4. Basics of Futures and Options: Part 1

Sean Fox <seanfox@k-state.edu>

John A. (Sean) Fox is a native of Ireland and has been on the faculty at K-State since 1994. His B.S. in Agricultural Science is from University College Dublin and his Ph.D. in Agricultural Economics from Iowa State University. Currently a Professor of Agricultural Economics, he has taught classes in Agricultural Policy, International Trade, Futures Markets, Managerial Economics and Applied Econometrics. His research is primarily focused on non-market valuation and involves surveys, market experiments, and retail trials in an effort to quantify consumer valuation of food safety and response to new food products, technologies or information.

Abstract/Summary

Session 1:

<u>Futures markets:</u> *a. Where they are, contracts traded, months traded, contract specs, volume, open interest, b. Performance guarantee, offsetting – how those work, c. Margin requirements, price limits d. Open outcry vs computer trading.* ***<u>Trading:</u>*** *a. Opening an account, Choosing a broker – local vs online, commissions, b. Types of order: market, limit, stop orders, c. Hedging accts vs Speculation accts (margin and tax implications).* ***<u>Hedging:</u>*** *a. Basis, basis risk, basis patterns, b. Basics of a short (long) hedges, c. Futures vs cash forward contracts d. Hedge-to-arrive (HTA) and basis contracts, e. Marketing alternatives for different price and basis situations*

Futures & Options
Basic Concepts, Part 1

RISK AND PROFIT, AUGUST 2013

SEAN FOX
DEPT. OF AG. ECONOMICS
KANSAS STATE UNIVERSITY

Overview

2

- Futures markets, contracts, terminology
- Hedging with futures vs forward contracts
  - Basis
  - Examples of hedges
- Price patterns
  - Marketing alternatives in different price scenarios
  - Technical and Fundamental analysis

A Futures Contract

3

- an agreement between a buyer and a seller
- requires seller to deliver and the buyer to accept delivery of:
  - a specified amount
  - of a specified commodity
  - at a specified location
  - <u>on some (specified) future date</u>
- <u>**Everything fixed (standardized), except price**</u>

Futures Exchanges

4

- CME Group (Chicago) www.cmegroup.com
  - is where most US agricultural futures and options contracts are traded
    - Corn, Soybeans
    - Wheat – SRW and, since June 2013, HRW (from KC)
    - Live cattle, Feeder cattle, Lean hogs
    - Class III milk,
    - Cotton, Cocoa, Sugar (on NYMEX, part of CME)
  - <u>PLUS</u> Energy, Metals, Foreign Exchange, etc.
  - Most futures trading is now electronic
    - Some exchanges are electronic only

How do I trade?

5

- First you need to open an account. Two alternatives are:
  - Local "introducing broker"
    - Buchanan & Co. http://www.buchananandcompany.com/
  - Online broker
    - OptionsExpress https://www.optionsxpress.com
    - Others: E*Trade, TradeStation, TDAmeriTrade, Optionshouse,
    - Some don't offer futures – TradeKing, Scottrade
  - Commission and service varies

Why trade futures?

6

- 1. To hedge
  - Objective is to manage price risk, an effort to lock in a price ahead of a future sale or purchase
- 2. To speculate
  - Objective is to make a profit
  - The distinction isn't always perfect.

Price risk in commodity markets

7

- December Corn
  - 2011: $4.50 to $7.75, peak in late August
  - 2012: $4.00 to $8.50, peak in late August
  - 2013: $4.50 to $6.60, peak in **August 2012**

Dec. 2011 Corn (Dec, 2011)

Dec. 2012 Corn

Dec. 2013 Corn (Aug 16,2013)

July 2014, KC Wheat

To hedge 2014 wheat .....

12

- Sell KC 2014 July wheat futures contracts.
  - If prices fall, the profit on futures compensates for the decline in the value of the crop
  - On the other hand, if prices rise, the loss on futures prevents you from benefiting from the higher price.
  - Effectively, a price has been locked in*
  - This will work ..... as long as the cash price and the price of the futures contract move together.

"Selling futures"

13

- When you "sell a wheat futures contract,"
  - you have an obligation to deliver wheat at a future date.
  - not selling wheat **now** → doesn't matter whether or not you own wheat **now**
- Most futures contracts do not result in delivery
  - Instead, obligations to deliver or accept delivery are offset – by taking an opposite position in a 2nd contract.
  - i.e.; 1st sell a contract - offset by buying back the same contract
  - Or, 1st buy a contract – offset by selling the same contract
  - In both these cases, one obligation cancels the other.

Terminology

14

Seller of futures → "**short futures**"

Buyer of futures → "**long futures**"

- "**Short**" and "**Long**" are also used to describe positions in the cash (spot) market
  - **Long** – you own the commodity, will be selling
    - (e.g., corn in store, wheat in field)
  - **Short** – need it, will be buying

Grain – Months traded

15

- Wheat and Corn
  - Mar, May, Jul, Sep, Dec
  - H , K , N , U , Z --- letters represent months
- Soybeans
  - Jan, Mar, May, Jul, Aug, Sep, Nov

Several contracts trade at the same time

Oct 2012, can now trade **Dec 2015** corn

Why not trade every month? (Liquidity, Thin markets)

Grains - Price patterns

16

Carrying charge (normal) market

→ deferred futures trade at a higher price

- July < Sep < Dec < Mar < May > July
  - spread reflects what market will pay to carry (store)
  - spread won't exceed "full carry". Why not?

