3. Understanding Basis and the Forward Contract for Kansas Wheat

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Mykel Taylor joined the Department of Agricultural Economics as an Assistant Professor in 2011. Her research and extension programs are focused in the areas of crop marketing and farm management. She grew up on a cattle ranch in Montana and attended Montana State University majoring in Agribusiness Management. Her PhD in Economics is from North Carolina State University. Mykel has worked in extension positions at both Kansas State University and Washington State University. Some of her current research areas include measuring basis risk for commodity grains, understanding the implications of food safety and country of origin labeling on meat demand, and estimating land values for crop and pasture land in Kansas.

Abstract/Summary

This session is a compilation of research, with the primary focus will be showing the impact of basis volatility on the cost of forward contracting and looking at current basis levels to forecast future costs of forward contracting. It is based on wheat, but is relevant for other crops.

Basis Volatility, Risk Premiums, and Forward Contract Pricing

by

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BASIS

Basis Risk

- Basis defined:

  Basis = cash price – futures price

- Basis reflects
  - Transportation cost to terminal market
  - Local demand (feedlots, ethanol plants)
  - Returns to storage
- Basis can (usually) be predicted with more accuracy than cash or futures prices

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Basis Risk

- Market fundamentals affect cash and futures prices in the same way
  - Absolute difference remains stable

Historical Data 2005-2011

	KCBOT Settle Price	KS Cash Price*	Basis
Average	6.08	5.52	-0.56
Minimum	3.15	2.81	-1.73
Maximum	13.37	13.03	0.25
Std. Deviation	2.05	1.92	0.39

* Cash price is an average of 6 KS locations: Beloit, Garden City, Goodland, Hutchinson, Pittsburg, and Topeka.

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- Basis deviation is lower
  - Less volatile than either cash or futures prices

Basis Risk

- Hedging vs. forward contracting
  - When basis volatility is low, there is less risk in forward pricing wheat with a futures hedge
  - If basis volatility is high (or you expect the basis to widen), forward contracts can be used to avoid basis risk

Basis Risk

- Hedging example without basis change

	Futures	Cash	Basis
February	$9.00/bu	$8.50/bu	-$0.50
Action:	Hedge cash position by selling futures contracts at $9.00		
June	$8.00/bu	$7.50/bu	-$0.50
Action:	Close out hedge by purchasing futures contracts at $8.00		
Return on hedge:			$1.00/bu
Effective cash price in June:			$8.50/bu

Basis Risk

- Hedging example with basis change

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Basis risk can cost you!

Basis Risk

- Basis relationships, for a given location, tend to be stable over time

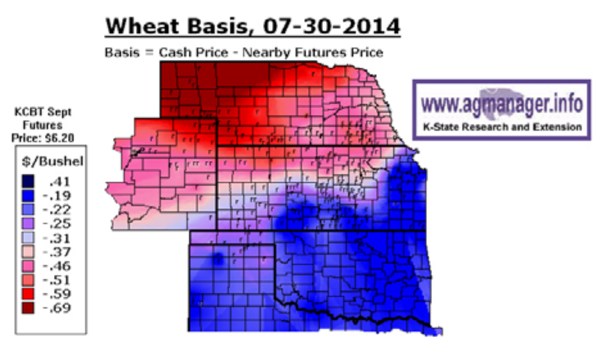
Expected basis **= Actual basis**

- Is this the case today?

Introduction

- What is basis?
  - Difference between the cash price for grain in a given location and the futures price (spatial)
- Why is there a difference?
  - Transportation costs of grain elevator to get to terminal market
  - Local supply and demand conditions that vary from those reflected in futures price

Geographic Variation



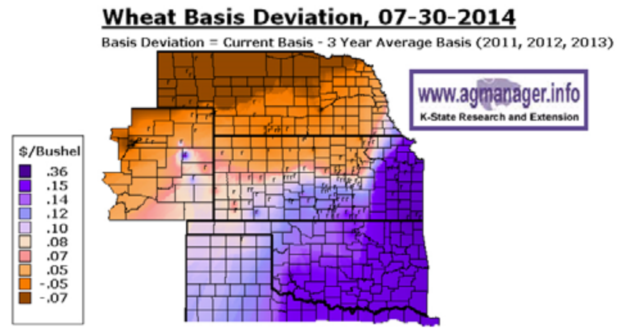
Basis Risk

- Market participants read basis relative to historic levels
  - When to market grain (farmers)
  - How to price forward contracts (elevators)
- Basis relationships, for a given location, tend to be stable over time

