

16. Profitability of Storage Hedges for Kansas Wheat Producers

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Lacey Ward is a first-year graduate student pursuing a Master's in Agricultural Economics at K-State. She graduated from Fort Hays State University in December of 2013 with a degree in Ag Business. Her family farms and has a cow-calf operation close to Superior, Nebraska. She has assisted in research on farm profitability differences in Kansas, as well as worked as a grain merchandising intern for Gavilon, LLC. Commodity marketing and farm management are Lacey's main areas of interest, and she hopes to one day work as a grain merchandiser or farm consultant.

Sean Fox

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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, Ireland and his Ph.D. in Agricultural Economics from Iowa State University. 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 to investigate consumer valuation of food safety and their demand for new food products, technologies or information.

Abstract/Summary

Two post-harvest marketing alternatives for grain are speculative and hedged storage, using either on-farm or commercial facilities. Speculative storage will only be profitable if the grain price increases by more than the full cost of storage. Hedged storage, which involves a short position in futures, will be profitable if the basis strengthens by more than the full cost of storage. This presentation will provide illustrations of both hedged and speculative storage and summarize the returns to each for Kansas wheat producers over the past 20 years.

PROFITABILITY OF STORAGE HEDGES FOR KANSAS WHEAT PRODUCERS

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Presented by: Dr. Sean Fox & Lacey Ward

POST-HARVEST DECISIONS

- After harvest, farmers have the option to sell or store their grain.
 - <http://www.agprofessional.com/news/US-farmers-resort-to-giant-storage-bags-to-avoid-cheap-sales-288318682.html>
- If they decide to store, they have two choices:
 - Speculative storage – futures and basis can vary
 - Hedged storage – futures is locked in, but basis can vary
- Hedging protects against a price decrease, but also eliminates gains from a price increase

STORAGE HEDGE

- The producer sells a wheat futures contract for a later date while being long cash grain following harvest
- This locks in the futures price, but leaves the basis to vary
- The objective of a storage hedge is to **gain from a strengthening basis**

HOW TO EVALUATE STORAGE HEDGE PROFITABILITY

- Need information on:
 - Opening basis
 - Expected closing basis
 - Storage costs
- $\text{Expected Profit} = \text{Projected Basis Improvement} - \text{Storage Cost}$

OPENING BASIS

- This is the difference between the cash price at the start of storage versus the futures price of the contract hedged
- Example:
 - June 2004 (Average Prices)
 - Cash Price in Beloit: \$3.42
 - December Futures Contract: \$3.97
 - Cash – Futures = Basis
 - Basis = - \$0.55

EXPECTED CLOSING BASIS

- This is what you expect the basis to be when you sell your grain
- You can make an estimate by looking at historical basis levels
- Example:
 - If you were trying to estimate the expected closing basis for December 2004 in Beloit, you could look at the basis level at that time for each of the five years prior
 - 2003: - \$0.23
 - 2002: - \$0.08
 - 2001: - \$0.12
 - 2000: - \$0.18
 - 1999: - \$0.46
 - The average of these is - \$0.21 or the weakest basis was - \$0.46. Make your decision depending on your market expectations and risk tolerance.

STORAGE COSTS

- This includes the physical cost of storing grain as well as the opportunity cost
- Opportunity cost is calculated using the current operating loan interest rate
- Example:
 - Beloit in 2004
 - Elevator charge: \$0.03/bu/mo
 - Opportunity cost: $\$0.015/\text{bu}/\text{mo}$ ($\$3.42 \times 5.234\% \times 1/12$)
 - Total cost: \$0.045/bu/mo
- Cost of carry until December (3.5 months): \$0.25/bu

EXPECTED PROFIT

- Expected Basis Improvement – Storage Costs = Expected Profit
- Expected profit is the expected profit/loss compared to selling grain at harvest
- Example:
 - Beloit in June 2004
 - Expected Closing Basis – Opening Basis = Expected Basis Improvement
 - $-0.21 - -0.55 = 0.34$
 - Total Storage Costs = \$0.25
 - Expected Basis Improvement – Storage Costs = Expected Profit
 - $0.34 - 0.25 = 0.09$

ACTUAL PROFIT

- Actual Basis Improvement – Storage Costs = Actual Profit
- Actual profit is the actual profit/loss compared to selling grain at harvest
- Example:
 - Beloit in December 2004
 - Average Cash: 3.29
 - Average Futures: 3.45
 - Actual Closing Basis – Opening Basis = Actual Basis Improvement
 - $-0.16 - -0.51 = 0.35$
 - Total Storage Costs = \$0.25
 - Actual Basis Improvement – Storage Costs = Actual Profit
 - $0.35 - 0.25 = 0.10$

