

Short Hedge Example With Options

This guide describes how to place an output (short) hedge in the options market to reduce the price risk associated with selling an output produced in your business. A short hedge in the options market is referred to as the purchasing of a put option.

For example, John, a cattle producer, knows he will be selling a pen of cattle two months from now. He knows that by selling live cattle for more than \$92 per hundredweight he can ensure a satisfactory profit. Currently, the local live cattle price is \$94 per hundredweight, but he believes that the price may drop during the next few months. By knowing his cost of production for these animals, John knows that the \$94 per hundredweight will allow for a satisfactory profit. What can John do to protect against falling prices? He cannot sell the cattle now because the cattle are too small, but he could enter the options market and partially offset any loss in value (decrease in price) with a gain in option value.

How to place a hedge

First, knowing your cost of production helps you know when to place a hedge. To place a hedge, you need to contact a broker. Most large communities have a broker who will take your order for a set fee (as is common when placing any futures/options market order). The broker can help you understand how to place and exit your position. The broker has a stake — a commission — in making sure you have a positive experience with hedging.

After you have placed the order, the broker will contact a brokerage house at the commodity exchange and relay the order. On the floor of the trading commission, market supply and demand are matched, so that if you want to place a short hedge using options (put option), there will always be someone willing to write a put option provided you are willing to pay the market price. This process is known as arbitrage. As a hedger, you must also know the strike price at which you would like to enter the options market. For more information, see MU Extension publication G603, *Introduction to Hedging Agricultural Commodities With Options*.

Revised by
Joe Parcell, Professor, Department of Agricultural and Applied Economics
Jason Franken, Former Postdoctoral Researcher, Department of Agricultural and Applied Economics

Options in, out of, and at the money

The price paid for the option is referred to as the premium. The amount of the premium paid is related to the strike price, which comes from a predetermined range of values that is different for each commodity. A put option is said to be *in the money* if the strike price is above the underlying futures price, *at the money* if the strike price is equal to the underlying futures price, or *out of the money* if the strike price is below the underlying futures price. At any given time, the range of strike prices quoted will cover values in the money, at the money, and out of the money. Thus, a hedger or speculator has the option of purchasing an option at any of these three levels. Typically, options in the money will have the highest premium, followed by options at the money. Options out of the money will be the cheapest.

Option premium

The option premium is the value the hedger pays for the right to take a futures position later. The premium is based on the intrinsic value (the difference between the strike price and the underlying futures price for an in-the-market put option) and time value (number of days remaining until expiration of the contract). If the futures market decreases, a put option theoretically increases in value; however, this need not be the case.

How a short hedge works

Cash price and options value both decrease

A decrease in futures price is assumed to be positively related to a change in the put option value. Thus, the option value decreases. Suppose that today Calvin, a corn producer, knows that he will be selling corn a few months from now and that given the current cash price of \$5.35 per bushel, he has the potential to profit. However, Calvin is concerned that the price may decrease before he sells. He decides to purchase a \$5.50 per bushel in-the-money put option for \$0.20 per bushel. Later, when the Calvin is ready to sell the corn, the cash and futures prices have decreased to \$5.15 per bushel and \$5.20 per bushel, respectively (no change in basis). The futures price has decreased such that the put option is now further in the money. Therefore, Calvin sells the corn for \$5.15 per bushel and sells his put option for \$0.35 per bushel, a \$0.15 per bushel gain in value (Table 1). In this case, Calvin has improved his selling price from \$5.15 per bushel to \$5.29 per bushel (\$5.15 per bushel less

\$0.01 per bushel commission plus \$0.15 per bushel gain in option value).

Table 1. Short hedge with options as cash and futures prices decrease (basis is held constant).

