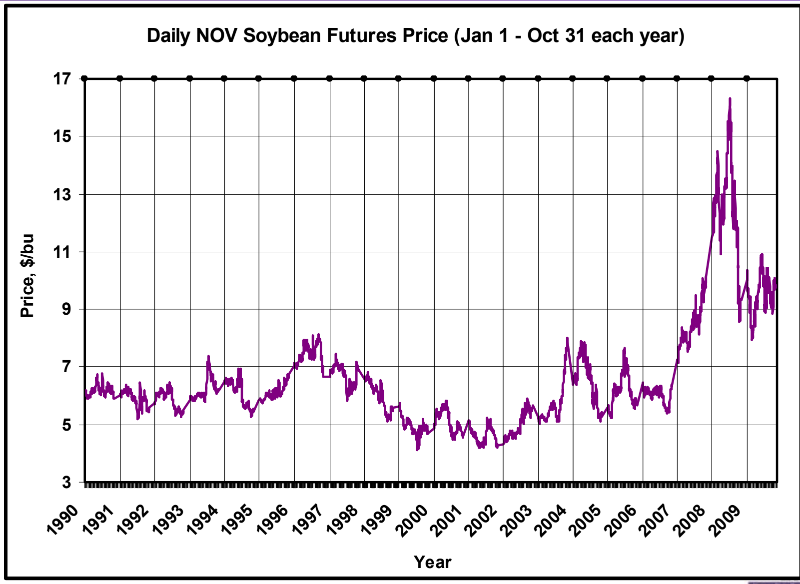


Before we move on…

Questions / discussion

Relationship between cash and futures is critical for risk management

- Basis = cash price − futures price
- Rearrange formula
- Basis + futures price = cash price

Decomposing a cash price

- Cash price = basis + futures price
- Recall the definition of hedging
- Hedging effectively "locks in" the futures price when the hedger sells (for a short hedger) a futures contract
- Hedging does not "lock in" the basis
- Therefore, the cash price is <u>not</u> locked in and the hedger is still exposed to basis risk

Evaluating a hedge

Cash price = basis + futures price

Hedging "locks in" the futures price

But, basis is not locked in, so

Expected cash price = expected basis + futures price

Evaluating a short hedge

At outset of hedge we can estimate the *Expected Selling Price*

Expected Selling Price is what the hedger expects to receive for the commodity net of any gains or losses in the futures, minus the brokerage commission.

Futures price at which futures contract is sold
+ Expected basis
− Brokerage commission

Expected selling price

Futures short hedge example

Assume Nov. FC are $105.25 /cwt. when hedge is initiated

Expect late Oct. basis will = +$8.75 /cwt. (for 500 lb. steer)

Assume brokerage commission = $60 per round turn or $0.12 /cwt.

What is the Expected Selling Price?

	Futures price at which hedge is initiated	$105.25
+	Expected basis	+ $8.75
−	Brokerage commission	− $0.12
	Expected Selling Price	$ 113.88 /cwt.

At hedge's conclusion

Calculate actual sale price (ASP)

Price received in the cash market
+ Net on futures transaction
- Brokerage commission

Actual sale price

Futures short hedge example (increasing market)

Assume Nov. FC are $110.25 /cwt. when hedge is concluded

Assume cash live cattle = $119.00 /cwt. when hedge concludes

What is your net gain on the futures trade?

	Sold Nov. FC futures @	$105.25
−	Offset (buy) Nov. FC futures @	$110.25
	Net gain on futures transaction	− $5.00 /cwt.

Futures short hedge example (increasing market)

So, if Nov. FC are $110.25 /cwt. when hedge concludes

And, cash live cattle = $119.00 /cwt. when hedge concludes

What is the Actual Sale Price?

	Price received in cash market	$119.00
+	Net on futures transaction	($5.00)
−	Brokerage commission	− $0.12
	Actual Sale Price	$113.88 /cwt.

Expected = Actual. Why?

Because Expected Basis = Actual Basis

Futures short hedge example (decreasing market)

Assume Nov. FC are $98.75 /cwt. when hedge is concluded

Assume cash live cattle = $107.50 /cwt. when hedge concludes

What is your net gain on the futures trade?

	Sold Nov. FC futures @	$105.25
−	Offset (buy) Nov. FC futures @	$98.75
	Net gain on futures transaction	+ $6.50 /cwt.

Futures short hedge example (declining market)

So, if Nov. FC are $98.75 /cwt. when hedge concludes

And, cash live cattle = $107.50 /cwt. when hedge concludes

What is the Actual Sale Price?

	Price received in cash market	$107.50
+	Net on futures transaction	+ $6.50
−	Brokerage commission	− $0.12
	Actual Sale Price	$113.88 /cwt.

Expected = Actual. Why?

Because Expected Basis = Actual Basis

Evaluating a long hedge

At outset of hedge we can estimate the *Expected Purchase Price*

Expected Purchase Price is what the hedger expects to pay for the commodity net of any gains or losses in the futures, plus the brokerage commission.

	Futures price at which futures contract is bought
+	Expected basis
+	Brokerage commission
	Expected purchase price

Futures long hedge example

Assume May SBM is $301.60 /ton when hedge is initiated

Expect late April basis will = +$2.00 /ton

Assume brokerage commission = $60 per round turn or $0.60 /ton

What is the Expected Purchase Price?

	Futures price at which hedge is initiated	$301.60
+	Expected Basis	+ $2.00
+	Brokerage commission	+ $0.60
	Expected Purchase Price	$304.20 /ton

At hedge's conclusion

Calculate actual purchase price (APP)

	Price paid in the cash market
−	Net on futures transaction
+	Brokerage commission
	Actual purchase price

Futures long hedge example (declining market)

Assume May SBM is $280.00 /ton when hedge is concluded

Assume cash SBM = $287.50 /ton when hedge concludes

What is your net gain on the futures trade?

−	Bought May SBM futures @	− $301.60
+	Offset (sold) May SBM futures @	$280.00
	Net gain on futures transaction	− $21.60 /ton

Futures long hedge example (declining market)

So, if May SBM is $280.00 /ton when hedge concludes

And, cash SBM = $287.50 /ton when hedge concludes

What is Actual Purchase Price?

	Price paid in cash market	$287.50
−	Net on futures transaction	($21.60)
+	Brokerage commission	+ $0.60
	Actual Purchase Price	$309.70 /ton

Actual > Expected. Why?

Because Actual Basis > Expected Basis

Futures long hedge example (increasing market)

Assume May SBM is $335.00 /ton when hedge is concluded

Assume cash SBM = $335.00 /ton when hedge concludes

What is your net gain on the futures trade?

−	Bought May SBM futures @	− $301.60
+	Offset (sold) May SBM futures @	$335.00
	Net gain on futures transaction	+$33.40 /ton

Futures long hedge example (increasing market)

So, if May SBM is $335.00 /ton when hedge concludes

And, cash SBM = $335.00 /ton when hedge concludes

What is Actual Purchase Price?

	Price paid in cash market	$335.00
−	Net on futures transaction	+$33.40
+	Brokerage commission	+ $0.60
	Actual Purchase Price	$302.20 /ton

Actual < Expected. Why?

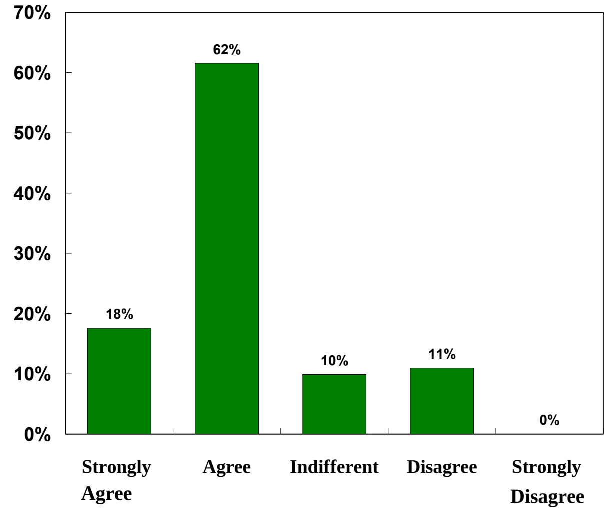
Because Actual Basis < Expected Basis

Before we move on…

Questions / discussion

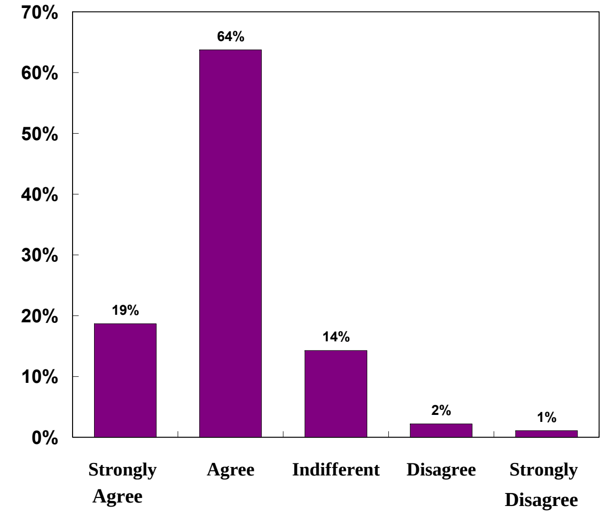
Question asked of Risk & Profit attendees (1996 & 1997)

Pre-harvest hedging strategies are available which allow farmers to, to, on-average, receive a higher price than always selling at harvest.



