Introduction to Risk Management using Futures & Options

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Purpose of Futures Markets

- To facilitate the exchange of commodities across time
  - Important for seasonally-produced crops
  - Aids the process of price discovery
    - relates to how individual transactions assimilate information about supply and demand fundamentals
  - Provides efficient, cost-effective alternative to contracting

Major U.S. Futures Markets

- CME Group
  - Chicago Board of Trade (CBOT) - **Grains**
  - Chicago Mercantile Exchange (CME) – **Livestock** and financials
  - NYMEX/COMEX – energy, metals
- Intercontinental Exchange (ICE)
  - **Cotton**, FCOJ, cocoa, sugar
- Minneapolis Grain Exchange (MGE)
  - Wheat

Farmer/Rancher Use of Futures Markets

- Benchmark for contracting/formula pricing
- Hedging
- Speculation

Key Concepts

- Futures traders rarely take delivery of product
  - For many commodities, delivery is not even an option (e.g., feeder cattle)
- Accounts are settled every day
  - Zero sum game
  - Margin calls keep accounts current

Delivery Months

- Most contracts don’t trade in every month
  - Typically hedge with the contract month closest to (but not before) when the cash market transaction will occur

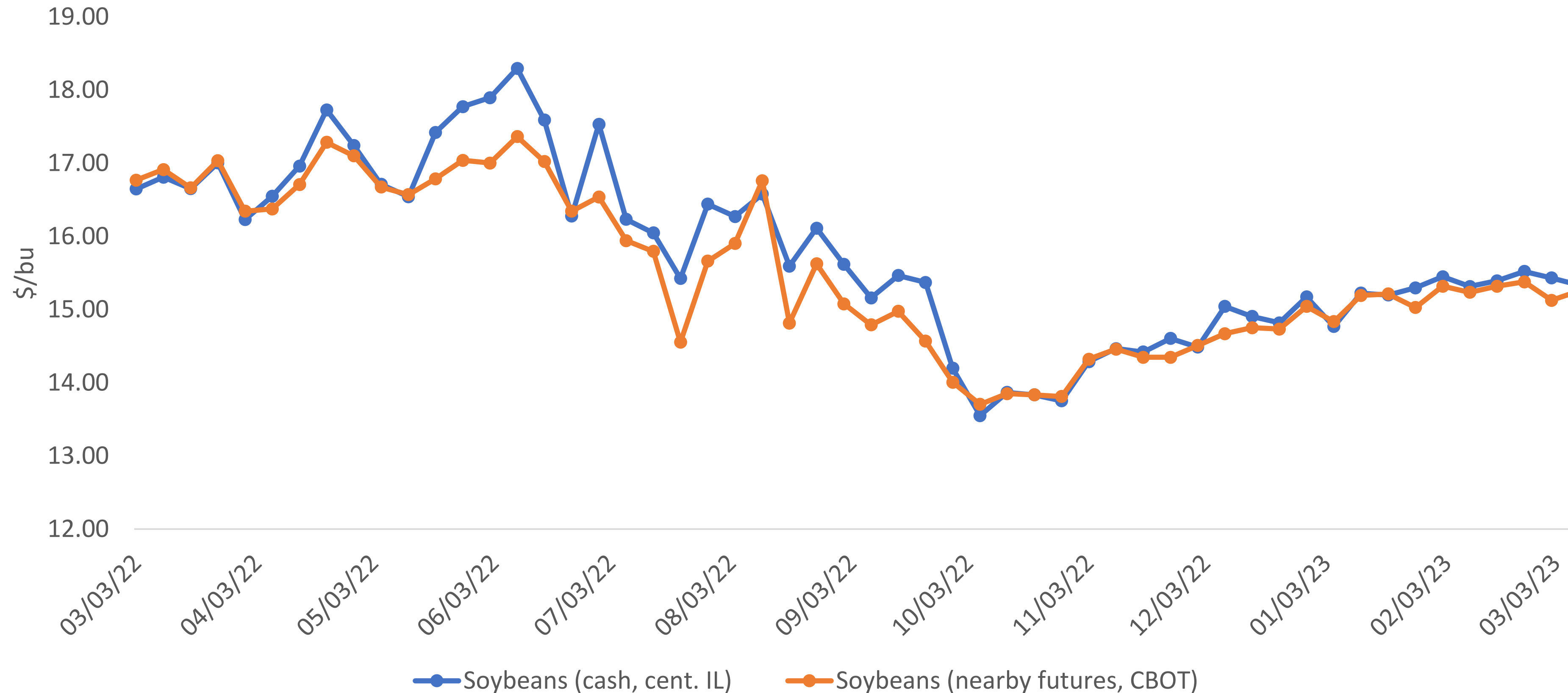
Delivery Months

	Cotton	Soybeans	Rough Rice	Corn	Live Cattle	Fdr. Cattle
Jan (F)		X	X			X
Feb (G)					X	
Mar (H)	X	X	X	X		X
Apr (J)					X	X
May (K)	X	X	X	X		X
Jun (M)					X	
Jul (N)	X	X	X	X		
Aug (Q)		X			X	X
Sep (U)		X	X	X		X
Oct (V)	X				X	X
Nov (X)		X	X			X
Dec (Z)	X			X	X	

What is Hedging?

- Taking opposite positions in the cash and futures market
  - If prices move together, gains in one market offset losses in the other
- A temporary substitute for an eventual cash market transaction

Cash v. Futures SoybeanPrice



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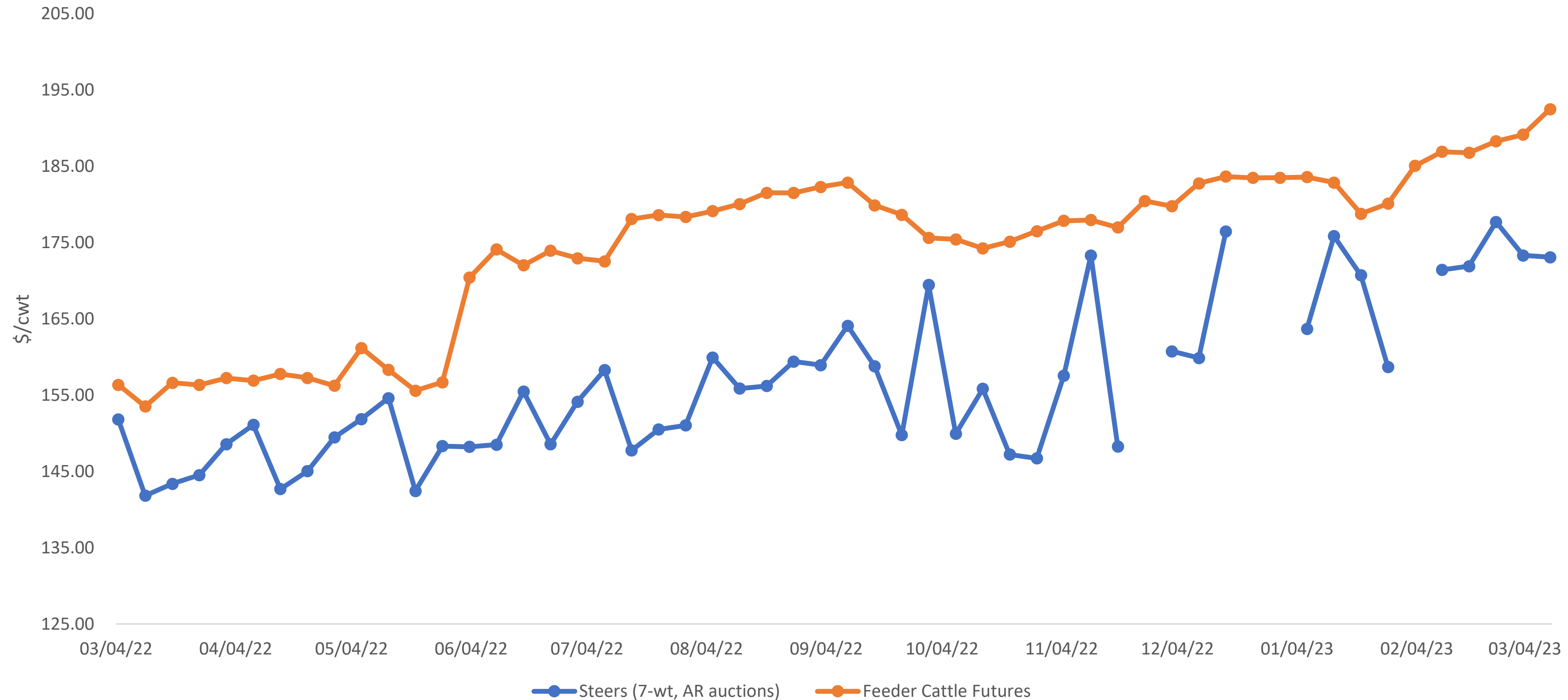
Cash v. Futures Feeder Cattle Price



