Section II
Advanced Pricing Tools

# Chapter 15: Options

## Learning objectives

- The appeal of options
- Puts vs. calls
- Understanding premiums
- Recognizing if an option is in-the-money, at-the-money or out-of-the-money

## Key terms

**Call option:** The right, but not the obligation, to buy futures contracts.

**Put option:** The right, but not the obligation, to sell futures contracts.

**Premium:** The price paid for an option.

**Exercise:** To execute the terms of the option. A call option owner can exercise the option and take a "long" (buy) futures position. A put option owner can exercise the option and take a "short" (sell) futures position.

**Strike price (aka exercise price):** The price at which an options contract can be exercised. Strike prices are established by the exchange.

**Intrinsic value:** One component of the premium and the amount by which an option is "in-the-money." Call options are in-the-money if the strike price is below the current futures price. Put options are in-the-money if the strike price is above the current futures price.

**Time value:** Another component of the premium, and the part not attributed to intrinsic value. Time value is influenced by the length of time to expiration and volatility of the underlying futures contract.

In 1982, the Commodity Futures Trading Commission (CFTC) authorized a three year pilot program for agricultural options. Each exchange was allowed to select one commodity for the pilot program, and options were developed for soybean futures (CBOT), HRS futures (MGEX), HRW futures (KCBOT), and

live cattle futures (CME). The pilot program was successful and in 1985 more commodities were opened to the trading of options. Today, trading in options is active and successful.

Some view agricultural options as the best solution for grain producers struggling with the task of marketing. Whether or not they are the best solution is open for discussion. However, they do provide a variety of tools for managing price risks. In order to understand the use of options in risk management, it is important to get comfortable with some common terms.

## The Options Contract

An option is the right, but not the obligation, to buy or sell a futures contract. Buyers of put options have bought the right to sell futures contracts. Buyers of call options have bought the right to buy futures contracts. Option sellers receive a premium, but are obligated to take the other side of a futures contract. To offset an option, you must do the opposite of your original transaction. If you bought a put, then you must sell a put to offset the transaction. If you sold a call, then you must buy a call to offset the transaction.

All terms of an options contract, except the premium, are standardized by the exchange. Delivery months and contract units are the same as the underlying futures contract. The minimum price fluctuation (a "tick") is smaller for options contracts; 1/8 cent in grains, or $6.25 per contract.

## The Appeal of Options:

Hedging with futures is used to lock-in a price, leaving only basis open. Hedging involves offsetting positions in cash and futures markets. Offsetting positions can be good – they protect hedgers from unfavorable price moves. For example, selling November futures protected the soybean producer from lower prices at harvest, while buying corn futures protects the cattle feeder from higher feed costs.

However, an offsetting futures position can also disappoint, because hedging takes away opportunities to make money from favorable price moves. For example, the soybean producer selling futures may have regrets if prices rise even higher during the growing season (losses in the futures position will offset a more valuable crop in the field). Alternatively, the cattle feeder may regret the purchase of corn futures if prices decline further. These regrets are magnified by the need to deposit more money in a margin account.

Decisions must be made to manage price risks. How can the hedger manage price risks while avoiding the disappointment and margin calls that come with locking in a specific price? Options offer an answer, with two appealing features:

Option buyers protect themselves against an unfavorable price move. At the same time, they can still benefit from a favorable price move.

Option buyers pay a premium, but are never asked for additional margin deposits. They avoid the dreaded "margin call."

You might think of options as “Protection with Potential” since buying options offers risk management against adverse price movement and potential for price improvement.

## Puts and Calls

An option is the right, but not the obligation, to buy or sell a futures contract at some predetermined price at any time within a specified time. There are two types of options; puts and calls.

A call option is the right to buy futures contracts. Recall the long hedge - the purchase of futures contracts against cash sales or to lock-in input costs. The long hedge alternative with options is the purchase of call options – the right to buy futures. Call options as a hedge are used to establish a maximum price, while retaining the ability to benefit from decreasing prices.

