Special Article

A Review of the New Corn Yield Insurance Futures and Options

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On June 2, 1995, the Chicago Board of Trade (CBOT) expanded the spectrum of agricultural futures and options to cover financial risks due to crop yield fluctuations. Yield insurance contracts for corn in the state of Iowa were offered in 1995. Starting on January 19, 1996, corn yield insurance contracts for the entire United States and the states of Illinois, Indiana, Nebraska, and Ohio were established on the CBOT. This article explains what the yield insurance contracts are and how the contracts work.

Corn yield insurance futures and options contracts allow the hedging of yield risk by producers and agribusinesses. Such instruments have been available for price risk for several years. To explain how risk is hedged through these contracts, we must first define futures and options contracts. A futures contract is a contract to buy or sell a financial instrument or a commodity sometime in the future. Contract specifics, such as item quantity, quality, and delivery location and time, are detailed in the contract. An option is a contract that gives the buyer the right to buy (call option) or sell (put option) futures contracts at a certain price during a specified time period.

The underlying instrument (or the key variable of interest) in the corn yield insurance contract is the set of U.S. Department of Agriculture (USDA) corn yield estimates for individual states and the entire nation. These estimates represent the ratio of total corn-for-grain production and total corn-for-grain acres harvested. The contract months are September, October, November, and January. The trading unit (or contract size) is $100 times the state or national yield estimate in bushels per acre (bu/ac). For example, if the Iowa corn yield estimate is 130 bu/ac, then the contract size of an Iowa corn yield insurance futures contract is $13,000.

The smallest allowable price movement (or tick size) is 0.1 bu/ac or $10 per contract. The largest allowable price movement (or daily trading limit) is 15 bu/ac or $1,500 per contract. Contracts are traded up to the last business day of the month prior to the USDA's release of the contract month's yield estimate. The contract is settled in cash after the yield estimate announcement. Trading is conducted at the CBOT Monday through Friday, 10:30 am to 12:45 pm Central Time.

Put and call options are available on the corn yield insurance futures. Strike yield intervals for the options are given in multiples of 5 bu/ac for 20 strikes above and below the trading futures yield. On April 22, 1996 (the day this article was written), the January 1997 Iowa corn yield insurance futures contract was trading at 127 bu/ac or $12,700 per contract. A put option for a 125 bu/ac January 1997 Iowa corn yield insurance futures contract was available for 9.0 bu/ac or $900 per contract.

The yield insurance futures and options can be viewed like their price counterparts. When a corn price futures contract is sold, it guarantees a price for corn. Likewise, selling a yield insurance futures contract guarantees a yield (both guarantees, however, are subject to basis variation). Put options can provide floors (or minimum levels) for the underlying instrument. You can establish a minimum yield through the purchase of a yield insurance put option.

Suppose you were to sell one Iowa corn yield insurance futures contract on April 22, 1996. It had a value of $12,700 (127 x $100). You would have to leave part of the money with the CBOT as a margin deposit (a security deposit for futures and options trading). If the contract drops to 120 bu/ac later, you could buy the futures contract back and see a $700 profit (ignoring transactions costs). If, however, the contract rose to 134 bu/ac, you would incur a $700 loss (again ignoring transaction costs) at settlement time.

The key to how these yield insurance futures and options contracts hedge against yield risk is the relationship between the state or national yield and your farm yield. The more closely your farm's yield moves with the state or national yield, the more successful the yield insurance contracts will be at hedging yield risk. It is not the level of the yields that counts. The yield contract can serve as a good hedging instrument even if your farm's yield and the state or national average yield differ substantially. For the yield futures and options contracts to serve as a good hedging instrument for yield risk on your farm, the movements in the state or national yield should closely parallel the movements in your farm's corn yield.

Let us examine the futures transactions above to show how yield risk is addressed, supposing that your farm's yield moves with the Iowa average corn yield. As expectations of the average Iowa corn yield fell from

127 to 120 bu/ac, your farm's yield also fell below expectations. The $700 profit from the yield futures contract will offset at least part of the fall in your expected revenue from corn. In the second case, as expectations of average Iowa corn yield rose from 127 to 134 bu/ac, your farm's yield also exceeded expectations. The excess revenue from the higher yield will offset the $700 loss in the futures market. Thus, the yield insurance futures contract works to stabilize corn revenue by locking in corn yield.

To show how a yield put option effectively sets a minimum corn yield, let's construct a hypothetical example. Assume we have a 75-acre field with an expected corn yield of 140 bu/ac. We can forward contract harvest delivery of our corn for $3.00 per bushel at the local elevator. The January 1997 Iowa corn yield insurance futures contract is trading at 127 bu/ac. To find the number of put options needed to protect the field, multiply the forward price by the number of acres, divide by $100, and round to the nearest whole number. In our case, (75 x $3.00)/$100 = 2.25, two put options are suggested.

Assume we choose to purchase two January 1997 Iowa corn yield put options with a strike yield of 125 bu/ac (the closest option contract to the futures contract) at a premium of 9.0 bu/ac or $900 per option contract. We forward contract all expected production (10,500 bushels) at $3.00 per bushel.

We will analyze two possible scenarios:

1) Farm yield = 125 bu/ac Iowa yield = 117 bu/ac
   Corn price = $3.30 per bu.

2) Farm yield = 155 bu/ac Iowa yield = 137 bu/ac
   Corn price = $2.70 per bu.

In scenario 1, the farm's corn production is 9,375 bushels, 1,125 bushels below what was contracted at the elevator. We receive $28,125 ($3.00 x 9,375) for the delivered corn, but pay back $394 to make up the production shortage (market difference in price and cancellation fee times bushel shortage) for a total revenue of $27,731 from the elevator. The Iowa corn yield futures contract stands at 117 bu/ac. As the futures contract fell, the premium on the put option rose. Supposing the put option premium is now 15 bu/ac, we sell back the put options for $1,500 per option. Therefore, we gain $1,200 through the option transactions. Adding this to our elevator revenue gives us $28,931.

In scenario 2, the farm's corn production is 11,625 bushels of corn. The forward contract generates $31,500 in revenue. Selling the additional production at the cash price of $2.70 per bushel provides $304, for a total of $31,804 of corn revenue from the elevator. The Iowa corn yield futures contract stands at 137 bu/ac. Thus, the put option has lost value. Let's assume the put option has some time value left at harvest and has a premium of 3.0 bu/ac or $300 per contract. We sell back the put options and take a $1,200 loss on the options. Total revenue in scenario 2 is $30,604.

These scenarios show how the yield insurance put options help alleviate revenue shortfalls due to lower than expected yields. The average revenue under the two scenarios with or without the put options is the same. However, the use of the put options reduces the variability in the revenue stream. In scenario 2, the loss on the put options can be considered as an insurance cost to protect against low yields.

Following the introduction of Iowa corn yield insurance contracts in 1995, the CBOT expanded the yield contracts to cover corn yields in Illinois, Indiana, Nebraska, Ohio, and the United States as a whole. Over 6,600 Iowa corn yield contracts were traded in 1995. With the expansion in contract coverage and the experience gained with the Iowa yield contracts, the CBOT hopes for even greater success in meeting the farmer's needs in risk-sharing.

Emerging Issues

Iowa Crop Insurance: What is the Coverage Level?

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In light of changes in the agricultural "safety net" brought about by this year's Farm Bill, volatile market conditions, and the 1994 crop insurance reforms, questions arise concerning the extent that Iowa's row crop producers are purchasing additional insurance to facilitate risk management. Here we present preliminary coverage numbers for 1996 crop insurance purchases for Iowa and compare these to 1995 figures.