Sailing with the wind

Risk management is all about taking control over price dicovery. **Cynthia Kase** *explains how technical market analysis – market timing – can help you identify and benefit from the market directions*

ONE OF THE biggest challenges facing risk managers is deciding whether a market is trending. Without a clear idea as to market direction, a risk manager is lost – it's impossible to evaluate strategies, and to time when to implement hedges and when to lift them. But all is not lost – market timing, a type of technical analysis, is a useful guide that evaluates trends, momentum, statistical significance and patterns.

For this discussion of market timing, let's define a hedge according to the Financial Accounting Standard Board's (FASB) and American Institute of Certified Public Accountants' criteria. According to these institutions, a hedge is a financial instrument that: is identified as such at the outset; has an ongoing high degree of correlation with the underlying exposures; applies to existing or anticipated exposures; above all else, aims to reduce risk; and is no longer considered a hedge when exposure ends.

And now to define discretionary hedging (ie, hedging which considers the best way to reduce risk in various circumstances), which we will assume includes: hedges that are postponed; hedges that hedge less than all exposure; hedges that are moved up in time to reduce risk on anticipated, future exposures; hedges that are reset (lifted and put back on); and hedges that are rolled forward. The key common denominator is that the financial instrument must reduce risk.

Let's now take the hypothetical example of KPWM Natural Gas Marketing Company, which buys natural gas to sell onward in a highly competitive environment to commercial customers, usually at a premium to an average market price index.

Before a company can begin to think about buying below the average price, it must have first taken steps to ensure that it is not buying gas at above the market price – it should adopt a price neutral strategy. KPWM's primary risk management goal, therefore, is to buy gas at an average market price. Once the price neutral strategy is in place, KPWM's secondary goal (not wishing to be undercut by the majority of its competitors) is not to buy gas at more than five cents higher than the price the most competitive marketer obtains.

The extremes relative to the average market price are greater in a trending market. Appreciating this phenomenon, KPWM's management recognises that in a trending market, its risk of being undercut by the lowest seller is greater. For example, in figure 1, in the month ending March 11, the market had been choppy, with an average trend strength of +20 (a statistical algorithm that measures the degree of serial dependency from 0 - 100%), and average change per day of 2.5%; the standard deviation around the average price was only two cents. So, even if the best buyer was able to obtain gas at two standard deviations below the mean, it would only be four cents better than KPWM (ie, within KPWM's 5 cents margin).

About two months later, after a downtrending move, the average market trend strength was -40%, with an average decline of about 7.5% per day, and a standard deviation of nine cents. So, the best buyer could easily have beaten KPWM by the five cent margin.

So, KPWM's strategy, is to buy futures contracts on a pro-rata basis to simulate an average market price, closing out the contracts as gas is sold, and to postpone price discovery in falling markets and anticipate (move up) price discovery in rising markets.

The challenge for KPWM's risk manager now is to determine where the market is moving; to decide whether it is still trending; to decide if the strategy is working, and to know when to hedge or lift the hedge. At this point, he should turn to market timing for guidance. Another subcategory of technical trading, called money management (ie, managing cashflows and losses), can also help management set limits for the risk manager's hedge activities.

First, we will examine how a risk manager can identify when a market turns against a current trend – this needs less evidence than when identifying a new trend. Trends can be interrupted in three ways: the market can reverse (turn) in the opposite direction, it can reverse enough to warrant a hedge and then turn back into original direction or it can trade sideways. So, just because a change from the status quo is imminent, a reversal to the opposite direction is not necessarily indicated.

With the example of KPWM, let's analyse the end of a downtrend in natural gas in December 1993 with the following market timing techniques – momentum, statistical analysis and pattern.

1. Natural gas behaviour: non-trending versus trending

Month ending	Price ($)	Trend strength (%)	Rate of trend change (per day%)
March 11	std.dev 0.02	17.45	10.46
	average 2.14	21.05	-2.37
May 16	std.dev 0.09	53.84	18.96
	average 2.05	-40.26	7.63

For pattern, we will use a charting technique called candlesticks (see Steve Nison, *Japanese Candlestick Charting Techniques*, New York Institute of Finance, 1991). This shows the open and closing range of prices as either a white rectangle (if the close is higher than the open) or a black rectangle (the close lower than the open); these rectangles are known as the "real body". The differences between the real body and highs and lows are shown as lines, called shadows. A classic reversal pattern is a "Harami line and star" (see figure 2), denoted in falling markets by a large black candle, followed by a day with a very small open-close range, right around the mid-point of the previous day.

When this pattern forms during a downward move which has generated high downward momentum, it means that after a large push-down, the market has stalled and may be forming a springboard for a reversal. At this point, the risk manager has some evidence that the market may turn.