A put option is the right to sell futures. With futures, a short hedge involves the sale of futures against cash ownership. With options, the short hedge alternative is the purchase of puts – the right to sell futures. Grain producers can buy put options to establish a minimum price for protection, without giving up the opportunity to profit from higher prices.

| Hedging strategy | Futures | Options alternative |
|---|---|---|
| long hedge | purchase futures contracts to lock-in a purchase price | purchase call options, the right to buy futures |
| short hedge | sell futures contracts to lock-in a selling price | purchase put options, the right to sell futures |

With puts and calls, the predetermined price is called the strike or exercise price. The premium is the price paid for the option. It is important to remember that puts and calls are separate contracts, not opposite sides of the same transaction.

**Option buyers have choices**

1. Exercise the option - convert the option into a futures contract at the strike price
2. Sell the option
3. Let the option expire

Option buyers pay a premium and have choices. One choice is to exercise the option. Any time before expiration, the option buyer can exercise, or convert, the option into a futures contract at the strike price. For example, the buyer of a $15 November soybean put option can convert the put into a short futures position. Few options are actually exercised by producers.

Another choice is to sell the option. The buyer of a $15 November soybean put option can place an order to sell a $15 November put. Whether or not you profit from the sale depends on several factors, not the least of which is whether market prices are falling (the right to sell futures becomes more valuable as prices fall).

The last choice open to the buyer is to simply let the option expire. For the buyer of a put option, this is a good choice if market prices increased (above the strike price). Does it make sense to exercise the right to sell at $15, if the market is trading at $18 per bushel?

Option sellers receive premiums from the buyers. Sellers are obligated to take the opposite futures position if an option is exercised. Because of this obligation, option sellers post margin and are faced with the possibility of margin calls. Option sellers have only one choice to make; whether or not to offset their position by purchasing the options sold.

Options are traded in a similar manner as futures contracts. At the CBOT, most of the trading of futures contracts has migrated to the electronic platform. The trading of options, however, is still dominated by open outcry in a trading pit. Some exchanges trade options like futures, on an electronic trading platform.

## Option Premiums

Trading in options is based on premiums. Option buyers pay a premium for calls (the right to buy futures) and puts (the right to sell futures). Option sellers receive a premium and have obligations. The premium paid for options is negotiated by buyers and sellers. What factors help determine the premium paid for an option?

An option premium is made up of two components; intrinsic value and time value. Intrinsic value refers to whether an option is of value compared to the current futures market. Time value is the rest of the premium – the part that is not attributed to intrinsic value. Let's explore intrinsic value and time value.

Intrinsic value is the amount of money by which an option is "in-the-money." Options can be "in-the-money," "at-the-money" or "out-of-the-money." Let's look at a few examples.

A call option is in-the-money if the strike price is below the futures price (in other words, the right to buy futures has value at that time). A $6 July corn call is in-the-money if July futures are trading higher than $6 per bushel. For example, if July corn futures are at $6.75 per bushel, we would say the $6 call is 75 cents in-the-money. If July futures are at $6 per bushel (the same as the strike price), the option is at-the-money. If July futures are trading less than $6 per bushel, the $6 calls are out-of-the-money. If July corn is trading at $5.50 per bushel, we would say the $6 call is 50 cents out-of-the-money.

A put option is in-the-money if the strike price is above the futures price (in other words, the right to sell futures has value at that time). A $15 November soybean call is in-the-money if November futures are trading lower than $15 per bushel. For example, if November soybeans futures are trading at $13.80 per

bushel, we would say the $15 put is 120 cents in-the-money. If November futures are at $15 per bushel, the put option is at-the money. If November futures are trading higher than $15 per bushel, a $15 put is out-of-the-money. If November soybeans are trading at $17.50 per bushel, we would say the $15 put is $2.50/bu. out-of-the-money.

