Two-SD opening gap method

Finding statistical extremes in true range data offers a way to identify opening gaps that are prime candidates for "fade trades."

BY ADRIAN MANZ

Gaps in stock prices occur frequently and there are many theories about how to or if you should trade them. Many traders pay special attention to "opening gaps" — the move from the previous day's close to today's open — as a guide for intraday trades.

The strategy detailed here uses volatility (in the form of true range) to handicap opening prices and predict potential reversals using the concept of mean reversion. The basic idea is that price will reverse direction after an exceptionally large opening gap, and that a simple statistical calculation — standard deviation (SD) — can be used to identify such gaps. (See "Key concepts," p. 80, for more information on standard deviation and true range.)

Standard deviation represents the expected variation from the average within a set of values, such as prices. The SD formula for the gap strategy, which uses 10 days of true range data, is:

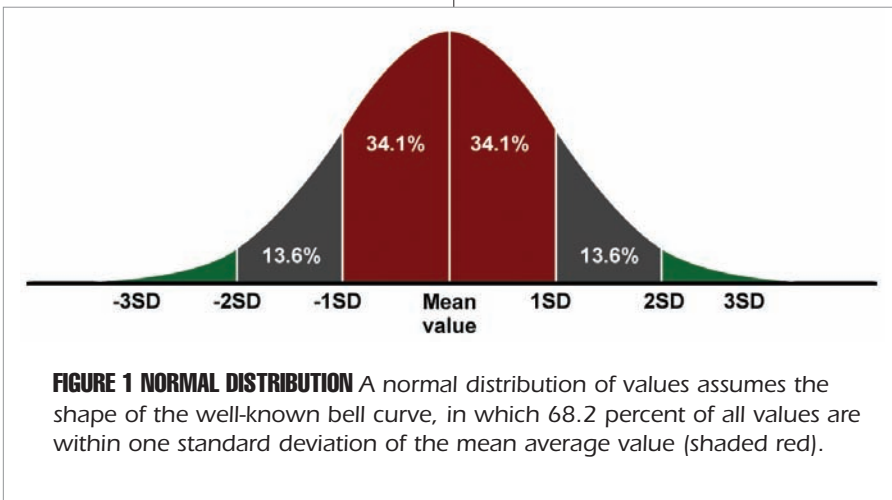$$SD = \sqrt{\frac{1}{N-1} \sum_{i=1}^{N} (x_i - x)^2}$$

FIGURE 1 NORMAL DISTRIBUTION *A normal distribution of values assumes the shape of the well-known bell curve, in which 68.2 percent of all values are within one standard deviation of the mean average value (shaded red).*

In plain language, this formula means:

1. Subtract the 10-day average true range (ATR) from each day's true range value.

2. Sum the results of all the calculations from step 1.

3. Square the value from step 2.

4. Divide the value from step 3 by N-1, which in this case is 9.

The result is one standard deviation of the previous 10 trading sessions' true range data.

Strategy logic

Every statistic relies on certain assumptions being met in order for the outcome to be considered valid. When you calculate SD for a dataset, the most important consideration is for the data to be "normally distributed" — that is, taking on the profile of a bell-shaped curve (Figure 1).

However, when a market is really on the move, volatility data such as the standard deviation of closing prices or the front-month options implied volatility tends not to meet this requirement. As a result, true range is used as a proxy, since it is highly correlated to volatility and tends to be much more normally distributed.

