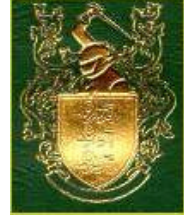


TRADING NEAR-EXPIRATION OPTIONS IN AGRICULTURAL COMMODITIES



This article is part of a series published by R.J. O'Brien on risk management topics for commercial agri-business clients.

In previous articles we have discussed how options behave quite differently depending on whether they are at-the-money (ATM), in-the-money (ITM) or out-of-the-money (OTM) and how far they are from expiration. This article takes a closer look at the pricing dynamics and trading strategies associated with near-expiration options. We start by reviewing the mechanics of expiration, exercise and assignment. We then examine the pricing dynamics of near-expiration options from both a theoretical and practical standpoint. With this foundation in place, we then start building some ideas on how to trade near-expiration options.

Note: For a more basic explanation of option pricing please refer to our article entitled *De-Mystifying the Greeks – The Essential Elements of Option Pricing*.

I. EXPIRATION MECHANICS

The first step to understanding near-expiration option trading is to be clear on how the expiration process works. First of all, most exchange-traded agricultural options are “American-style”, meaning they can be exercised anytime prior to the last trading day¹. However, options are normally exercised in the last few days prior to expiration. The reason for this is that the long option holder forfeits any remaining time value if they exercise early. The exception to this is deep ITM

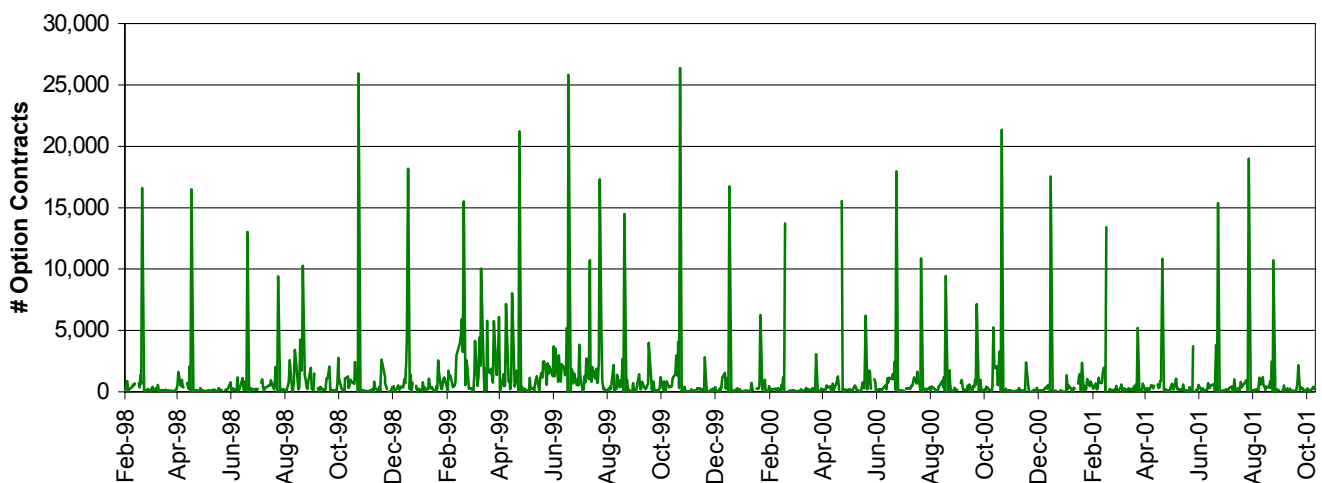
options, which are often exercised early since they have no time value. Figure 1 shows the exercise pattern for CBOT soybean options for the period Feb/98 to Oct/01.

Of course, OTM options will normally expire worthless and thus require no further attention. Likewise, options that are well ITM will almost always be exercised – otherwise the long option holder is walking away from a risk-less profit. Where it gets tricky is when the underlying futures contract is trading very close to the strike price as the options are nearing expiration.

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Figure 1.

Options Exercised—Soybeans February 1998 to October 2001



¹ This is the case for all CBOT and CME agricultural options, as well as KCBT wheat and MGE wheat.

