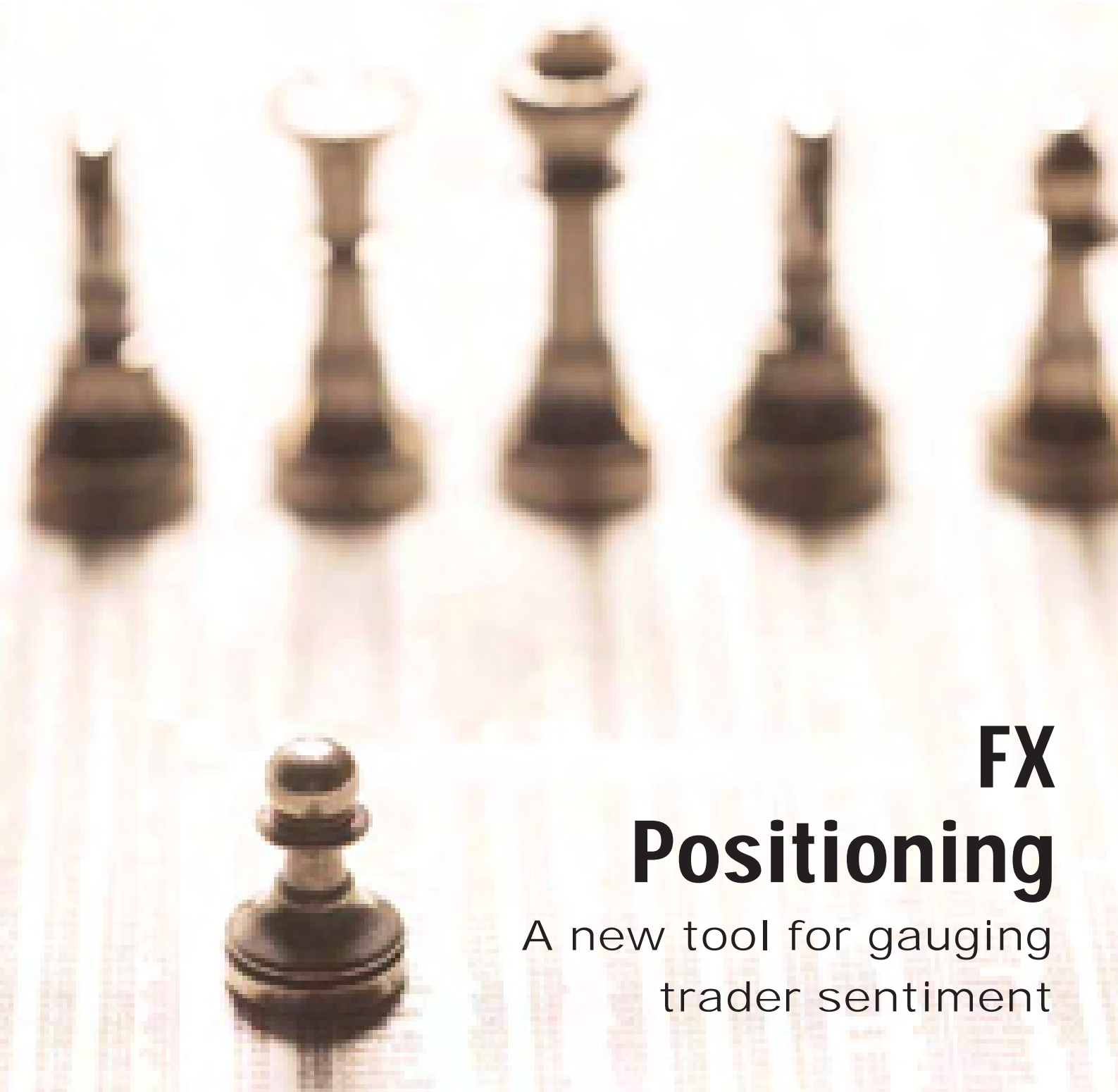


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TRADING THE PERCENTAGE VOLUME OSCILLATOR

by Victor Kalitowski and Andrew von Stuermer



Spikes in volume can be used to anticipate index trend reversals and can be developed into a simple low-risk, high-reward trading strategy.