Question asked of Risk & Profit attendees (1996 & 1997)

There are market timing strategies available to farmers which allow them to increase price received.



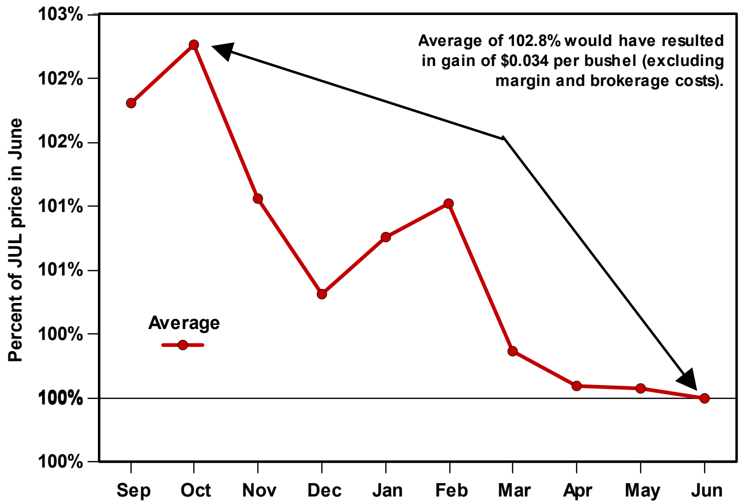
Seasonality of pre-harvest futures prices…

- Futures prices represent price expectations as well as what you could "lock in" assuming you hedge
- Do opportunities exist to take advantage of seasonal price patterns in futures market?
- Efficient markets

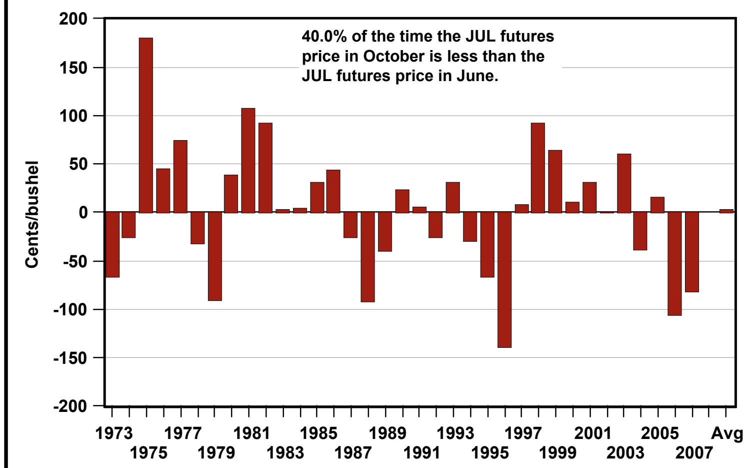
Seasonality of futures prices …

- Crops (contracts)
  - Wheat (July), Corn (Dec), Soybeans (Nov)
- Monthly price indices are defined relative to sales month (wheat – Jun, corn – Oct, soybeans – Oct), where the sales month = 1.0 (i.e., seasonal pattern indicative of pre-harvest marketing opportunities).
- Time period – monthly data from 1973-2007 (35 years)

Wheat JUL futures seasonality, 1973-2007

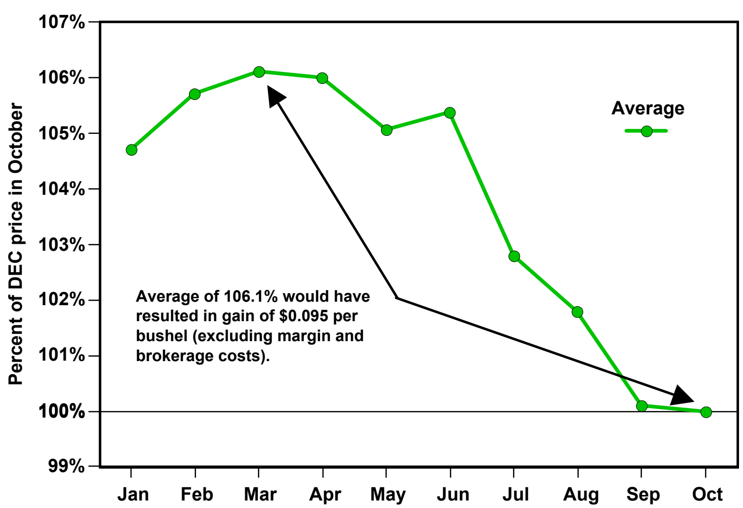


Wheat JUL futures price change from October to June

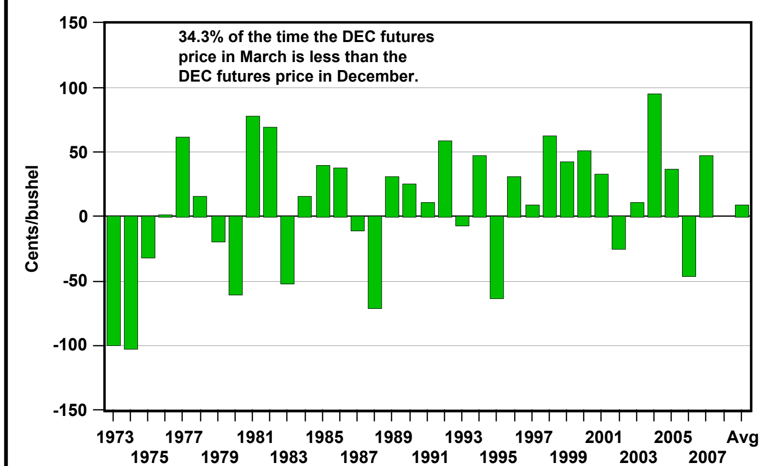


p-value associated with average being significantly greater than zero = 0.3831

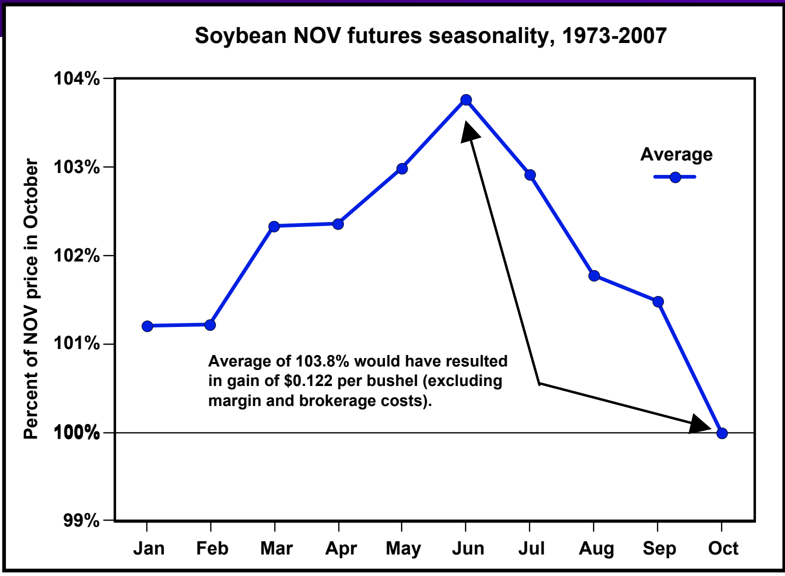
Corn DEC futures seasonality, 1973-2007

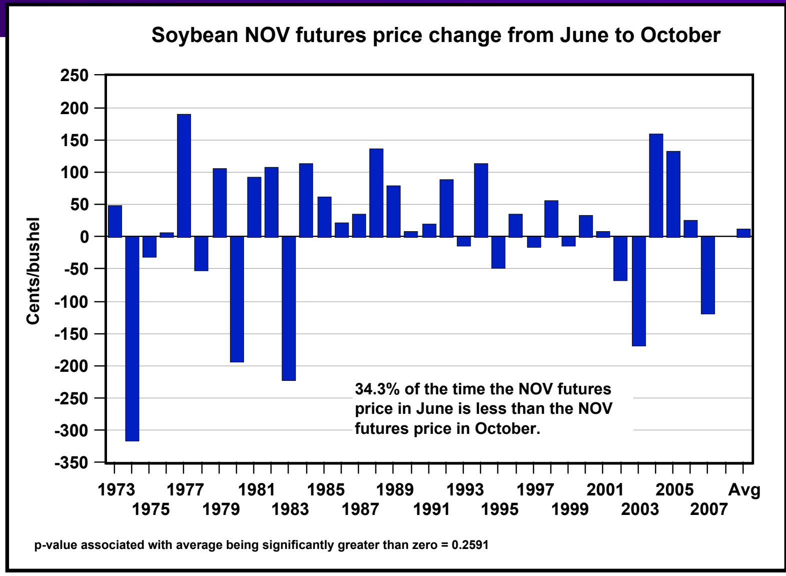


Corn DEC futures price change from March to October



p-value associated with average being significantly greater than zero = 0.1700





Seasonality of futures price…

- On average, a small profit would have been realized from routinely selling pre-harvest (statistical significance is marginal)
- Optimal selling month varies considerably from year to year (Oct-W=4 yrs; Mar-C=3 yrs; Jun-S=4 yrs).
- Results are sensitive to time period analyzed.
- How well this information could be followed in "real time" is somewhat questionable.

