

Forward Contracting by Iowa Corn Producers: Connecting Hedging with Price Movements

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IN 2015, Iowa corn producers marketed approximately 2.5 billion bushels of corn and 554 million bushels of soybeans (USDA 2016). As part of their marketing strategy, some crop producers make use of pre-harvest pricing tools such as forward contracting and hedging with futures contracts. These are tools intended to either enhance the price producers can receive for their product or mitigate some risks associated with uncertain prices. Forward contracting allows a producer to fully or partially price his crop for delivery to a processor or elevator at a later date. Hedging on futures is similar to forward contracting in that the producer is pre-pricing his crop by taking a short position in a commodity contract with a delivery date in the future. Unlike forward contracting, hedges can be removed if price conditions change, but even with the hedge in place, basis remains an important risk component faced by the producer. In both cases, uncertainty about the size of his crop limits a producer from fully pre-pricing his harvest.

Agricultural economists and extension specialists who work with producers and analyze marketing practices are interested in understanding the factors that play a role in producers' forward contracting or hedging behaviors. How prevalent is the use of forward contracting among producers? Is pre-pricing driven by price or price changes? Which prices seem to matter most?

A study at ISU in collaboration with a prominent grain marketing cooperative in Iowa investigates the relationship between producers' forward contracting behaviors and the December futures contract price movements of corn in the pre-harvest period of January through August.¹ A database of over 115,000 individual priced-forward contracts for corn made from January through August for the years 2009–2013 were analyzed, focusing specifically on contracts for delivery between September 1 of that year and August 31 of the following year. The study data included information on the number of bushels contracted each day and also the cooperative's total purchases of corn in each year. The co-op's weekly aggregate hedge ratio was constructed and analyzed for its response to changes in the December futures contract price as well as other candidate reference prices that could trigger producers' hedging.²

Table 1 summarizes the aggregate observed forward contracting activity of

producers in each of the marketing years by month. The data show that producers do indeed hedge more of their crop in some years and in other years only a small fraction of the expected harvest, and this is consistent with anecdotal evidence from grain merchandisers. Generally speaking, 2011 and 2012 were relatively high-price years, with average December futures contract prices in the pre-harvest period at \$6.42 and \$6.09, respectively. In those years, and in 2010, a year of rapidly raising corn prices, over 20 percent of the crop was forward contracted by August with some form of price protection (basis or futures price). In contrast, less than 4 percent of the crop was priced by August of 2013, a year when corn prices fell significantly but still averaged over \$5.38 per bushel; however, approximately 13 percent was forward contracted in 2009 when the average December price was just \$4.02 per bushel.

Regardless of the harvest price level observed by producers, they increased forward contracting for ↗

Table 1. Aggregate Producer Hedge Ratio of Expected Crop by Marketing Month and Year

| | Crop Growing Year | | | | |
|----------|-------------------|-------|-------|-------|------|
| | 2009 | 2010 | 2011 | 2012 | 2013 |
| January | 0.5% | 1.5% | 2.8% | 0.7% | 0.3% |
| February | 0.9% | 2.0% | 4.8% | 1.8% | 0.5% |
| March | 1.7% | 2.7% | 6.5% | 3.4% | 1.4% |
| April | 2.5% | 5.0% | 9.9% | 4.2% | 1.8% |
| May | 8.9% | 6.6% | 12.0% | 5.0% | 3.0% |
| June | 11.6% | 7.2% | 13.7% | 13.0% | 3.3% |
| July | 12.0% | 14.7% | 16.9% | 20.3% | 3.5% |
| August | 12.9% | 24.1% | 21.3% | 23.3% | 3.8% |

¹Basis movements for delivery in October, November, and December for contracts initiated in the period January through August are not considered.

²The producers' hedge ratios are calculated by dividing the total amount of corn forward contracted (in bushels) by producers at any given time by the cooperative's total annual handle of corn in that year.

future delivery as prices rallied and reduced it when prices fell. Under a standard expected utility framework, producers using forward or futures contracts to reduce commodity price risk should behave opposite this to limit the downside risk.

Finally, there are asymmetries in these producers' forward contracting that can be explained by price movements relative to reference prices. Producers forward contract a greater proportion of their crop when prices are above some historic reference price and they significantly limit selling when the price is below this reference. Controlling for time to harvest, expected production, and price volatility, a one percentage point increase in the 30-day average price of the December futures contract is associated with a 0.14 percentage point increase in forward contracting; however, a one percentage point decrease in the same price causes a 0.12 percentage point reduction in forward contracting. The hedge and price series are plotted in Figure 1.

