How to cash in on the cash market

Managing your risk in the cash markets does not have to mean hedging your exposure, crossing your fingers and hoping. **Cynthia Kase** *shows how risk can be minimised by taking a more considered approach*

FOR MANY PEOPLE in the enegry markets, derivatives represent a completely new concept in risk management. So it is hardly surprising that many market participants are wary of using these instruments, preferring instead to stick with their tried-and-trusted strategy of managing their risk in the cash markets.

But what they fail to recognise is that most cash market participants – be they producers, consumers or marketing companies – have for many years taken enormous risks in trading short-term cash market commodities.

For example, producers will often consider themselves protected against risk by selling at a price that is related to the New York Mercantile Exchange (Nymex) settlement price. But at the same time, these producers allow marketers to sell their product at any time, so any negative difference between the sale price and the Nymex settlement should be treated as a speculative loss. Unfortunately, many producers are not aware of this loss as they do not track such cash market speculative losses, the risks their traders take in selling early or traders' basic performance statistics.

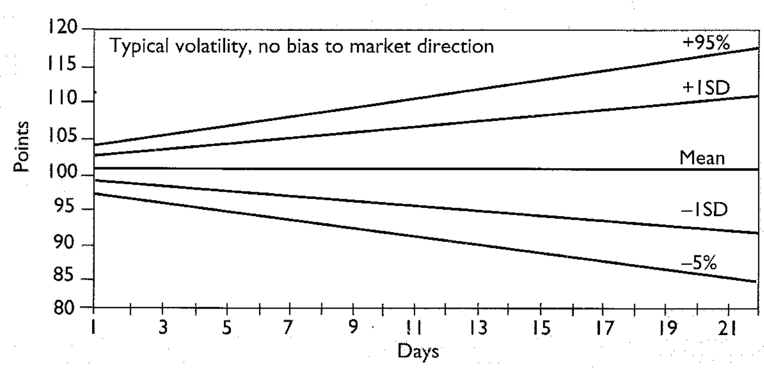
Most cash market participants do not regard their activities in the cash markets as risky because they are used to this form of speculation; also, mark-to-market reporting is not necessary in the cash markets and there are no margin calls. The downside is that losses relative to a non-speculative base case are hidden from management and can therefore go unrecognised.

The level of risk in selling at the beginning of the month runs, on average, at about 15% of the underlying crude oil price and 25% of the underlying natural gas price, even in non-trading, random environments.

Risk and its relative volatility are both linked to the square root of time. This is because volatility is a measure of the standard deviation of price changes, and standard deviation is the square root of variance. Thus, the risk in one month is not 1/12th of the risk in a year, but $1/\sqrt{12}$. So if you have a market, such as West Texas Intermediate (WTI), which might have a typical first nearby volatility of 34%, one standard deviation of risk over a month is 34/3.46, or about 9.8%.

The standard measure of risk is to look at an adverse move, such that there is only a 5% chance of worse prices, or at a level that is 1.65 standard deviations above or below the mean. Thus, 1.65×9.8 results in a 95% confidence level of a 16% move in WTI. In this event, a crude oil producer, assuming a nominal crude price of $20 a barrel (bbl), may be taking as much as a $3.20/bbl risk by allowing its marketers to sell that crude at anything other than the benchmark.

1. Crude oil simulation trend across one month



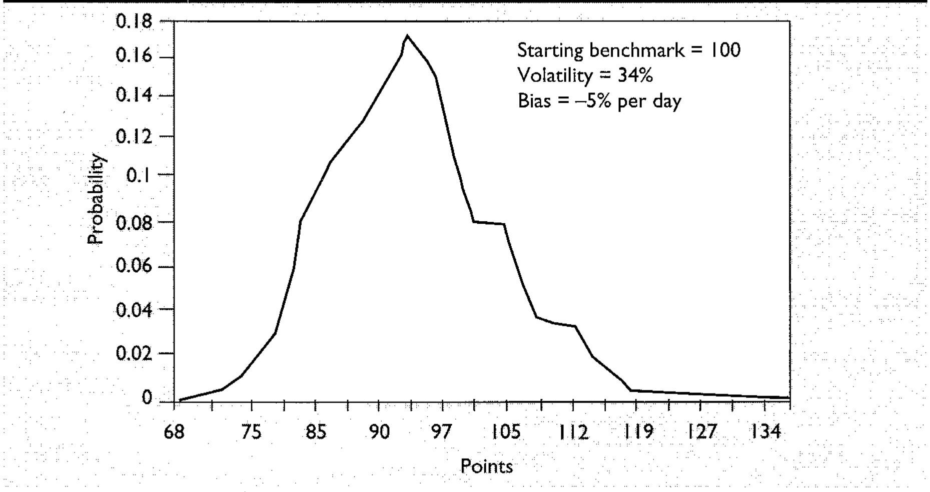
This scenario can be illustrated by running a Monte Carlo simulation or similar random model simulation which, using a random number generator and, given certain probability criteria, generates empirical results. Assuming an average daily rate of change of zero and annualised volatility of 34%, a Latin Hypercube simulation, for example, running 500 times over a typical 22-day trading month gives the results shown in figure 1. (This simulation is similar to the Monte Carlo approach, but selects the variables more evenly over a distribution than a purely random model would do, thus preventing an unreasonable cluster of selections.) The figure clearly shows that, like the theoretical calculation above, the upper band is about 16% higher than the notional benchmark starting price (100), and the lower band is about 16% lower.

