

Stock Market Dashboard Back-Test **October 29, 1998 – March 29, 2010 Revised**

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My objective in writing *Buy DON'T Hold* was to provide investors with a better alternative than the buy-and-hold approach. My focus was on a rule-based investing approach, to first determine the market's trend, then to invest at the right time in the highest ranking ETFs based on high relative strength analysis, and lastly to use appropriate "stops" to minimize risk. Based on the back-tested results my objective was accomplished. The back-tested results focus on The Stock Market Dashboard "buy" and "sell" signals. As you will see, these signals were neither perfect nor frequent – 20 total signals over an approximate 12-year test period – and about 50% of the signals lost money. Nevertheless, the results were profitable.

The Importance of Using Stops Is Critical to Minimizing Losses

As explained in my book (Step #6 of the investment plan on page 201 titled "Protect Your Portfolio Using Stops,") stops are critical to investment success. Moreover, on page 125 in the highlighted text at the top of the page, I included the following paragraph:

"For your added protection, it is always important to have a defensive plan ready in case the market suddenly falls after a composite dashboard buy signal is given. **That is why you need to place a stop-loss order on each ETF position in your portfolio, as soon as it is bought. You can consider this action as having portfolio insurance in case of an unexpected market tumble. The key is to protect principal at all costs.** You can always reenter the market if it reverses and the dashboard issues a buy signal. These occurrences should be rare, but at least you will have added protection."

I mention this solely to indicate the importance of protecting your principal. The Dashboard ETF back-tested results include trailing stops. They were critical in avoiding large drawdowns.

General Back-testing and Dashboard Background

Back-testing is a well-known technique to test the effectiveness of a stock market strategy. Many investors and traders analyze back-tested results before putting money at risk. The objective is to determine if a strategy's past performance and risk parameters are acceptable. Of course, there is no guarantee that a strategy's "live" results will mirror the past back-tested performance, but at the minimum it provides an indication as to the strategy's potential viability and profitability.

Ideally, a long back-test period, such as 30-years is desirable, but that was impractical in our case because of two factors. First of all, two of the indicators tested do not have available history beyond the last quarter of 1998. Therefore, I was limited to the latest **common period** of all indicators, which was October 29, 1998 to the present, a total of 4,121 days. Fortunately, this particular timeframe consisted of both bull and bear markets of significant proportion, so in that respect it was a realistic test period. Secondly, almost all the ETFs tested did not exist prior to 1998 so testing earlier time periods would have been useless. Remember that the SPDRs ETF came public in 1993 and was one of only a few available for many years.

The eight dashboard indicators used to determine the stock market's trend were based on my tracking them over many years. I did not try to optimize any of the indicators or try to test all sorts of variations or parameters. My goal was not to "curve-fit" the parameters to obtain maximum profits, as this would not have been realistic or able to be replicated in the future. The Dashboard buy and sell signals were determined using data from multiple sources including chart data from www.stockcharts.com, and historical price data from www.bigcharts.com, American Association of Individual Investors (AAII), and Investors Intelligence.

A Dashboard Composite signal of +3 or more was considered a "buy" signal for the **equity** markets and a -3 or more was considered a "sell" signal for the **equity** markets. All signals ranging between +2 and -2 were not acted on. A **composite signal** takes into account the value of all eight indicators (+, 0 (if applicable), and -1) and then sums them to arrive at the final number. This signal does refer to fixed income investments. Those should be bought based on their high relative strength rankings, as the equity market declines.

A value of “0” was assigned to indicators #3, #4 and #6 when the signal did not change over the subsequent six-month period after their last buy or sell signal. If another signal in the same direction occurred, then the six months timeframe was extended accordingly. If a reverse signal occurred at any time, that would then be the new signal value.

The rationale for the assignment of “0” after six months is that there were periods when these three indicators did not have any signals many for months during the test period. Therefore, it was prudent to adjust their value to a neutral “0” so as not to negate the impact on the other more recent indicator signals. This six-month period was selected as a reasonable timeframe for the signal to work. I didn’t test other timeframes (such as three months or one month) or try to optimize this time period.