About Volume

Volume is the number of shares, traded during a given period, for an individual security, or for an entire index or stock exchange.

Volume data simply indicates the number of shares that were transferred from one group of investors to another. Sometimes, this data is available broken down by market price; in those instances, one can study how much trading activity took place at specific price intervals.

Two unique definitions are at the core of our volume methodology: We call any volume that occurs as an index or share is moving lower "supportive volume"; conversely, any volume that occurs during the time an index moves higher is defined as "resistive volume".

As a general rule we have found the following to be true: *After a long run in one direction, the appearance of a significant volume surge signifies the transfer of a large number of shares from one group of market participants to another. It is at this point that the market may become "overbought" or "oversold", whatever the case may be.*

Based on an analysis of such volume spikes (How extensive are they? How far away from a previous reversal point do they occur? How prolonged over time are they?), investors can anticipate when the market is likely to reverse -

over the short-, mid-, or long-term. On a larger timeframe, a significant supportive volume spike can spark a bullish trend while a considerable resistive volume surge can mark the onset of a new bearish trend.

In our study of volume patterns on the major indices (i.e., the determination and quantification of resistive and supportive volume spikes), we use index moving averages (IMA) as a key tool. We also use the Percentage Volume Oscillator (PVO). This is an indicator that allows us to quantify the

magnitude and the duration of specific volume spikes.

About the Percentage Volume Oscillator (PVO)

The PVO measures the divergence between two VMAs with different settings. The shorter-term VMA is known as the "fast VMA" whereas the longer-term VMA is called the "slow VMA". The formula for calculating the PVO is:

$$PVO = \frac{([Fast\ VMA] - [Slow\ VMA])}{[Slow\ VMA]} \rightarrow$$

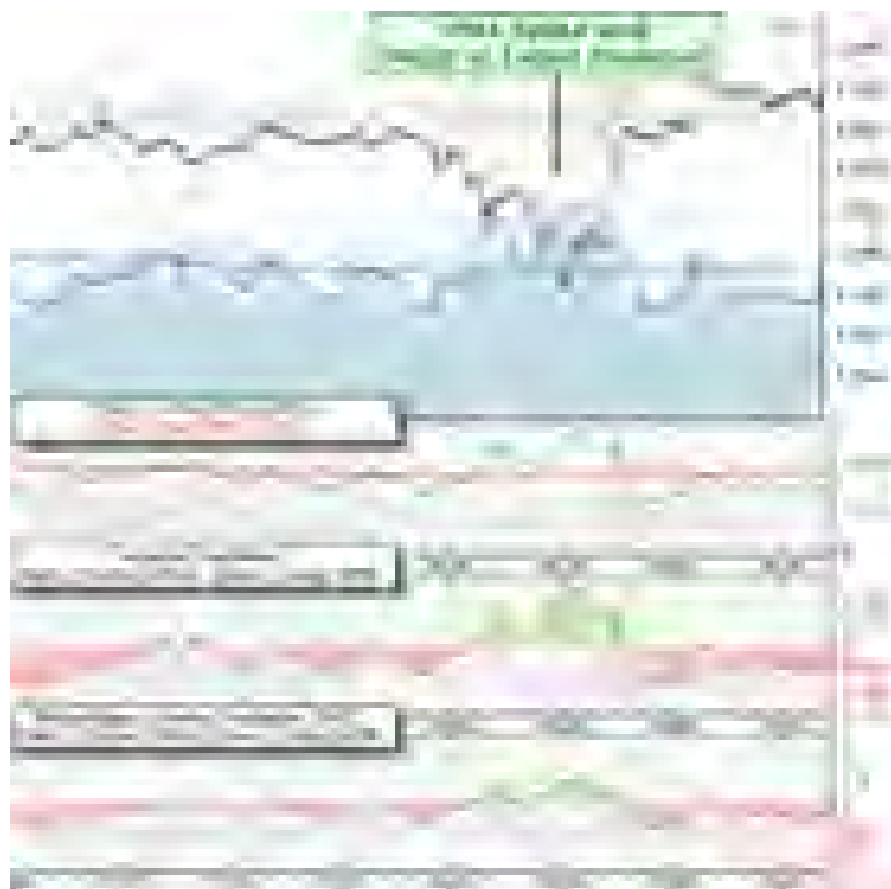


Figure 1. Example of an intraday PVO. S&P 500 index. April 22, 2005. Fast VMA = 15 minute moving average; slow VMA = one-day moving average.

