

## Hedging vs. Forward Contracting for Wheat

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Producers use different tools to manage price risk in their farming operations, including hedging in the futures market and forward contracting.<sup>1</sup> The choice of the risk management tool depends on the type of risk a producer is trying to minimize. In the case of hedging, producers protect themselves from price risk, but remain exposed to basis risk. With forward contracting, producers secure a price for their crop prior to harvest and eliminate both price and basis risk. In both cases, a producer will face costs from minimizing risk. The difference in these costs may impact a producer's choice of risk management tools.

### ***Selling (Short) Hedge in the Futures Market***

Before hedging in the futures market, a producer must determine an expectation of basis for the time when they will sell their wheat in the cash market (e.g., at harvest). This can be done by examining historical basis and forming an expectation based on previous years' basis levels. By adding the expected basis for late June or early July to the July futures contract price currently offered, an expected harvest cash price is determined. If this cash price is acceptable, producers may sell a July wheat contract in the futures market and hedge their cash price at harvest.<sup>2</sup> This process is best demonstrated using an example of hedging the price for a wheat crop.

Table 1. Example of Selling Hedge for Wheat in 2003<sup>a</sup>

Date	Futures Market	Basis	Other Costs	Cash Market
Week 15 (mid-April)	Sell a KCBT July wheat futures contract at \$3.12/bu	Expected basis on July 1 of -\$0.33/bu	Commission costs of -\$0.02/bu	Expected cash price on July 1 is equal to \$2.77/bu

<sup>a</sup> The expected basis is a four-year average across 48 Kansas locations.

In the example presented in Table 1, a producer determines the 4-year historical average basis for 1999-2002 has been -\$0.33/bu. This basis implies that the cash price has averaged \$0.33/bu less than the July futures market price for the first week of July over the previous four years. The Kansas City Board of Trade (KCBT) July wheat futures contract was trading at \$3.12/bu during week 15 (mid-April) of 2003. Including commission costs of \$0.02/bu, the expected cash price at harvest would be \$2.77/bu. Assuming this is an acceptable price, the producer would sell one futures contract for each 5,000 bushels to be covered by the hedge and "lock in" this price. Now, the producer is protected from downside price risk on all covered bushels. If the basis prediction is correct, the cash price at harvest will equal the expected price of \$2.77/bu.

<sup>1</sup> Producers also can manage price risk in the options market. The options market allows producers to manage downside price risk while allowing upside potential. However, this flexibility comes at a cost in the year of interest (although that cost likely is recouped in other years for the routine options user), namely the premium paid to purchase the option. Similar to hedging, producers still have basis risk when using options.

<sup>2</sup> Selling a futures contract refers to entering into a contract to deliver grain for a set price at harvest.

Table 2 illustrates two different price scenarios at harvest for the example hedge displayed in Table 1. In both cases, the actual basis is assumed to equal the expected basis and the producer receives the expected price of \$2.77/bu. When the cash price at harvest is higher than the expected price (i.e., price increases), the loss in the futures market reduces the actual price received. When the price at harvest is lower than the expected price (i.e., price decreases), the gain in the futures market offsets the loss in the cash market and thus increases the actual price received. It is this variation in price from which the producer is protected by hedging in the futures market.

Table 2. Example of Price Changes Between Week 15 (mid-April) and Harvest (July 1)<sup>a</sup>

Date	Price Increases		Price Decreases	
July 1	Buy July Wheat Contract	\$3.32/bu	Buy July Wheat Contract	\$2.92/bu
	Actual Basis	-\$0.33/bu	Actual Basis	-\$0.33/bu
	Futures Gain (Loss)	-\$0.20/bu	Futures Gain (Loss)	+\$0.20/bu
	Commission Costs	<u>-\$0.02/bu</u>	Commission Costs	<u>-\$0.02/bu</u>
	Actual Cash Sale Price	\$2.77/bu	Actual Cash Sale Price	\$2.77/bu

<sup>a</sup> Based on an initial futures position of selling a July contract at \$3.12/bu.

The remaining risk is attributed to the potential change between the *expected* basis at the time the futures contract is sold (week 15) and the *actual* basis at the time of delivery (July 1). If the basis is more negative than -\$0.33/bu (widening or weakening of the basis), the actual cash sale price received would be less than \$2.77/bu. If the basis at harvest is less negative than -\$0.33/bu (narrowing or strengthening of the basis), then the actual price received would be greater than \$2.77/bu. In the example, the actual basis at harvest (as opposed to *expected basis*) averaged across 48 Kansas locations in 2003 was -\$0.33/bu, indicating producers would have received their expected cash price of \$2.77/bu. Although the expected basis equaled the actual basis in 2003, there has been a wide range of basis levels observed over the past four years ranging from -0.19/bu in 2002 to -\$0.46/bu in 1999. Thus, while producers are generally interested in expectations based on an historic average, they also should consider that basis may be something different than what is expected (i.e., basis risk exists).

