

Commodity Pricing Software

The main objective of this software is to provide farmers with an objective viewpoint of their potential risk and returns from selling or buying commodities while hedging their positions using options. Market advisory firms may suggest various options strategies to “hedge” farmer positions – this software provides farmers with a clear insight as to what such strategies actually mean by graphing Effective Prices associated with such strategies over a range of potential outcomes.

This program graphs the range of potential prices that sellers (buyers) of commodities would receive (pay) if they chose to hedge cash positions with options. The potential range of prices depends upon a number of factors, which are input by the user. These factors include the type(s) of options – calls or puts – bought or sold, the premium(s) paid or received for the option(s), the strike price of the option(s), the expected basis (local cash market price – futures price) at time hedge is lifted and cash commodity is sold or purchased, and the futures price at time hedge is lifted and cash commodity is sold or purchased.

For comparison purposes the program can also graph the range of potential prices that sellers (buyers) of commodities would receive (pay) if (a) they chose to hedge cash positions with futures or (b) simply traded in cash market without hedging.

Screen Interface

On opening the program the user will see a number of input boxes along the bottom of the screen. The first 4 boxes show the type of option contract bought or sold by the user. So for example, if the user bought a put option to hedge future sales of a cash crop, he/she would go to the second box from the left, titled “Long Put Option”, and enter the strike price of the option and the premium (price) paid for the option. The user would then click on the “include” square in the top left corner. A check mark will appear in the square indicating the user wants to graph potential payoffs from this option along with the effective price associated with selling the cash crop and exercising the option (hedging with the option).

The user can simultaneously graph up to 8 different options contracts positions. Each contract position requires the user to input its associated strike price and premium and to check the include square in each case.

Once options contracts positions have been entered, the user must click on either the buyer or seller circles in the Point of View box (bottom right hand side of screen). If the user will sell a

cash commodity sometime in the future, the seller circle should be checked. If the user will buy a cash commodity sometime in the future, the buyer circle should be checked.

The last 3 input boxes require the user to enter: the current price of the futures contract of the same delivery/maturity month as the options contracts position; the expected basis at the time the hedge will be lifted and the cash commodity bought or sold; and the graph range (default is 1), which adjusts the scale of the graph to best visualize positions and prices.

The final step is to click the graph button (bottom right hand side of screen), and 2 graphs will be automatically displayed on the screen.

Options Return Graph (Displayed in right half of screen)

This graph shows the returns to options contract(s) positions over a range of potential futures prices that could occur at contract maturity. The returns are measured on the vertical (Y-axis) in units of contract (e.g. cents per bushel for grains). The range of potential futures prices are measured on the horizontal (X-axis) in units of contract.

The potential returns to each option position held (long or short, call or put) are depicted with a different color. Thus, if the maximum of 8 options positions are held the graph will show 8 different colored lines. The red line represents the returns to the combined options positions. Note if only one option position is held only a red line is visible as – the single option return is the combined option return – it overlays the return line to the single option position.

By allowing multiple options positions to be graphed simultaneously the Options Return Graph can be used to show potential returns and risk of various options strategies (e.g. straddles, condors, butterflies etc.)

Note the options returns graphs are the same whether the user is a seller or a buyer. In other words the same potential returns from holding say a long put option exist whether the user is a seller or a buyer in the cash market.

Effective Price Graph (Displayed in left half of screen)

This graph shows the Effective Price (red line) that a user hedging cash sales or purchases with options positions will receive or pay. It represents the price associated with the combined cash and options positions. Effective price is measured on the vertical (Y-axis) in units of the cash commodity price (e.g. cents per bushel for grains). The range of potential futures prices are measured on the horizontal (X-axis) in units of contract. The Effective Price is affected by basis at time of cash sale or purchase, and so the Effective Price line adjusts upwards and downwards to reflect basis value previously input by user.

To compare the potential options hedging Effective Price with futures hedging price, the graph can also show the Hedged Price (orange line) associated with hedging using futures. The user previously input the current futures price to get this hedged price. It reflects the fixed (lock-in price) associated with selling or buying futures contracts at the time the hedging decisions are made. The Hedged Price is affected by basis at time of cash sale or purchase, and so the Hedged Price line adjusts upwards and downwards to reflect basis value previously input by user.