By calculating and charting the difference between a slow and a fast VMA, you can determine the extent to which the fast VMA trades above or below the slow VMA. This provides an indication of the intensity of short-term trading activity (compared to the average trading activity over a longer time span).

The PVO evaluates volume spikes with unbiased, mathematical precision, allowing you to gauge the impact a volume spike might have on the market over different timeframes. For instance, large positive oscillator values are indicative of significant volume spikes. Figure 1 shows an example of an intraday PVO. Two VMAs are compared: a 15 minute VMA as the "fast" VMA and a 1-day VMA as the "slow" VMA.

Figure 1 clearly illustrates how the peak value of the PVO corresponds to the point at which the index reversed its trend from down to up.

The PVO value provides an indication of the magnitude of a particular volume spike. Because it represents a percentage value, it has the added benefit of being amenable to comparisons. The PVO permits you to analyze volume spikes that occurred in the past, allowing you to establish associated critical values at which an index trend reversal is most likely to occur (over various timeframes). You can use this information to build a trading system and tailor it to your personal trading style.

Approach

We looked for critical PVO levels, inflection points at which index reversals are most likely to occur. While the following research was performed on the S&P 500 and is most suited to a medium-term trading approach based on daily volume data, the basic principles outlined could also be applied to other timeframes and other indices.

Based on tests over the last 250 trading days, we have established the most appropriate critical PVO levels as follows:

Date	PVO	5-day change in index*	Trend	VMA Spike	Decision
04/21/2005	16.7%	-2.10	down	Supportive	Go Long
04/20/2005	17.6%	-36.29	down	Supportive	Go Long
04/19/2005	14.9%	-34.98	down	Supportive	Go Long
04/18/2005	14.7%	-35.23	down	Supportive	Go Long
02/01/2005	14.7%	21.00	up	Resistive	Sell Short
01/31/2005	16.4%	17.52	up	Resistive	Sell Short
01/28/2005	17.0%	3.49	up	Resistive	Sell Short
01/27/2005	15.2%	-0.86	down	Supportive	Go Long
01/26/2005	15.8%	-10.56	down	Supportive	Go Long
01/25/2005	14.9%	-27.57	down	Supportive	Go Long
01/24/2005	12.3%	-20.77	down	Supportive	Go Long
01/10/2005	11.7%	-11.83	down	Supportive	Go Long
01/07/2005	13.2%	-25.73	down	Supportive	Go Long
12/21/2004	15.9%	2.05	up	Resistive	Sell Short
12/20/2004	19.0%	-4.03	down	Supportive	Go Long
12/17/2004	20.5%	6.22	up	Resistive	Sell Short
12/16/2004	13.4%	13.96	up	Resistive	Sell Short
12/15/2004	13.3%	22.91	up	Resistive	Sell Short
10/25/2004	11.4%	-19.22	down	Supportive	Go Long
10/22/2004	11.6%	-12.46	down	Supportive	Go Long
10/21/2004	13.1%	3.20	up	Resistive	Sell Short
10/20/2004	11.3%	-9.99	down	Supportive	Go Long
10/19/2004	11.1%	-18.61	down	Supportive	Go Long
10/06/2004	14.0%	27.25	up	Resistive	Sell Short
10/05/2004	14.0%	24.42	up	Resistive	Sell Short
10/04/2004	15.5%	31.65	up	Resistive	Sell Short
09/24/2004	11.6%	-18.44	down	Supportive	Go Long
09/23/2004	14.3%	-15.14	down	Supportive	Go Long
09/15/2004	14.6%	4.10	up	Resistive	Sell Short
09/14/2004	13.7%	7.03	up	Resistive	Sell Short
09/13/2004	13.2%	12.19	up	Resistive	Sell Short

Table 1. Trading days with elevated PVO levels. S&P 500 index. August 2004 to July 2005. Fast VMA = 5-day VMA. Slow VMA = 25-day VMA. * The 5-day change in the index is calculated as the difference between the current close and the close 5 trading days ago.