Inverted market

→ nearby futures at higher prices

→ market wants the grain now

Livestock – months traded

17

- LC - Feb, Apr, Jun, Aug, Oct, Dec
- FC – Jan, Mar, Apr, May, Aug, Sep, Oct, Nov
- LH – Feb, Apr, May, Jun, Jul, Aug, Oct, Dec

Contract sizes

18

- Grains
  - Standard is 5,000 bu
    - Mini contracts at CME are 1,000 bu
- Livestock

  Live cattle – 40,000 lbs

  Feeder cattle – 50,000 lbs

  Lean hogs – 40,000 lbs

Price quotes - Grains

19

- CME uses a 4 digit system
  - **digits** represent dollars, cents, & **eights** per bushel
- Example
  - Dec'12 Corn quoted as 609'6 (or 609-6)
  - This means $6.09 and 6/8 cent / bu ($6.09¾)
  - Minimum price change (tick) → **¼ cent/bu**
  - →Last digit can only be 0, 2, 4, or 6
- Several delivery contracts are listed simultaneously
  - See www.cmegroup.com
  - Lists Dec 2016 corn, July 2016 wheat

Price quotes (CME)

20

- Last – most recent price (20min delay +/-)
- Change – from prior settle (e.g., +6'4)
- Prior settle – yesterday's closing price (avg of closing range)
- Open – opening (range) of prices
- High – highest price during session
- Low – lowest price during session
- Volume – number of contracts traded

Open interest is the number of contracts not offset. Like volume, it is an indicator of market liquidity – the ability to quickly execute a trade at the current price.

Typical Daily CME Volumes

21

Corn	300,000
Wheat, Beans	100,000
Live Cattle	50,000
KC Wheat	25,000
Feeder Cattle	5,000
Ethanol	1,000
Oats	300

Price Limits

22

CME Quotes include a hi/lo limit

- largest permitted change from prior settle

Example

Soybeans: limit is +/- 70c/bu (C - 40, W - 60)

e.g., settle at **$14.00 today**

Tomorrow's permitted range is from **$13.30 to $14.70**

At $13.30 market would be "**limit down**"

At $14.70 market would be "**limit up**"

Short hedge – falling prices

23

- Aug 2013: planning to sell wheat in July'14
  - **Sell** July14 wheat futures @ $7.93
- July 1, 2014:
  - Sell wheat locally at $6.53
  - Buy back futures @ $6.53
- Hedge locked in a price of $7.93
  - Cash price of $6.53/bu
  - Profit of $1.40/bu on futures

(Ignoring basis – any difference between cash & futures – for now)

Short hedge – rising prices

24

- Aug 2013: planning to sell wheat in July'14
  - **Sell** July wheat futures @ $7.93
- July 1, 2014:
  - Sell wheat locally at $10.43
  - Buy back futures @ $10.43
- Hedge locked in a price of $7.93
  - Cash price of $10.43/bu
  - Loss of $2.50/bu on futures

Did the hedge work?

Summary

25

- In these examples the hedge locked in a price that was equal to the futures price at the time the hedge was placed
- Why?
  - because, in July, the cash and futures were equal
  - Cash and futures are typically not equal, and the difference between them is called basis

Basis

26

- **Basis** is the difference between the cash price and the futures price.
- Cash and futures typically **aren't** equal

Basis = Cash – Futures

Rearranging → **Cash = Futures + Basis**

Hedging locks in the futures, not the basis.

Changes in Basis - terminology

27

- **Strengthening**
  - from -90 to -50; from -5 to +2; from +10 to +16
  - "narrowing" → becoming less negative
- **Weakening**
  - from -70 to -85; from +17 to -5; from -3 to -16
  - "widening" → becoming more negative

Basis risk ...

28

- When a hedge is placed, **you don't know what the basis will be** when you sell
  - could be 80 under, 110 under, 50 under, etc
- Basis risk
  - → fact that basis is variable, not perfectly predictable
  - → But it is somewhat predictable (more so than price).
  - → How? Using historical data

Short hedge – rising prices

29

Oct 22: plan to sell wheat at harvest in July
- **Sell July wheat futures @ $8.80**
- **Expected basis is 70 under**

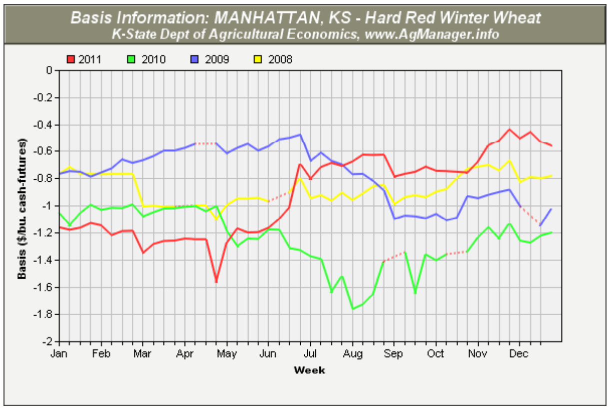
- July 1:
  - Sell cash wheat @ $8.50; offset futures @ $9.40
  - Basis is 90 under
- The hedge results in a price of $7.90
  - **Futures + Basis:** $8.80 - $0.90 = $7.90
  - Same as: Cash $8.50 + loss of $0.60 on futures = $7.90

