



Hunting For Those Early Bear Signals

Normalized Volatility Indicator

Early bear phase signals can help you get out of the market before it turns down. This indicator tells you how.

by Rajesh Kayakkal



There are many ways to identify the trend of a financial market, the most common being the 200-day exponential moving average (EMA). When price is trending down below the 200-day EMA, the market is believed to be in a bear phase. If the market is trending up above the 200-day EMA, it is considered to be in a bull phase.

Since every indicator fails at times, I wanted to find other indicators to confirm a trend. In my quest for another indicator to determine the trend for the financial markets, I found the CBOE Volatility Index (VIX) to be a good indicator of the market direction. The VIX is calculated from the weighted average of the implied volatilities of various options on the Standard & Poor's 500 index futures.

J. Welles Wilder's average true range can also give an indication of the financial market trends; that is, when the market is in a bull phase, the average true range narrows, and when it is in a bear phase, the average true range expands. The normalized volatility indicator (NVI) is based on this behavior.

NORMALIZED VOLATILITY INDICATOR (NVI)

Average true range (ATR) varies depending on time. But how do we determine the phase of the financial market with ATR? Perhaps some type of ratio could give us a clue. A ratio presents a relationship of a quantity with respect to another. I did some research based on a ratio of the 64-day average true range and the end-of-day value of equity indexes such as the Standard & Poor's 500 (SPX). I selected the 64-day period since it is close to the average number of trading days in a quarter. The ratio of the 64-day average true range and closing price does discount seasonal variations in the average true range and gives a single number that can be used to compare volatility

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FIGURE 1: NORMALIZED VOLATILITY INDICATOR (NVI). The NVI gave advanced signals before the cyclical bear phase of SPX commenced in October 2000 and was almost on the spot with the bull phase that began in 2003 and the current secular bear market cycle, which started in November 2007.

of an instrument across many decades. I call this ratio the *normalized volatility indicator*.

I found an interesting correlation between NVI and cycles of major equity market indexes. The formula for the NVI is:

$$\text{NVI} = 64 - \text{Day average true range}/\text{End-of-day price} * 100$$

**ADVANCED WARNING SIGNALS**

As you can see in Figure 1, NVI gave advance warning signals before the cyclical bear phase of SPX that commenced in October 2000. The NVI was almost on the spot when the bull phase began in 2003 and the current secular bear market cycle started in November 2007.

What is the NVI pivot value that separates bear and bull market cycles of SPX? I ran several backtests with about 10,000 datapoints of the SPX. The code for the backtest can be seen in the sidebar, “Prorealtime backtest code.” Backtests were done for a range of NVI values from 1 to 1.5, using a step of 0.001. There were many optimal values of NVI that gave good results, and I picked the value of 1.343, which is one of the optimal values. When the NVI value was about 1.343, the backtest results gave a recovery factor (net profit/maximum drawdown) of 4.374. This means the strategy can withstand long periods of drawdown. The win percentage is 16.67; the profit factor is 10.44 and the payoff ratio is 52, which means that for every \$1 loss, there is a \$52 gain. All of these meet my criteria for an indicator.

The strategy to test the profit potential of the NVI is simple.

When the NVI goes above 1.343, close all long positions and open short positions. Continue shorting the market by one unit every day until NVI goes below 1.343. As soon as NVI goes below 1.343, close all your short positions and open long positions. Continue to buy one unit every day until NVI goes above 1.343.

Backtest results are displayed in Figure 2. The equity curve

PROREALTIME BACKTEST CODE

```

nvi=averagetruerange[64]/close*100
if nvi < x then
    if shortonmarket then
        exitshort COUNTOFSHORTSHARES SHARES AT MARKET
    REALTIME
    endif
    buy 1 SHARES AT MARKET REALTIME
endif

if nvi > x then
    if LONGONMARKET then
        sell COUNTOFLONGSHARES SHARES AT MARKET
    REALTIME
    endif
    sellshort 1 SHARES AT MARKET REALTIME
endif

```

Optimization parameters for X are:
 Minimum 1
 Maximum 1.5
 Step 0.001

	All trades	Long trades	Short trades
Profit & Loss (net total)	907,283.94	876,208.19	31,075.73
Total profit	1,003,425.94	886,717.25	116,708.70
Total loss	-96,142.00	-10,509.04	-85,632.97
Total profit / Total loss	10.44	84.38	1.36
Number of trades	24	12	12
Percentage of winning trades	16.67%	16.67%	16.67%
Winning trades	4	2	2
Losing trades	20	10	10
Even trades	0	0	0
Trade expectancy (Total P&L / Nbr trades)	37,803.50	73,017.35	2,589.64
Average profit on winning trades	250,856.48	443,358.62	58,354.35
Average loss on losing trades	-4,807.10	-1,050.90	-8,563.30
Standard deviation on profit and loss	145,081.03	195,204.48	38,886.89
Highest profit	696,409.50	696,409.50	115,774.88
Highest loss	-68,519.25	-4,433.67	-68,519.25
Avg time in the market (nbr of bars)	211.21	253.50	168.92
Avg time between trades (nbr of bars)	2.78	5.82	5.82
Avg time on winning trades (nbr of bars)	921.25	1,372.50	470.00
Avg time on losing trades (nbr of bars)	69.20	29.70	108.70
Avg time on even trades (nbr of bars)	n/a	n/a	n/a
Percent of time in the market	98.75%	98.75%	98.75%
Total brokerage fee	0.00	0.00	0.00
Highest nbr of consecutive winning trades	1	1	1
Highest nbr of consecutive losing trades	9	3	5
Drawdown (highest loss of the equity curve)	207,387.38	143,242.88	227,741.06
Highest gain of the equity curve	1,094,948.00	1,013,086.44	327,814.31
Return on initial capital (Profit/Loss/Initial C)	90.73%	87.62%	3.11%

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FIGURE 2: BACKTEST STATISTICS. Here are the backtest statistics of NVI value 1.343 from April 1990 to May 2010. Note that commissions are not included in the backtest.

for the backtest with NVI value of 1.343 can be seen in Figure 3. The entries and exits are marked just below the equity curve. Green represents long positions and red represents short positions.

EARLY SIGNALS?

NVI can be used as a long-term trend-trading indicator. However, NVI may give early bear phase signals even though a simple trading strategy based on the NVI has positive statistical advantage, or an edge in the long run. Therefore, to minimize your drawdown, you should use the NVI in conjunction with other trend-following indicators such as the 200-day EMA since the NVI is developed to augment long-term trend-following indicators.

Figure 1 shows that the NVI value below 1 is ideal for entering long positions. It also implies that the current secular bear market may not end soon.

This study is specific to SPX. The pivot value of the NVI may vary for different indexes and my backtests assumed zero commission and a relatively large initial capital. Therefore, to use the NVI you will need to backtest and select a

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FIGURE 3: EQUITY CURVE. Entries and exits are marked just below the equity curve. Green represents long positions and red represents short positions.

INDICATORS

pivot value of NVI that is suitable for the index and your trading style.

Rajesh Kayakkal is a software developer in Brisbane, Australia.
Email him at rajesh.kayakkal@bizken.com.

SUGGESTED READING

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