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Assumptions and Parameters

I used the VectorVest’s (VV) Software, an in particular their AutoTester module, to back-test the specific universe of ETFs as indicated in the book, over the 4,121-day test period. The assumptions and parameters for performing this back-test (refer to Table 1.) were as follows:

- ◆ The specific Dashboard “buy” and “sell” signal dates that were previously determined were keyed into the Vector Vest AutoTester.
- ◆ The test was performed on my specific universe as a whole, not on separate ETF grouping such as style, sector, country, fixed income, etc.
- ◆ An equal dollar amount was initially invested in the **top 15 ETFs** based on their 6-month relative strength ranking as measured by the VV software. The initial amount invested was set at \$100,000.
- ◆ In a number of the earlier periods the number of ETFs available for testing was less than 35. In subsequent years more and more ETFs became available.
- ◆ A 10% trailing stop was placed after every ETF purchase to protect profits or minimize losses. I could have used a different percentage stop such as the more traditional 7% or the more aggressive 15%, but I decided to use a percentage in-between, so I

selected 10%. My intention was to use a common stop value that would fit most investors risk tolerance. Alternative stop percentages to optimize the results were not tested.

- ◆ The proceeds of any ETF sale as a result of hitting its trailing stop were then invested in the top ETF(s) as a replacement. For example, if two ETFs were sold on the same day, then top two ranked ETFs (based on relative strength) were purchased in equal dollar amounts.
- ◆ The ETF purchase and sale price used was the **next business day's** opening price after the signal date to provide realistic entry and exit prices.
- ◆ Taxes, dividends, commissions and potential interest income during non-invested periods, were not factored into the analysis.
- ◆ No short positions were taken on sell signals. And nor margin was used

Back-test Results

Referring to Table 1, we find that the ETF portfolio generated a return for the entire period of 121.06%. Putting it terms of dollars and cents, a \$1,000 investment at the beginning of the test period increased to \$2,210.57 by the end of the period. The Vector Vest Composite (VVC) which consists of an unmanaged portfolio of over 7,000 stocks, equally-weighted, for the same invested periods), returned 70.5% and ended with \$1,705.71. I used the VVC as the benchmark for the period because of its size and wide market representation. Thus, the ETF portfolio's return exceeded the VVC benchmark by 29.6%.

A simple buy-and-hold approach using the VVC for the entire 4,121 day period (purchase of that index on October 29, 1998 and holding until March 29, 2010) resulted in a gain of 40.5%. Thus, the ETF strategy tripled the performance of buy-and-hold. Moreover, the ETF strategy was invested for 2,497 or only 60.4% of the days. Therefore, the portfolio resided safely in cash for the other 39.6% days (refer to Table 2).

The maximum drawdown (the largest percentage drop from the highest closing price to the lowest closing price in the period) for the ETF portfolio was quite reasonable with the highest readings at 16.45%, three readings in the 14% range and the remainder below 8.2%. The average (mean) maximum drawdown was 6.23% for all the invested periods. Investors

would have had to sit through these drawdowns unless some of their ETF positions were taken out by the trailing stop of 10%.

Over the “buy” periods, 50.7% of the 597 trades were winning trades. This means that the average winning trades had a higher return than the average losing trades. As many researchers and traders using rule-based strategies have found, it is not necessary to have a large percentage (75% - 80%) of winning trades to have a viable investing strategy.

Surprisingly, the AutoTester performance reports did not include the Sharpe Ratio (measure of risk/reward ratio) or any risk/reward measurement; otherwise I would have included it.

Additional Back Tests

To obtain additional insight into the effectiveness of the Dashboard signals, I performed three additional back-tests using two well-known indexes – S&P 500 Index and the NASDAQ Composite Index.

Non-Invested Periods Results

The second back-test focused on the non-invested period of 1,624 days to determine the market’s performance’s compared to being invested in a cash equivalent such as three-month Treasury bills.