WHY ITM OPTIONS MIGHT NOT GET EXERCISED

Sometimes a long option holder may choose not to exercise at expiration even if the option is ITM. For example, let's assume on the last trading day of the Dec options CZ settles at \$2.19 1/2 and you are long CZ 220 puts. While on paper you have a small profit if you exercise, unless you're already long futures (in equal quantity) you can't realize this profit until the next trading session. In the case of the CBOT grain markets the last trading day is a Friday, so your next opportunity to trade the futures is A/C/E on Sunday night. If CZ opens higher than \$2.20, your paper gain quickly turns into a loss.

Now let's say we're in the middle of corn pollination and the NWS 6-10 day forecast for the corn belt comes out Friday afternoon (the last trading day for our puts) at above-normal temps and below-normal precipitation. Even with a 1/2 cent head start in the position, it is unlikely that our put holder will choose to exercise and carry a short position over the weekend in this scenario (unless they are already long the offsetting futures).

Another key variable is the commission structure. For example, under some brokerage arrangements, customers do not pay the back end of commissions when options expire unexercised. However, if they exercise the option, they pay commissions on both sides of the options, as well as for the offsetting futures. Thus, in cases where an option is only one or two ticks in the money, the holder may choose not to exercise, since his incremental trading cost is more than the intrinsic value of the option. This is particularly the case for small, retail customers that pay higher commission rates.

By the way, ITM options at the CBOT, CME, KCBT and MGE are automatically exercised, although the long option holder can stop the automatic exercise by notifying the clearing house (via your FCM).

WHY OTM OPTIONS MIGHT GET EXERCISED

On the other hand, we sometimes see options exercised that are slightly OTM at expiration. Options do not have to be ITM to be exercised. One motivation for this is when the long option holder wishes to establish a futures position and prefers to exercise the option (even though its slightly OTM) rather than risk pushing the market against themselves to establish their position in the futures pit. This is obviously only an issue for large traders.

A more common situation is where the long option holder gets some new market information after the close that suggests the underlying futures will open sharply higher (for calls) or lower (for puts) during the next trading session. For example, assume you were long SX550 calls and SX closed at 5.49 1/2 on the last trading day of the options. That same afternoon, USDA announces a surprise change to the non-recourse loan program that is expected to dramatically reduce U.S. soybean acreage this spring. Under this scenario you might decide to exercise your calls even though they are 1/2 cent OTM.



It should be evident from the previous section that the long option holder is in control of the exercise process and can normally lock in their profit on ITM options, either by offsetting the option itself or by taking the offsetting futures position. For example, if WN is trading at \$3.52 late in the session on the last trading day and you're long 50 WN350 calls, you can simply sell 50 WN futures and then indicate your intention to exercise your 50 WN350 calls after the close. The only time you might not be able to do this is when the market closes sharply higher or lower and you end up being ITM with little warning. In such a case you need to evaluate whether you want to exercise and carry the underlying futures position through to the next session.

The option writer, on the other hand, bears the risk of not knowing whether he will be assigned on his short option position whenever the underlying futures are trading near the strike price on the last trading day. This is sometimes referred to as pin risk, in that the short might end up being "pinned" to a long or short futures position and will have to carry this risk through to the next trading session.

This uncertainty arises from three sources:

1. As discussed above, the long option holder will not necessarily exercise an ITM option and may choose to exercise an OTM option.
2. If the market closes right around the strike, the short may be unable to determine whether the option will expire ATM, ITM or OTM.
3. The assignment process for CBOT options is random, and therefore just because some longs exercise, it doesn't necessarily mean all shorts will get assigned (unless all the longs exercise, of course).

Keep in mind that the above dynamics apply not only to customers, but also to numerous locals and option market makers. The market makers may have a large book of offsetting options and futures positions that they have accumulated over months of trading a particular option month. It's no wonder that the market is often volatile during the last trading day of the options.