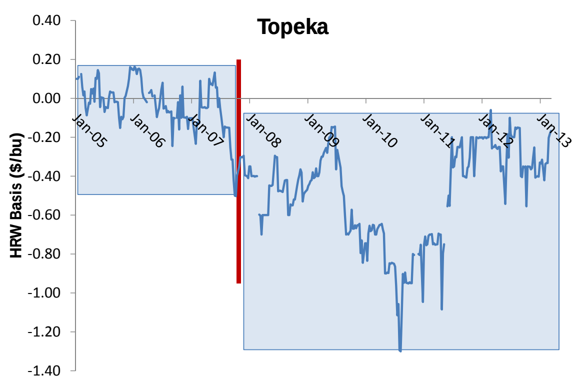
Expected basis **= Actual basis**

- Is this the case today?

Time Variation



Historical Data 2005-2012



FORWARD CONTRACTS

Introduction

- What is a forward contract?
  - Pre-harvest agreement between local grain elevator and a farmer
  - Sets price to be paid (received) at harvest for a fixed amount of grain
- Removes uncertainty of price for farmer
- More popular today because of crop insurance

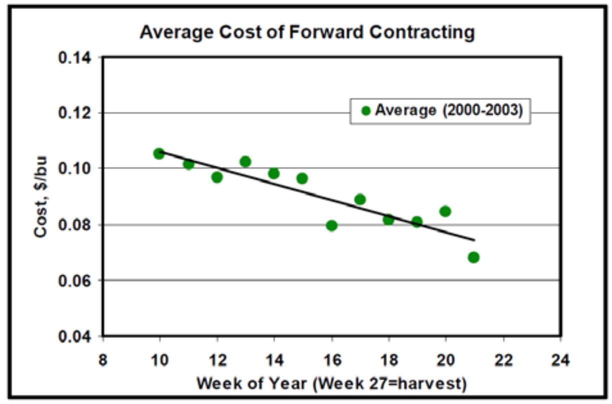
Basis Risk

- Forward contract protects farmer from *price* and *basis* risk
  - Harvest price is fixed
  - Hedging with a futures contract still exposed to basis risk
- Ability to predict based on historical basis levels is reduced
  - Hard for elevators to price forward contracts
  - Elevators will hedge all contracted grain

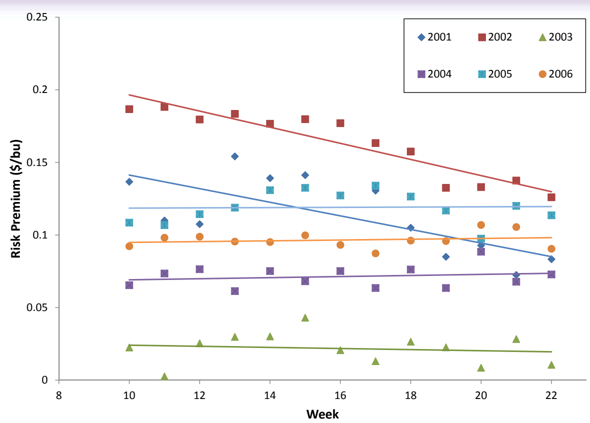
Forward Contracting

- Previous studies
  - Cost of forward contracting wheat
    - Taylor, Dhuyvetter, & Kastens (2003): 9¢/bu
    - Townsend & Brorsen (2000): 6-8¢/bu
    - Brorsen, Coombs, & Anderson (1995): 2-5¢/bu
- Findings
  - Year-to-year variation in cost is low
  - Costs decline as approach harvest
    - As more information is available, basis risk declines

