Financially Settled Hard Winter Wheat Index (HWI) Futures: An Analysis

Introduction

This analysis measures the viability of a financially settled hard red winter wheat future contract. Financially settled futures contracts have no physical delivery feature and are the standard settlement procedure for many equity futures markets and for certain livestock futures markets. The following research compares price correlation, basis variability and basis ranges of hard red winter wheat cash market data to the Hard Winter Wheat Index (HWI) and also to currently listed deliverable wheat futures contracts traded on U.S. futures exchanges.

Data

Data used in this analysis are month-end prices from March 1999 through December 2002 (46 observations). Cash market quotes are as reported by the USDA. Chicago Board of Trade (CBOT), Kansas City Board of Trade (KCBT) and Minneapolis Grain Exchange (MGEX) wheat futures prices are used in the comparisons. Data Transmission Network (DTN) constructed the Hard Winter Wheat Index (HWI) based on hard red winter wheat bids collected daily from an average of 396 elevators per day over the sample period. The markets and data are defined in Table 1.

Table 1. Data and Market Definitions

Futures Markets

W: CBOT wheat, nearby futures
KW: KCBT wheat, nearby futures
MW: MGEX wheat, nearby futures

DTN Spot Index

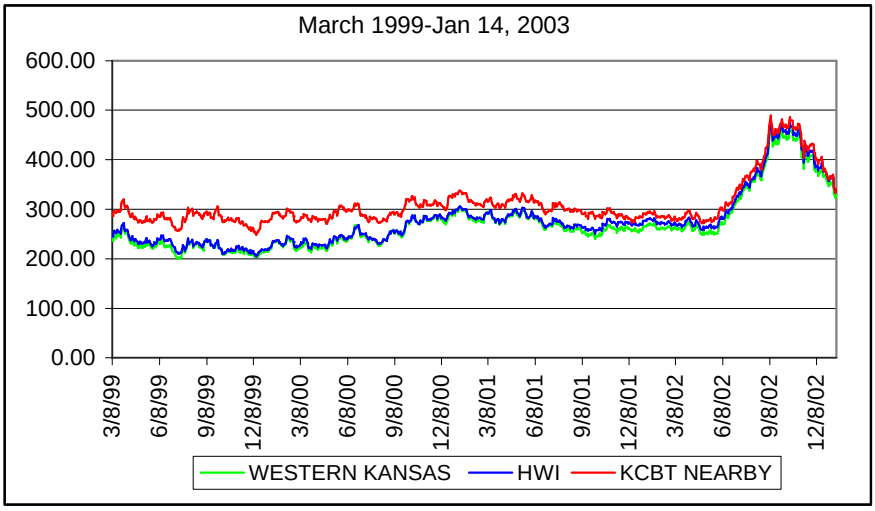
HWI: Hard Red Winter Wheat, Spot Elevator Bids

USDA Cash Markets

HRW: Hard Red Winter Wheat
Kansas HRW: Western Kansas Elevators, #1 HRW, USDA
Nebraska HRW: Nebraska Elevator Bids, #1 HRW, USDA
Colorado HRW: Denver Area Elevator Bids, #1 HRW, USDA
K.C. HRW: Kansas City, #1 HRW, 13% protein, USDA
Houston, HRW: Houston, #1 HRW, Ordinary, USDA

Figure 1 indicates a high degree of correlation between the HWI, KCBT nearby wheat futures, and western Kansas HRW cash prices. As expected, the KCBT futures (a terminal-level contract) trade at a premium to both the HWI and western Kansas country elevator bids. Figure 1 suggests that the HWI is an accurate reflection of commercial transactions and closely follows country-level prices in a major production area.

Figure 1. Hard Winter Wheat Index, KCBT Nearby Wheat Futures, and Western Kansas Cash Prices, March 1999 – January 14, 2003



Methodology and Results

Basis Levels

Expectation of basis levels is an important component of effective hedging. Average nearby basis levels over the sample period are presented in Table 2.

