



Buy & Hold Investing: Managing Risk

Introduction

Long-term buy & hold has been the hallmark of traditional investment theory since time immemorial. The concept relies on two main beliefs: 1) that the stock market will, over the long run, outperform the majority of other asset classes, and 2) trying to time market entries is a fool's game that will only result in lost opportunities and increased commissions.

The main problem with buy & hold is that the stock market undergoes both long bullish cycles *and* long bearish cycles. This has been highlighted by the market gyrations of the past two decades. Staying in the market during both good times and bad means experiencing both unrealized profits *and* unrealized losses. So while the stock market may indeed be the best place to place one's money *over the long run*, it would be naive for buy & hold investors to believe that they could exit the market *at any time* at or near market tops. Buy & hold investors would have experienced large drawdowns after the dotcom bubble burst in 2000 or during the financial crisis of 2008 and 2009. This would not have been a problem had they simply "held on", but would have proven catastrophic for those needing to liquidate their stock market investments during these periods.

The key to generate an acceptably smooth equity curve is to effectively manage risk. And while volatility is often used as the measure of investment risk, its value is arguably best employed to describe short-term market movements. A better measure of long-term risk is peak-to-valley drawdown - i.e. the maximum percentage pullback from an equity high.

In this study we will look at two simple and well-documented methods for managing drawdown risk. The instrument used in this study will be the INX (S&P500 Index), from Jan 1st 1966 to Dec 31st 2015. Note that since the INX is not a tradable financial instrument, actual positions would have been entered into using S&P500 futures, S&P500 ETFs or an S&P500 mirror fund.

Analysis

Buy & Hold

To benchmark our study, we will first look at the hypothetical results of having bought the S&P500 index in January 1966 and held it for 50 years.

System data:

- Instrument: INX (S&P500 Index), from Jan 1st 1966 to Dec 31st 2015 (50 years)
- Initial capital: US\$ 100,000
- No allowance for commissions or slippage

System rules:

- Entry: long on Jan 4th 1966
- Exit: flat on Dec 31st 2015

Strategy	Net Profit	Win Rate	Profit Factor	Annual Rate of Return	Time in the Market	Max Drawdown	Date of Max Drawdown
Buy & Hold	\$ 2,117,660	100%	NA	6.30%	100%	57.69%	6 march 2009

The results show that the initial \$100,000 investment would have grown 21 fold over the past 5 decades, yielding an annual rate of return of 6.3%. The associated equity curve below provides further insight as to how this *average* rate of return would have been distributed over time. As we can see, the first 2 decades leading up to 1985 saw very little in terms of capital appreciation and witnessed a major reversal in 1974/1975. The bulk of the rise in the stock market actually occurred from late 1987 to 2000. The decade that followed (2000-2010) was then characterized by extreme market movements that hurt domestic economies, housing markets and investment accounts worldwide.



The Mechanical Trader

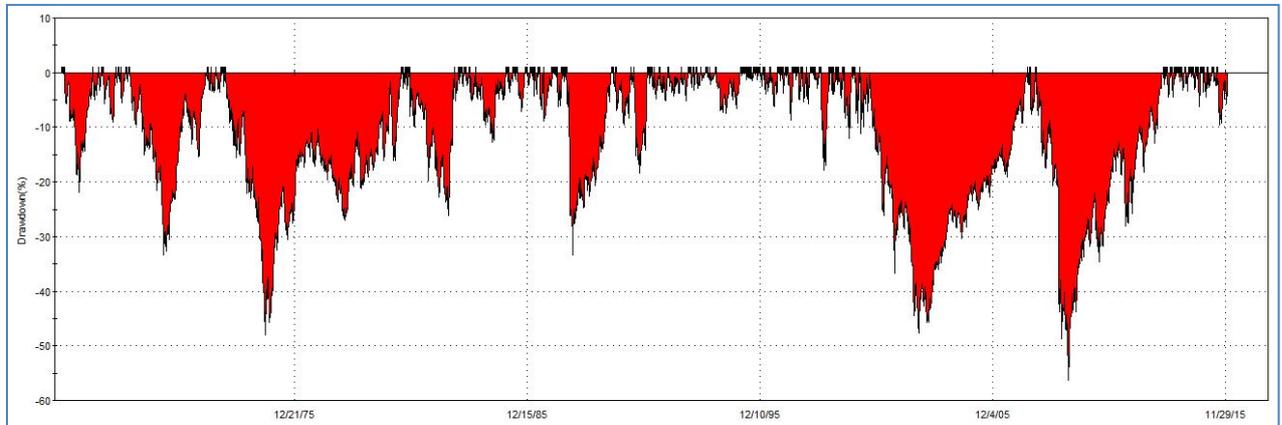
The US stock market suffered a 50% drawdown from 2000 to 2002, followed by an unprecedented 58% drawdown from 2008 to 2009. Equities then recovered and the market has been on a bull run ever since.

The wisdom of buy & hold investing was seriously tested during the "lost decade" of 2000-2010. Most retail investors saw their long-term investments wither, with some undoubtedly having to sell at market bottoms to raise liquidity or fund their retirements.

Equity Curve: Buy & Hold



Equity Drawdown: Buy & Hold



This begs the question of whether manageable alternatives to buy & hold exist to help avoid such dramatic dips in investment value. In the following pages we will examine two simple investment strategies that would have allowed investors to sidestep the bulk of the damage incurred during some of the bear markets of the past 5 decades. Both strategies would have required investors to sell their positions when market expectations turned neutral or negative (low expectancy periods), and to re-enter the market when expectations turned positive again (high expectancy periods).