Before we move on…

Questions / discussion

Buy put (call) option contract…

- **Characteristics –**
  - put locks in a "floor" price (strike price)
  - call locks in a "ceiling" price (strike price)
  - subject to basis risk
  - fixed contract specifications and size
  - deal with broker / brokerage commission
  - no margin account or maintenance required
  - pay premium for option
  - easy to enter and liquidate
  - transparent price quotes
  - no risk of other party "backing out"

What is an option?

A contract that gives the buyer the right, but *not the obligation* to buy or sell a futures contract at a specific price within a certain time period.

Put option – the right to sell futures (short hedge)
Call option – the right to buy futures (long hedge)

The seller of the options contract *does have an obligation*, which is why options are referred to as buyer's discretion contracts.

Futures Contract

- **Buy**
  - **Call Option Contract**
    - **Buy**
    - **Sell**
- **Sell**
  - **Put Option Contract**
    - **Buy**
    - **Sell**

What is a premium?

- **The purchase price a buyer pays and seller receives for the option.**
- **Buying options is somewhat analogous to buying insurance. Thus, the premium can be considered the cost of your price insurance.**

How is the premium determined?

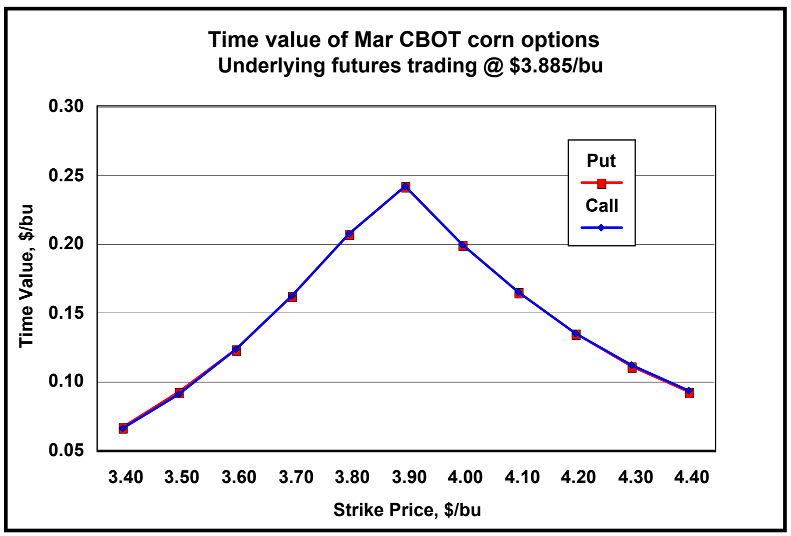
- Intrinsic value
  - What the option is "worth" today
  - Strike price versus current futures
- Time value
  - A residual
  - Affected by time, volatility and interest rates

Premium components -- example

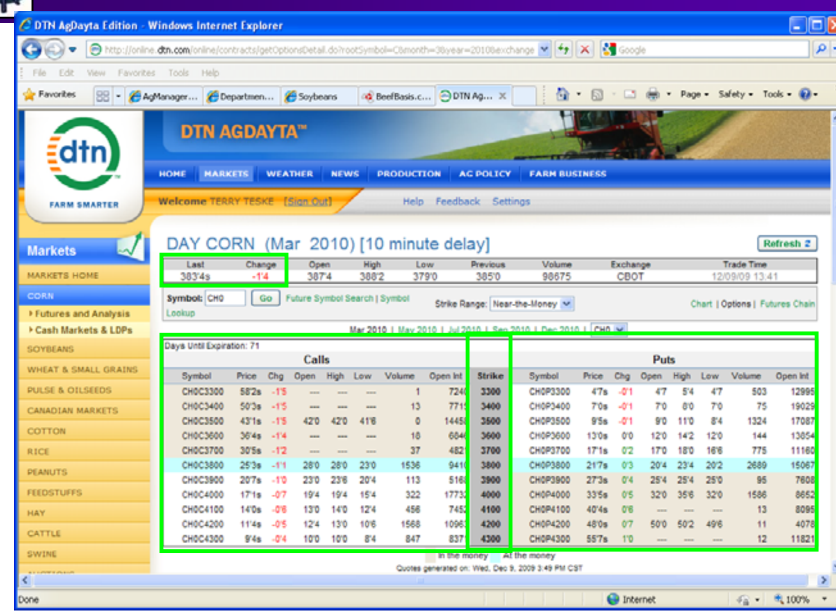
Underlying futures = $3.88 ½ per bu

Strike	Premium	= Intrinsic	+ Time
$3.80 call	29.25	8.50	20.75
$3.80 put	20.75	----	20.75
$4.00 call	20.00	----	20.00
$4.00 put	31.50	11.50	20.00

Time value is highest "at-the-money"



Mar 2010 Corn Options



Last	Change	Open	High	Low	Previous	Volume	Exchange	Trade Time
383'4s	-1'4	387'4	388'2	379'0	385'0	98675	CBOT	12/09/09 13:41

Days Until Expiration: 71

Calls									Puts							
Symbol	Price	Chg	Open	High	Low	Volume	Open Int	Strike	Symbol	Price	Chg	Open	High	Low	Volume	Open Int
CH0C3300	58'2s	-1'5	---	---	---	1	7240	3300	CH0P3300	4'7s	-0'1	4'7	5'4	4'7	503	12995
CH0C3400	50'3s	-1'5	---	---	---	13	7715	3400	CH0P3400	7'0s	-0'1	7'0	8'0	7'0	75	19029
CH0C3500	43'1s	-1'5	42'0	42'0	41'6	0	14458	3500	CH0P3500	9'5s	-0'1	9'0	11'0	8'4	1324	17087
CH0C3600	36'4s	-1'4	---	---	---	18	6846	3600	CH0P3600	13'0s	0'0	12'0	14'2	12'0	144	13654
CH0C3700	30'5s	-1'2	---	---	---	37	4821	3700	CH0P3700	17'1s	0'2	17'0	18'0	16'6	775	11160
CH0C3800	25'3s	-1'1	28'0	28'0	23'0	1536	9410	3800	CH0P3800	21'7s	0'3	20'4	23'4	20'2	2689	15067
CH0C3900	20'7s	-1'0	23'0	23'6	20'4	113	5168	3900	CH0P3900	27'3s	0'4	25'4	25'4	25'0	95	7608
CH0C4000	17'1s	-0'7	19'4	19'4	15'4	322	17732	4000	CH0P4000	33'5s	0'5	32'0	35'6	32'0	1586	8652
CH0C4100	14'0s	-0'6	13'0	14'0	12'4	456	7452	4100	CH0P4100	40'4s	0'6	---	---	---	13	8095
CH0C4200	11'4s	-0'5	12'4	13'0	10'6	1568	10963	4200	CH0P4200	48'0s	0'7	50'0	50'2	49'6	11	4078
CH0C4300	9'4s	-0'4	10'0	10'0	8'4	847	8371	4300	CH0P4300	55'7s	1'0	---	---	---	12	11821

What are option premiums telling us?

Underlying futures contract @ $3.83’4

“At-the-money” call option ($3.80) = 25’3 (-1’1)

Intrinsic value	3’4
Time value	21’7

“At-the-money” put option ($3.80) = 21’7 (+0’3)

Intrinsic value	0’0
Time value	21’7

How are options exercised?

A buyer exercises an option when he decides to buy or sell the underlying commodity by taking a futures position (once a futures position is taken, the producer is subject to margin calls).