Table 2. Average Basis Levels (cents per bushel), March 1999 - December 2002

	W Kansas HRW	Nebraska HRW	Colorado HRW	K.C. HRW	Houston HRW
W	-8.04	9.77	4.23	46.00	62.00
KW	-39.96	-22.15	-27.69	14.08	30.08
MW	-60.15	-42.33	-47.88	-6.10	9.90
HWI	-5.80	12.01	6.47	48.24	64.24

Basis Variability

Effective futures contracts should provide stable and predictable basis. For the comparisons in Table 3, historical cash wheat prices at various locations are compared to the historical HWI and to wheat futures contracts traded at U.S. exchanges. HWI is used as a proxy for a nearby financially settled futures price series. Basis variability is measured by the standard deviation in cents per bushel.

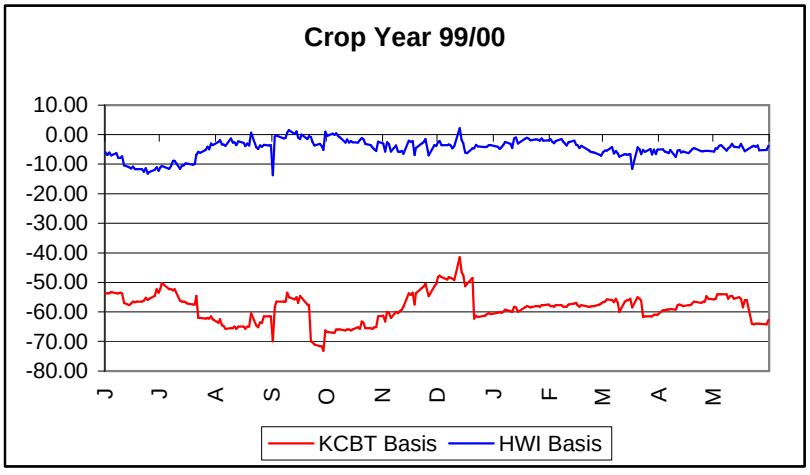
Table 3. Basis Standard Deviations (cents per bushel), March 1999 - December 2002

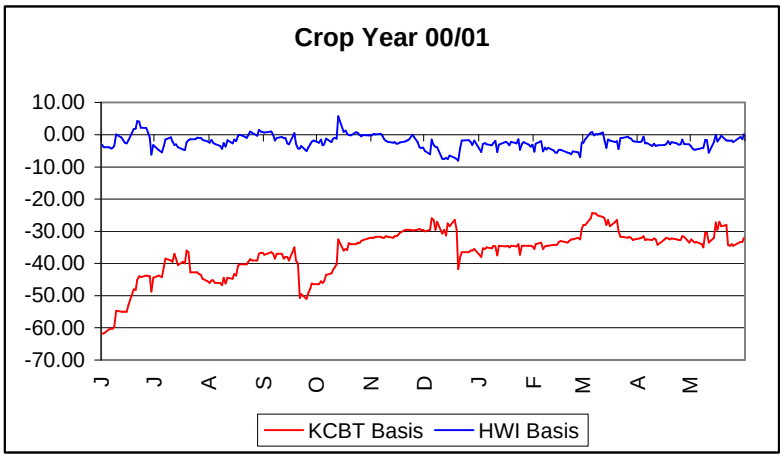
	W Kansas HRW	Nebraska HRW	Colorado HRW	K.C. HRW	Houston HRW
W	26.31	23.57	32.17	30.77	27.19
KW	15.82	15.96	25.54	23.17	19.28
MW	30.00	27.44	38.39	36.29	32.60
HWI	3.97	8.02	9.15	7.48	5.81

Table 3 clearly suggests the potential for financially settled HRW futures using HWI as the settlement index. Over the sample time period, basis variability for the western Kansas HRW market averaged nearly 16 cents per bushel versus KCBT nearby futures and 4 cents per bushel versus the HWI—*a 75 percent reduction in basis variability.* Similar reductions in basis variability were associated with HWI across all analyzed markets.

Figure 2 shows western Kansas basis versus both the HWI and KCBT wheat futures over time. The graph clearly shows a more stable western Kansas basis relationship versus the HWI than versus KCBT futures.

