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Factors Affecting Option Premium Values

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Put Options

Hedging in the futures market with options is much like buying an insurance policy to protect commodity sellers against declining prices or buyers against rising prices. A put option allows producers to establish a price floor or minimum selling price. With a put the producer can benefit from a price rally. The buyer of a put option pays an option premium but does not have to establish a margin account. For this premium, the put option buyer has the right, but not the obligation, to sell a futures contract at a predetermined price known as the "strike" price.

Call Options

Call options protect buyers from rising prices and allow them to set a price ceiling. Call options also can be used in place of storage following harvest. They give buyers the opportunity to profit from a post-harvest price rally. The call option buyer has the right, but not the obligation, to purchase a futures contract at the strike price. The buyer of a call option pays a premium. Losses are limited to the premium and commission costs, while the purchaser retains the opportunity to profit from a post-harvest price rally.

Strategies for Using Options

A number of pricing objectives can be achieved through options. Among these are: (1) buying put options for protection against lower prices; (2) buying call options for protection against escalating prices (a common strategy of commodity purchasers); and (3) buying call options at harvest to profit from a post-harvest price increase. The IRS views this last strategy as purely speculative.

Option Premium Specifics

Option buyers pay option sellers a premium for the rights conveyed by the option contract. The option gives the buyer the right, but not the obligation, to take the underlying futures position, so the premium is his maximum financial liability. The option seller is obligated to take the opposite side of the futures position if the buyer takes his futures position, so the seller must set up a margin account and meet margin calls if the market moves against the option seller's position. Premiums are determined by open outcry in the trading pits of commodity exchanges such as the Chicago Board of Trade, New York Cotton Exchange, Chicago Mercantile Exchange, and the Kansas City Board of Trade. The two specific aspects of a futures contract option are the underlying futures contract and the strike price. Option contract sizes are consistent with their underlying futures contract counterparts and are

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listed for each of the traded contract months of a commodity. For example, for corn, there are both put and call options for each contract traded (i.e, December, March, May, etc.). Options expire approximately a month before the associated futures contract. In other words, a March corn option expires in February.

Any time before the option expires the option buyer can exercise the option (convert the option into a futures contract at the strike price). The option buyer also can sell the option to someone else (offset) or do nothing and let the option expire. The choice of action is left entirely to the option buyer.

Option Strike Prices

Option strike prices trade in specific increments above and below the price at which futures are trading for each commodity. Corn, oats and wheat are listed in 10-cent-per-bushel increments and soybeans are listed in 25-cent-per-bushel increments. Rice options are listed in 20-cent-per-hundredweight increments and cotton options are listed in 1-cent-per-pound increments. As an example, if December cotton is trading at $0.7425 per pound, call and put options would be listed above futures at strike prices of $0.75, $0.76, $0.77, etc. and below futures at $0.74, $0.73, $0.72, etc.

Terminology of Option Premiums

Option premiums have two components—intrinsic value and time value.

Intrinsic value is the built-in value of an option. It is the difference between the option strike price and the underlying futures price. For example, the intrinsic value of a $2.70 December corn put when December corn futures are trading at $2.60 is 10 cents ($2.70 strike price - $2.60 underlying futures price). The holder has the right to sell at $2.70 while the market is trading at $2.60, so the $2.70 put has a "built-in" value of 10 cents. In this case, the $2.70 put is said to be "in-the-money" by the amount of its intrinsic value ($0.10/bushel).

If December corn futures were trading at $2.76, the $2.70 put would have no intrinsic value and the $2.70 put would be classified as "out-of-the-money." Intrinsic value is never quoted as less than zero. Similarly, if December corn futures were trading at exactly $2.70, a $2.70 option (put or call) would be classified as "at-the-money."

Time value is equal to the option premium less intrinsic value. Time value reflects the risk that the option seller bears in selling the option to the buyer. If a $2.70 December corn put sold for 34 cents per bushel when December corn was trading at $2.60, the put would have 24 cents per bushel of time value ($.34 premium - $.10 intrinsic value = $.24 time value). The total cost of this put option would be $1,700 ($0.34 x 5,000 bushels) plus a commission charge. Of this amount, $500 would be the intrinsic value and $1,200 the time value.

For options with no intrinsic value, the entire premium equals time value. Suppose that in July a December corn put with a strike price of $2.40 is offered for $0.08 per bushel at the same time the December corn futures price is quoted at $2.60. The option is $0.20 out-of-the-money and has no intrinsic value. Even so, the put option has a time value of $0.08 per bushel. The $0.08 premium represents the risk the seller still has that the option could expire in-the-money.

Why would anyone pay for something that has no intrinsic value? It has value because the option still has 4 months before expiration in November, and during that time, the option buyer and seller know the underlying futures price could fall below the $2.40 strike price. If the December corn futures price were to fall below $2.32 (strike price of $2.40 minus premium of $0.08), the holder of the put option would be sure of a profit. For a December corn futures price between $2.32 and $2.39, the put option buyer could recover all or a portion of the initial premium cost.

Classifications of Option Pricing

In-the-Money. Any option (call or put) that has intrinsic value is said to be in-the-money by the amount of its intrinsic value. For a call, it is the amount by which the futures price is above the strike price. For a put, it is the amount by which the futures price is below the strike price.