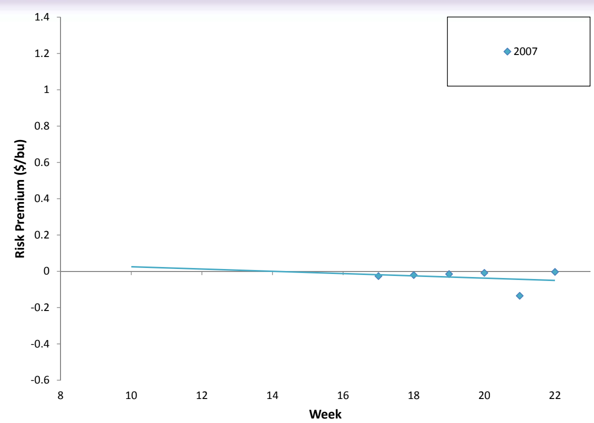
Cost of Forward Contracting



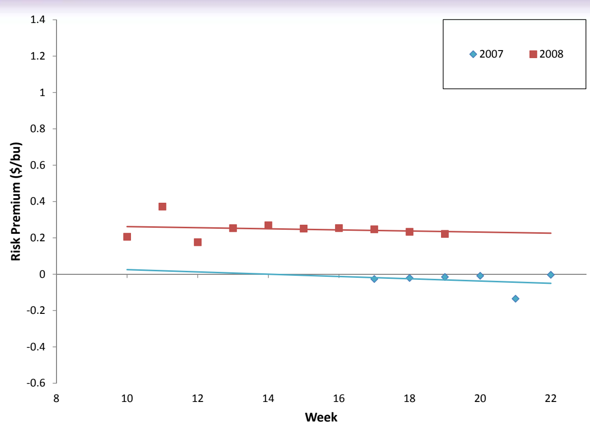
Forward Contracting



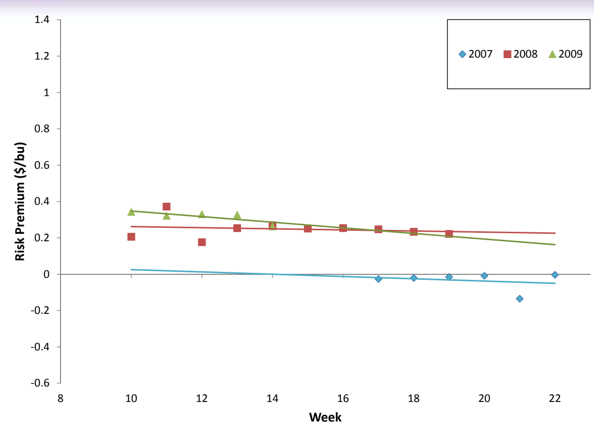
Forward Contracting



Forward Contracting



Forward Contracting



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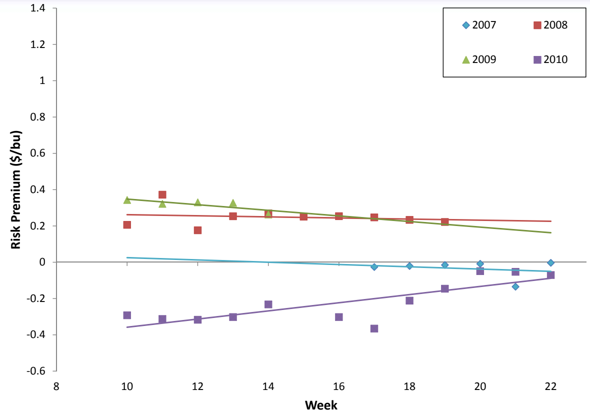

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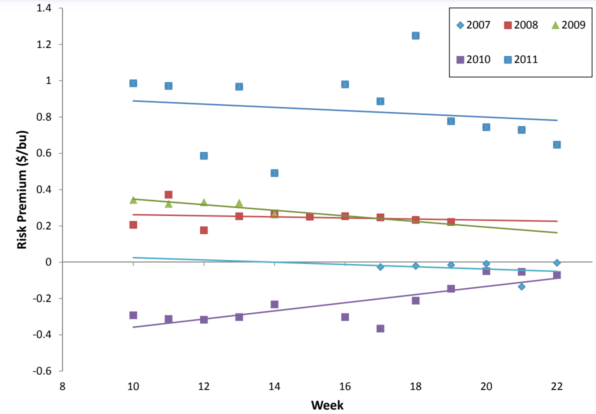