SPECULATIVE STORAGE EXAMPLE

- Beloit 2004 (Average Prices)
 - June Cash: 3.42
 - December Cash: 3.29
- Price Improvement: $3.29 - 3.42 = -0.13$
- Storage Costs: 0.25
- Price Improvement – Storage Costs = Profit/Loss
 - $-0.13 - 0.25 = -0.38$

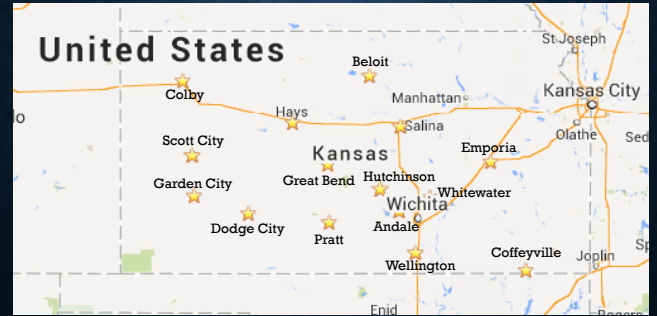
HANDOUT

OUR STUDY

OVERVIEW

- Our study looked at the profitability of storage hedges across Kansas
- Years analyzed were 1995 – 2013
- Gathered weekly cash wheat bids (Wednesdays) from the *Wichita Eagle*
- 15 locations across Kansas
- Compared speculative and hedged storage until December and March

LOCATIONS



HEDGED STORAGE

- Opening basis was calculated using the average Wednesday June futures prices and the average Wednesday June cash wheat bids
- Closing basis was based on average Wednesday December (March) futures prices and average Wednesday December (March) cash wheat bids
- Actual basis improvement was calculated using:

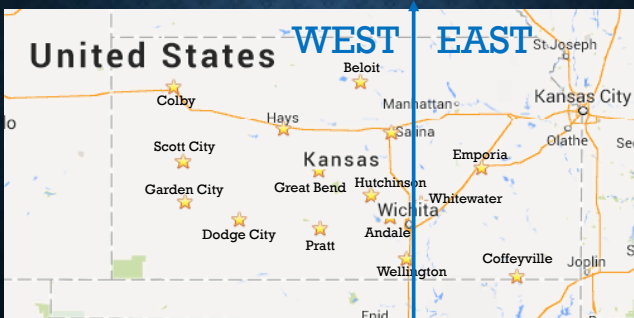
$$\text{Actual Closing Basis} - \text{Opening Basis} = \text{Actual Basis Improvement}$$

SPECULATIVE STORAGE

- Speculative storage is storing your grain unhedged
- With this alternative, you are subject to futures price and basis risk
- Price improvement was calculated by finding the difference between the average cash price when the grain was sold (December or March) and the average price at harvest (June)

$$\text{Cash price at Selling} - \text{Cash Price at Harvest} = \text{Price Improvement}$$

REGIONS FOR STORAGE COSTS



ESTIMATED ELEVATOR STORAGE RATES

	EAST	WEST
2008 – 2013:	5 c/bu/month	4 c/bu/month
2000 – 2007:	4 c/bu/month	3 c/bu/month
1995 – 1999:	3 c/bu/month	2.5 c/bu/month

OPPORTUNITY COST

- Average annual LIBOR rate + 3.4% was used as the operating loan interest rate

1995	9.483%	2005	7.173%
1996	9.013%	2006	8.670%
1997	9.275%	2007	8.649%
1998	9.023%	2008	6.341%
1999	8.957%	2009	4.347%
2000	10.035%	2010	3.932%
2001	7.085%	2011	3.893%
2002	5.313%	2012	4.008%
2003	4.672%	2013	3.804%
2004	5.234%		