Please note that CBOT agricultural options cease trading at 1:15 p.m. CST on the last trading day, but can be exercised until 6:00 p.m. CST that same day. MGE and KCBT wheat options can be exercised until 4:00 p.m. CST on the last trading day. CME ag options can be exercised up to 7:00 p.m. CST on the last trading day. **Please notify your broker early in the day if you are considering exercising an ATM or OTM option on the last trading day.**

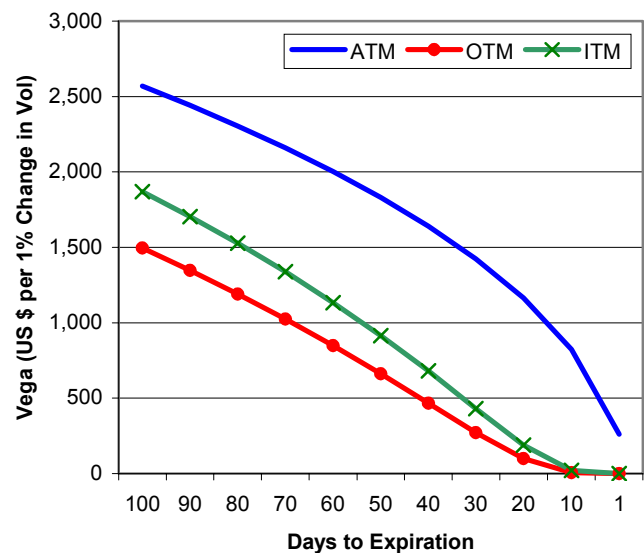
II. PRICING DYNAMICS OF NEAR-EXPIRATION OPTIONS

Not to get bogged down in theory, but there are a couple of important things we need to understand about how near-expiration options behave before we can trade them effectively.

First, as options get closer to expiration, their sensitivity to changes in implied volatility diminishes. In other words, vega gets smaller as we near expiration, as illustrated in Figure 2. This is intuitive in that the fewer days to expiration, the smaller the impact of any change in implied volatility since it has less time to work. Figure 2 also illustrates the point that vega for ITM or OTM options drops off even faster as we approach expiration, since we are converging to either zero (OTM) or intrinsic value (ITM). So as we approach expiration we become less and less concerned with vega. (Note: Figure 2 assumes a position size of 100 contracts.)

Figure 2.

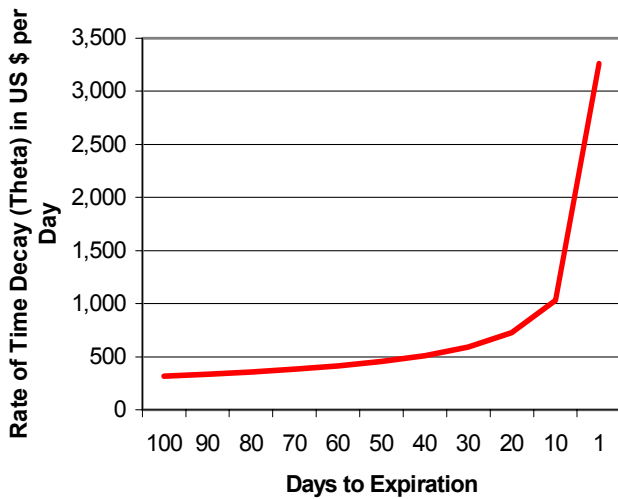
Impact of Days to Expiration on Vega CN 250 Calls, 100 Contracts, IV=25%



Conversely, as we near expiration two of our other Greeks increase in importance – theta and gamma. Most traders are familiar with the fact that as we near expiration, time decay accelerates, particularly in the last 30-40 days. This is illustrated in Figure 3. This often prompts traders into short option positions as we near expiration, hoping to cash in on the accelerating time decay.

Figure 3.

Illustration of Accelerating Time Decay
ATM CN 250 Calls, 100 Contracts, IV=25%



What's important to recognize is that gamma and theta are really two sides of the same coin, and what we gain in terms of accelerating time decay, we pay for in terms of increased gamma risk. Table 1 illustrates how both theta and gamma increase in importance as we approach expiration for an ATM option. From Table 1 you can see how gamma increases exponentially as we near expiration of an ATM option. For OTM and ITM options, gamma will fall off rather quickly as we converge to a delta of either zero or one.

Table 1.