This scenario is based on an unbiased non-trending market. If the market were trending upward, the losses from selling early would be even greater. Assuming the same volatility as in figure 1, but with a downward bias of 0.5% per day, figure 2 examines the expectation for price after one month (as opposed to over one month), that is a detail of day 22. In this simulation, the risk of a loss is more than 22% (as opposed to 16%) or, on the $20/bbl crude price, $4.40/bbl from the beginning of the month.

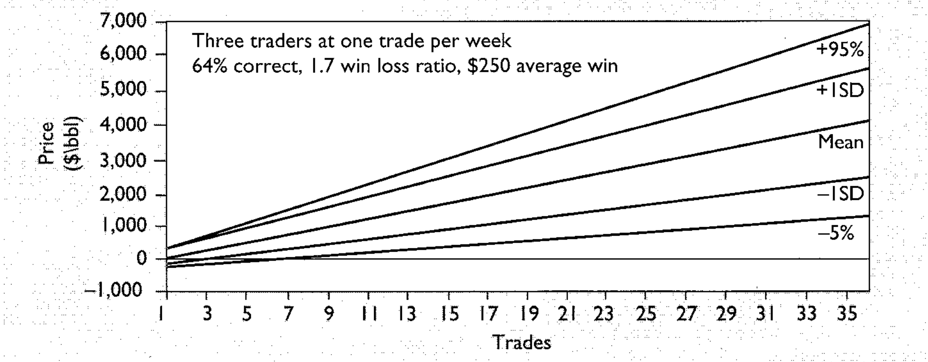
Another example of risk-taking in the cash market is the risk associated with trying to make an outright profit or to beat a benchmark price. Pure marketing and trading companies often buy or sell oil and gas to make a profit, either on basis or on outright (often called flat) price changes. Many utilities are now becoming involved in incentive programmes and are hoping to buy fuel in such a way as to average below the benchmark price.

Although some firms have profit targets or know the margin by which they hope to beat a benchmark, they assign trader volume limits that are based on instinct and hoping for the best. But they know neither what the odds are of meeting these targets nor what risk is associated with the trading or hedging activity. In reality, the ability to meet a profit target is related directly to the frequency with which one trades, individual trader

2. Distribution for price after 22 days



3. Cashflow across one quarter



with which one trades, individual trader performance and trade volume. These are, in turn, tied to the amount of capital at risk. In other words, probability cannot be ignored.

Assuming it has successful traders, a firm which can afford to take a 1% chance of losing $1 million will have a better chance of making a given profit target than one which can take only a 1% chance of losing $10,000.

However, it is important for any organisation to take a considered approach to its management of trade risk. The methodology it applies in doing so can either work forward from a goal which must be met, or backward from a risk limit.

Working forward, for example, a crude producer of 2800,000 bbl/month might wish to set a profit target of enhancing its crude oil price by 1% per week, so wiping out its trading profit or loss on a quarterly basis.

Assuming a WTI price of $20/bbl, the producer's profit target equates to $20/bbl × 280,000 bbl/day × 3 months/quarter × 1% = $168,000 per quarter.

Now imagine that the producer has three traders, each of which take an average of four trades a month, or 36 trades per quarter between them, and whose overall performance record is that they are 64% accurate (ie, they make money 64% of the time, so lose 36% of the time), have an average gain of 25 cents/bbl and an average loss of 15 cents/bbl.

For the sake of a realistic simulation, also assume a standard deviation of about 15 cents around both wins and losses, and a lognormal, rather than a normal distribution on losses. Losses, for example, may spike to the upside. For the purposes of the Latin Hypercube simulation of 500 iterations, assume that the skew of the loss distribution curve is such that the maximum loss is actually 1.5 times that which would be assumed under a normal distribution.

The simulation finds that, after the 36 trades, the producer has an average expectation of making about $3,800 for every 1,000-barrel contract traded (figure 3). As a result, it would have to trade about 45 futures contracts (168,000 × 3,800), or 45,000 barrels.

Having identified the average trade size of 45,000 bbl, the next step is to determine how much money the producer is risking. This is achieved by applying a standard risk-of-ruin calculation, as follows:

Capital at risk = (volume traded × average loss × 1n [% chance of losing total funds])/ 1n (% loss × loss amount) – 1n (% win × win amount).

As such, at a 1% probability of losing the entire amount, and given the criteria above, the capital at risk is calculated to be close to $29,000 (see table below). The amount at risk at various other probabilities of loss are:

Capital at risk ($)	Probability of losing capital at risk (%)
42,927	0.1
32,926	0.5
28,618	1.0
14,309	10.0
10,002	20.0
4,307	50.0
1,788	75.0
95.0	319
6	99.9

The average amount at risk on each individual trade is $150 × 45, or $6,750, and the largest loss, at the 95% confidence level, is about $12,000.

At this point, the producer can evaluate both whether it can afford to trade the volume required to meet the profit target it has set, and whether the risks involved are within its tolerance parameters. If the risks identified are lower than the firm first thought, it might wish to raise its target; if they are larger, it might choose to reduce its target.

However, all the wishful thinking in the world, given the assumptions in the simulation, will not change the probabilities involved. ❐

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