The area shaded red in Figure 1 represents one SD above and below the aver-
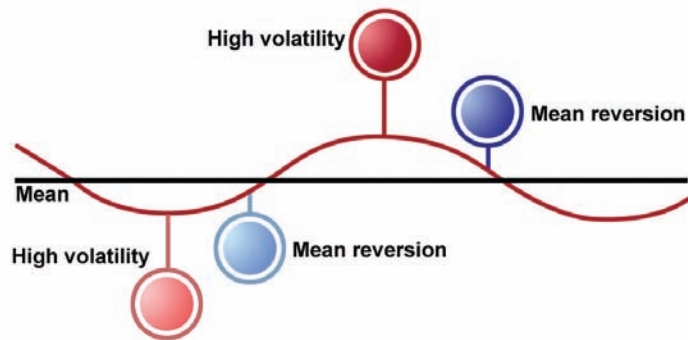
FIGURE 2 VOLATILITY AND MEAN REVERSION *After reaching a high or low extreme, volatility tends to move back toward its average value.*

move on the open suggests that 95 percent of true range variability has been accounted for, and that a reversion to the mean — that is, a gap fade — is likely.

Figure 2 illustrates the concept of mean reversion and central tendency. The average true range is represented by the line marked "mean." The oscillating red line shows the variability around the mean, the red balloons indicate the two-SD high volatility extensions, and the blue balloons mark the reversion to the mean — the tendency for volatility to revert to a value close to its average.

age, which accounts for 68.2 percent of the variability you would expect to see in your data. In other words, a gap that pushes price to the one-SD mark of the distribution has accounted for approximately 68 percent of its expected move from the average true range for the day.

Two SDs around the mean account for an additional 27.2 percent, meaning that a move of that magnitude should contain about 95 percent of the day's price action. However, this does not imply a 95-percent probability of being correct in the decision to fade a gap. Rather, a two-SD
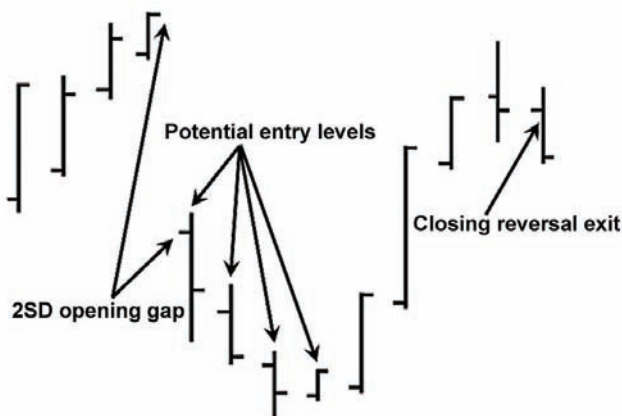
Trade setup

The two-SD gap setup occurs most frequently in earnings-announcement situations or on the heels of broker upgrades or downgrades (see "Playing the ratings game," p. 14), corporate actions, or other market-moving news. The setup rules are:

1. A gap open sends the price 2.0 standard deviations of the 10-day average true range above yesterday's high or below yesterday's low.

2. Enter the trade within the first 30 minutes of trading 0.10 above the high or below the low of the deepest bar in the gap (Figure 3). If trading continues in the direction of the gap after the first 30 minutes, ignore the setup for the day.

3. Trail an initial stop at the extreme of the morning move.

FIGURE 3 TWO-SD GAP SETUP *These hypothetical five-minute bars illustrate the basic trade setup. The position can be entered any time in the first 30 minutes of the trading session.*

4. As the position moves in your favor, trail a stop at a reversal of two closing prices — that is,

when price trades below (long trade) or above (short trade) the closes of the two most recent five-minute bars that traded in

your favor. For example, if you are in a profitable long trade and the most recent close was 40.10 and the next bar closes at 40.01, one close has been reversed. If the next five-minute bar closes at 39.90, a two closing prices have been reversed and the trade is exited.

5. If the gap is closed, immediately move the trailing stop to the closing price of the bar that fills the gap.

Trade examples

Winnebago Industries (WGO) recently made the news with earnings that missed estimates and a downside opening gap. Table 1 (p. 26) shows the daily true range data for the preceding 10 sessions, along with the corresponding descriptive statistics.

Figure 4 (p. 26) shows the formation of the pattern after an earnings announcement in the pre-market ECN session (WGO is an NYSE-listed stock). The standard deviation of 0.22 in Table 1 represents one SD. The opening gap strategy uses two SDs (2 * 0.22 = 0.44) added to the average true range (0.44 + 0.78 = 1.22) then subtracted from the previous day's low (30.33 - 1.22 = 29.11) as the qualifying gap move.