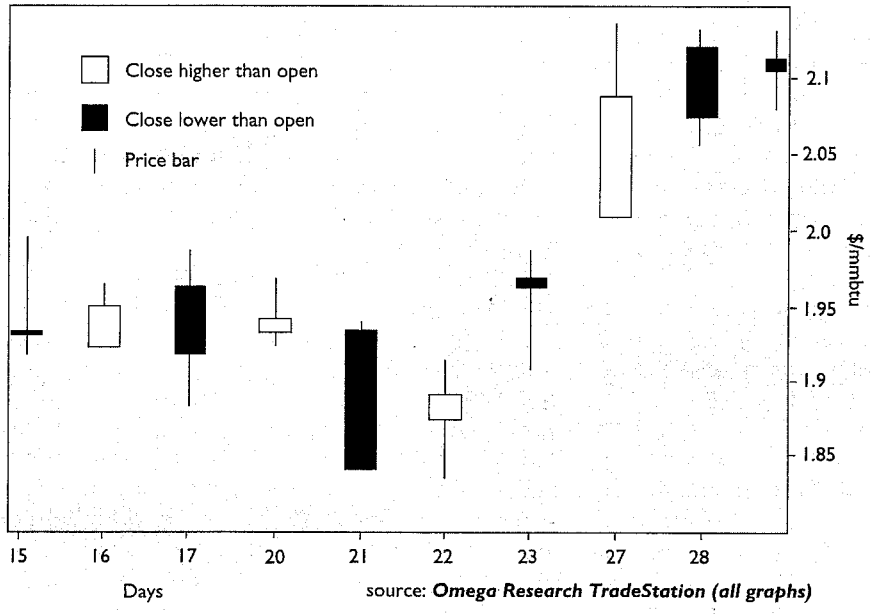
We then combine the pattern with momentum, noting that one key rule of timing is never to use just one technique (C. Kase, *Momentum Divergence - Fifteen Years of Heating Oil History;* Nymex Energy in the News, Fall/Winter 1993). We only pay attention to the pattern if momentum has been extreme, and also look for a classic momentum signal – momentum divergence (when a new high or low in price is not matched by a new high or low in momentum). Classic divergence is a new high or low not matched by momentum. Class 2 divergence is a double top or bottom (same high or low) neither matched nor exceeded by momentum, and Class 3 divergence is a new high or low and equal momentum readings.

Figure 3 shows a newly introduced momentum indicator, the Peak-Oscillator (Peak-Oscillator, Peak-Out, Permission-Screen, Permission-Stochastic, Kase CD and Dev-Stop are all included in Kase's Hi-Tech Indicator Library), exhibiting a classic momentum divergence, and an associated signal called a Peak-out.

Traditional oscillators plot the rate of change (or oscillations) between two moving averages. The Peak-Oscillator plots the relative rate of change between the degree of serial dependency the market exhibits to the upside versus downside, using statistical formulae that evaluate the degree of pure random behaviour in a data series. Rather than having a fixed look-back range (for example, a traditional stochastic oscillator that looks back over 13 days), the Peak-Oscillator searches over a wide range of look-back periods for the most significant trend period, so it is superior to traditional oscillators.

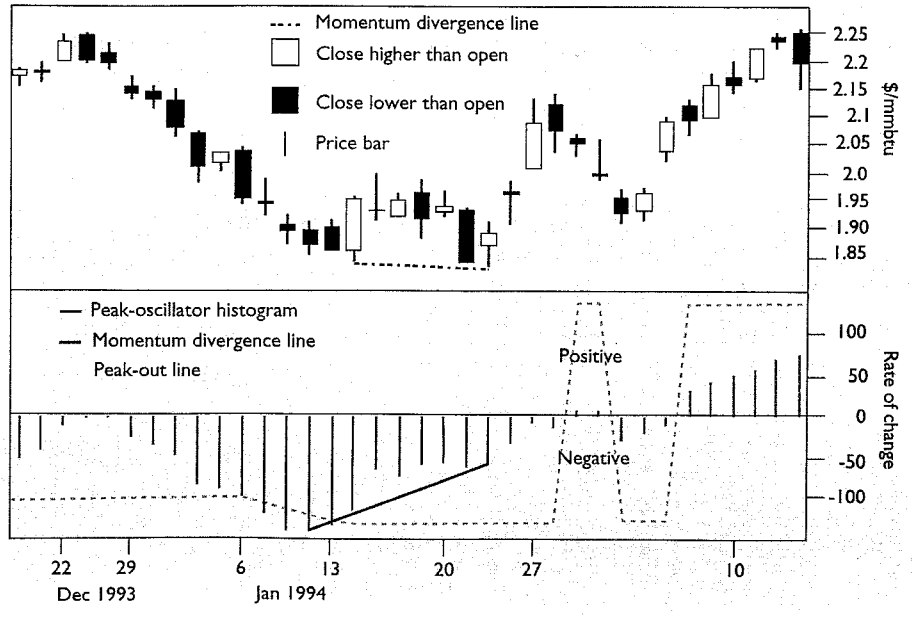
The Peak-Out line is the 90th percentile level of the oscillator (or two standard deviations of recent data – whichever is greater) as determined over an 80-year sampling of historical data, which includes not only energy data, but metals, softs, currencies, and