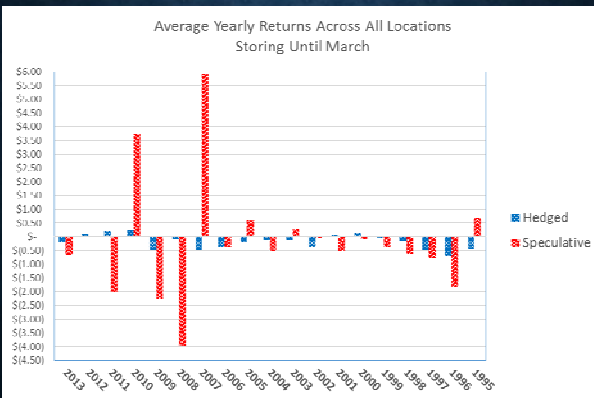
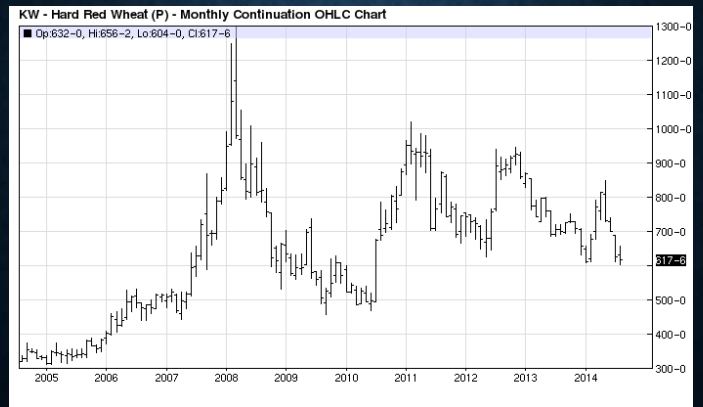
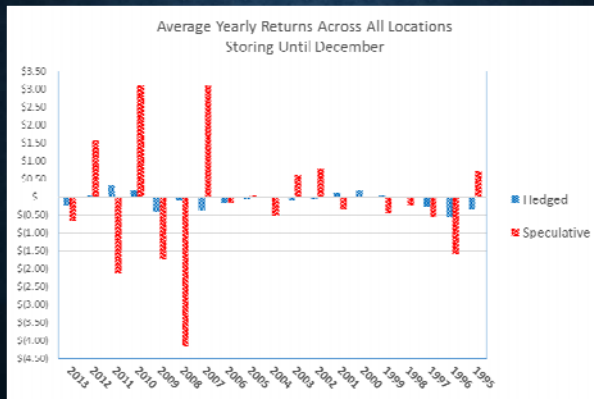
RETURNS

HEDGED STORAGE

$$\begin{aligned} & \text{Actual Basis Improvement} \\ & - \text{Total Storage Costs} \\ & = \text{Profit/Loss} \end{aligned}$$

SPECULATIVE STORAGE

$$\begin{aligned} & \text{Price Improvement} \\ & - \text{Total Storage Costs} \\ & = \text{Profit/Loss} \end{aligned}$$



RETURNS ACROSS ALL YEARS & LOCATIONS

HEDGED STORAGE

- December:
 - Average: -0.10
 - Variance: 0.05
 - Min: -0.55
 - Max: 0.34
- March
 - Average: -0.18
 - Variance: 0.07
 - Min: -0.69
 - Max: 0.23

SPECULATIVE STORAGE

- December:
 - Average: -0.14
 - Variance: 2.73
 - Min: -4.16
 - Max: 3.12
- March
 - Average: -0.15
 - Variance: 4.23
 - Min: -4.01
 - Max: 5.91

REGIONAL BASIS IMPROVEMENT ACROSS ALL YEARS

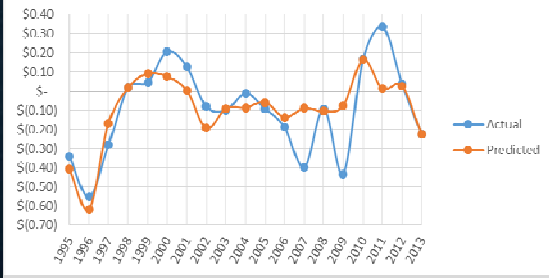
EAST REGION

- December:
 - Average: 0.19
 - Variance: 0.05
- March
 - Average: 0.28
 - Variance: 0.07

WEST REGION

- December:
 - Average: 0.22
 - Variance: 0.05
- March
 - Average: 0.31
 - Variance: 0.06

Comparing Actual and Predicted Returns For Hedged Storage Until December



$$\text{Expected Return} = -0.1524 - 0.0545(\text{Average Harvest Price}) - 0.1265(\text{Average Nearby Basis}) + 1.2464(\text{Average Jul-Dec Spread in June})$$

PREDICTIONS FOR HEDGED STORAGE UNTIL DECEMBER 2014

$$\text{Expected Return} = -0.1524 - 0.0545(\text{Average Harvest Price}) - 0.1265(\text{Average Nearby Basis}) + 1.2464(\text{Average Jul-Dec Spread in June})$$

Average Harvest Price: \$6.93

Average Nearby Basis: - \$0.22

Average Jul-Dec Spread: 0.11

Expected Return: - \$0.36

Any Questions?

or

Suggestions for Future Research?