To compare the potential Effective Price associated with selling or buying in cash market, the graph also shows the Cash Price (black line) associated with cash trading (no hedge) at time of futures prices, its relative position against the futures (X-axis) is determined by basis level previously input by user.

Important Assumptions

- 1) The sizes of Hedged positions (options or futures) always match the size of cash positions. The Effective and Hedged Prices displayed in **Effective Price Graph** are based on this assumption. For example, if the user will sell 10,000 bushels of corn in cash market, it is assumed that 10,000 bushels of corn or futures options are used to hedge the cash position. The size of any hedged cash position can be analyzed, but futures or options position are always assumed to be the same size as the cash position.
- 2) The sizes of different options positions are always match, or are of the same size. For example, if the user inputs 2 different long put positions, the return line displayed in **Options Return Graph** assumes each position is same size (e.g. 5,000 bushels in long put 1, and 5,000 bushels in long put 2.)
- 3) Options Return lines and Effective Price lines assume the options position is exercised rather than re-traded (bought or sold) in options market. Thus, the software does not take into account the possibility that options may be sold in options market to gain time value.

Example taken from CME Group “Self-Study Guide to Hedging with Grain and Oilseed Futures and Options”.

http://www.cmegroup.com/trading/agricultural/files/AC-216_HedgersGuideNewBoilerplate.pdf

Page 50 Strategy #2: Buying Put Options

Protection against lower prices and opportunity if prices rally

As a soybean producer whose crop has just been planted, you are concerned that there may be a sharp decline in prices by harvest in October. You would like to have protection against lower prices without giving up the opportunity to profit if prices increase. At the present time, the November futures price is quoted at 950 cents/bushel. The basis in your area during October is normally 25 cents under the NOV soybean futures price. Thus, if the November futures price in October is 950 cents, local buyers are likely to be bidding about 925 cents.

Premiums for NOV soybean put and call options with various strike prices are presently quoted as follows:

Put Option Strike Price	Put Option Premium	Call Option Premium
900	10	61
920	19	51
950	31	31
980	49	21
1000	60	12

Effective (expected) minimum selling price (Price Floor) for Put with 950 strike price:

950 (strike)

-30 (premium paid)

-25 (expected basis)

895 floor selling price

Using commodity pricing software

Check include box for Long Put Option, and input 950 strike price and 30 premium. Then input -25 for basis and 950 for current futures price. Make sure Seller circle is highlighted in Point of View box, and then hit Graph button.

The Effective Sale Price is graphed on left hand side of screen in **Effective Price Graph**.

As you can see the Effective (expected) minimum selling price (Price Floor) is depicted as a horizontal red line for any futures price of 950 or lower, that intersects the Effective

Net Price axis at 895. Note for futures prices above 950 Effective Price rises to continually higher levels. The futures hedged price (orange line) and cash sale price (black line) are also shown to compare the relative risk-returns for each strategy over a range of possible futures prices.

Scenario # 1: Prices Decline Page 51.

Assume the Nov futures price has declined to 850, and local buyers are pay 825 (basis is -25). With the futures price at 850, the 950 put option can be exercised for a profit of 70 cents (strike – current futures price – initial premium paid). That added to the local cash market price of 825, gives you an Effective Price of 895 cents/bushel.

Under this scenario, you are on the price floor which is clearly shown in **Effective Price Graph**.

Scenario # 2: Prices Increase Page 51.

If prices increase, you will allow your put option to expire (assuming no time-value), because the right to sell at 950 when futures prices are in excess of 950 has no intrinsic value. Your Effective Price will be whatever amount local buyers are paying in cash market less the premium you initially paid for the option.

Assume the futures price when you sell your crop has increased to 1,100 cents/bushel and local buyers are paying 1,075 (basis is -25). Assuming no time value, you allow the option to expire, and the Effective Price is 1,045 cents/bushel (Cash Price – initial premium).

Under this scenario, you are on the upward sloping part of the Effective Price line at 1,045, which is clearly shown in **Effective Price Graph** by selecting Range of 2. The comparison Cash Price of 1,075 and futures Hedged Price of 925, are also shown in **Effective Price Graph**.