Date	VMA Spike	Strategy One (using dollar cost averaging)						Strategy Two (using 2nd volume spike)					
		Decision	Open Price	Close Date	Close Price	Returns	Average Returns	Decision	Open Price	Close Date	Close Price	Returns	
04/21/2005	Supportive	Buy	1,159.95	8/3/2005*	1,237.92	6.72							
04/20/2005	Supportive	Buy	1,137.50	8/3/2005*	1,237.92	8.83	7.74%						
04/19/2005	Supportive	Buy	1,152.78	8/3/2005*	1,237.92	7.39		Buy	1,152.78	current	1,237.92	7.39%	
04/18/2005	Supportive	Buy	1,145.98	8/3/2005*	1,237.92	8.02							
02/01/2005	Resistive	Sell	1,189.41	4/18/2005	1,145.98	3.65							
01/31/2005	Resistive	Sell	1,181.27	4/18/2005	1,145.98	2.99	2.94%	Sell	1,181.27	4/18/2005	1,145.98	2.99%	
01/28/2005	Resistive	Sell	1,171.36	4/18/2005	1,145.98	2.17							
01/27/2005	Supportive	Buy	1,174.55	1/28/2005	1,171.36	-0.27							
01/26/2005	Supportive	Buy	1,174.07	1/28/2005	1,171.36	-0.23							
01/25/2005	Supportive	Buy	1,168.41	1/28/2005	1,171.36	0.25	0.02%						
01/24/2005	Supportive	Buy	1,163.75	1/28/2005	1,171.36	0.65							
01/10/2005	Supportive	Buy	1,190.25	1/28/2005	1,171.36	-0.16		Buy	1,190.25	1/28/2005	1,171.36	-0.16%	
01/07/2005	Supportive	Buy	1,186.19	1/28/2005	1,171.36	-0.13							
12/21/2004	Resistive	Sell	1,205.43	1/7/2005	1,186.19	1.60	1.60%						
12/20/2004	Supportive	Buy	1,194.65	12/21/2004	1,205.43	0.90	0.90%						
12/17/2004	Resistive	Sell	1,194.22	12/20/2004	1,194.65	-0.04							
12/16/2004	Resistive	Sell	1,203.20	12/20/2004	1,194.65	0.71	0.53%	Sell	1,203.20	12/20/2004	1,194.65	0.71%	
12/15/2004	Resistive	Sell	1,205.72	12/20/2004	1,194.65	0.92							
10/25/2004	Supportive	Buy	1,094.80	12/15/2004	1,205.72	10.13	10.09%	Buy	1,094.80	12/15/2004	1,205.72	10.13%	
10/22/2004	Supportive	Buy	1,095.74	12/15/2004	1,205.72	10.04							
10/21/2004	Resistive	Sell	1,106.49	10/22/2004	1,095.74	0.97	0.97%						
10/20/2004	Supportive	Buy	1,103.66	10/21/2004	1,106.49	0.26	-0.02%	Buy	1,103.66	10/21/2004	1,106.49	0.26%	
10/19/2004	Supportive	Buy	1,103.23	10/21/2004	1,106.49	-0.30							
10/6/2004	Resistive	Sell	1,142.05	10/19/2004	1,103.23	3.40							
10/5/2004	Resistive	Sell	1,134.48	10/19/2004	1,103.23	2.75	2.97%	Sell	1,134.48	10/19/2004	1,103.23	2.75%	
10/4/2004	Resistive	Sell	1,135.17	10/19/2004	1,103.23	2.81							
09/24/2004	Supportive	Buy	1,110.11	10/4/2004	1,135.17	2.26	2.34%	Buy	1,110.11	10/4/2004	1,135.17	2.26%	
09/23/2004	Supportive	Buy	1,108.36	10/4/2004	1,135.17	2.42							
09/15/2004	Resistive	Sell	1,120.37	9/23/2004	1,108.36	1.07							
09/14/2004	Resistive	Sell	1,128.33	9/23/2004	1,108.36	1.77	1.46%	Sell	1,128.33	9/23/2004	1,108.36	1.77%	
09/13/2004	Resistive	Sell	1,125.82	9/23/2004	1,108.36	1.55							
Total:							31.54%	Total:					28.10%

