# Market Secrets That Energy Hedgers Should Know

**Cynthia Kase, president of Kase and Co., explains how statistical analysis can help prevent common hedging mistakes.**

In my two decades of advising companies about energy risk management strategies, I've seen producers and consumers make the same hedging mistakes over and over again.

It's possible, however, to learn from history. By studying almost 60 years of commodity price histories for Nymex heating oil, crude oil, natural gas and propane contracts, I've found that certain aspects of market behavior are statistically reliable. By integrating this historical information into your trading strategy, it's possible to avoid many common hedging mistakes—and to make the right moves at the right time to improve your hedging results.

Here are some of the most common hedging mistakes—and what statistical analysis can tell us about effective trading techniques.

## SEASONALITY

Those who buy heating oil or natural gas as a fuel generally break the year into two seasons: winter, from November through March, and summer, from April to October. Winter prices are about 6 percent higher than summer prices on average. This, however, has nothing to do with deciding when to hedge heating oil or natural gas.

Many consumers rush to buy winter fuel in the summer and many producers hesitate to sell fuel until the dead of winter. The facts, however, do not support either strategy. Although winter prices are higher than summer prices, the winter strip usually peaks in the summer and meets its lowest prices during the winter months. The summer strip tends to meet its lows and highs in summer.

## WHEN TO HEDGE

Hedgers tend to hedge too soon, wait too long or time hedges to the annual budget-planning cycle. Following a bear market, producers tend to rush out on the first sign of hope and sell forward. If prices are strong, producers assume high prices will continue and wait too long to hedge. Many view the market in calendar-year increments.

The best opportunity for producers to hedge is when the forward curves are high—that is, when the three-, six- and 12-month strips are all at statistically high levels. The inverse is true for consumers.

We define high and low by setting a threshold target a certain number of standard deviations above or below the strip mean. Then we calculate the target over the price distributions from three months out to four years and select the target that is highest (for producers) or lowest (for consumers).

The shape of the forward curves of fuels, such as natural gas or heating oil, is driven by seasonality. So bull and bear markets can be alternatively in contago or backwardation, depending on where the winter months are within the strip. Because of this, some bull markets may see the front of the strip rise first, while in others the middle or the back of the strip may fall first. This is the reason we wait for all three strips to be at a statistical extreme.

## HOW MUCH TO HEDGE

Many hedgers try to pick one price at which to hedge their entire portfolio. But this is not necessary, since prices tend to trend in the statistically high or low region for three to four contract months.

In a bull market, producers will have three or four months over which to space out the placement of their fixed-price position. In a bear market, the converse is true for consumers.

The number of days in a particular contract month during which prices are above or below the target threshold is directly correlated with the number of consecutive months in a given hedge opportunity window. This means that the fewer days we are able to hedge during the first month of opportunity, the fewer consecutive months or opportunity we are to expect. If we find that in the first month of hedging, we have hedged for 10 consecutive days, the odds are that we will have continuing opportunities to hedge, and can plan accordingly.

Conversely, if we can hedge for only two of the first 18 trading days in a month, we may want to hedge a bigger piece during the next opportunity.

## EXPIRATIONS

In a bull market, prices of outer months tend to rise to the level of the expiring strip after expiration. As a result, for the first two months of hedging we will usually step back from hedging into expiration. If after expiration the forward curves do not recover to the previous level, however, we have a sign that the opportunity may end early and we can accelerate our hedges.

## HOW FAR OUT TO HEDGE

Hedges are often placed on too-short or too-long a maturity—for exam-

ple, three months or three years. Our statistical model is based on the fact that physical commodity markets mean-revert. Individual contract months or extremely short strips do not have enough time to mean-revert.

Thus we never use statistical modeling on the first nearby contract—all of the strips we hedge start with the second nearby contract.