Long-Term Trend-Following

We will first examine the effectiveness of using simple trend-following techniques to help time market entries and exits. We will test several moving average crossover pairs to try to find the best performing combination. The strategy will be long-only: it will go long when the fast moving average (FMA) crosses *above* the slow moving average (SMA) and will go flat when the fast average crosses *below* the slow average. The system will not take any short positions.



The Mechanical Trader

System data:

- Same as Buy & Hold

System rules:

- Entry: long when the FMA crosses above the SMA
- Exit: flat when the FMA crosses below the SMA

Below are the results of the system using 6 different moving average pairs. As we can see, the net profit figures for most combinations compare favourably to those obtained with the buy & hold system. So little to no profits would have been lost by staying out of the market during low-expectancy periods (when the SMA was above the FMA). But where these systems shine is in their low maximum drawdown figures, suggesting they did indeed do a good job at managing downside risk.

Strategy	Fast MA	Slow MA	Net Profit	Total Trades	Win Rate	Profit Factor	Max Drawdown
Trend Following	50	200	\$2,580,403	27	81.48%	44.80	27.76%
Trend Following	100	300	\$2,165,110	14	92.86%	848.82	33.02%
Trend Following	50	250	\$1,908,498	25	76.00%	33.77	32.30%
Trend Following	50	300	\$1,905,310	21	76.19%	61.84	32.13%
Trend Following	100	200	\$1,739,260	23	86.96%	16.44	35.66%
Trend Following	100	250	\$1,582,875	19	63.16%	19.14	33.20%

The moving average pair that stands out is the 50/200 day combination. This is a well-documented moving average pair and the basis to the *Golden Cross / Death Cross* concept. Historically using this moving average pair would have yielded not only the highest net profit, but also the lowest maximum drawdown. Below is the equity curve of the trend-following system using the 50/200 settings.

Equity Curve: Trend-Following (50/200)



The equity curve above is considerably smoother than the one generated by the buy & hold system, and is characterized by the occasional flat periods corresponding to the times the system was out of the market (low-expectancy periods). The largest drawdown of 28% occurred on *Black Monday* in 1987, and the highest recent



drawdown of 18% occurred in 2011. The strategy would have done a good job at avoiding long multi-year market declines, such as those experienced in 2000-2003 and 2008-2009. Moreover, since the system was in the market only 68% of the time, funds could have been invested in low/no-risk investments for approximately 1/3 of the time, further improving average annual returns.

"Sell in May and Go Away" Seasonal System

This investment strategy is based on the theory that the six-month period of November to April tends to exhibit stronger stock-market performance than the rest of the year. To test this concept we will run the following simulation:

System data:

- Same as Buy & Hold

System rules:

- "Best 6 mths of the year": Enter long on the 1st trading day of Nov; exit on the last trading day of Apr;
- "Worst 6 mths of the year": Enter long on the 1st trading day of May; exit on the last trading day of Oct;

As shown in the table below, the results of the "best 6 months of the year" system were dramatically better than those of the "worst 6 months of the year". In fact the net profit ratio between the two was an astounding 94:1. Maximum drawdown numbers were also lower during the November to April period. So while the seasonal strategy of staying in the market only during the "best 6 months of the year" might well be dismissed by many as too simplistic and the product of stock-market folklore, it has nevertheless proved very effective over the past 50 years.

Strategy	Net Profit	Total Trades	Win Rate	Profit Factor	Max Drawdown
Best 6 mths of the year (Nov-Apr)	\$1,548,413	50	76.00%	4.32	37.40%
Worst 6 mths of the year (May-Oct)	\$16,480	50	64.00%	1.10	43.65%

The equity curves for both the "best" and the "worst" 6 months of the year are shown below. The "best 6 months" curve is fairly linear - barring the volatility experienced in 2008 and 2009 - and is now close to all time highs. By contrast, the "worst 6 months" curve is extremely choppy, barely managing to scrape a profit at the end of the 50 year period.

Equity Curve: Best 6-months of the year





Equity Curve: Worst 6-months of the year



Summary

The table below shows the results of the three long-term investment strategies (1966-2015) analyzed in this study.

Strategy	Net Profit	Win Rate	Profit Factor	Annual Rate of Return	Time in the Market	Max Drawdown	Date of Max Drawdown
Buy & Hold	\$ 2,117,660	100%	NA	6.30%	100%	57.69%	6 march 2009
Trend Following (50/200 days)	\$ 2,580,403	81.48%	44.80	6.72% (1)	68%	27.76%	20 october 1987
Best 6 mths of year (Nov-Apr)	\$ 1,548,413	76.00%	4.32	5.63% (1)	50%	37.40%	6 march 2009

1 - exclusive of returns from alternate investments during "flat" periods.

The key findings are:

- The stock market has become increasingly volatile, particularly over the past 15-20 years. This makes buy & hold a poor strategy for those wanting the flexibility of redeeming their investment *at any time* at or near equity highs. A method for sidestepping the market during potentially bearish times (low expectancy periods) is therefore desirable.
- Trend-following systems, and in particular those using the 50/200 day MA combination, have historically done a good job at avoiding long multi-year market declines, such as those witnessed during 2000-2003 and 2008-2009. Net profit results over the 50 year period of 1966-2015 were better than those of buy & hold, and the maximum drawdown was less than half.
- Results for the "best 6 months of the year" seasonal system tend to confirm the theory that November to April is a period that offers both higher profit expectancy and lower volatility than May to October. And while net profit figures for the "best 6 months of the year" system would have been lower than those for buy & hold, maximum drawdown figures would have been considerably lower too.
- Both the trend-following and the seasonal investment strategies examined in this paper were in the market for no more than 50-70% of the time. During "off" periods, funds could have been invested in low/no-risk financial instruments, further increasing annual returns.