Option trading

“Buyer”

1) Offset (by selling)
2) Let the option expire
3) Exercise the option

“Seller”

1) Offset (by buying)

Short hedging option strategy

- Buying a PUT gives option buyer the right, but not the obligation to SELL a futures contract at a specified price known as the “strike price”
- So, we can use the purchase of a PUT in place of selling a futures contract
- Therefore, you can buy a PUT to establish a “Minimum Expected Selling Price”

Minimum Expected Selling Price

- Buyer of put establishes "minimum" price, but retains upside potential
- Minimum because put buyer has the right, *but not the obligation*, to sell futures contract
  - If prices go up above the strike price you would simply allow the option to expire
- Calculations are similar to Expected Selling Price, but we must convert the put option's purchase into a futures price equivalent

Evaluating a put option strategy

- Start with put option strike price
- subtract the put option premium

This creates a "futures equivalent"

- then add basis forecast
- subtract brokerage commission
  - remember that most brokers charge once to buy an option and once to sell an option
  - have to account for possibility of "double" brokerage commission in calculations

Evaluating a put option strategy (increasing market)

- Example: Buy CME $100.00 Nov. Feeder Cattle Put (when Nov Feeder Futures are @ $105.25 /cwt.)
- Put option premium = $2.10 /cwt.
- Late Oct basis forecast = +$8.75 /cwt. (500 lb. steer)
- Assume brokerage commission is $30 to buy an option contract and $30 to sell an option contract
- For buyer of $100.00 /cwt. Nov FC Put
  What is the Minimum Expected Selling Price?

Evaluating a put option strategy (increasing market)

	$100.00	Option strike price
−	$2.10	Put premium
	$97.90	Futures equivalent
+	$8.75	Expected late Oct basis
−	$0.12	Maximum possible commission
	$106.53 /cwt.	Minimum expected selling price

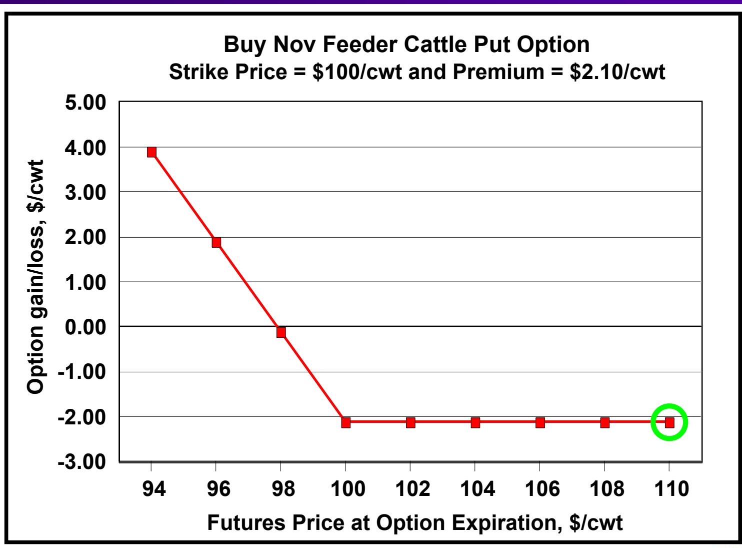
Actual Sale Price

- Start with price received in cash market
- add the "net" from the option trade
- subtract actual brokerage commission

Evaluating a put option strategy (increasing market)

- Sell cash cattle in late Oct. for $119.00 /cwt.
- Nov. feeder cattle futures are $110.25/cwt.
- What is the net on the option trade?

Put Option – profit / loss graph



Actual Sale Price
(for buyer of CME Put Option)

$119.00	Cash market price
+ (2.10)	+ Net on option trade
− 0.06	− Brokerage commission
$116.84	Actual net sale price

Actual > Expected Minimum. Why?

Prices went up after Put Option purchase and the Put Option buyer retained the right to benefit from future price increases

Evaluating a put option strategy (declining market)

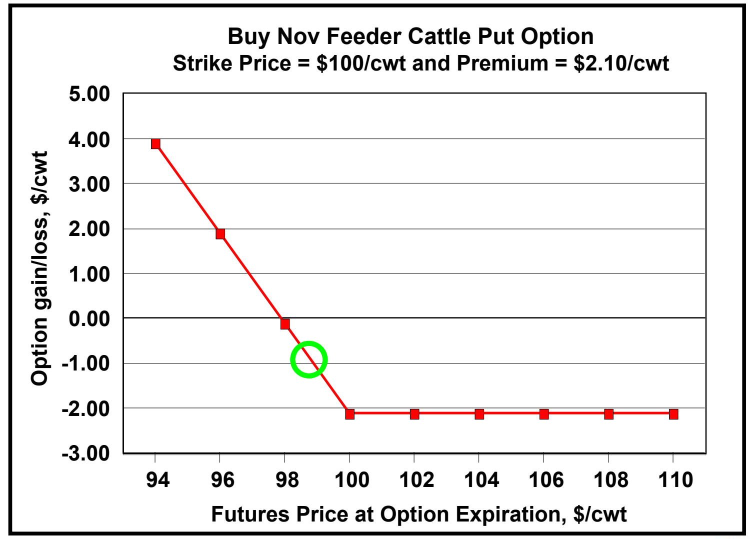
- Sell cash cattle in late Oct. for $107.75 /cwt.
- Nov. feeder cattle futures are $98.75 /cwt.
- What is the net on the option trade?

  the "right to sell" @ $100 should have $1.25 intrinsic value

  less the initial cost of put option of $2.10

  net on option = -$0.85 (1.25 - 2.10 -- excluding commission)

Put Option – profit / loss graph



Actual Sale Price
(for buyer of CME Put Option)

$107.50	Cash market price
+ (0.85)	+ Net on option trade
− 0.12	− Brokerage commission
$106.53	Actual net sale price

Actual = Expected Minimum. Why?

Prices went down after Put Option purchase and the actual basis was equal to the expected basis

Before we move on…

Questions / discussion

Option long hedging strategy

- Buying a CALL gives option buyer the right, but not the obligation to BUY a futures contract at a specified price known as the "strike price"
- So, we can use the purchase of a CALL in place of buying a futures contract
- Therefore, you can buy a CALL to establish a "Maximum Expected Purchase Price"

Maximum Expected Purchase Price

- Buyer of call establishes "maximum" price, but retains downside potential
- Maximum because call buyer has right, *but not the obligation*, to buy futures contract
  - If prices go below the strike price you would simply allow the option to expire
- Calculations are similar to Expected Purchase Price, but we must convert the call option's purchase into a futures price equivalent

Evaluating a call option strategy

- Start with call option strike price
- add the call option premium

This creates a "futures equivalent"

- then add basis forecast
- add brokerage commission
  - remember that most brokers charge once to buy an option and once to sell an option
  - have to account for possibility of "double" brokerage commission in calculations

Evaluating a put option strategy (increasing market)

- Example: Buy CBOT $4.00 Mar Corn Call
  (when Mar Corn are @ $3.89 /bu.)
- Call option premium = $0.20 /bu.
- Late Feb basis forecast = −0.30 /bu.
- Assume brokerage commission is $50 to buy an option contract and $50 to sell an option contract
- For buyer of $4.00 /bu. Mar Corn Call
  What is Maximum Expected Purchase Price?

Evaluating a call option strategy (increasing market)

	$4.00	Option strike price
+	$0.20	Call premium
	$4.20	Futures equivalent
+	($0.30)	Expected late Feb basis
+	$0.02	Maximum possible commission
	$3.92 /bu.	Maximum expected purchase price

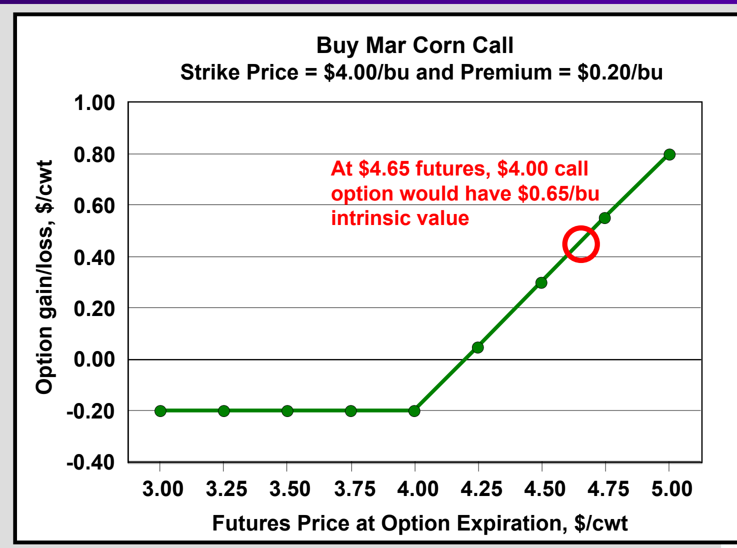
Actual Purchase Price

- Start with price paid in cash market
- subtract the “net” from the option trade
- add actual brokerage commission

Evaluating a call option strategy (increasing market)

- Buy cash corn in late Feb. for $4.35 /bu.
- Mar. corn futures are $4.65 /bu.
- What is the net on the option trade?