Table 2 contains a back-test of the Dashboard “buy” and “sell” signals using the S&P 500 Index, for the periods when the Dashboard was in cash and not invested. During the non-invested periods, the S&P 500 actually **lost 29.60%** or looking at the data in dollars and cents, an initial investment of \$1,000 on June 1, 1999, ended with a balance of \$704.05 on February 18, 2010. Moreover, in 10 out of the 19 time periods there were negative returns. The two worst periods were during the market crash earlier in the decade when 22.95% was lost in 2001 and 19.85% was lost in 2002.

Interestingly, those two periods also had the largest maximum drawdowns of 28.35% and 29.33%, respectively. The average maximum drawdown for this entire test period was 7.85% which was 1.65 percentage points higher (worse) than during the ETFs comparable data in Table 1.

In addition, there were nine periods of positive returns: six of those were in the range of 0.14% to 3.93%; with single period returns of 5.35%, 9.57% , and 15.86%.

Investing the proceeds of the sell signals in a 3-month Treasury bill during the non-invested periods would have amounted to at least \$171.02 in interest income during the entire period for each \$1,000 invested initially. This represents a return of 17.10% for the entire period. I used \$1,000 as the base for each period (not the compounded amount) available for ease of calculation. That means that these results understate the actual interest.

In conclusion, investors who were out of the market (for example, those using the Dashboard) for these 1,624 days avoided a **loss of 29.60%** and could have earned interest income by investing in T-bills or higher yielding other cash equivalents. Therefore, the Dashboard accomplished its goal of playing defense during these market periods while offering income opportunities.

Dashboard S&P 500 Back-test Results

As a comparison to the ETF back-test with a 10% trailing stop, two other back-tests without any stops were performed, one with the S&P 500 Index and one with the NASDAQ Composite Index using identical dashboard buy and sell signal dates and parameters, except that trailing stops were not used. The objective was to determine if a broad index could do just as well without using ETFs or relative strength. The results were enlightening. Let's first review them in Table 3.

Table 3 shows the performance data for the S&P 500 Index for all initial Dashboard +3 and -3 signals. A few signals were +4 and -4 and those are duly noted. All other signals in the range of +2 and -2 were not shown since they did not generate an actionable signal. Multiple buy signals of +3 or more in each period were not shown on this table as they would not have been redundant and not acted on.

There were 20 round-trip signals in total with 11 winning signals and 9 losing signals for a 55% success rate. No dividends, commissions, taxes or interest income (obtainable during non-invested periods) were included in this analysis. On a sell signal the proceeds were invested in cash at zero interest. Moreover, there was no shorting the market on sell signals.

Using the Dashboard's "buy" and "sell" signals, the index earned a compounded return of only 44.73% for the entire period compared to 121.06% for the EFT portfolio, illustrating the benefit of investing in strong relative strength ETFs with trailing stops. Buying and holding the index over this period resulted in a paltry 8.10% return.

Of greater significance were the three highest drawdowns of 48.1% and 16.1% during the 2007-2009 market decline, and 20.9% during the 2002-2003 decline. These drawdowns were more severe than those of the ETF backtest because no stops were used to limit losses. The average (mean) drawdown was 7.69% compared to 6.23% for the ETF test. Based on the results of this back-test it appears that the 10% trailing stop was worthwhile as a defensive strategy during the market declines during the Dashboard buy periods.

The largest drawdown was 48.1% in the period 7/15/2008 through 10/05/2009. Unfortunately, the Dashboard failed to avoid the 2007- 2009 crash, but fortunately did stay invested through the March 9, 2009 bottom with a sell signal on October 5, 2009, thus losing 14.2% for the entire period. While, the next largest drawdown was 20.9%, in the 7/31/2002 to 1/30/2003 period, the Dashboard loss was limited to 7.4%.

Throughout the July 2008 through January 2009 period, there were multiple +3 or higher "buy" signal generated as the market became weaker and weaker. In late January and February 2009 there were two signals of -2 that did not meet the sell criteria of -3. The market did hit bottom on March 9, 2009. A "buy" signal of +5 occurred on March 15, but that just confirmed the much earlier "buy" signal in July 2008.