Short hedge – falling prices

30

- Nov 22: planning to sell wheat in July
  - **Sell July wheat futures @ $7.80**
  - **Expected basis is 60 under**
- July 1:
  - Sell cash wheat at $6.80
  - Offset futures @ $7.20
  - Basis is **40 under** (better than expected)
- Net price from hedging?
  - Futures + Basis: **$7.80 - $0.40 = $7.40**
  - Same as Cash $6.80 + $0.60/bu on futures → $7.40

Manhattan – Wheat Basis



Using basis information

- **Feb 18**.
  - Elevator offers **$6.48** forward price for new crop wheat
  - Is that a good offer?
  - How do you evaluate it?
  - That price represents a basis of **??** under July
  - What basis **do you expect** in July?

Hedge – or forward contract?

- With a hedge:
  - you have basis risk
  - you need to manage a margin account
- With the added risk, the average return <u>should</u> be higher
  - Taylor et.al., 2003 → +7c bu <u>on average</u>

Which contract?

- Which contract month?
  - Futures that is nearby at the time you plan to buy/sell
  - Corn – generally Dec for new crop, Wheat – July,
- How many contracts?
  - Most producers that do hedge don't <u>fully</u> hedge
- For how long?
  - <u>Can be</u> offset prior to cash sale

Another sample hedge

- <u>Oct 31</u>: plan to sell 5,000bu wheat in July
  - July futures @ $6.20, Expected basis -$0.80.
  - Expected price = 6.20 - 0.80 = <u>**$5.40**</u>
  - **ACTION: sell 1 July futures @ 6.20**
- <u>July 1</u>: Cash price ***$5.10***, July futures @ $5.70
  - Basis is -$0.60, ***stronger than expected***
  - **ACTION: sell wheat @ 5.10, offset futures @ 5.70**
- <u>**Realized price**</u>

  Futures + realized basis = $6.20 - $0.60 = <u>**$5.60**</u>

  = Cash + gain on futures = $5.10 + $0.50 = <u>**$5.60**</u>

and yet another ....

- <u>Oct 31</u>: plan to sell 5,000bu wheat in July
  - July futures @ $6.20, Expected basis -$0.80.
  - Expected price = 6.20 - 0.80 = <u>**$5.40**</u>
  - **ACTION: sell 1 July futures @ 6.20**
- <u>July 1</u>: Cash price ***$8.10***, July futures @ $9.50
  - Basis is -$1.40, ***weaker than expected***
  - **ACTION: sell wheat @ 8.10, offset futures @ 9.50**
- <u>**Realized price**</u>

  Futures + realized basis = $6.20 - $1.40 = <u>**$4.80**</u>

  = Cash + loss on futures = $8.10 - $3.30 = <u>**$4.80**</u>

Margin

37

- Deposit required of <u>both</u> buyer and seller
  - both have risk of losing $$
  - held in a Margin Account by the FCM
  - accounts adjusted daily based on settlement price

  - Initial margin: the initial deposit
  - Maintenance: <u>min. amount</u> to be maintained
  - Margin call: request for additional funds

  Hedgers pay less initial margin than speculators

Margins are set by the exchange

38

- typically around 3% to 10**%** of contract value
- varies with price and volatility

- Example - Corn
  - <u>Jan 2005</u>, Corn at $2.70: Initial **$540**, Maint. $400
    $540 = **4%** of contract value ($13,500)

  - <u>Aug 2011</u>, Corn at $7.20: Initial **$2,363**, Maint. $1,750
    $2363 = **6.5%** of contract value ($36,000)

    Cash flow implications of higher margins.

Margins and volatility

39

- Live cattle margins
  - Nov 1, 2003, Price = $90/cwt
    - Initial - $1,600; Maintenance - $1,200
    - Approx 4.5% of value

  - Feb 1, 2004, Price = $80/cwt
    - Initial - $2,700; Maintenance - $2,000
    - Approx 8.5% of value (due to increased volatility)

- Why did volatility increase?

Margin – example

40

- KC Wheat
  - Contract = 5000bu
  - Initial margin = $3125; Maintenance = $2500

  <u>Day 1</u>: Sell 1 Dec @ 725'0, deposit $3125
  <u>Day 2</u>: Dec settles @ 745'0 (up 20)
  - Receive margin call ?
  - If so, how much?

Margin and cash flow

41

- If you decide to hedge using futures – what is your plan for dealing with margin calls?
- <u>Worst case scenario</u>
  - Hedge (i.e., sell futures)
  - make some margin calls as price rises,
  - exit market after substantial loss,
  - then price falls.

  See 2008

December 2008 Corn

42