Call Option – profit / loss graph



Actual Purchase Price
(for buyer of CBOT Call Option)

$4.35	Cash market price
− 0.45	− Net on option trade
+ 0.02	+ Brokerage commission
$3.92	Actual net purchase price

Actual = Expected Maximum. Why?

Prices went up after Call Option purchase and the value of the call option offset price increases (and the actual basis was equal to the expected basis)

Evaluating a call option strategy (declining market)

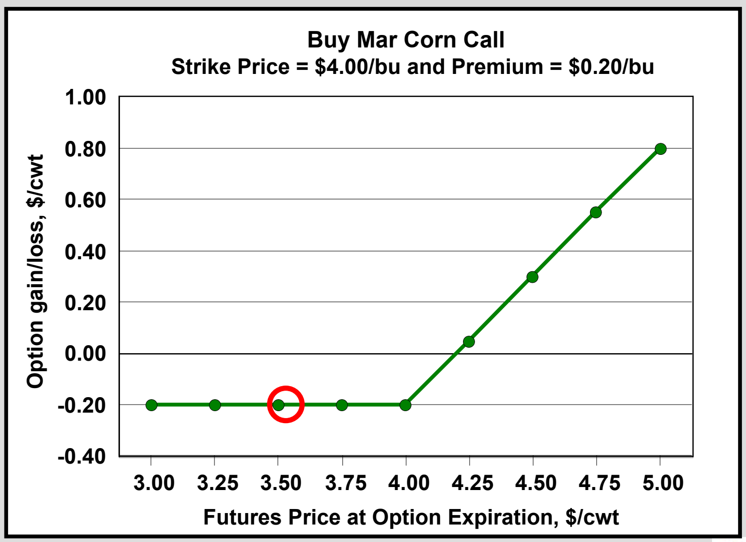
- Buy cash corn in late Feb. for $3.25 /bu.
- Mar. corn futures are $3.55 /bu.
- What is the net on the option trade?

  the "right to buy" @ $4.00 should have $0 intrinsic value

  less the initial cost of call option of $0.20

  net on option = -$0.20 (excluding commission)

Put Option – profit / loss graph



Actual Purchase Price
(for buyer of CBOT Call Option)

$3.25	Cash market price
− (0.20)	− Net on option trade
+ 0.01	+ Brokerage commission
$3.46	Actual net purchase price

Actual < Expected Maximum. Why?

Prices went down after Call Option purchase and the Call Option buyer retained the right to benefit from lower prices

Synthetic Put
(forward contract or hedge and buy call option)

- Forward cash contract locks in price and basis
- Call options gives the buyer the right to benefit from price increases with limited downside risk (price of premium)
- Forward contracts used in conjunction with call options provide similar results as put options only without the basis risk

Other marketing/risk management tools…

- LRP (feeder cattle, fed cattle, hogs, lambs)
  - -- Similar to a put options (i.e., locks in floor price, subject to basis risk)
- LGM (fed cattle, hogs, dairy)
  - -- "Bundle" of options that protects a gross margin

Before we move on…

Questions / discussion

Option Marketing Strategies Problems

I. Short Hedge (producer hedging price of future sale)

A soybean producer that intends to harvest 20,000 bushels of soybeans in October of 2010 wants to hedge 50% of expected production. The producer wants to compare options and futures strategies. In December the following information is available:

CBOT November futures		$10.415
CBOT November soybean options		
Put strike price	$10.40	$1.160
Call strike price	$10.40	$1.175
Harvest-delivery cash contract		$9.92
Expected harvest-time basis		($0.40)
Commission to sell AND buy futures		$75.00
Commission to buy OR sell options		$50.00

What is the expected price/minimum price with:

a. Futures hedge ________

b. Put option ________

c. Synthetic put option (cash contract and call option) ________

Option Marketing Strategies Problems

2. It is late October and the soybeans have been harvested. What is the actual price the producer received on the hedged soybeans with a futures hedge, put option, and the synthetic put under the following price scenarios (A and B)?

		A	B
CBOT November futures		$11.170	$9.410
CBOT November soybean options			
Put strike price	$10.40	$0.005	$0.980
Call strike price	$10.40	$0.775	$0.005
Local cash price		$10.57	$9.01
Actual basis			

Price Scenario A:

d. Futures contract	______	______
e. Put option	______	______
f. Synthetic put	______	______

Option Marketing Strategies Problems

II. Crop Storage (producer storing on paper vs. actual storage)

A soybean producer has just finished harvest and wants to retain ownership in case prices rally. The cost to store soybeans (storage + interest) until mid to late June is $0.70 per bushel. In addition, the following information is available:

Current cash price	$9.83
CBOT July soybean futures	$10.6475
CBOT $11.60 July soybean call option	$0.6700
Expected basis in June	($0.40)
Commission to buy OR sell option	$50.00

What is the net price received for storing the soybeans versus selling them and buying a call option for each of the following price scenarios (A,B,C, and D)?

	A	B	C	D
Local cash price	$11.45	$9.85	$11.30	$12.25
July CBOT Futures	$12.25	$10.25	$11.65	$13.00
July CBOT $11.60 call option	$0.67	$0.02	$0.07	$1.41
Actual basis	($0.80)	($0.40)	($0.35)	($0.75)

Price Scenario A:

j. Storing soybeans	______	______	______	______
k. Buying call option	______	______	______	______

Option Marketing Strategies Problems

III. Short Hedge (producer hedging price of future sale)

It is early December and a dairy producer that intends to produce approximately 300,000 pounds of milk in June wants to hedge 67% of his expected production using options. Currently, the following information is available:

CME June Class III milk futures $15.79

CME June Class III milk options

Strike price	Put	Intrinsic	Time	Call	Intrinsic	Time
$14.50	$0.45			$1.73		
$14.75	$0.54			$1.57		
$15.00	$0.64			$1.43		
$15.25	$0.75			$1.29		
$15.50	$0.87			$1.16		
$15.75	$0.99			$1.03		
$16.00	$1.05			$0.84		
$16.25				$0.74		
$16.50				$0.64		
$16.75				$0.56		
$17.00				$0.49		

June forward cash contract	$14.50
Expected harvest-time basis	($1.00)
Commission to buy OR sell option	$0.03

Option Marketing Strategies Problems

1. What is the producer's expected minimum hedge price with the following options:

r. Put option

Strike price	
$14.75	______
$15.25	______
$15.75	______
$16.25	______
$16.75	______

s. Synthetic put (cash contract and call option)

Strike price	
$14.75	______
$15.25	______
$15.75	______
$16.25	______
$16.75	______

Option Marketing Strategies Problems

IV. Long Hedge (producer hedging price of future purchase)

A livestock producer that needs corn for feed in late winter (late Feb) wants to hedge the purchase price of the corn using options. This will allow the procuder to "lock-in" a purchase price in the event prices increase yet benefit in the event prices decrease.

In December the following information is available:

CBOT March corn futures	$3.89
CBOT $4.00 corn call option	$0.20
Expected basis (late Feb)	($0.30)
Commission to buy OR sell option	$0.01

t. What is the producer's maximum expected purchase price: ______

It is now late February and the producer has purchased the needed corn in the cash market. What is the actual price paid for the corn that was hedged under the following price scenarios (A, B, C, and D)?

	A	B	C	D
CBOT March corn futures	$4.54	$3.32	$4.62	$3.65
CBOT $4.00 corn call option	$0.55	$0.00	$0.62	$0.01
Cash price	$4.28	$2.95	$4.22	$3.35
u. Actual price paid	______	______	______	______

Before we move on…

Questions / discussion

Other options strategies…

- **Characteristics –**
  - anything goes…
  - buy / sell put(s), calls(s), sell futures, forward contract…
  - selling options requires margin account and maintenance
  - make sure you understand what you are doing!

Several of the more common options strategies

- Synthetic put – hedge (sell futures) or forward contract and buy call option (works similar to buying put option)
- Buying a call option in lieu of storing grain
- Window / fence – establish minimum (floor) and maximum (ceiling) prices by buying a put option and selling a call option(s) (selling options requires margin calls)

Comparing pricing alternatives…

Cash vs. Hedging vs. Options…

Because the various risk management tools have different characteristics (e.g., flat price vs. minimum price), it is useful to compare them under alternative price outcomes.

KSU-Option Strategies.xls (available on *www.agmanager.info)* is a tool that allows users to compare various pricing strategies, specifically focusing on using put and call options.

What "alternative price outcomes" should be considered?

