



More Ways to Hedge the RP Guarantee Before Harvest

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Recent Farmdoc Daily articles explained how prices in short-crop years often peak early and decline throughout the remainder of the marketing year [here](#), and then showed how farmers who insured using Revenue Protection (RP) insurance can use futures to protect insurance payments against a pre-harvest peak in crop prices [here](#).

Options contracts can be used instead of futures contracts to hedge up to the TA APH yield times the coverage level. The earlier RP hedging article showed how the futures hedge "locked in" total revenue of \$1,082 per acre, regardless of whether prices moved higher or lower after the hedge was placed. However, there are some risks associated with this approach. If prices move higher after the hedge is established, the farmer would miss out on those higher prices and also might receive margin calls, all of which would leave him worse off than if he had not hedged at all. Maximum income would occur if prices happen to peak on the same day that the futures hedge is established. Readers should recall that the reason for hedging in this situation is to guard against a drop in prices prior to end of the RP settlement period in October.

Hedging with put options – the right but not the obligation to sell a futures contract at a fixed price at some later date – allows hedgers to maintain downside price protection while retaining the ability to take advantage of higher prices. This additional flexibility can allow hedgers to adjust hedges in response to changing market conditions. In addition, there are no margins and therefore no margin calls for buyers of options. Instead, the buyer pays a one-time premium at the time the option is purchased, and this premium is the most that the buyer can lose on the option position.

In this post we will present option hedges with two different outcomes at two different time horizons, using the same basic assumptions as before, to allow a side-by-side comparison of hedging with options and hedging with futures:

- RP crop insurance for corn has been purchased at an 80% coverage level
- The TA APH yield is 175 bushels
- The cash price in October will be \$.10 below the December futures price in October
- The October futures price will be the harvest price for the RP product
- Hedging will occur at 140 bushels (175 bushel TA APH yield x .80 coverage level)

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- Actual yield will equal 100 bushels, and
- The current December futures price is \$7.80

While there are many different “strike” or exercise prices that could be used, in these examples we will buy a December \$7.80 (at-the-money) put option now and pay a premium of 62 cents per bushel. Based on the assumption that December futures are currently trading at \$7.80, we will examine the outcomes if futures prices a month from now are \$1 per bushel lower (\$6.80) or \$1 per bushel higher (\$8.80), using an online option pricing tool to estimate option premiums. These are the same prices (\$6.80, \$7.80, \$8.80) used in the earlier futures hedging examples, so we can directly compare the results from our option hedges to those earlier futures hedging results. In addition, two different time horizons are considered: late August (representing an early peak in prices for the marketing year) and late October (corresponding to the end of the RP settlement period).

At-the-money option premiums change by only about half as much as the underlying futures price (i.e., the delta is approximately 0.5), so a 10-cent change in the December futures price will cause the premium of our put option to change by about 5 cents per bushel. Therefore, we need to buy twice as many put options as the number of futures contracts we would have used for a futures hedge.

Futures price falls by \$1 per bushel to \$6.80 by late August If the futures price is \$6.80 a month from now, the premium on each put option contract would increase to \$1.15, a gain of 53 cents per bushel. Since two put options were purchased for the hedge, the total gain on the option position is $2 \times \$0.53 = \1.06 per bushel. This amount slightly more than offsets the \$1.00 decline in the futures price used to determine the RP payout, so the farmer is 6 cents per bushel better off than he would have been from using a futures hedge.

At this point, the hedger could lift the hedge by selling the two put options to capture the \$1.06 per bushel in premium. If the futures price is still \$6.80 in October, the hedging gain would be \$148.40 per acre (140 bushels \times \$1.06 per bushel) and total revenue, borrowing from the July 24 farmdoc daily post, would be \$1,090.40 per acre (\$670 crop revenue + \$272 RP payment + \$148.40 hedging gain), or \$8.40 per acre more than with the futures hedge. Alternatively, the farmer could hold the options until October and maintain the hedge against further declines. However, if prices do not continue to decline, maintaining the hedge will incur additional costs, as shown in the next example.

Futures price falls by \$1 per bushel to \$6.80 by late October. If the futures price is \$6.80 at the end of the October, the premium on each put option contract would be \$1.02, a gain of 40 cents per bushel on each option. Since two put options were purchased for the hedge, the total gain on the option position is $2 \times \$0.40 = \0.80 per bushel. Notice that this amount is 20 cents per bushel less than the \$1.00 decline in the futures price used to determine the RP payout, so the option hedge failed to cover the entire change in the insurance payment caused by falling prices, and the farmer is 20 cents per bushel worse off than he would have been from using a futures hedge.