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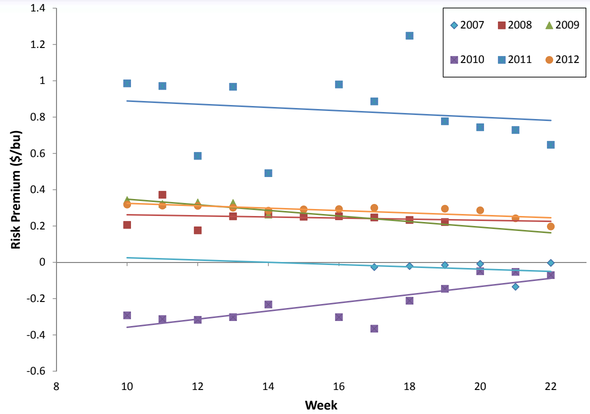
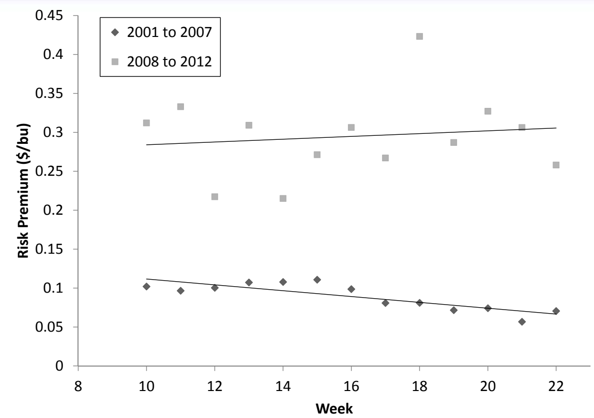


Costs of Forward Contracting



Research Questions

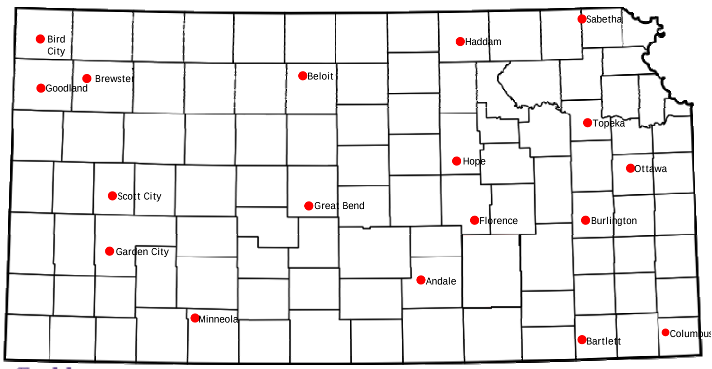
- Has increased basis volatility affected cost of forward contracting?
- Are elevators still able to accurately forecast basis?
- Can we estimate a model to explain risk premiums?

Data

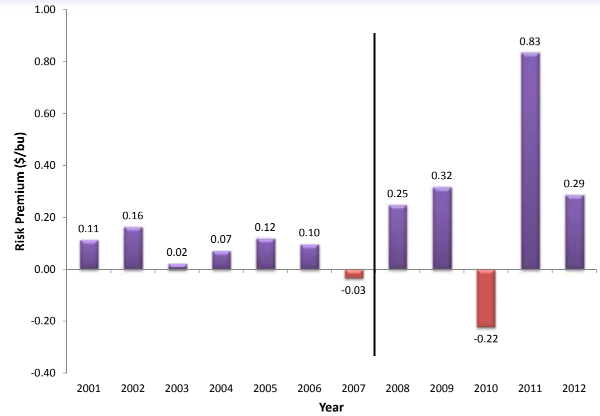
- Forward contract bids offered
  - 18 Kansas elevator locations
  - Week 1 to week 25 of the crop year
  - 2001 to 2012
  - Harvest period: 4th week of June
- Unbalanced panel
  - 69 to 172 observations per elevator
  - 2,111 total observations

