Options Tools to Reduce Price Risk

Ag Decision Maker
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Price options for crops, when used in conjunction with cash sales, provide a set of marketing tools for farmers. Two of these tools can protect producers from falling prices while allowing producers to follow prices higher.

For more information on options see the following Ag Decision Maker Information Files:
- [Crop Price Options Basics](extension.iastate.edu/agdm/crops/pdf/a2-66.pdf), extension.iastate.edu/agdm/crops/pdf/a2-66.pdf
- [Options Tool to Enhance Price](extension.iastate.edu/agdm/crops/pdf/a2-68.pdf), extension.iastate.edu/agdm/crops/pdf/a2-68.pdf
- [Crop Price Options Fence](extension.iastate.edu/agdm/crops/pdf/a2-69.pdf), extension.iastate.edu/agdm/crops/pdf/a2-69.pdf

To successfully use these tools, you must carefully coordinate the use of options with cash crop sales. Using options independently of cash sales results in speculation.

Buying options allows you to establish a minimum or floor price for your crop while receiving the benefits of higher prices. For this price protection, you pay a premium. Your decision is to assess whether the price protection is worth the cost of the premium.

There are two basic tools for establishing a minimum or floor price for your crop. One tool involves holding your crop unpriced and buying put options. The other involves selling or otherwise establishing a price for your crop and buying call options.

Using Put Options for Price Protection

You can make money on a put option when the futures price falls below the strike price. As the futures price drops below the strike price, it's advantageous to exercise the option which places you in the futures market, selling futures at the strike price. Then you buy the future contract back at the lower futures price and pocket the difference.

If you don't want to exercise the option, you can simply sell the option in the options market. You will make at least as much money by selling the option as you will by exercising the option and buying back the futures position.

As shown in Figure 1, the farther the futures price drops below the strike price, the more the put option increases in value. However, as the futures price declines, the cash price also declines. So, as the put option increases in value, the value of your crop decreases due to the declining cash price. A floor price is established because the gain on the put option offsets the decrease in value of the cash crop.

The strike price sets the floor futures price because this is the point at which the option begins to accrue exercise value which offsets the declining value of the cash crop value.

To translate this into a floor price for a cash crop, you must estimate what the cash price will be when the futures price reaches the strike price. Do this by subtracting the expected basis from the strike price. This is the basis you expect will exist when you plan to sell the option and the crop.

The net cash floor price is the cash floor price less the put premium and trading costs.

Figure 1.

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Extension and Outreach
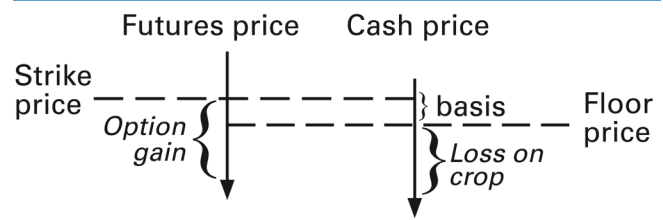
To implement this strategy, purchase the put option now. Later, when the crop is sold, also sell the option. If the price declines, as shown in Figure 2, the money made on the option will offset the loss on the cash crop. If the price rises, the option expires and the cash crop is sold for the higher price, as shown in Figure 3.

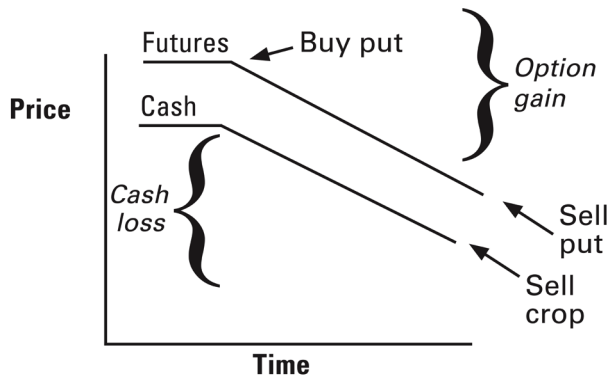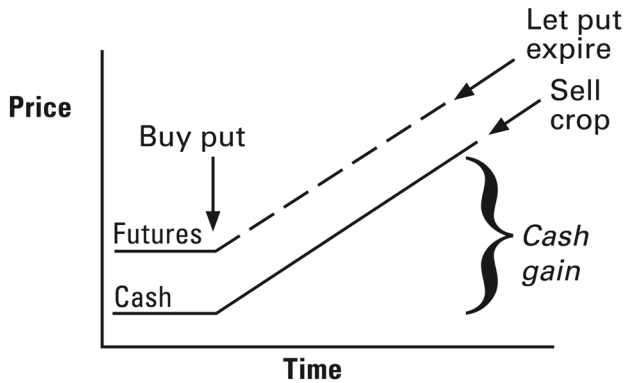**Figure 2. Hold grain and buy put (declining market)**