Cash and futures		Options price
Today: Cash	\$5.35/bu	Purchase \$5.50/bu put at \$0.20 bu (pay \$1,000 plus commission)
Futures	\$5.40/bu	
Later: Sell corn in local market at	\$5.15/bu	Sell \$5.50/bu put at \$0.35/bu (receive \$1,750 less commission)
Futures	\$5.20/bu	
Results	Cash price paid	\$5.15/bu
	Plus commission	\$0.01/bu
	Plus option premium gain	\$0.15/bu
	Net selling price	\$5.29/bu

Cash price and options value both increase

An increase in futures price is assumed to be inversely related to a change in the put option value. Thus, the option value decreases. Assuming the same initial conditions as the previous example, suppose that after Calvin purchases the put option, the cash and futures prices increase to \$5.60 per bushel and \$5.65 per bushel, respectively (no change in basis). The futures price has increased such that the put option is now out of the money. Therefore, Calvin sells the corn for \$5.60 per bushel and sells his put option for \$0.05 per bushel, a \$0.15 per bushel loss (Table 2). In this case, Calvin has decreased his selling price from \$5.60 per bushel to \$5.44 per bushel (\$5.60 per bushel less \$0.01 per bushel commission less \$0.15 per bushel loss in option value). However, Calvin had the potential for unlimited gains (Table 1 scenario) with limited losses.

Table 2. Short hedge with options as cash and futures prices increase (basis is held constant).

Cash and futures		Options price
Today: Cash	\$5.35/bu	Purchase \$5.50/bu put at \$0.20 bu (pay \$1,000 plus commission)
Futures	\$5.40/bu	
Later: Sell corn in local market at	\$5.60/bu	Sell \$5.50/bu put at \$0.02/bu (receive \$250 less commission)
Futures	\$5.65/bu	
Results	Cash price paid	\$5.60/bu
	Plus commission	\$0.01/bu
	Less option premium gain	\$0.15/bu
	Net selling price	\$5.44/bu

Cash price changes minimally, option value expires

With the same initial conditions as in the previous examples, assume that the cash and futures prices change minimally (no change in basis) and the contract month expiration date is tomorrow. Therefore, Calvin purchases the corn for \$5.34 per bushel and allows his put option to expire worthless (and Calvin does not pay commission

costs for allowing the option to expire). In this case, Calvin has decreased the price received from \$5.34 per bushel to \$5.135 per bushel (\$5.34 per bushel less \$0.005 per bushel commission less \$0.20 per bushel loss in option value; see Table 3). However, Calvin had the potential for unlimited gains with limited losses.

Table 3. Short hedge with options as cash and futures prices do not change (basis is held constant).

Cash and futures		Options price
Today: Cash	\$5.35/bu	Purchase \$5.50/bu put at \$0.20 bu (pay \$1,000 plus commission)
Futures	\$5.40/bu	
Later: Sell corn in local market at	\$5.34/bu	Sell \$5.50/bu put at \$0/bu (receive \$0) Option expires worthless
Futures	\$5.39/bu	
Results	Cash price paid	\$5.34/bu
	Less commission	\$0.005/bu
	Less option premium loss	\$0.20/bu
	Net selling price	\$5.135/bu

Exercise a put option

Table 4 outlines an example similar to the one described in Table 1. However, in this case, the futures price decreases substantially and the option premium realizes only a modest increase in value. In this case, Calvin might want to exercise the put option. That is, Calvin would use his right to sell a futures contract at a later date at \$5.50 per bushel and buy back in the futures market at the current price of \$5.00 per bushel. Therefore, Calvin would receive \$5.19 per bushel instead of the current cash price of \$4.95 per bushel. Furthermore, if Calvin had sold his put option, he would have received \$5.09 per bushel because the put option increased in value by only \$0.15 per bushel.

Table 4. Short hedge with options as cash and futures prices increase (basis is held constant).

Cash and futures		Options price
Today: Cash	\$5.35/bu	Purchase \$5.50/bu put at \$0.20 bu (pay \$1,000 plus commission)
Futures	\$5.40/bu	
Later: Sell corn in local market at	\$4.95/bu	Option value is \$0.35/bu. Therefore, exercise option at \$5.50/bu and offset in futures market at \$5.00/bu for an increase in value of \$0.50/bu (receive \$2,500 less commission)
Futures	\$5.00/bu	
Results	Cash price paid	\$4.95/bu
	Less commission	\$0.01/bu
	Less initial call premium	\$0.20/bu
	Plus option exercise gain	\$0.50/bu
	Net selling price	\$5.24/bu

Original authors: Joe Parcell and Vern Pierce, formerly of the Department of Agricultural Economics

MU Extension publications G601 through G611 cover agricultural risk management. Topics include futures, options, hedging, basis and price forecasting.