Having met the first setup rule, the entry for the position is 0.10 above the deepest bar in the gap, which in this case happens to be the first five-minute bar. In the next five-minute bar, the stock closes the gap and signals an exit, as a reversal bar forms and reverses the close of the
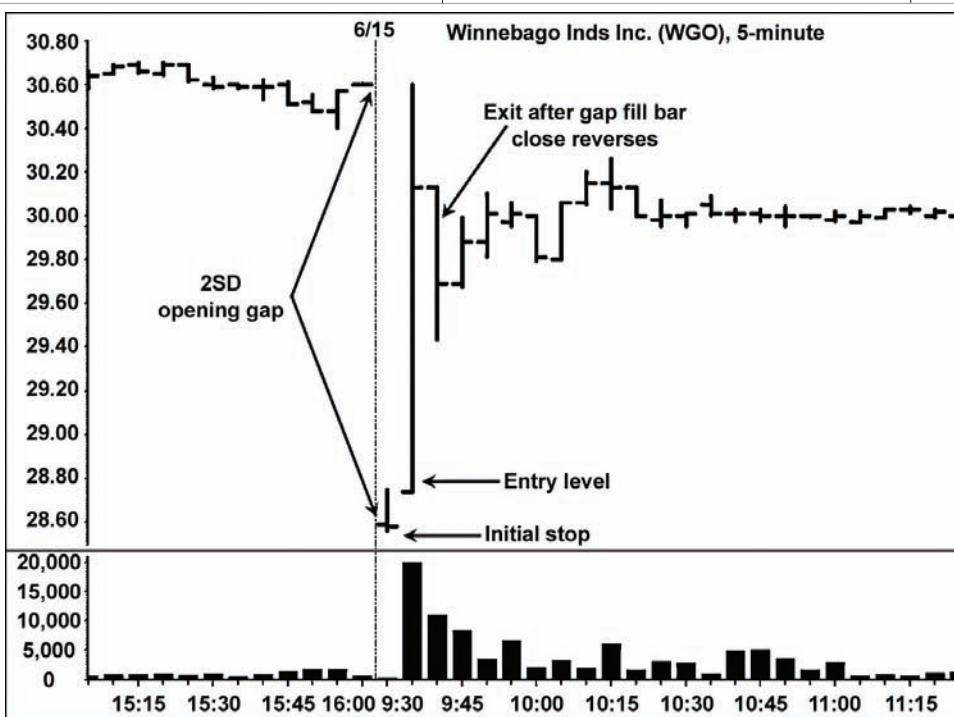

FIGURE 4 QUICK ENTRY AND EXIT *This trade was triggered after an earnings announcement pushed the stock much lower on the open. The gap was filled after the second five-minute bar.*

Date	True range	Statistics	
6/1/2007	0.77	Mean	0.78
6/4/2007	0.89	Standard deviation	0.22
6/5/2007	0.84	Range	0.78
6/6/2007	0.99	Minimum	0.21
6/7/2007	0.98	Maximum	0.99
6/8/2007	0.88	Count	10
6/11/2007	0.21		
6/12/2007	0.70		
6/13/2007	0.80		
6/14/2007	0.70		

TABLE 1: WINNEBAGO (WGO) STATISTICS

gap-filling bar.

This kind of volatility off the opening bar is characteristic of stocks that open with heavy ECN activity prior to the presence of a bid-ask from the NYSE specialist. The NYSE OpenBook is a very good resource in these instances for gauging the direction of the market once trading starts on the floor.

In the second trade example, Stryker Corp (SYK) fell victim to a Goldman Sachs downgrade ahead of earnings and made a two-SD opening gap move. The daily true range data and other statistics are shown in Table 2.