Out-of-the-Money. A call option is said to be out-of-the-money if the underlying futures price is currently below the option strike price. A put option is out-of-the-money if the futures price is above the option strike price.

At-the-Money. If the options strike price and the underlying futures price are the same, the option is at-the-money.

At expiration an option's premium consists only of intrinsic value because the option no longer has any time value.

Consider the previous out-of-the-money corn put example. Four months before expiration it commanded a premium of $0.08 a bushel. Why $0.08? Why is the premium not $0.10 or $0.05? What are the factors that influence an option's time value? There are four primary factors: the relationship between the underlying futures price and the option strike price; the length of time remaining until expiration; the volatility of the underlying futures price; and interest rates.

The relationship between the underlying futures price and the option strike price is one factor affecting the value of premiums. One indicator of this relationship is the option "delta," a measure of the amount by which an option premium will change for a corresponding change in the underlying futures price. All things being equal, an at-the-money option will have more time value than an out-of-the-money option. The reason is that the at-the-money option stands a much better chance of eventually becoming worthwhile to exercise.

A second factor is the **length of time remaining until expiration**. Ordinarily, the more time an option has until expiration, the higher its premium. This is because the option and the underlying futures contract price have more time to fluctuate in value. Time increases the probability that the option will, at some point, move into the money and become profitable for the buyer. Therefore, an option's time value will decline (erode) as the option approaches expiration. This is why options are sometimes described as "eroding or time decaying assets."

Another factor is the **volatility of the underlying futures price**. Generally, option premiums are higher during periods of volatile futures prices. Because there is increased price risk associated with a volatile market, the cost of obtaining the insurance through options is also greater. An option is more likely to move in-the-money and become profitable for the buyer when prices are volatile. Sellers (attempting to avoid losses) require higher premiums. Thus, it is possible for an option 3 months from expiration to command a higher premium in a volatile market than an option 4 months from expiration in a stable market.

The final factor affecting time value is **interest rates**. Although not as important as the other factors, interest rates would also have an affect on option premiums. It is generally assumed that interest rates and option premiums move in opposite directions, all else being constant. When interest rates increase, option premiums decline. The purchaser of an option pays the premium and brokerage fees up front in order to receive a potential profit from that action some time in the future. If interest rates increase, current value of the expected future profit declines while the implicit cost of the option increases. The buyer, therefore, would not want to pay as much for the option, and the seller would likely be willing to take less.

Most active option traders use some tool to estimate the value of premiums. One of the most common tools is the Black Scholes model developed from the seminal work of Fischer Black and Myron Scholes in 1973. There are also computerized software versions of this type of analysis that estimate option premiums as the futures price, time to expiration, volatility, and interest rates change.

Option Values at Expiration

An option's value at expiration will reflect whatever amount of money the option holder could realize by exercising the option. If, at expiration, an option is not worth exercising (i.e., it has no intrinsic value) it will expire worthless. Assume you are the owner of a November soybean call option with a strike price of $6.25 (i.e., you have the right to buy a November soybean futures contract for $6.25 a bushel). If, at expiration of the option, the November soybean futures price is less than $6.25, it stands to reason that no one is going to pay for the right to buy the futures contract at a higher price and have an immediate loss in the position. As a result, the out-of-the-money option is worthless after expiration. In this case, your option will expire worthless and you forfeit the premium you initially paid for the option.

Profitable Option Positions

For a call to be worthwhile to exercise, the futures price must be above the strike price. An "in-the-money" call conveys the right to buy a contract below the current market price. Alternatively, for a put to be worthwhile to exercise, the futures price must be below the strike price. This is because the "in-the-money" put will then convey the right to sell above the current market price.

What happens when, at expiration, an option is worth exercising? Assume you hold a March cotton call with a $0.74-per-pound strike price and, at the option's expiration, the March cotton futures price is $0.76. Because you have the right to buy a cotton futures contract at $0.74, which can be sold immediately for $0.76, the

option will be worth $0.02 per pound (or $1,000 for the entire contract; $0.02 x 50,000 lbs.). If you have your broker sell the option you should be able to realize this amount.

Suppose at the option's expiration the March futures price is $0.77. In this case, the intrinsic value of the option would be $0.03 per pound (or $1,500 per contract). The call option would convey the right to buy a futures contract at $0.74 that can be immediately sold at the current market price of $0.77.

Option Pricing in Summary

The five most important things you need to know about option premiums are:

1. Premiums are determined by the interaction between buyers and sellers on the trading floor of the exchange. The two specific aspects of an option contract are the underlying futures contract and the strike price.
2. The total cost of an option is the option premium multiplied by the size of the futures contract. For example, if a wheat option premium is quoted at $0.14 per bushel, the total cost of the option would be $700 ($0.14 x 5,000 bushels).
3. Before expiration, the option premium will consist of its intrinsic value plus its time value. If an option has no intrinsic value (i.e., the option is at-the-money or out-of-the-money), its premium is entirely time value.
4. An option's value at expiration will be equal to its intrinsic value (the amount by which it is in-the-money) because there is no time value remaining. This is true for both puts and calls. If an option has no intrinsic value at expiration it will expire worthless.
5. The time value of an option's premium is primarily determined by the: (1) relationship between the underlying futures price and the option strike price; (2) length of time remaining until expiration; (3) volatility of the underlying futures price; and (4) the interest rate.

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