### ***Forward Contracting***

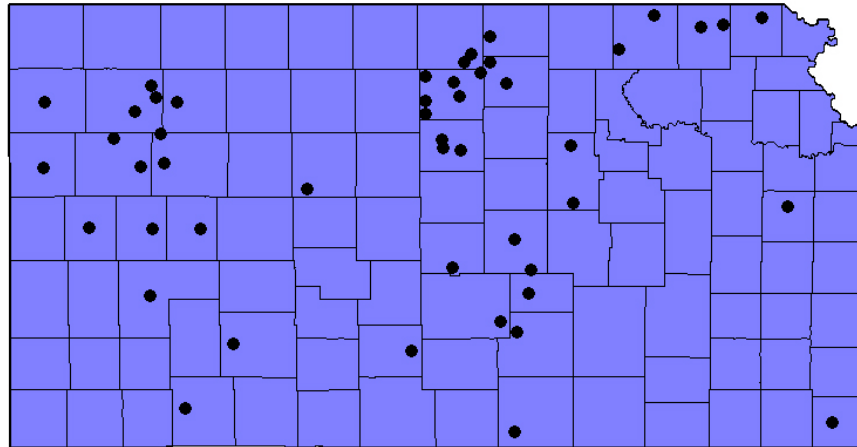
If a producer prefers to eliminate both price and basis risk, forward contracting would be an appropriate risk management tool. Forward contracting wheat allows producers to secure a price for their crop prior to harvest. It eliminates risk from declining prices as well as basis risk and avoids the costs of paperwork and time associated with hedging in the futures market. As a result, producers who forward contract would be expected to receive a lower price, on average, for their crop because the price and basis risk have been transferred to the end user and there are fewer transaction costs than hedging (i.e., commission costs, margins, interest on margins).

Producers forward contract by accepting a new crop bid from their local elevator prior to harvest. In some locations, the bids are offered starting in January and ending within a few weeks of harvest. These new crop bids reflect the expected basis at harvest plus the charge by the local elevator, if there is one, associated with basis risk absorption. As harvest approaches, the new crop bids and the cash price bids converge because basis is easier to predict closer to delivery time.

To determine the cost of forward contracting, the basis offered via a forward contract bid in a given week is compared to the actual basis at harvest. That is, the basis implied by a forward

contract reflects the elevator’s expected basis plus a charge for its costs and the risk it incurs. The difference reflects the uncertainty of predicting basis prior to harvest. New crop bids were collected weekly from 48 Kansas locations (see Figure 1). The bids were available starting in week 10 (mid March) and ending in week 21 (mid May) from 2000 to 2003 for most of the 48 locations. To calculate the difference between an “expected basis” implied by the new crop bids and the actual basis, week 27 (July 1) was selected as the harvest week.

**Figure 1. Kansas New Crop Bid Locations**



Basis was calculated for weeks 10 to 21 for each location for each year using the following equation:

(1)  $\text{Expected Basis} = \text{New Crop Bid} - \text{July Futures Contract Price}.$

This expected basis was then compared to the actual basis observed during week 27, which was calculated using the following equation:

(2)  $\text{Actual Basis} = \text{Cash Price at Harvest} - \text{July Futures Contract Price}.$

It is important to note that, while both equation (1) and equation (2) use the July futures contract price, these prices are not equal because they are calculated at two different points in time.

The difference between the expected basis and the actual basis can be viewed as the “cost” associated with forward contracting (also referred to as a risk premium). Figure 2 shows the 2000-2003 average cost of forward contracting by week of year for the 48 locations. The average across all locations was \$0.09/bu and ranged from \$0.105/bu in week 10 to \$0.068/bu in week 21. Lower costs were observed closer to harvest because basis risk tends to decline as harvest approaches.

Forward contracting reduces both price and basis risk for producers and allows them to avoid the transaction costs of hedging in the futures market. In exchange, the price received by the producer is expected to be \$0.09/bu less based on our analysis of four years of data from 48 locations in Kansas. However, the net difference would be \$0.07/bu, if the commission costs of hedging are accounted for. It should be noted that predictions of basis at harvest, whether from historical averages of harvest time basis or from the basis implied by elevators’ new crop bids, have not been especially accurate. Furthermore, based on this and other research, elevators have not

necessarily been more accurate at predicting harvest time basis than simply using an historical average of basis as the prediction.