In conclusion, the S&P 500 Index back-test compared to the ETF back-test indicated that:

1. The Dashboard signals generated a 44.73% return for the S&P 500 Index compared to 8.10% for buy-and-hold.
2. The ETF portfolio had a 3:1 better percent return than this index for the invested periods, indicating the benefit using a trailing 10% stop and ETF rotation using relative strength.
3. The ETF portfolio had almost a 15:1 higher percent return than buying and holding the S&P for the entire 4,121 days.
4. The ETF portfolio had lower drawdowns than the index.

Dashboard NASDAQ Composite Back-test Results

Table 4 provides results of the NASDAQ Composite Index with identical assumptions and parameters as the S&P 500 Index test described above. No dividends, commissions, taxes or interest income (obtainable during non-invested periods) were included in this analysis. On a sell signal the proceeds were placed in cash at zero interest. Moreover, there were no stops placed and no shorting of the market on sell signals. There were 20 round-trip signals in total with 11 winning signals and 9 losing signals.

First of all, referring to the table the NASDAQ Composite produced the highest return of all three comparable back-tests at 179.1% for the entire period compared to 121.06% for the ETF portfolio without using any stops. Buying and holding this index over this period resulted in a 36.07% return. Of greater significance, and more troubling were the five highest drawdowns of 48.7% and 20.9% during the 2007-2009 market decline, 35% during 2000-2001 market decline, 29.6% during the mid-1999 through July 2000 period, and 21.8% during the late July 2002 through January 2003 period. These large drawdowns were more severe than those of the ETF portfolio because no stops were used to limit losses, among other reasons. The NASDAQ average (mean) maximum drawdown was 11.1% compared to 6.23% for the ETF test, almost twice as high.

Although the 179.1% return trounced the ETF 121.06% return and appears on first glance to be much better, it is important to point out a few facts. First of all, the NASDAQ's returns during 1998 through July 2000 of 39.5% and 49.8% for the two periods was abnormally high. In comparison only a portion of the ETF universe was available during this period where the Dashboard performance was 8.2% and 14.6%, respectively, for the investment periods. So we may not be obtaining the best possible ETF performance. Second of all, if we started measuring results from 8/15/2000 to the present, not including the prior two robust periods the results are quite different. In this scenario the NASDAQ gained only 33.6% compared to the ETF portfolio performance of 110.5%. Moreover, if you picked any other starting period date after July 2000, the ETF portfolio would have outperformed the NASDAQ Composite in most cases.

Moreover, the largest five NASDAQ maximum drawdowns were much worse than the ETF portfolio's drawdowns. Additionally, the composition of the NASDAQ is quite different and much more concentrated than the

S&P 500 and the ETF portfolio. Therefore, taking these facts into consideration lessens the appearance and value of the NASDAQ's outperformance.

Review of Overall Performance Results

The ETF Dashboard back-test outperformed buy-and-hold, as well as two other indexes (VVC and S&P 500) whether measured on a percent return basis or using a \$1,000 initial investment and compounding the results from each invested period to the next. The ETFs also outperformed the NASDAQ Composite for the 20 invested periods, if the two earliest periods are eliminated from the performance figures, since I considered them to be "outliers." Certainly the ETF portfolio did better on the basis of lower maximum drawdowns. Not only were the performance figures of the ETF portfolio better than buy-and-hold, but also 39.4% of the time the portfolio was safely in cash. That means that the overall results are even better, if we had annualized the data.

However, the back-test revealed some concerns. For example, there were a number of large drawdowns in a few of the "buy" periods when using the S&P 500 Index and NASDAQ Composite that could have been difficult for investors to sit through.

Fortunately, the ETFs coupled with the 10% trailing stop would not have had that problem. The largest ETF portfolio maximum drawdown was 16.45% and that trade actually lost only 8.15% for the period. And that was the largest period loss over the 12-year test period.

Another concern was that the Dashboard did not issue a sell signal in 2008 before the crash in September or thereafter during that bear market. Actually, there were multiple confirmation "buy" signals in November and December 2008. That is why using trailing stops, such as a 10% stop, is a critically step in the investment process coupled with buying the highest ranking ETFs.

In conclusion, using the Stock Market Dashboard with selected ETFs with the highest relative strength, and trailing stops is a viable investing strategy.