Table 2. Using critically high PVO levels to generate simulated buy and sell signals. S&P 500 index. Expected returns from August 2004 to July 2005 (250 trading days). * 3/8/2005: The date when the final data for this article was compiled. →



- 13% as the critical level for resistive PVO values;
- 11% as the critical level for supportive PVO values.

Our research indicates that these values will catch the majority of index trend reversals and resulted in the largest hypothetical returns over the 250 trading day period. Table 1 shows a compilation of trading days with elevated PVO levels. It also provides the difference between the current index close and the close 5 trading days ago in order to define supportive and resistive volume spikes.

The most basic trading decision one can make based on this information is to sell on resistive volume spikes and to buy on supportive volume spikes.

Based on the PVO values and trading decisions presented in Table 1, we can formulate two simple trading strategies:

Strategy one:

- a)** Close "Short" positions and open "Long" positions on supportive volume spikes;
- b)** Close "Long" positions and initiate "Short" positions on resistive volume spikes;
- c)** Add to a "Long" position on each additional supportive volume spike;
- d)** Add to a "Short" position on each additional resistive volume spike.

Strategy two:

- a)** Open "Long" positions only on a second or even a third supportive volume spike;
- b)** Close "Long" positions on a first resistive volume spike;
- c)** Open "Short" positions only on a second or even a third resistive volume spike;
- d)** Close "Short" positions on a first supportive volume spike.

The difference between the two strategies is that the first applies a dollar cost averaging approach whereas the second assumes a trader will only make a single buy/sell decision. The dollar cost averaging approach is based on the premise that a trader will never remain in cash - short positions are entered immediately upon the closing of long positions, and vice versa.

In the second strategy, traders are assumed to limit their dealings to a single buy/sell decision. Until a good opportunity arises, the trader will remain in a cash position. A trade is entered only on the appearance of a second volume spike (which provides a much better return than initiating a trade on the first - or on the third - volume spike).

In Table 2, we have compiled the hypothetical returns from these two trading approaches (based on the last