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Basic Terminology

- Short hedge
  - Initiated by selling a futures contract (or buying a put option)
  - Used by producers of a commodity
- Long Hedge
  - Initiated by buying a futures contract (or buying a call option)
  - Used by consumers of a commodity
    - E.g., livestock producer hedging corn purchases

What is Hedging NOT?

- A way to enhance profits
  - Focus is on managing risk, not increasing returns
- A way to eliminate risk completely
  - Hedging addresses price risk only. Other sources of risk are still present

Hedging

- Taking opposite positions in the cash and futures market
- The futures transaction is a temporary substitute for an eventual cash market transaction
- If cash and futures prices move together, gains in one market offset losses in the other

Example Hedge

Hedge to "lock in" corn price of **$5.50/bu**.

	Cash Market	Futures Market
Apr.	Corn planted and coming up.	Short Sep C futures @ $5.50
Sep.	Sell corn for $4.50	Long Sep C futures @ $4.50

Net Price = $4.50 cash + $1 futures gain = **$5.50/cwt**

Hedging and Basis

- Basis: difference between cash price at a given spot market and the futures price
- If basis is consistent, hedging works very well
  - Cash and futures markets are moving together
- Hedging amounts to trading price risk for basis risk

Example Hedge with Basis

Hedge to "lock in" corn price of **$5.30/bu**.

	Cash Market	Futures Market
Apr.	Corn planted and coming up.	Short Sep C futures @ $5.50 (expect -0.20 cent basis)
Sep.	Sell corn for $4.30	Long Sep C futures @ $4.50

Net Price = $4.30 cash + $1 futures gain = **$5.30/cwt**

Hedge with Changing Basis

Hedge to "lock in" fed cattle price of **$165/cwt**.

	Cash Market	Futures Market
Nov.	Place load of feeder cattle in feedlot	Short Apr. LC futures @ $167 (expect –$2 basis)
Apr.	Sell fed cattle for $150	Long Apr. LC futures @ $157 (-$7 basis)

Net Price = $150 cash + $10 futures gain = **$160/cwt**

Basis

- With short hedge, if basis weakens (cash price declines relative to the futures price), the hedge won't work as well as expected
- With a short hedge, if basis strengthens (cash price improves relative to futures price), the hedge will work better than expected

Factors Affecting Basis

- Transportation costs
  - Between producing and consuming regions
- Supply of and demand for storage
  - Affect carrying charge
- Farmers' willingness to sell
  - e.g., cash flow considerations
- Buyer competition
  - Bids up cash prices, strengthens basis

Options

- Give the holder the right but not the obligation to buy or sell a futures contract at a specified price on or before a certain expiration date