CBOT soybean futures prices (12-09-09) …

Futures Detail

Refresh

DAY SOYBEANS (S) [10 minute delay] Future Symbol Search | Symbol Lookup

More Info	Month	Last	Chg	Open	High	Low	Volume	Open Int	Trade Time
chart options	Jan-10	1028'4s	-15'4	1043'0	1050'4	1022'0	95941	188546	12/09/09 13:41
chart options	Mar-10	1037'6s	-15'0	1052'0	1058'4	1031'0	52973	130011	12/09/09 13:41
chart options	May-10	1045'6s	-15'2	1059'0	1066'0	1041'0	18706	47119	12/09/09 13:41
chart options	Jul-10	1052'0s	-15'6	1052'0	1052'0	1051'0	11015	43785	12/09/09 13:41
chart options	Aug-10	1048'0s	-16'0	---	---	---	158	1791	12/09/09 13:41
chart options	Sep-10	1030'0s	-17'0	---	---	---	127	477	12/09/09 13:41
chart options	Nov-10	1020'0s	-17'0	1033'0	1038'0	1014'0	6668	63817	12/09/09 13:41
chart options	Jan-11	1028'0s	-17'6	1042'0	1046'0				
chart options	Mar-11	1035'6s	-17'2	1029'0	1029'0				
chart options	May-11	1035'2s	-16'0	---	---				
chart options	Jul-11	1037'2s	-14'2	---	---				
chart options	Aug-11	1035'0s	-14'0	---	---				
chart options	Sep-11	1025'0s	-14'0	---	---				
chart options	Nov-11	1017'0s	-14'0	1025'0	1025'0				

Nov-10 is trading at $10.20

This is the market's forecast as to what prices will be. How much confidence do we have in this forecast?

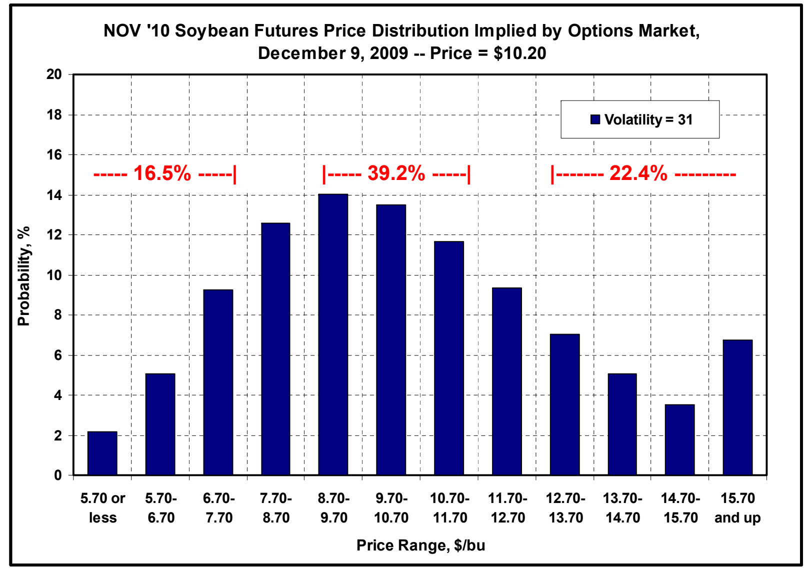
A. What is the probability price will be $9.70 to $10.70 (+/- $0.50) in late Oct?

B. What is the probability price will be $8.70 to $11.70 (+/- $1.50) in late Oct?

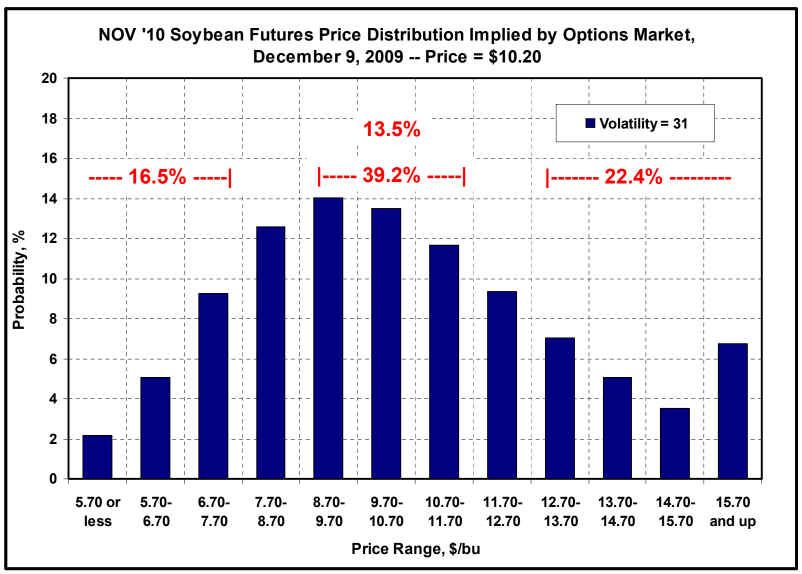
C. What is the probability price will be < $7.70 (down $2.50) in late Oct?

D. What is the probability price will be > $12.70 (up $2.50) in late Oct?

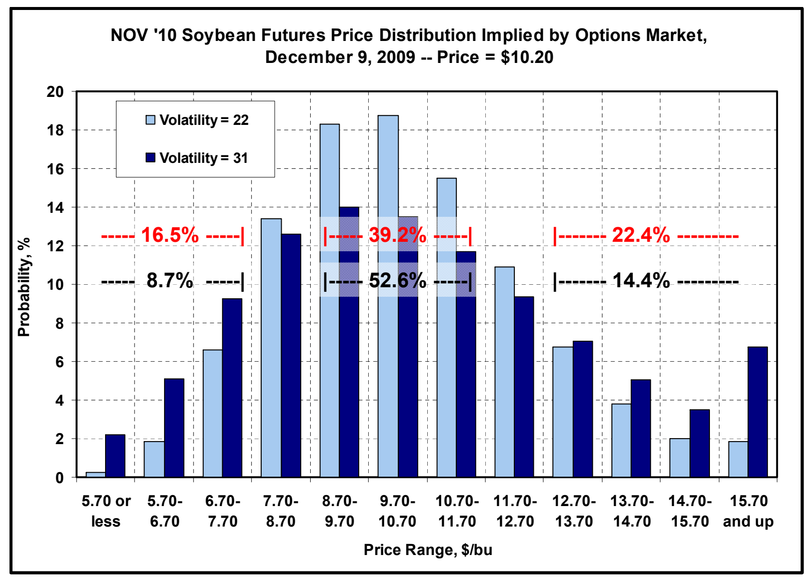
Distribution of market's expectation of Nov prices in early Dec…

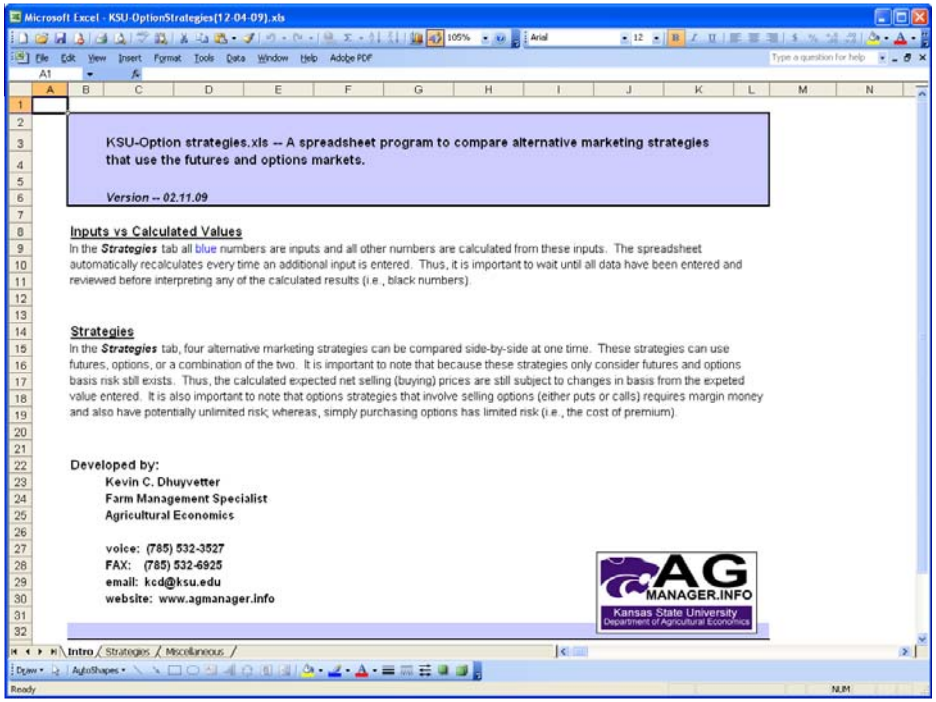


While $10.20 might be our best guess, we don't have all that much confidence that prices will end up being close to $10.20



At historical volatility levels, variability still exists, but we would have much more confidence in price forecast…