Does The Producers' Strategy Result in a Higher Price of Marketed Grain?

That producers' forward contracting activities appear to respond to price changes suggests that marketing may be less about risk management and more about an attempt to time the market to achieve a certain price target or minimum threshold. Using the known December contract prices and the actual contract data for each year, weighted average prices per bushel were calculated under several marketing scenarios. Table 2 summarizes the weighted average per bushel prices for these scenarios. In hindsight, no one strategy was best across all years. Also, the actual forward contracting behavior observed was not the worst case in any

year, and on average, the contracting resulted in an average price only slightly below the strategy that resulted in the highest five-year average price: pricing it all at harvest.

The bottom line is that it appears producers are using forward contracting to time the market, and this strategy potentially increases the marketing risk they face. In years of good growing conditions and potentially large crops, they hedge a very low proportion of their crop. Yet,

these are precisely the years when forward contracting a growing crop makes most economic sense. ■

References

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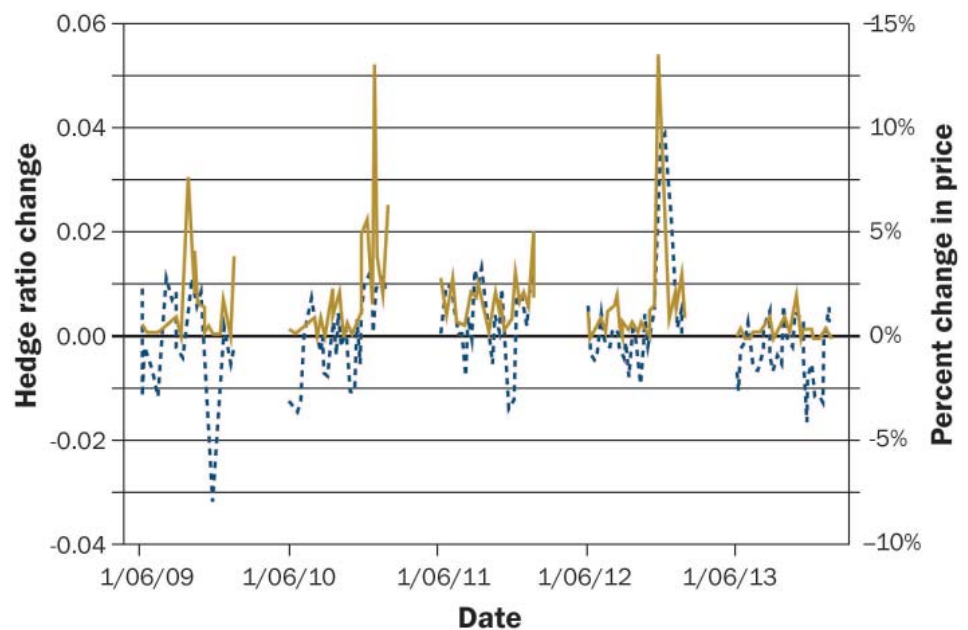


Figure 1. Weekly change in producer hedge ratios vs. percent price changes for December futures from its past 30-day moving average in the pre-harvest period, 01/2009–08/2013.

Table 2. Average Marketing Prices by Forward Contracting Strategy

| Marketing Strategy | Average Marketing Price Outcomes | | | | | 5-year Avg |
|---------------------------------|----------------------------------|--------|--------|--------|--------|------------|
| | 2009 | 2010 | 2011 | 2012 | 2013 | |
| Sell equal amounts monthly | \$4.02 | \$3.95 | \$6.42 | \$6.09 | \$5.38 | \$5.17 |
| Price at harvest | \$3.71 | \$5.46 | \$6.32 | \$7.50 | \$4.39 | \$5.48 |
| Price in January | \$4.35 | \$4.13 | \$5.69 | \$5.67 | \$5.85 | \$5.14 |
| Price in March | \$4.11 | \$3.97 | \$5.98 | \$5.59 | \$5.58 | \$5.05 |
| Actual contracting by producers | \$4.15 | \$4.00 | \$6.57 | \$6.80 | \$5.49 | \$5.40 |