2.Detail of February 1994 natural gas with Harami Line and star, December 21/22 1994



source: ***Omega Research TradeStation (all graphs)***

3.February 1994 natural gas with Harami Line and star, December 21/22 1994



other commodities and financial futures. If we have a break of the peak-out line, and then a turn back from it, we have a signal that says there is a 90% chance that the market will turn either at the current extreme, or more likely on the following divergent extreme.

Figure 3 shows that there is a peak-out on December 13 foreshadowing a major turn upwards (as a reversal), followed by a minor pull-back, and then a new low coincident with a classic divergence and Harami line and star. Thus, we have a very strong signal (according to the confluent rule – when different techniques combine to show the same signals, the probability of that signal happening is higher) that the current trend is either in for a major stall or coming to an end. If the KPWM Natural Gas Marketing Company risk manager had postponed hedging purchases since, say, late November, he would have been well-advised to make sure all past-due purchases were then hedged.

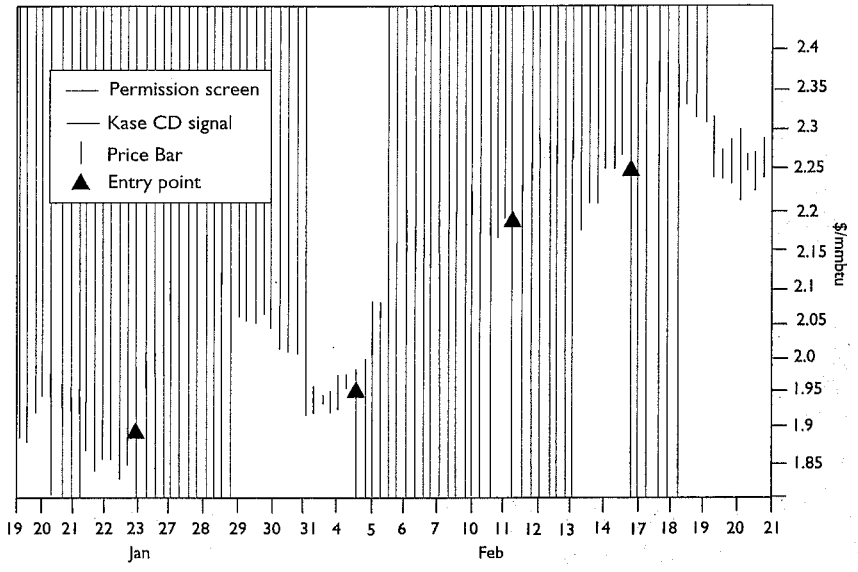
At this confluence point, the risk manager would hedge all outstanding exposure and hedge all new exposure on a current basis (ie, achieving a neutral position), and look to see if there was any confirmation of a trend in the opposite direction. It would also be recommended technically to "drop down" in time (ie, monitor trends on a shorter time basis, say one-third day bars). This allows the risk manager to reduce risk if wrong, and take action earlier if correct in the identification of a new trend.

Another primary rule of market timing is that identification of new signals should always take place in more than one time frame.

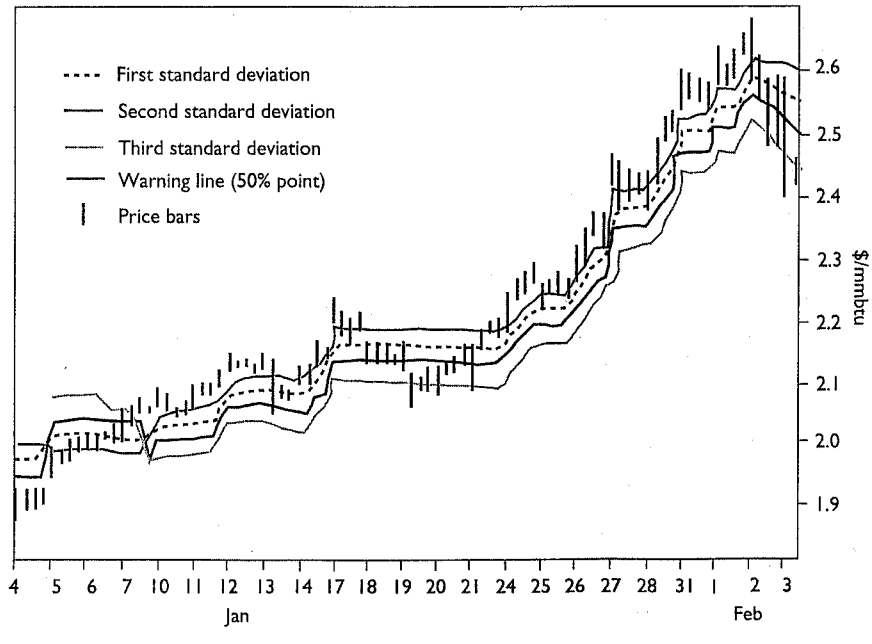
In figure 4, we see signals from two different time frames. The time-bars shown on the chart are one-third day bars; the upper part of the chart shows when the risk manager has permission to go long or short, based on a longer-term momentum filtering technique called the "Permission-Screen". The default time frame is five levels higher than the bars on the chart (5/3 days in this instance), which tells the risk manager when the longer-term momentum is up or down - in this example, green for up and blank for down.