Figure 2. Western Kansas Cash Wheat Basis, by Crop Year

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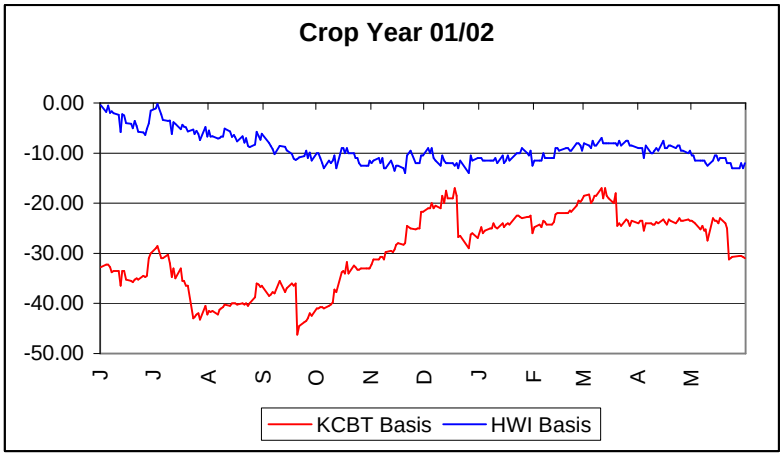
J J A S O N D J F M A M
KCBT Basis
HWI Basis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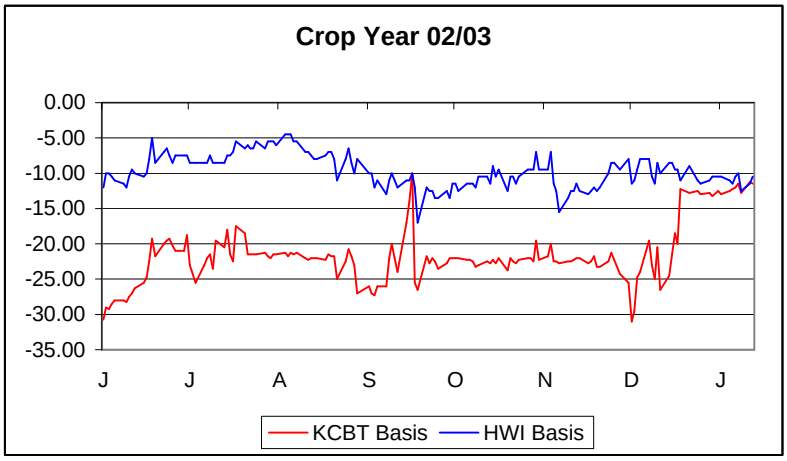
KCBT Basis
HWI Basis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J J A S O N D J
KCBT Basis
HWI Basis

Table 4 shows maximum and minimum basis levels, by market. The analysis presents another way to view basis variability.

Table 4. Maximum-Minimum Basis Range, March 1999 – December 2002

	W Kansas HRW		Nebraska HRW		Colorado HRW		K.C. HRW		Houston HRW	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
W	56.00	-56.75	79.00	-39.75	84.50	-52.25	120.50	-10.25	130.50	17.75
KW	-13.25	-77.25	6.75	-60.25	14.25	-72.75	55.25	-30.75	59.25	-4.00
MW	-7.50	-114.75	6.50	-97.75	16.00	-115.50	58.00	-68.25	62.50	-44.25
HWI	1.00	-12.50	25.00	-19.00	21.00	-15.00	63.00	33.00	73.50	51.00

Hedge Effectiveness

The second method for evaluating and ranking potential among the various hedging instruments is a measure of hedge effectiveness. This is simply the R-squared from a regression of the *percent change* in the cash price against the *percent change* in the price the proposed hedging instrument (index or existing futures). The R-squared can be interpreted as the percent reduction in flat price risk from hedging. The remaining risk (1 minus the R-squared) is unhedgeable basis risk. Hedge effectiveness measures are presented in Table 5.