We have noted that hedge opportunities tend to continue for three or four months. As a result, the front end of our strip may be "underwater" for a month or two as we scale in over time. Thus, it is foolish to hedge any strips that may expire while still in the hedge window. The entire strip could expire before the market mean-reverts. The shortest time period in which we fix prices is the six-month strip (second through seventh nearby contracts).

Volatility tends to dampen out the longer the maturity of the forward curve. This means that long-dated curves reach neither extremely high nor extremely low prices relative to those reached in the front of the market. For example, the highest price at which the three-month crude oil strip has traded in the past four years is $25.931, vs. the 12-month strip's $23.38. Thus, there is a built-in backwardation risk associated with a producer fixed-price hedge under these circumstances.

We use the following rule in hedging longer than one year (starting with the second nearby). If the longer-dated strip meets the target threshold we have set for hedging the one-year strip, we will place the hedge. Otherwise, we will not.

## BUYING PRICE PROTECTION

Developing an effective options strategy is probably the most difficult task for hedgers. The three major mistakes made are fixing the price instead of buying options, buying options at absurd strikes, and buying options for unnecessarily lengthy maturities.

There are pricing zones in which it makes no logical sense to fix a price. If we are using a statistical approach—and not speculating—we cannot justify, for example, selling at the 55th percentile. Such a hedge has a 45 percent chance of being underwater. Even so, we may wish to avoid dropping to the 10th percentile. The only sensible strategy to protect against a drop is to buy puts.

Options models assume that the current price is the mean of a distribution, the standard deviation of which is determined by volatility. By definition, therefore, there is an assumption of a 50 percent chance of prices being higher and a 50 percent chance of prices being lower. The market does not work this way, however—strips mean-revert. We've found, for example, that the highest price at which WTI has settled over any six-month period in the last four years has been $24.25. During a run-up in oil prices, consumers did nothing. In September, as the six-month strip hit $22.75, panic inevitably set in and consumers wanted to hedge. At-the-money options were priced at $2.50. That gave them protection at $25.25, a dollar higher than the high settlement price of $24.25. The strategy was illogical, since consumers were hedging against a threat that had a negligible probability of occurring. If consumers cannot sleep at night because they're worrying about new market highs and want to buy a call anyway, we advise spending 25 cents for one deep out-of-the-money option to get it out of their systems.

**CONSUMERS RUSH TO BUY WINTER FUEL IN THE SUMMER AND PRODUCERS HESITATE TO SELL FUEL UNTIL THE DEAD OF WINTER. THE FACTS DO NOT SUPPORT EITHER STRATEGY.**

Many hedgers buy price protection too far out of the money in order to save on premium. Let's go back to the earlier example about the six-month strip. In that case, the strip was trading at $20.25 and we wished to buy calls. In order to save premium, we could choose to buy calls $5.00 out of the money. Assuming a policy of holding the options to expiration, even though we save money on premium we are simply throwing that premium away.

If we buy an option at, say, $1 out of the money, it has a reasonable probability of being exercised. The strike is the 75th percentile of the six-month settlement over the past four years. The only time it would make sense to buy deep out-of-the-money options is when one has the authority to liquidate the hedge at any time. In this way, the call can be sold back at a higher price (provided time value has not degraded too much) on much less than a $5 run to the upside.

The mistake on the other end of the spectrum is to buy options for too-long a maturity. Opportunities to buy price protection occur with 85 percent probability once every six to eight months. In this light, it does not make sense to pay for options longer-dated than the six-month strip, provided one can stand the 15 percent probability of a miss. On the second occurrence of a window of opportunity to buy options, one may end up buying price protection at a slightly less-attractive strike price, but what one saves on time value on the option should more than make up for this.

## FINAL ADVICE

The key to sensible hedging is to face the reality that the more attractive the price of the hedge, the less frequently that price trades. There is a trade-off between the probability of an opportunity to hedge actually taking place and the probability of that hedge being of benefit to the company. Many people wish to have opportunities to hedge 20 percent of the time at the 97th percentile of price. If you take a moment to think about that, you will be more clear-minded than the majority of people.

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