Figure 3. Hold grain and buy put (rising market)

Example 1.

Assume a $7.00 strike price put option is purchased for a premium of $.40. Subsequently, the futures price declines $1 below the $7.00 strike price to $6.00. The cash grain price decreases to $5.50 ($ –.50 basis).

$7.00	strike price
6.00	futures price
5.50	cash price
.40	premium

The net price is the $5.50 cash price, plus the $1 option gain, less the $.40 premium, for a total of $6.10 (not including trading costs).

$5.50	cash price
+1.00	option gain
– .40	premium
$6.10	net floor price

Next, assume the futures price declines to $5.00 or $2 below the strike price. The cash price declines to $4.50 ($ –.50 basis). The net cash price is the $4.50 cash price, plus the option gain of $2, less the $.40 premium, for a total of $6.10. The same as above.

$4.50	cash price
+2.00	option gain
– .40	premium
$6.10	net price

As shown in Example 1, whenever the futures price is at or below the strike price, the net price is $6.10.

The actual floor price will differ only due to changes in basis, not changes in futures price.

Example 2.

Assume the futures price declines to $5.00 but the cash price declines to $4.60 ($ –.40 basis). The cash price of $4.60 plus the options gain of $2 results in a net cash price of $6.20 (not including trading cost).

$4.60	cash price
+2.00	option gain
– .40	premium
$6.20	net price

Because the basis in Example 2 is $.10 narrower, the cash price is $.10 higher, resulting in a $.10 higher price than the previous example. The opposite is true if the basis is wider.

If the futures price is above the strike price, as in Example 3, the cash crop is sold for the higher price and the option is allowed to expire.

Example 3.

Assume the futures price increases to $8.00 and the cash price to $7.50 ($ –.50 basis).

The cash price of $7.50, less the premium of $.40, results in a net price of $7.10 (not including trading cost). The option expires worthless.

$7.50	cash price
– .40	premium
$7.10	net price

Estimating the Floor Price

An estimate of the minimum net price or floor price can be made in advance. It can be computed by subtracting the premium and trading costs from the strike price and adding in the expected basis.

Example 4.

Assume the strike price is $7.00, the premium is $.40, and the estimated basis is $ –.50. The estimated floor price is $6.10 (not including trading cost).

$7.00	strike price
– .40	premium
+ –.50	estimated basis
$6.10	estimated floor price

Second Best

Using options for price protection turns out to be the second-best alternative regardless of whether price rises or falls. If price rises, the alternative of **doing nothing** and waiting for the higher price results in the best alternative. If price declines the best alternative is to sell **now** before the price declines.

Example 5.

Assume the futures price is $7.50 and cash price is $7.00 ($ –.50 basis). A put option with a strike price of $7.50 sells for a premium of $.40.

$7.50	futures price
7.00	cash price
7.50	put options strike price
.40	premium

If the grain is sold now, the net price is $7.00 regardless of whether price goes up or down. If the grain is held for later sale, the net price depends on whether the price goes up or down. If the option tool is used, the net price is $6.60 ($7.00 – .40 = $6.60) if the price goes down. If the price goes up, the net price is the cash price less the $.40 premium.