The lower signal (buy) is simply generated by the crossover of the zero line of a hybrid convergence-divergence indicator, the Kase CD (a hybrid indicator that generates both trend signals, such as crossover of the zero line and momentum divergence signals), and is shown green for up, blank for down. (For those familiar with the moving average convergence-divergence histogram, the concept is the same except, once again, a statistical evaluation of serial dependency is substituted for moving averages.) Once a valid divergence has been generated, a match of the upper green line with the lower darker green histogram constitutes a valid long signal. Following match-ups (when lines are both the same colour) can be considered as points at which contracts could be added, so at these

4. February 1994 natural gas on a 1/3 day basis, with Permission-Screen and Kase CD



5. March 1994 natural gas with Dev-Stop



points, KPWM's risk manager might decide to hedge some future anticipated purchases. If for any reason the market turned back down again, hedges would be removed on unused volumes.

Finally, the risk manager must decide – in the absence of a divergence or exit signal, if he misses such a signal, if he is incorrect in his judgement or if the odds are simply against him – when to hedge. Thus, you need a safety net – a trailing stop – this is an exit point (either quit the market, liquidate the hedge or implement a hedge) which moves with the trade. Let's say that our risk manager has purchased some gas at $1.90 and places a stop at $1.80. If the market moves up to $2.00, the stop would be moved up to $1.90; if it turns back down, the stop stays the same.

The Dev-Stop (see figure 5) is a trailing stop system that accounts not only for average volatility, but also for volatility variance and skew. These are factors that must be considered in determining how much room to let the market have to breathe. This stop system is shown in four layers. The first is the warning line, placed at the average point to which a two-bar (day) reversal would be expected to move. The next three lines are the first, second, and third standard deviations above the mean excursion (reversal), corrected for skew. This method tells the risk manager if the reversal is statistically significant.

On February 2, 1994, the market turned down – assume the trader missed any warning signs. If the trader has placed stops to unhedge the remaining anticipated exposure in thirds at the first, second and third level stops (you don't necessarily want to exit all positions at one level; it is prudent to adopt a scale-out approach), the hedge is automatically lifted over the course of the day as the trader's stops are hit.

Once a trader has developed a systematic approach to discretionary risk management using stops, managers can use the trader's track record to decide how much exposure on which to allow him discretion.Take the case of a risk manager who has a simulated and/or actual record of a statistically significant number of trades (35 at minimum, but ideally 100) over various market conditions. On average, the trader is correct 60% of the time. When incorrect the trader loses an average of $1,000 (including all execution losses and commissions) per contract, and when correct, improvement by the hedge over the "do-nothing" case averages $2,500.

This formula can be used to determine the amount of exposure on which the trader can exercise discretion:

$$\text{Units of capital} = \frac{\text{Log (\%) chance of ruin}}{\text{Log (\%) average loss - Log (\%) average gain}}$$

Lets assume that management view a 2% chance that they will lose $300,000 as a manageable and acceptable risk in order to meet their goal of minimising the risk of being way out of line with the most competitive buyer during trending markets.

For the first year, all improvements over the average market price will be left in the hedge account. For the second year, $1,000 is withdrawn each time the trader makes a good decision. Using the formula above (substituting figures to simulate an average trading record for the first year), the trader can exercise discretion over 100 contracts of natural gas, and in the second year over 60 contracts, provided the track record remains stable.

Risk management is all about control over price discovery. Often the best tactic is to be neutral and take an average market price, but from time to time, conditions may dictate that discretion be exercised and price risk actively managed. To do so, a systematic, logical approach is necessary. Market timing tools can determine hedge entry and exit points, control trade-by-trade risk and develop a statistically significant methodology with which management can control overall discretionary exposures ❐

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