Trade-off Between Theta and Gamma

CN250 Calls, 100 Contracts, IV = 25% - ATM

Days to Expiration	Theta (\$/day)	Gamma (bushels)
100	\$ 317	6,002
90	\$ 335	6,336
80	\$ 356	6,731
70	\$ 382	7,207
60	\$ 414	7,797
50	\$ 455	8,555
40	\$ 510	9,580
30	\$ 590	11,080
20	\$ 725	13,591
10	\$ 1,029	19,251
1	\$ 3,262	60,965

Remember that gamma is essentially the rate of change in delta, given a change in the underlying futures price. Thus, it's a good measure of leverage. To illustrate this point, let's assume that we believe a sharp increase in price is imminent and want to leverage this view in a big way. At the same time, we are reluctant to buy futures outright, just in case we are wrong. Let's compare the leverage from investing the same option premium in calls that are 6 days from expiration versus 60 days. Let's say we decide to buy 1,000 SN500 calls for 4 cents/bu, that are 5 cents OTM. For the roughly the same premium, to get 60 days to expiration, we'd have to buy SN550 calls. Table 2 shows the profit given a 10, 20 and 30 cent/bu increase in SN.

Table 2.

Illustration of Leverage for Near-Expiration Options

1,000 Contracts - IV = 24.5%

PROFIT FROM INVESTING \$200,000 (4 cents/bu)

Increase in SN	SN 500 Calls	SN 550 Calls
	6 days to Expiration	60 days to Expiration
10 cents (495 → 505)	\$252,630	\$90,030
20 cents (495 → 515)	\$621,020	\$208,560
30 cents (495 → 525)	\$1,067,320	\$359,070

From Table 2 you can see the dramatic increase in leverage for the near-expiration options. With a 10 cent increase in SN, the near-expiration position records almost 3 times the profit as the position with 60 days to expiration.

Hopefully the above illustrates the point that writing near-expiration options can be quite risky, and many option market makers have blown up by being short gamma near-expiration. In fact, most option professionals will only be long gamma in near-expiration options due to this potentially catastrophic risk. Equally, buying near-expiration options are an excellent way for large traders to increase their leverage, while limiting their downside risk. This is particularly the case when the trader has reason to believe that a large price swing is imminent. This is discussed further in the next section.

III. TRADING NEAR-EXPIRATION OPTIONS

One of the most common perceptions among option traders is the idea that the underlying futures will head toward the strikes as they near expiration. Based on our past analysis, the data usually does not support this perception. However, if the underlying futures are *trending toward* a particular strike in the last 20 days of trading, often the strike price acts like a magnet that draws the underlying futures toward it. For example, if SN starts moving from 480 toward say 495 in the last few days prior to expiration, the 500 strike often sucks the underlying futures to 500 or higher.

The reason for this is that some traders will have shorted the 500 calls as it nears expiration, hoping to cash in on their rapid time decay. However, as SN starts moving toward 500, these traders start covering their positions – thereby pushing SN even higher (either by buying futures against their short calls or by buying their calls back– which in turn causes the seller to buy futures).

With the above dynamics in mind, there is sometimes value in checking to see what sort of open interest is remaining at a given strike, particularly if you see the futures heading toward a strike with large open interest in the last few trading days. Another ingredient to consider is how the funds are positioned. For example, if we know the funds initiated a large short position around the 490 to 500 mark in soybeans, and SN is moving toward 500 in the last few days of trading for SN options, there is additional fuel that might warrant a long SN 500 call position. Finally, you may have reason to believe that there are some “weak” shorts (short options, not short price) at a given strike price that make the market more vulnerable to penetrating a given strike price in the last few days prior to expiration. Put bluntly, you’re looking for where the greatest pain threshold exists.

Occasionally, large traders appear to buy large amounts of near-expiration options when their real objective is to execute a futures trade, particularly when they sense an imbalance in the market. For example, they may buy a large number of slightly OTM near-expiration calls to bring buying into the futures pit when their ultimate goal is to sell futures.

As a final note, given the introduction of serial options on all CBOT commodities as of April 1998, you can now trade expiration strategies every month. Serial options are listed for trading only on the nearby contract. The first trading day is usually on the Monday of the same week the current option contract is scheduled to expire. For example, if the last trading day of the July option is the third Friday in June, then the August serial begins trading on the Monday of that same week.

IV. SUMMARY

Trading near-expiration options involves a number of important considerations regarding both the mechanics of exercise/assignment and the market dynamics that develop when an option expires near the strike price. While traders often focus on the time decay aspects of near-expiration options, it is equally important to consider the impact of gamma on leverage. Getting on the wrong side of gamma in a near-expiration option has been the downfall of many option traders. Equally, long gamma positions offer the potential for large gains under the right circumstances.

- Ron Gibson

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