As shown in Figure 4, if the price declines, the best alternative is to *sell now* for $7.00. If price increases, the best alternative is to *hold for later sale*. If the price stays the same, both the *sell now* and the *hold for later sale* alternatives are preferred to the option alternative. In none of the situations did the options alternative result in the highest price.

Figure 4.
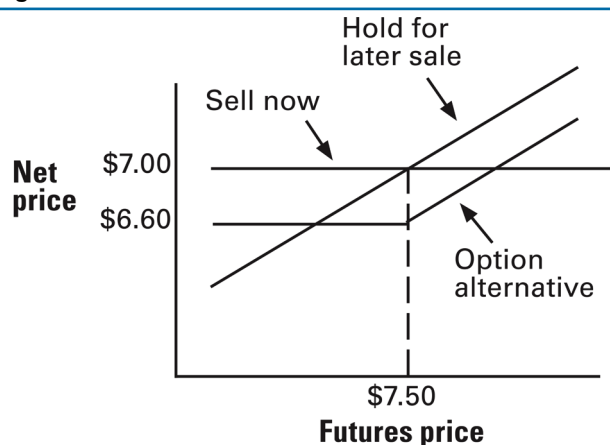
Reducing the Cost

One of the complaints of using put options to reduce price risk is the high cost of the option premium. One way to reduce the cost is to buy **out-of-the-money** options. The premiums for these options are less than **at-the-money** options. Because of the smaller premium, **out-of-the-money** put options result in a higher net price if price increases. However, **out-of-the-money** put options result in a lower minimum or floor price.

Example 6.

In the example below the futures price is $7.00 and basis is $ −.30.

Strike prices ranging from $7.00 (**at-the-money**) to $6.25 ($.75 **out-of-the-money**), and their respective premiums are shown below.

Strike price	$7.00	$6.75	$6.50	$6.25
Premium	.40	.30	.25	.22

The minimum selling price is $6.30 for the **at-the-money** option and declines to $5.73 for the $.75 **out-of-the-money** option.

Minimum Price

Strike price	$7.00	$6.75	$6.50	$6.25
Expected basis	+ −.30	+ −.30	+ −.30	+ −.30
Premium	− .40	− .30	− .25	− .22
Net price	$6.30	$6.15	$5.95	$5.73

However, the net price increases from $7.30 for the **at-the-money** option to $7.48 for the ($.75 **out-of-the-money** option if the futures price increases to $8.00.

Rally price ($8.00 futures)

Futures price	$8.00	$8.00	$8.00	$8.00
Expected basis	+ −.30	+ −.30	+ −.30	+ −.30
Premium	− .40	− .30	− .25	− .22
Net price	$7.30	$7.40	$7.45	$7.48

The **out-of-the-money** put options result in a lower floor price but a higher net price if price rises.

Using Call Options for Price Protection

This strategy involves selling or establishing a price for your crop and buying a call option. If price rises, you benefit because the call option increases in value similar to what the crop would have increased in value. Your net price is the sale value of the crop, plus the gain on the call option, less the call option premium and trading cost.

To implement this strategy, you sell or establish a price for your crop and buy a call option. Later when you normally sell your crop, you sell your call option. If the price has increased above the strike price as shown in Figure 5, you sell your option at the higher price and add it to the sale price of the cash crop. If the price has declined below the strike price, as shown in Figure 6, you may be able to sell the call option back and recover some of your premium, or continue to hold it to see if it expires worthless.