On a per-acre basis, the hedging gain would be \$112 per acre (140 bushels \times \$0.80 per bushel) and the total revenue would be \$1,054 per acre (\$670 crop revenue + \$272 RP payment + \$112 hedging gain), or \$28 per acre less than with the futures hedge. The difference of 26 cents per bushel ($\$1.06 - 0.80$) or \$36.40 per acre ($\$1,054 - 1,090.40$) between late August and late October is due entirely to the erosion in the time value component of the option premium. Time value erosion can greatly affect the performance of option hedges, particularly when the options are held for extended periods with little or no price movement. Option hedges provide best results with large, unfavorable price changes that occur over relatively short periods of time.

Futures price rises by \$1 per bushel to \$8.80 by late August If the futures price is \$8.80 a month from now, the premium on each put option contract would decrease to 21 cents, a loss of 41 cents per bushel. Since two put options were purchased for the hedge, the total loss on the option position is $2 \times \$0.41 = \0.82 per bushel. This is 18 cents per bushel less than the \$1 increase in the futures price used to determine the RP payout, so the farmer is 18 cents per bushel better off than he would have been from using a futures hedge.

If the hedger lifts the hedge at the end of August and sells the two put options to salvage the remaining premium, and if the futures price is still \$6.80 in October, the hedging loss would be \$114.80 per acre (140 bushels \times $-\$0.82$ per bushel) and total revenue, borrowing from the July 24 farmdoc daily post,

would be \$1,107.20 per acre ($\870 crop revenue + $\$352$ RP payment – $\$114.80$ hedging loss), or $\$25.20$ per acre more than with the futures hedge. Alternatively, the farmer could hold the options until October and maintain the hedge against the possibility of a sudden collapse in prices. However, if there is no change in the futures price, maintaining the hedge will result in further time value erosion that will adversely affect the net income, as shown in the next example.

Futures price rises by \$1 per bushel to \$8.80 by late October. If the futures price is $\$8.80$ at the end of the October, the premium on each put option contract would be just 4 cents, for a loss of $62 - 4 = 58$ cents on each put. Since two put options were purchased for the hedge, the total loss on the option position is $2 \times \$0.58 = \1.16 per bushel. Notice that this amount is 16 cents per bushel more than the $\$1$ increase in the futures price used to determine the RP payout, so the farmer is 16 cents per bushel worse off than he would have been from using a futures hedge. Furthermore, maintaining the option hedge between late August and late October without any further change in the futures price would result in a loss of time value of 34 cents per bushel ($\$0.82 - \1.16).

On a per-acre basis, the hedging loss would be $\$162.40$ per acre (140 bushels \times $-\$1.16$ per bushel) and the total revenue would be $\$1,059.60$ per acre ($\$870$ crop revenue + $\$352$ RP payment – $\$162.40$ hedging loss), or $\$22.40$ per acre less than with the futures hedge. The difference of 34 cents per bushel ($\$1.16 - 0.82$) or $\$47.60$ per acre ($\$1,059.60 - 1,107.20$) between late August and late October is due entirely to the erosion in the time value component of the option premium.

As shown by the examples above, option hedges do not provide identical results in rising and falling markets, are sensitive to the length of time they are held, and generally require more active management. In addition, the premium paid for the option has a large bearing on the final result obtained from an option hedge. However, for some hedgers these characteristics are more than compensated by the additional flexibility that options can provide.

For example, many users rely on a strategy called a “fence” to reduce the net cost of the premium on the hedge and enhance the hedging results. In this strategy, the hedger sells out-of-the-money call options and applies the premium received from selling call options to help offset the premium paid for the put options.

Another popular option strategy is “rolling” puts to higher strike prices as the market rises, selling back previously-purchased lower-strike puts and buying new higher-priced puts. When prices eventually turn lower – as they will if the markets behave like they have in previous short-crop years – the hedger will have established a selling price near the market peak.

While all these approaches involve some degree of risk, hedgers should consider options as one of the ways they can take advantage of the high prices currently being offered for harvest-time futures contracts. The services of a trusted broker or other financial advisor can be extremely useful in tailoring a plan that fits the risk profile and financial needs of each individual hedger.