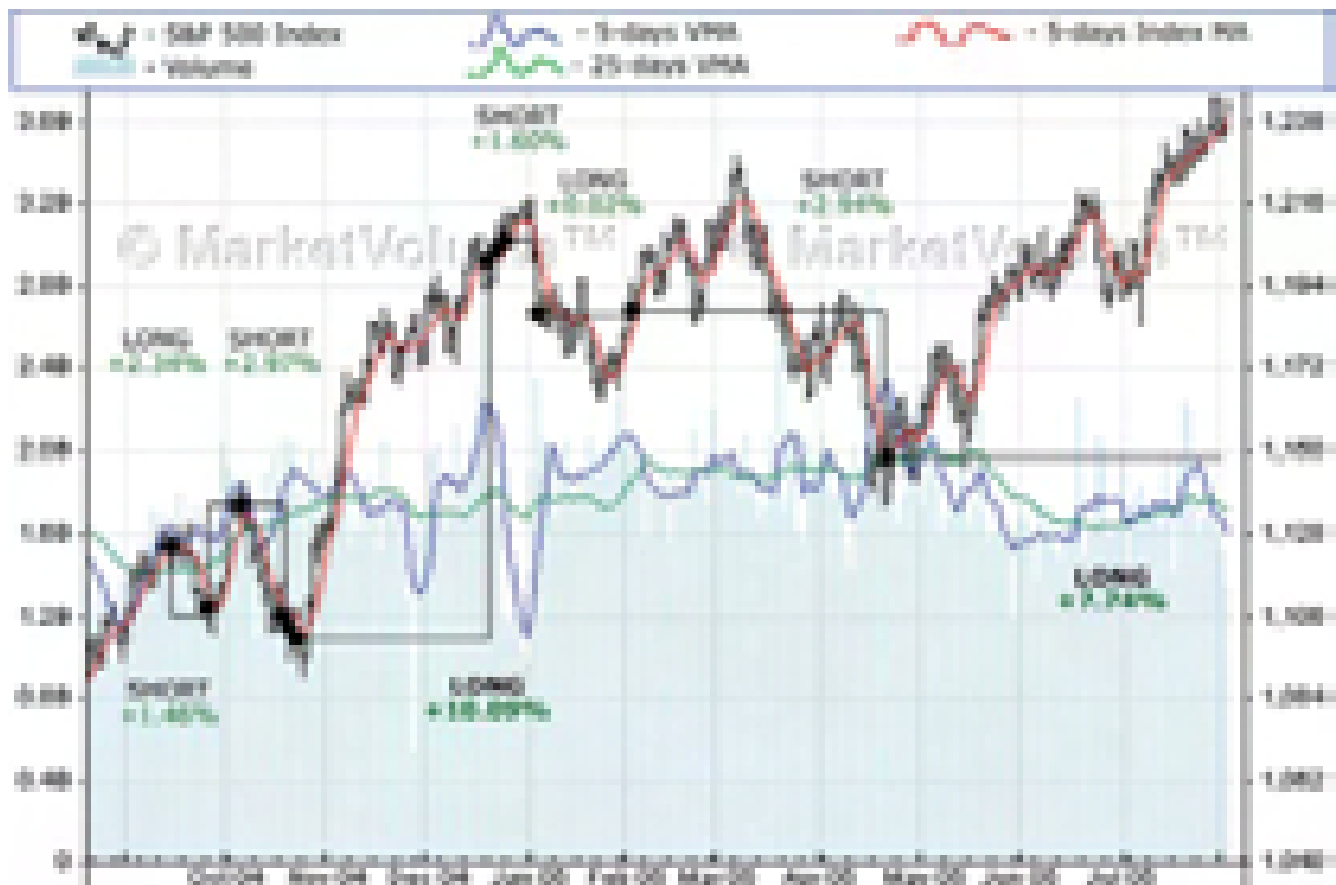


Figure 2. Depiction of the key trades outlined in Table 2. Dollar cost averaging approach.

250 trading days).

Table 2 shows that the use of a dollar cost averaging approach yields a yearly return exceeding 31%. However, only a portion of one's portfolio can be invested this way, because funds need to be held back in case a trader wishes to add to an existing position should a second, third, or subsequent volume spike appear.

The second trading approach yielded somewhat lower returns; however, here the entire portfolio may be invested. There is no need to hold back part of the funds, as no further money is invested should a second, third, or subsequent volume spike appear.

Both trading approaches are simple to implement and both have yielded a good return over the last 250 trading days. Figure 2 points to the main short and long trades established, as noted in Table 2, using the dollar cost averaging approach. As you can see, the system

catches the main mid-term trend reversals and thus provides stable, high returns.

Discussion

The appearance of large index volume spikes indicates a significant number of shares are changing hands, prompting shifts to the prevailing support/demand balance. A wholesale transferring of shares during a mature up-trend (i.e., the building of a resistive volume spike) can ultimately lead to the exhaustion of the bullish group of investors - the market may become oversold, making it prone to downside reversals. The opposite is true when large supportive volume surges appear during mature down-trends.

Our PVO analysis uses a mathematical model to characterize price movements based on critical volume spike levels. But the strategy of using elevated PVO levels to anticipate index rever-

sals remains highly sensitive to the status of the prevailing long-term trend. PVO levels should therefore be re-analyzed on a regular basis so that critical PVO values can be re-calibrated for the current market situation.

The attractiveness of this system is that it generates trading signals in a mechanical, objective way, excluding the emotional factor from trading decisions. Our research shows that this approach can be highly rewarding for medium-term players.

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