Options Terminology

- put -- conveys the right to short (sell) a futures contract
- call -- conveys the right to go long (buy) a futures contract
- premium -- amount paid for an option
- strike price -- price at which the option gives the holder the right to take a position on the underlying futures contract

Hedging with Options

✓Options allow a producer to manage price risk using the futures market without actually holding a futures market position

- Allows producer to take advantage of futures market price changes
- Avoid margin calls
- Up-front premiums can be expensive

Options Hedge Example

Hedge 1		
Futures Price	13.00	
Expected Basis	-0.50	

	Option 1	Option 2
Put Strike Price	13.00	12.40
Premium	0.71	0.45
Protected Price	12.50	11.90
Less Premium	**11.79**	**11.45**

Options Hedge Application

Futures Price	13.00
Expected Basis	-0.50
Expected Harvest Price	12.50
Strike Price	12.40
Premium	0.45
Protected Price[1]	**11.45**
Futures Price @ Expiration	10.40
Actual Basis	-0.50
Cash Market Price[2]	9.90
Futures Gain[3]	1.55
Cash Receipts + Futures Gain	**11.45**

[1] Strike Price - Premium - Transactions Fees + Basis

[2] Futures Price + Basis

[3] Strike Price - Futures at Expiration - Premium - Transactions Fees

Option Hedge: Price Increase

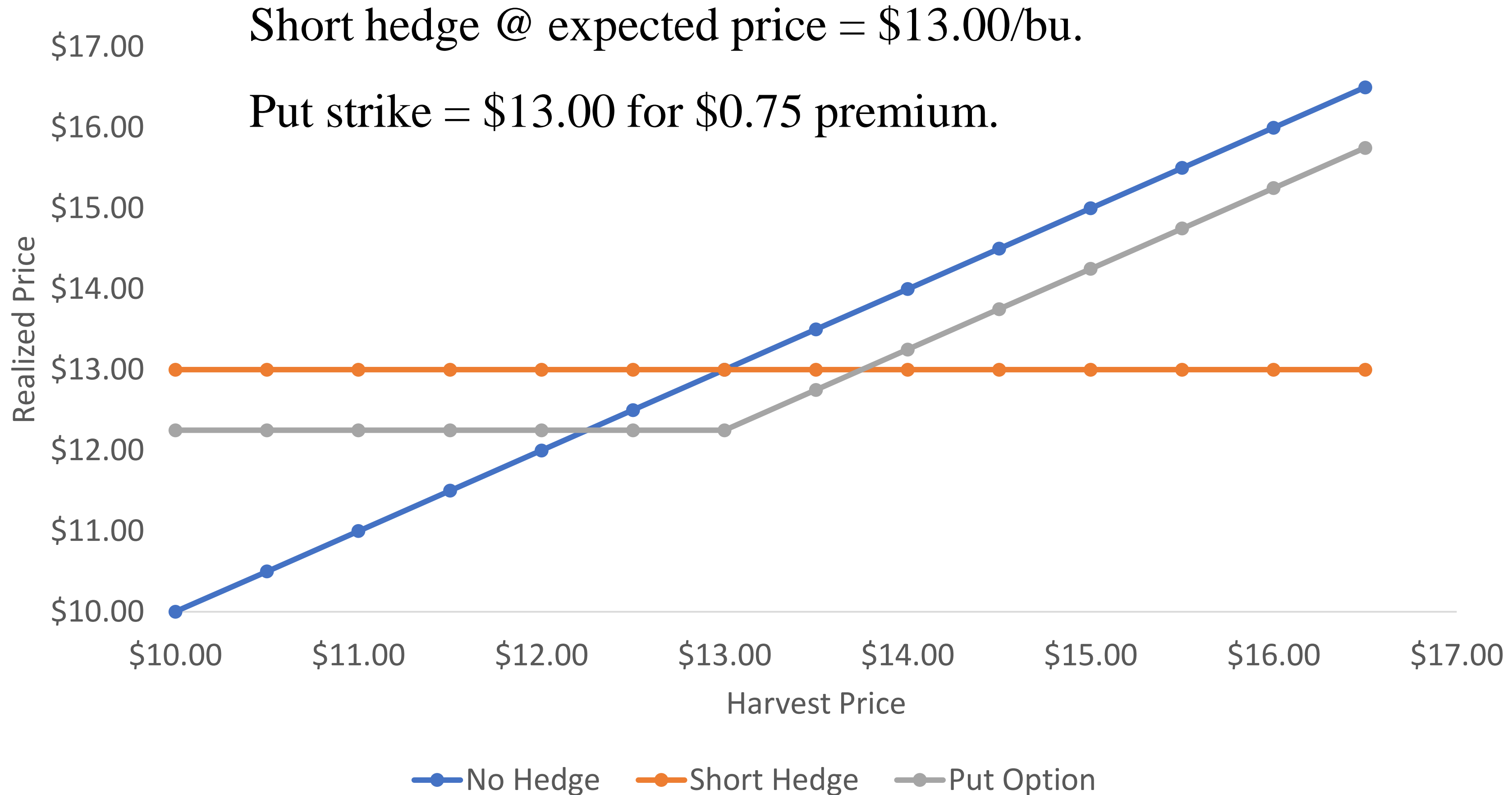
Futures Price	13.00
Expected Basis	-0.50
Expected Harvest Price	12.50
Strike Price	12.40
Premium	0.45
Protected Price[1]	**11.45**
Futures Price @ Expiration	14.00
Actual Basis	-0.50
Cash Market Price[2]	13.50
Futures Gain[3]	-0.45
Cash Receipts + Futures Gain	**13.05**