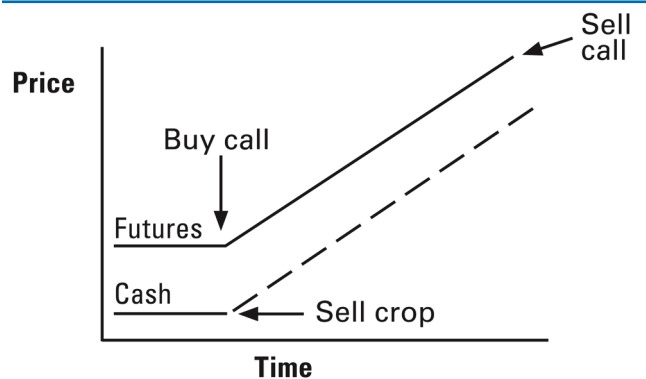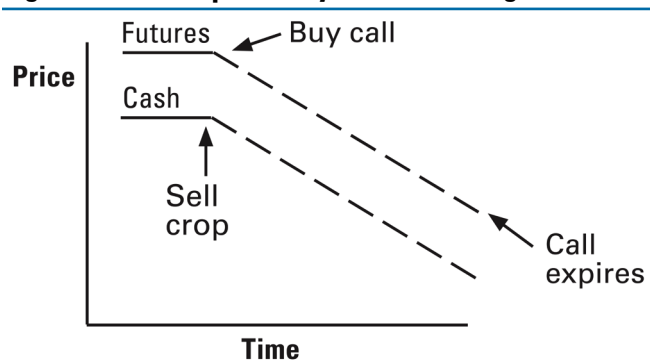**Figure 5. Sell crop and buy call (rising market)**

Figure 6. Sell crop and buy call (declining market)

Example 7.

Assume the crop is sold for $6.50 and a $7.00 strike price call option is purchased for a premium of $.40. The futures price subsequently declines $1.00 below the strike price to $6.00.

$6.50	cash price
7.00	strike price
.40	premium
6.00	futures price

The net floor price is the $6.50 cash price less the $.40 premium or $6.10 (not including trading cost). The call option expires worthless.

$ 6.50	cash price
– .40	premium
$ 6.10	floor price

Next assume the futures price drops further to $5.00. The option still expires worthless. The net floor price is still $6.10.

$ 6.50	cash price
– .40	premium
$ 6.10	floor price

As shown in Example 7, whenever the futures price is at or below the strike price, the net floor price is $6.10 (not including transaction costs).

If the futures price is above the strike price, the call option is sold and its value is added to the cash sale price.

Example 8.

Assume the futures price increases $1 above the strike price to $8.00. The cash price is $6.50 and the premium is $.40.

$6.50	cash price
– .40	premium
+ 1.00	option gain
$7.10	net price

As the futures price rises above the strike price, the option increases in value resulting in a higher net price.

Calculating the Floor Price

The floor price or minimum price can be figured in advance. It can be computed by subtracting the option premium from the cash sale price. If the futures price drops below the strike price the option will expire worthless.

Example 9.

Assume the cash price is $6.50 and the premium is $.40.

$6.50	cash price
– .40	premium
$6.10	floor price

If the price drops and the options expires worthless, the net price is $6.10.

Reducing the Cost

One way of reducing the cost of the option is to buy **out-of-the-money** options. The premiums for these options are less than **at-the-money** options.

Out-of-the-money call options result in a higher floor price. However, **out-of-the-money** call options result in a lower net selling price if price increases.

In Example 10, the **out-of-the-money** options result in a higher floor price but a lower net price if prices rise.

Example 10.

Assume the futures price is $7.00 and the cash price is $6.60.

Strike prices ranging from $7.00 (**at-the-money**) to $7.75 ($.75 **out-of-the-money**), and their respective premiums are shown below.

Strike price	$7.00	$7.25	$7.50	$7.75
Premium	.40	.30	.25	.22

The minimum selling price is $6.20 for the **at-the-money** option and increases to $6.38 for the $.75 **out-of-the-money** option.

Minimum Price

Cash price	$6.60	$6.60	$6.60	$6.60
Premium	− .40	− .30	− .25	− .22
Minimum price	$6.20	$6.30	$6.35	$6.38

However, the net price decreases from $7.20 for the **at-the-money** option to $6.63 for the $.75 **out-of-the-money** option if futures price increases to $8.00.

Rally Price ($8.00 futures)

Futures price	$8.00	$8.00	$8.00	$8.00
Strike price	− 7.00	− 7.25	− 7.50	− 7.75
Option gain	$1.00	$ .75	$ .50	$ .25
Cash price	6.60	6.60	6.60	6.60
Premium	− .40	− .30	− .25	− .22
Net Price	$7.20	$7.05	$6.85	$6.63