Elevator Locations

KS Forward Contract Data Sources: 2001-2012



Cost of Forward Contracting



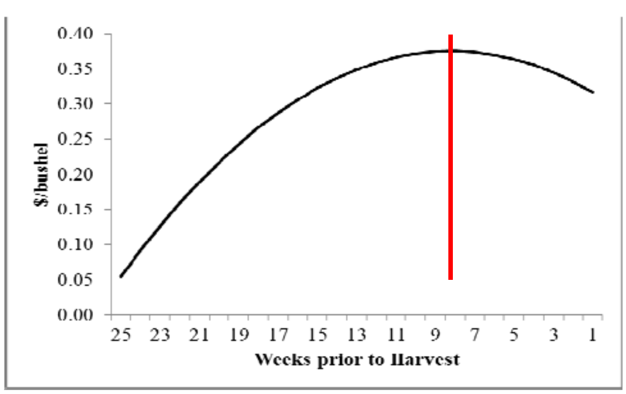
Model Results

- Pre-structural break period (2001-2007)
  - Relative lack of variability in risk premiums
  - Previous studies used use non-parametric measures
- Post-structural break period (2008-2012)
  - More variability in basis and forward contract prices
  - Model fit suggests backward-looking variables have impact on current forward contract bids

Model Results

Factor	Impact
Volatility of basis adjustments last year	Increases costs by $0.228/bu
Elevator performance on contracts last year	For every $0.10/bu lost on forward contracts last year, fc cost will increase by $0.05/bu
Harvest price	A $1.00/bu increase in the harvest price will increase the risk premium by $0.04/bu
Number of weeks prior to harvest	Cost of fc changes across the weeks prior to harvest

Time Effects



Forward Contracting

- Total impact on risk premiums of forward contracts for wheat

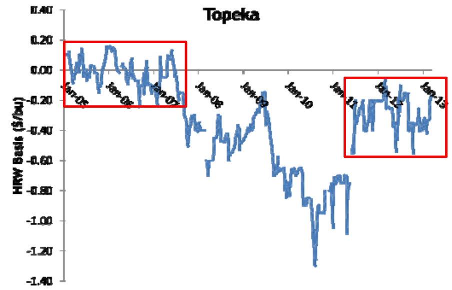
	2002-2007	2008-2012
Risk Premium on Forward Contract	8.6¢/bu	32.7¢/bu
Total cost on a 5,000 bu contract	$430	$1,635
FC risk cost as a % of wheat price	2.38% (@$3.64/bu)	4.94% (@$6.63/bu)

Summary

- Higher basis volatility over past 5 years has significantly increased risk premiums for forward contracts
- Farmers facing risk management tradeoff
  - Higher risk of basis movements (for and against them)
  - Higher cost of transferring risk to elevator

Future Work

- Forecasting basis volatility and FC prices
  - Unique time period between 2008 and 2012?
  - Will basis return to a stable level?



MORE INFORMATION

More Information

- www.AgManager.info
  - Crops: Insurance and Risk section
    - Risk management resources
    - Press releases, radio interviews, & links
  - Crops: Marketing
    - Market outlook, basis tools and maps
    - Bulletins, radio interviews, & decision tools
  - Livestock: Marketing
    - Outlook, price charts, & decision tools

More Information

- Risk Assessed Marketing Workshop
  - $100 per person for a full day workshop
    - Crop insurance
    - Government programs
    - Puts, calls, forward contracts, marketing loans, basis contracts
  - Contact Rich Llewelyn: 785-532-1504

Questions?

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For your information:

References:

Brorsen, B.W., J. Coombs, and K. Anderson. 1995. “The Cost of Forward Contracting Wheat.” *Agribusiness*, 11(July/August):349-354.

Taylor, M., K. Dhuyvetter, and T. Kastens. 2003. “Hedging vs. Forward Contracting for Wheat.” http://www.agmanager.info/marketing/publications/marketing/forward_contracting_wheat.pdf

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