Time value is that part of the premium not attributed to intrinsic value. Time value is influenced by two factors; length of time to expiration and volatility of the underlying futures contract. It is the time value component of options premiums that is often compared to insurance premiums.

Consider the time to expiration and the impact on premiums. When buying auto insurance, which will cost more; 6 months of coverage, or one year? The answer is obvious. Buying coverage for a full year will cost about twice as much. The same reasoning applies to options. The more time there is to expiration, the higher the time value of the premium. Consider, for example, a cattle feeder buying call options on corn futures to cover input costs. Which at-the-money option would you expect to have more time value in mid-January - a May or a December corn call? May calls will expire in mid-April, and provide price "coverage" for 3 months. The December option expires in mid-November, providing 10 months of coverage. Clearly, the time value on the December call will be higher than the May call.

Options are sometimes described as "wasting assets" because the time value portion of the premium erodes over time.

The auto insurance analogy works equally well to explain the impact of volatility on premiums. Consider two men with similar driving records and they are about to buy the same car. One man is 50 years old and married. The other man is 18 years old and single. Who will pay more for insurance? Unfortunately for young people, the answer is again obvious – the 18 year old will pay more.

The insurance industry has reams of data showing that the average married 50 year old man is a relatively low insurance risk. They have fewer accidents and make fewer claims than the average 18 year old single man. Young men are, on average, a greater risk. As a result, they pay higher premiums.

**Buying options and buying insurance:**
Buying options has a lot in common with buying insurance.

- You pay a premium for a certain level of "price insurance."
- Premium is your only cost.
- The outcome of not using the "price insurance" is favorable.

The same reasoning applies to options premiums. Consider two different commodities like wheat and orange juice. The wheat market might be calm because major wheat producing countries had good crops and there are few surprises on the demand side. With little news to feed a dramatic price move, the wheat market will trade narrow range. In this example, volatility is low and so are option premiums.

The orange juice market, on the other hand, might be concerned about the risk of an early frost. Supplies are tight and demand is steady. Prices are reacting sharply to every bit of news. The market is

tense, knowing that prices could soar or collapse. In the case of orange juice, volatility is high and so are options premiums.

Volatility can and does change over time, and the changing level of volatility affects premiums. Next year it might be wheat with higher volatility and premiums, while the orange juice market settles into a trading range with lower volatility and premiums.

***Further reading***

Self-Study Guide to Hedging with Grain and Oilseed Futures and Options (handbook), CME Group, April 2012 http://www.cmegroup.com/trading/agricultural/self-study-guide-to-hedging-with-grain-and-oilseed-futures-and-options.html

Grain and Oilseed Futures and Options (brochure), CME Group, February 2012 http://www.cmegroup.com/trading/agricultural/grain-and-oilseed-futures-and-options-fact-card.html

## Exercise #15

Use the following market closes for soybean futures and options on April 6, 2011 to answer the questions below.

### Soybean futures market

| Contract | Closing Price |
|---|---|
| July | $13.88 |
| September | $13.86 |

### Soybean options market (cents per bushel)

| | Calls | | Puts | |
|---|---|---|---|---|
| Strike Price | July | September | July | September |
| 1340 | 86'1 | 116'2 | 38'0 | 70'5 |
| 1360 | 74'4 | 106'2 | 46'3 | 80'5 |
| 1380 | 64'4 | 96'7 | 56'3 | 91'1 |
| 1400 | 56'1 | 88'1 | 67'7 | 102'3 |
| 1420 | 48'6 | 80'6 | 80'4 | 114'7 |

What is the intrinsic value of a 1360 July call? _____

What is the time value of this same call option? _____

What is the intrinsic value of a 1360 September call? _____

What is the time value of this same option? _____

What is the intrinsic value of a 1380 July put? _____

What is the time value of this same option? _____

What is the intrinsic value of a 1420 September put? _____

What is the time value of this same option? _____