Table 5. Hedging Effectiveness, March 1999 – December 2002

	W Kansas HRW	Nebraska HRW	Colorado HRW	K.C. HRW	Houston HRW
W	73.52	56.43	64.27	64.41	67.24
KW	92.57	73.34	79.44	83.97	86.35
MW	72.55	63.30	59.69	68.08	67.78
HWI	96.96	77.82	87.58	90.20	88.74

Rankings in Table 5 are generally consistent with those in Tables 3 and 4. For instance, the hedge effectiveness for Colorado elevators is 79% using KCBT wheat futures, and improved to 88% using the HWI. The results suggest substantial improvements in hedge effectiveness are possible with the HRW futures that financially settle to the HWI.

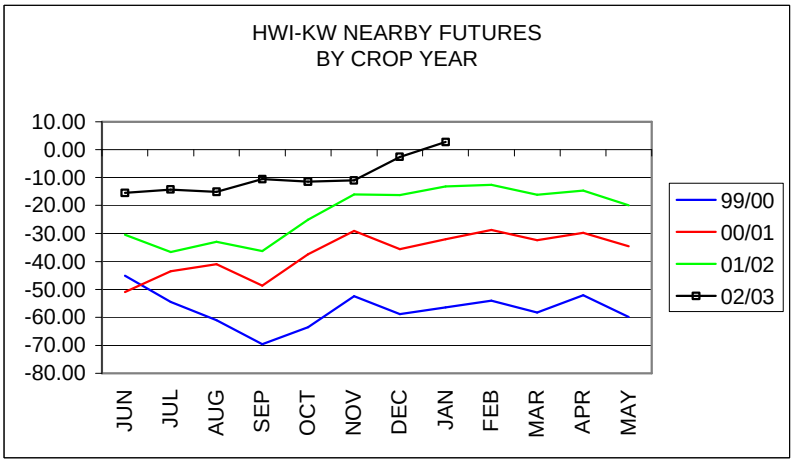
The results presented in Tables 3, 4, and 5 strongly suggest that financially settled HWI futures could provide substantial improvements in price discovery and risk management opportunities versus currently traded wheat futures contracts. Specifically, there is the potential for reduced basis variability and greater hedge effectiveness.

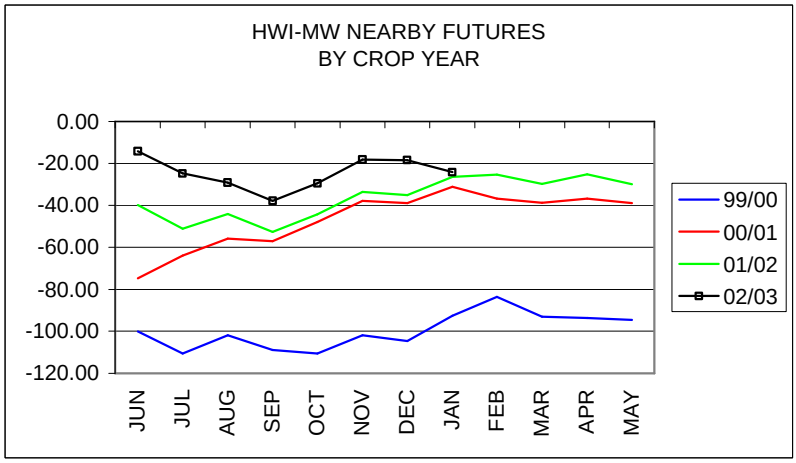
Spread Opportunities

Spread trading is a strategy that helps build market liquidity among alternative wheat contracts. Figure 3 shows the spread between the HWI and existing wheat futures markets. From the graphs, it is clear that numerous spread opportunities exist between the farm-level HWI and the

existing terminal-level futures contracts, including the ability to hedge basis and/or initiate a synthetic basis position.

Figure 3. HWI – Nearby Futures Spreads





Summary

Results of this analysis indicate that hard red winter wheat futures that financially settle to the Hard Winter Wheat Index would offer reduced basis variability, as compared to currently traded wheat futures, for commercial wheat buyers and sellers. The HWI, as calculated by DTN, is an accurate reflection of hard red winter wheat pricing at country elevators, river terminals and export terminals. Additionally, a country-level HWI would provide spread opportunities versus existing wheat contracts that give commercial participants in the hard red winter wheat market a way to hedge basis and speculators a way to initiate a speculative basis position.