[1] Strike Price - Premium - Transactions Fees + Basis

[2] Futures Price + Basis

[3] Strike Price - Futures at Expiration - Premium - Transactions Fees

Hedging Outcomes



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Margin Accounts

- Hedgers are required to maintain margin accounts
  - Margin requirements are lower for hedgers than for speculators
  - Margin calls are a possibility for hedgers
    - Make sure the bank understands this

Margin Requirements

Commodity	Initial	Maintenance
Live Cattle		
Hedger	$1,350	$1,000
Speculator	$2,700	$2,000
Soybeans		
Hedger	$1,350	$1,000
Speculator	$3,150	$2,500

Margin Account Example

- You have a $10,000 commodity account with a brokerage firm. On Mar 21, you go short (sell) one Oct LC contract @ $160.
  - Initial margin = $1,350
  - Maintenance margin = $1,000

Margin Account Example

		closing price	price change	gain/loss	beginning balance	balance + gain/loss	initial deposit	margin calls	ending balance
sell @ close	3/21	$160.00					$1,350		$1,350
	3/22	$162.00	$2.00	($800)	$1,350	$550		$450	$1,000
	3/23	$162.50	$0.50	($200)	$1,000	$800		$200	$1,000
	3/24	$163.25	$0.75	($300)	$1,000	$700		$300	$1,000
	3/25	$161.00	($2.25)	$900	$1,000	$1,900		$0	$1,900
	3/26	$160.00	($1.00)	$400	$1,900	$2,300		$0	$2,300
	3/27	$157.50	($2.50)	$1,000	$2,300	$3,300		$0	$3,300
buy @ close	3/28	$159.00	$1.50	($600)	$3,300	$2,700		$0	$2,700

Commodity Acct. Summary

Beginning Balance	$10,000
Initial Margin (3/21)	-$1,350
Margin Calls	-$950
Returned from margin acct. (3/28)	$2,700
Ending Balance	$10,400
Profit/Loss	**$400**

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Other Risk Management Tools

- Other tools exist for participating in the risk transfer facilitated by futures markets without trading futures instruments yourself
  - Forward Contracting – forward contracts are offered based on prices available on underlying futures contracts
  - Crop Insurance – revenue insurance guarantees are based on futures prices during some defined 'price discovery' period
    - RP product on crops
    - LRP product on cattle