Figure 5 shows the progression of this news-driven setup in SYK. The development of the pattern is more typical, with the move into the gap area occurring over the course of approximately the first 30 minutes of trading, with consistent buying pressure and significant intraday volume pushing price through a series of higher highs and higher lows (and closes in the upper 25 percent of each five-minute bar's range).

The exit occurs on a move that reverses the previous two five-minute closes. This frequently leaves money on the table as there is a tendency for such moves to continue. However, it's a good idea to follow the rule because reversals in volatility-based patterns such as this one can often be very powerful and wipe out significant profits in a relatively short time period.

The two-SD opening gap strategy relies on the premise of mean reversion and uses the strength of the statistical measure of volatility, as well as the tendency of traders to search out extended openings as candidates for reversal. This can lead to quick profits as a reversion, or gap fade, takes place, but it can also spell disaster if a trader is unwilling to exit at the first sign of trouble. As with all volatility-based patterns, you should test the applicability of the setup, and be certain to honor stops, as reversals can quickly erase gains and create losses. ☊

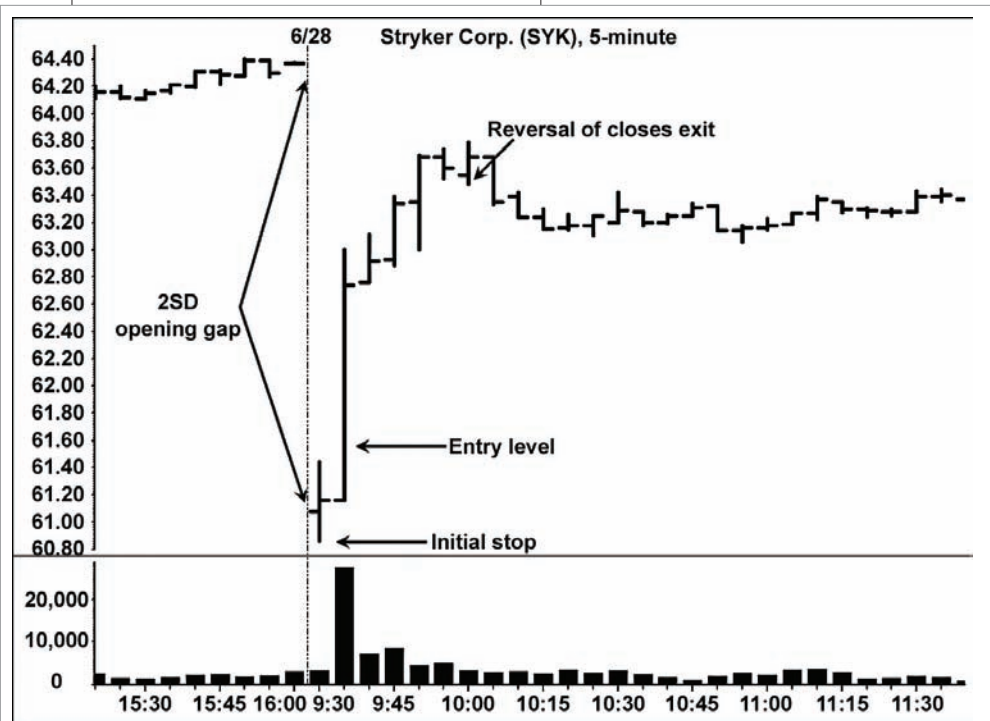| Date	True range	Statistics	
6/14/2007	0.6	Mean	1.18
6/15/2007	1.6	Standard deviation	0.42
6/18/2007	1.23	Range	1.44
6/19/2007	1.2	Minimum	0.60
6/20/2007	1.27	Maximum	2.04
6/21/2007	0.69	Count	10
6/22/2007	2.04		
6/25/2007	1.22		
6/26/2007	1.11		
6/27/2007	0.85		

TABLE 2: STRYKER (SYK) STATISTICS

FIGURE 5 TYPICAL FORMATION *After the long entry, price reversed toward the top of the gap. The trade was approximately 30 minutes into the trading session.*