Implied Probabilities for Corn and Soybeans Prices in 2017

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February 21, 2017

farmdoc daily (7):32

As crop insurance and crop planting decisions are being made for the 2017 crop year, it is useful to assess possible indemnity, marketing, and harvest price information. Average futures settlement prices during the month of February for December 2017 corn and November 2017 soybeans are used to establish Projected Prices, and volatility factors are taken from options prices during the final week of the month. In addition to crop insurance decisions, marketing and crop planting decisions also depend critically on prices and relative corn/soybean prices. In addition to the current levels of prices, it is also useful to understand the degree of uncertainty about future market prices and the associated implied probabilities of possible prices.

A Futures Price Distribution Evaluation Tool has been developed and released at the *farmdoc* Crop Insurance site that allows a user to select an underlying futures contract and recover the probabilistic price information associated with the market prices at that point in time.

The tool is accessible here.

To understand the information provided, a couple of cases are taken from the site and used in a few examples to understand the implications for future crop revenue. First consider the December 2017 Corn contract shown in figure 1 below taken from the site on February 21, 2017 (importantly, these update continuously to reflect market information at the time the site is accessed, so results will update as prices change).

The top panel shows the cumulative probability distribution for prices at the expiration and can be interpreted by reading the probability on the (left) vertical axis of any price of interest on the (bottom) horizontal axis. In the lower panel, the more commonly depicted bell-shaped curve of probability is provided. In the case shown, a price to evaluate of $4.00 was chosen to evaluate, with the corresponding regions shaded in the graphic. In the case shown, current market prices indicate that there is about 55% chance that the expiration price for the Dec 2017 Corn futures will be below $4.00 – or, there is a 45% chance that harvest price will be above $4.00 according to the probabilistic information contained in options prices. One could assess the likelihood of breaking even or of exceeding the projected price in a crop insurance contract for example, in similar fashion by entering the value of interest in the box near the bottom. The tables to the right of the graphics provide identical information in two alternative layouts. In the top table, various possible expiration prices are shown on the left and the associated probability of prices below that level at expiration given on the right. For example, the tool indicates that the is about a 30% chance that futures prices will be below $3.50 at expiration, and that there is currently only about a 11.57% chance that prices will be above $5.00 (or 100%-88.43% shown at $5.00). In the lower table, it can be seen that there is about a 50% chance that expiration prices will be below $3.90 according to the option's market prices, and a 95% chance that prices will be below $5.49.

iFarm Price Distribution Tool

Select Crop:

| Crop:	Futures Month:	Year:
Soybeans ▾	Nov ▾	2017 ▾

Results

The charts below show the current Nov 2017 soybeans price distribution at expiration in two related forms. The top shows the cumulative probability distribution for expiration prices and can be interpreted by identifying a price of interest and reading the associated probability on the left axis. The lower chart contains the same information in a probability density form. The associated tables tabulate the information from the charts by price and probability.

Cumulative Probability of Prices at Expiration

Price at Expiration	Prob Below
$9.25	29.45%
$9.50	35.32%
$9.75	41.40%
$10.00	47.54%
$10.25	53.58%
$10.50	59.40%
$10.75	64.89%
$11.00	69.96%
$11.25	74.58%

Probability of Prices at Expiration
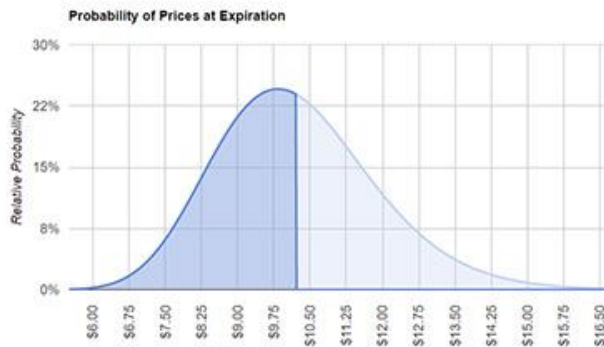
At Expiration	
Prob Below	Price
5%	$7.73
15%	$8.53
25%	$9.05
35%	$9.49
45%	$9.90
50%	$10.10
55%	$10.31
65%	$10.76
75%	$11.27
85%	$11.96
95%	$13.20

Enter Price to Evaluate: 10.22

The implied distribution indicates that there is a 52.86% probability that the price will be below $10.22 at expiration.

Accessed Feb 21, 2017 12:07:56 PM

⊕ CME Group

In the case of Nov. 2017 Soybeans shown above, there is just less than a 30% probability that expiration prices will be below $9.25, and about 30% chance that prices will be greater than $11.00 implying a 40% chance of being between those values. The tables on the right again provide a few other specific examples corresponding to the information in the graphs. As the growing season continues and as uncertainty is further resolved about final production and demand, the prices will continue to shift and evolve and collapse on final values. Hopefully the *iFARM* Price Probability tool will continue to provide a simple presentation of the market's estimated prices and their associated probabilities in an easily understood and easily updated form that helps producers make informed decisions about managing their crop risks.

Note: Options data provided by Barchart.com. Primary programming support provided by National Center for Supercomputing Applications (Tim Dudek and Nathan Tolbert). All calculation errors are the responsibility of the author.

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