Figure 2.

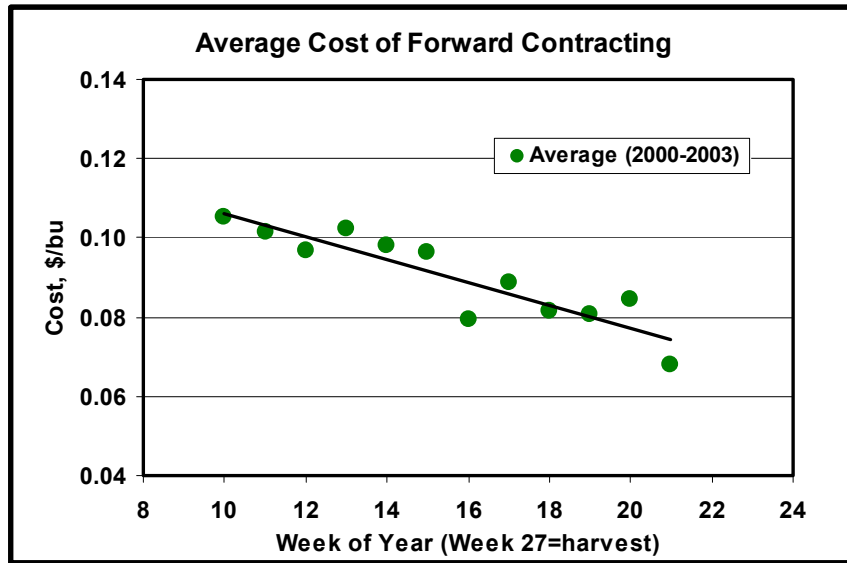
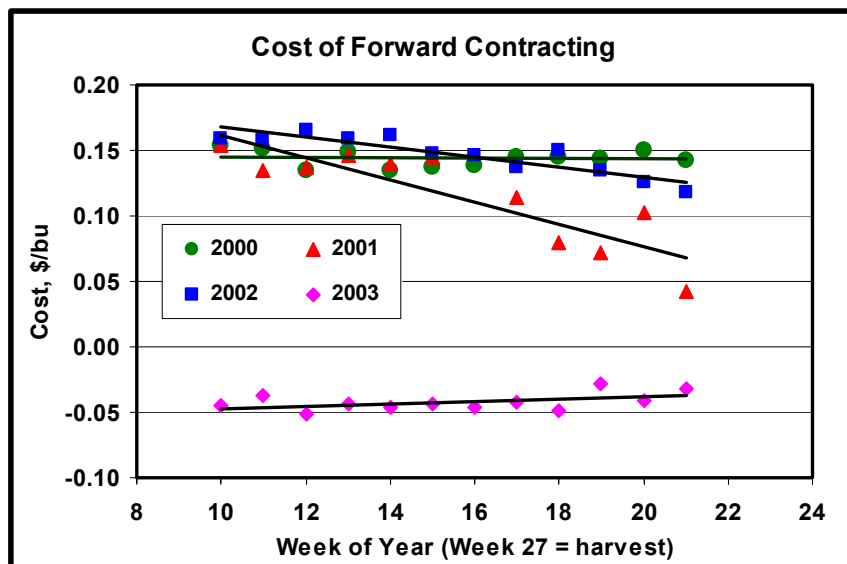


Figure 3 illustrates the variation in the cost of forward contracting over the four years observed. Clearly, it is not a foregone conclusion that the risk premium (cost of forward contracting) will be positive every year. In 2003, the basis at harvest widened at most locations resulting in a risk premium that was negative. Thus, producers who forward contracted during 2003 were protected from the widening basis and were better off than if they had simply hedged in the futures market. The average costs, however, across all four years of data still indicate a positive cost of forward contracting.

Figure 3.



Although risk-reward theory would suggest a risk premium that declines into harvest like that observed in years 2001 and 2002, our confidence that the basis risk premium will continue to be around \$0.09/bu is not great. In fact, research in Oklahoma and Illinois suggests that the risk

premium might be as low as \$0.05/bu. Regardless, this research on Kansas wheat prices does give some indication of the cost associated with removing basis risk. Analysis of additional years' data on contracting costs will help establish the risk premium more accurately, to assist producers in making ever better decisions regarding forward contracting versus hedging.