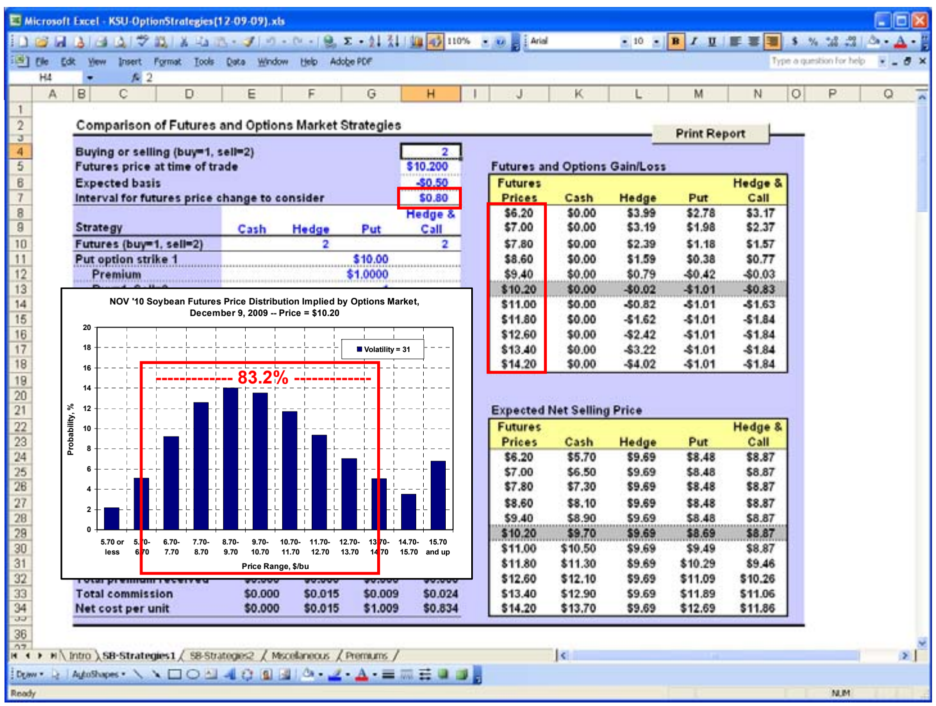
Example: 2010 soybean market (12/09/09 closing prices)

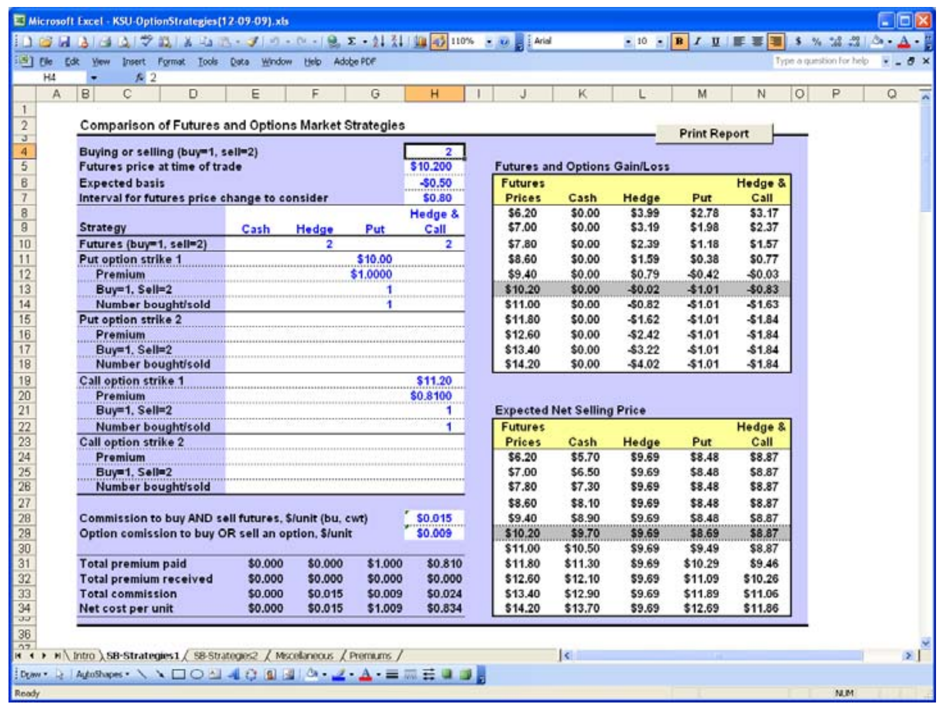
CBOT Nov 2010 Soybean (S)

Futures close	$10.2000
Days until expiration	315

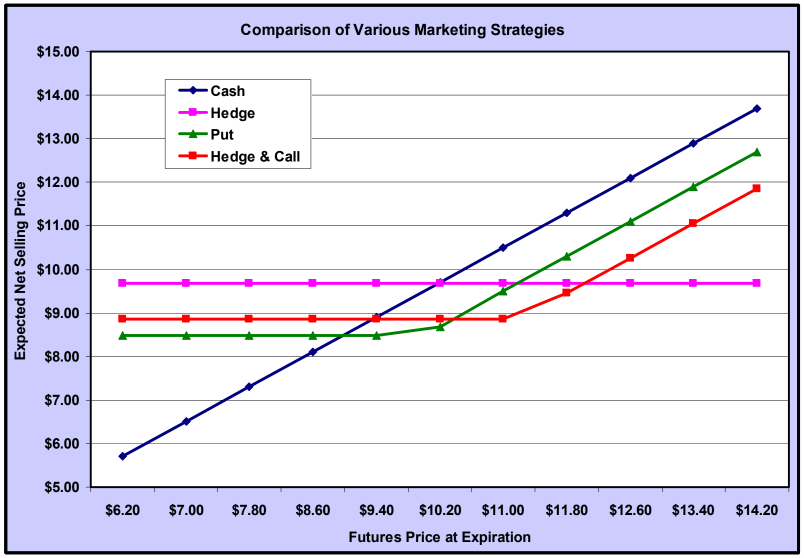
Strike price	Call premium	Put premium
$9.20	-----	$0.60250
$9.40	$1.48625	$0.69250
$9.60	$1.38375	$0.78875
$9.80	$1.28875	$0.89125
$10.00	$1.19875	$1.00000
$10.20	$1.12125	$1.12125
$10.40	$1.05000	$1.24875
$10.60	$0.98375	$1.38125
$10.80	$0.92250	-----
$11.00	$0.86250	$1.65625
$11.20	$0.81000	-----
$11.40	$0.76000	-----
$13.60	-----	$3.62375

A. Cash (do nothing)
B. Hedge (sell futures)
C. Buy Put option (floor price)
D. Hedge and buy Call option (floor price)





Example: 2010 soybean market (12/09/09 closing prices)



All expected net selling prices are based on assumption that actual basis = expected basis

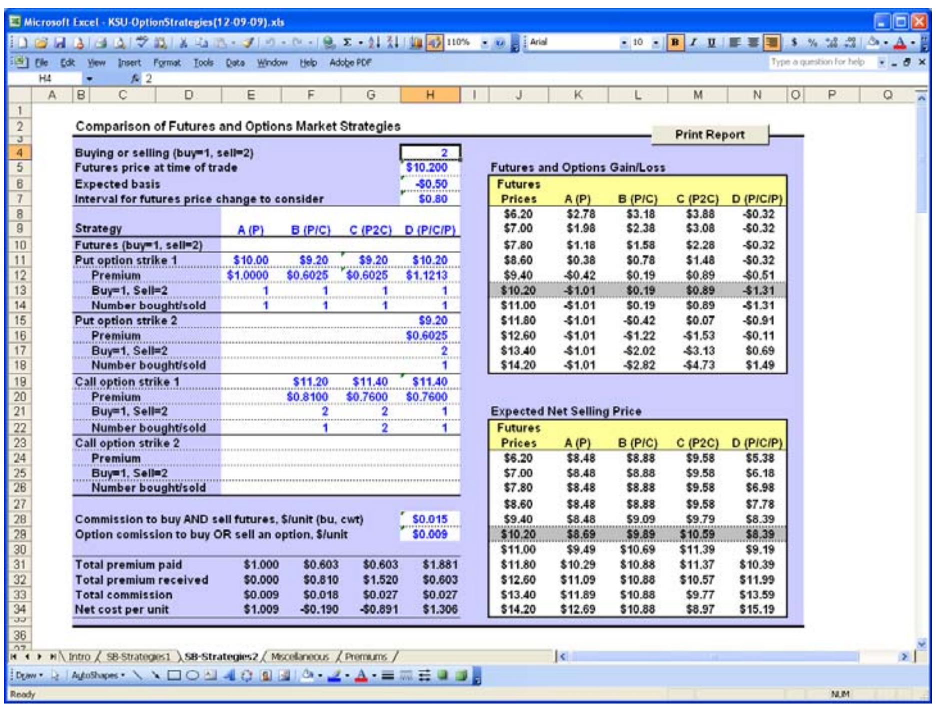
Comparison of additional options strategies

A. Buy Put option (floor price)

B. Buy Put option and sell Call option (window)

C. Buy Put option and sell two Call options (???)

D. Buy Put option, sell Call option, and sell Put option (???)



Comparison of Futures and Options Market Strategies

Buying or selling (buy=1, sell=2)	2
Futures price at time of trade	$10.200
Expected basis	-$0.50
Interval for futures price change to consider	$0.80

Strategy	A (P)	B (P/C)	C (P2C)	D (P/C/P)
Futures (buy=1, sell=2)				
Put option strike 1	$10.00	$9.20	$9.20	$10.20
Premium	$1.0000	$0.6025	$0.6025	$1.1213
Buy=1, Sell=2	1	1	1	1
Number bought/sold	1	1	1	1
Put option strike 2				$9.20
Premium				$0.6025
Buy=1, Sell=2				2
Number bought/sold				1
Call option strike 1		$11.20	$11.40	$11.40
Premium		$0.8100	$0.7600	$0.7600
Buy=1, Sell=2		2	2	1
Number bought/sold		1	2	1
Call option strike 2				
Premium				
Buy=1, Sell=2				
Number bought/sold				

Commission to buy AND sell futures, $/unit (bu, cwt)	$0.015
Option comission to buy OR sell an option, $/unit	$0.009

	A (P)	B (P/C)	C (P2C)	D (P/C/P)
Total premium paid	$1.000	$0.603	$0.603	$1.881
Total premium received	$0.000	$0.810	$1.520	$0.603
Total commission	$0.009	$0.018	$0.027	$0.027
Net cost per unit	$1.009	-$0.190	-$0.891	$1.306

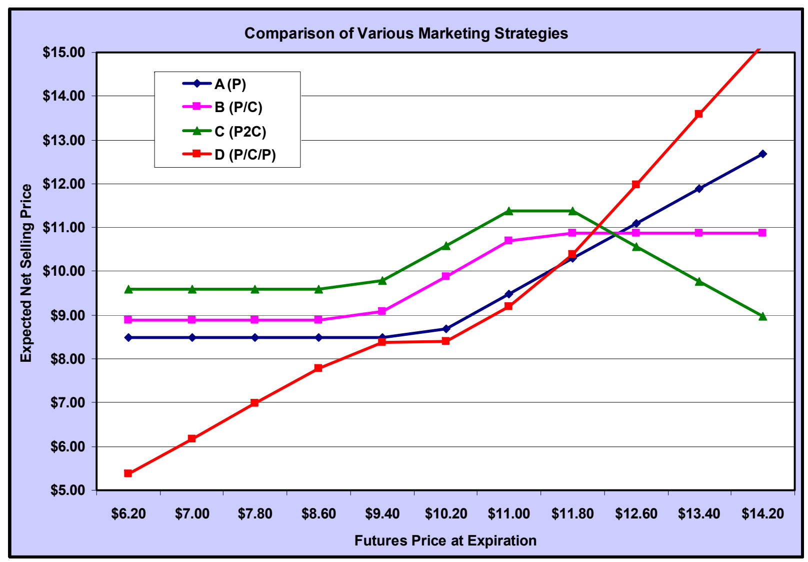
Futures and Options Gain/Loss

Futures Prices	A (P)	B (P/C)	C (P2C)	D (P/C/P)
$6.20	$2.78	$3.18	$3.88	-$0.32
$7.00	$1.98	$2.38	$3.08	-$0.32
$7.80	$1.18	$1.58	$2.28	-$0.32
$8.60	$0.38	$0.78	$1.48	-$0.32
$9.40	-$0.42	$0.19	$0.89	-$0.51
$10.20	-$1.01	$0.19	$0.89	-$1.31
$11.00	-$1.01	$0.19	$0.89	-$1.31
$11.80	-$1.01	-$0.42	$0.07	-$0.91
$12.60	-$1.01	-$1.22	-$1.53	-$0.11
$13.40	-$1.01	-$2.02	-$3.13	$0.69
$14.20	-$1.01	-$2.82	-$4.73	$1.49

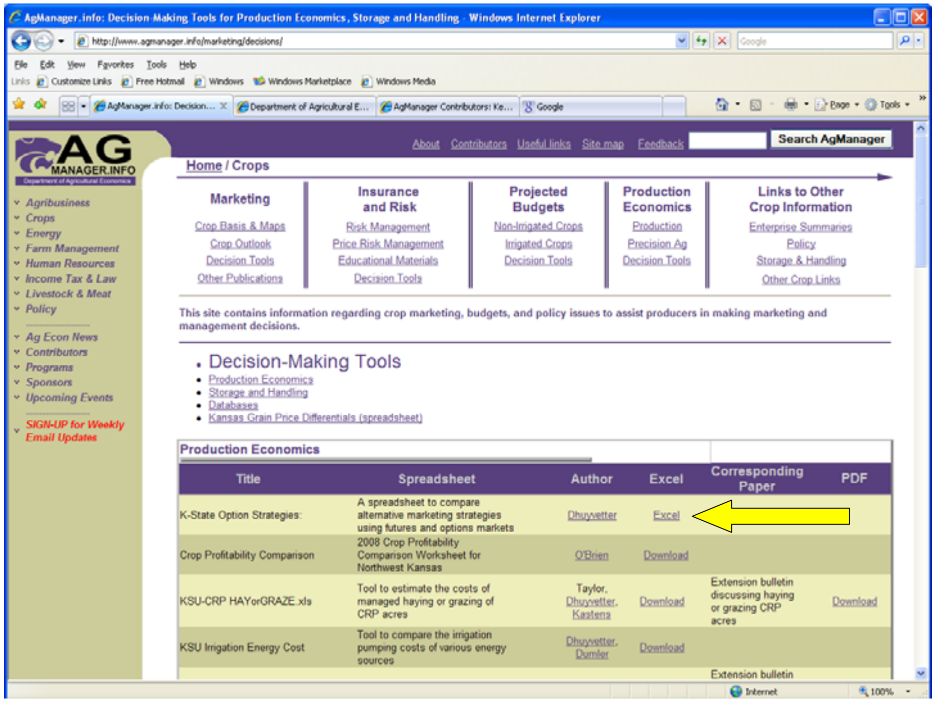
Expected Net Selling Price

Futures Prices	A (P)	B (P/C)	C (P2C)	D (P/C/P)
$6.20	$8.48	$8.88	$9.58	$5.38
$7.00	$8.48	$8.88	$9.58	$6.18
$7.80	$8.48	$8.88	$9.58	$6.98
$8.60	$8.48	$8.88	$9.58	$7.78
$9.40	$8.48	$9.09	$9.79	$8.39
$10.20	$8.69	$9.89	$10.59	$8.39
$11.00	$9.49	$10.69	$11.39	$9.19
$11.80	$10.29	$10.88	$11.37	$10.39
$12.60	$11.09	$10.88	$10.57	$11.99
$13.40	$11.89	$10.88	$9.77	$13.59
$14.20	$12.69	$10.88	$8.97	$15.19

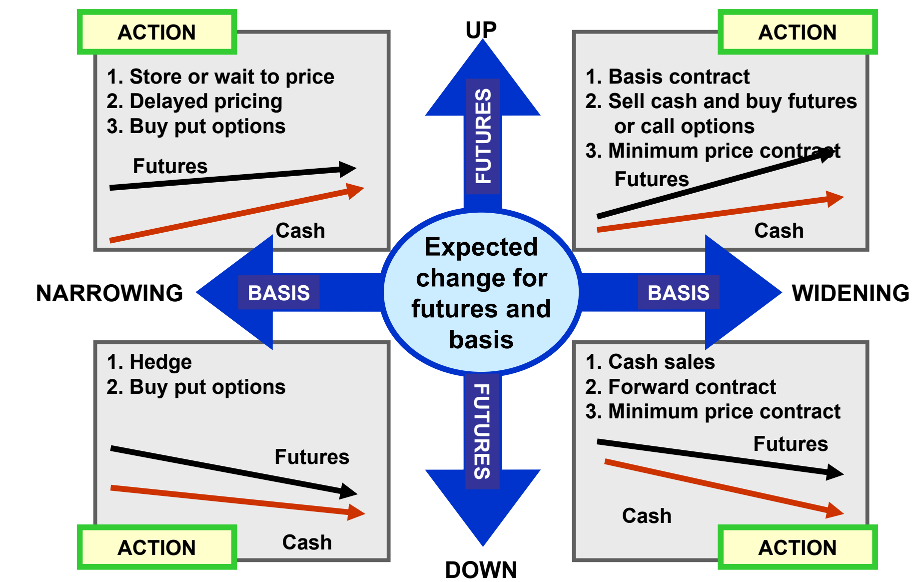
Bottom line: more advanced strategies can work if prices don't move too much -- with big moves they can work against you.



Note: expected value of all four lines is approximately equal.



Marketing strategies vs price/basis changes -- Seller



Marketing strategies vs price/basis changes -- Buyer