

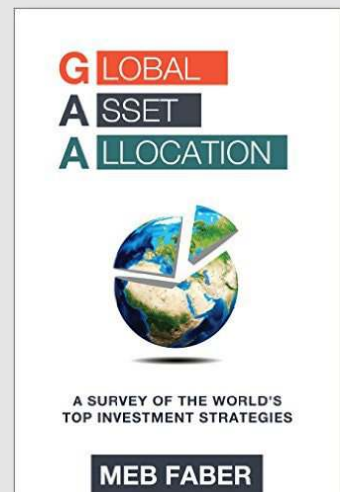
Learning to Play Offense and Defense: Combining Value and Momentum from the Bottom up, and the Top Down

SUMMARY

Sorting stocks based on value and momentum factors historically has led to outperformance over the broad US stock market. However, any long-only strategy is subject to similar volatility and drawdowns as the S&P 500. Drawdowns of 50%, or even 60-90% make implementation of a stock strategy very challenging. Is there a way to add value on stock selection, but also reduce volatility and drawdowns of a long only strategy with hedging techniques? In this paper we examine the possibility of following a strategy that combines aggressive offense and smart defense to target outsized returns with manageable risk and drawdowns.



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I had an old football coach that used to say, “Nobody ever lost a game 0-0.” He was giving a motivational speech to the defensive squad, trying to hammer home the idea that defense was just as important to winning as the offense (although offense was much more “fun” since that was where all the points were scored). This saying had its own complement of course, and when the offense was doing poorly he would proclaim, “Nobody ever lost a game 0-0. But nobody ever won one either!”

Many investors struggle with the concepts of offense and defense as applied to investing. Often our emotions work against us here, and we often want to “play offense” when times are good (borrow to buy more stocks, chase hot tech names, chat about how much money we’re making to friends). On the flip side, we often want to play defense when we start losing money (selling stocks after a big decline and feeling lots of anxiety and fear.) Thinking about the concepts of playing strong offense and smart defense together may help investors to find a coherent investment strategy that they can implement and more importantly, stick with during good times and bad.

OFFENSE

Let’s say you set out to design a stock investing strategy. Furthermore, let’s create one that is rules based so that anyone can follow it. Likely, the strategy would contain two classic elements that help determine future stock performance – value and momentum. At its core, the model should reflect the following basic generalizations:

1. **Invest in cheap stocks.**
2. **Invest in stocks that are going up.**

There are piles of academic papers, stacks of books, and real-time fund performance that demonstrate the success of these two factors. They don’t work all the time, and even better, they often don’t work at the same time - but historically value and momentum have been great ways to select stocks. The exact specifics of which value factor (price-to-earnings or price-to-sales?) or momentum factor (12-month total returns or relative returns?) to use probably don’t matter a great deal, rather, what does matter is choosing to use them in the first place.

Now, there are many, many ways to construct such a portfolio, and countless others have built simulations before – Joel Greenblatt’s [The Little Book that Beats the Market](#) is a famous example of a basic multifactor stock screen, as is [Quantitative Value](#) by Wes Gray. If you really want to examine various stock factors, the Bible of stock screens is the classic [What Works on Wall Street](#). We will lay out an incredibly basic screen below with the help of our good friends at [Alpha Architect](#).

THE OFFENSIVE PLAYBOOK

We include all historical stocks trading on the NYSE back to 1964, and only include the large and liquid stocks above the 40th percentile market cap (around \$2 billion today). The portfolios are formed monthly with a three-month holding period similar to the methods in [Jegadeesh and Titman](#) (1993). The two value and momentum variables are below:

Invest in cheap stocks (value) – Rank stocks on P/E (price to earnings ratio), P/B (price to book ratio), and EBIT/TEV (earnings before interest and taxes / total enterprise value) . The average of the three is the value rank.

Invest in what is going up (momentum) – Rank stocks on 3-month, 6-month, and 12-month momentum. The average of the three is the momentum rank.

Could we use other variables? Sure – but we’re trying to keep this simple.

Each month the top 100 value and top 100 momentum stocks are bought and held for three months (equal-weighted). We will call this combination portfolio value and momentum (VAMO). All returns are total returns and include the reinvestment of distributions (e.g., dividends). No trading or management fees are included. (You can find more information in the [Alpha Architect post here.](#)) Below are the results going back to 1964.

Results (1/1/1964 - 12/31/2014)

	VAMO	S&P 500
Returns	16.68%	9.98%
Volatility	18.70%	14.90%
Sharpe	0.62	0.33
Max Drawdown	-56.05%	-50.95%

The results are hypothetical results and are not an indicator of future results and do not represent returns that any investor actually attained. The simulation does not reflect management or trading fees. Volatility is calculated as annualized standard deviation of monthly returns. Maximum Drawdown is calculated at the monthly timeframe, and daily drawdowns would be higher. The risk-free rate for the Sharpe calculation was 5.11% over the period

The portfolio would have outperformed the S&P 500 massively over the historical time period with over six percentage points over the broad market! Of course, we are benefitting from hindsight, as we know now that value and momentum worked historically. Every quant around the globe has the same datasets and the historical spread, or alpha, of value and momentum strategies will likely be lower going forward than it has been in the past since more people have implemented such strategies. We also don’t include transaction costs that would eat into returns, which would have been substantial in the 1960s and 1970s.

However, we still believe in the benefit of using value and momentum, and we lump the two concepts in a grouping of strategies that we consider timeless, meaning human nature and the emotional involvement of investors will continue to create stock mispricings in the future.

Having an investment approach that focuses on “cheap stocks that are going up” seems fairly reasonable, and we believe is better than market capitalization weighting and certainly better than buying expensive stocks going down.

However, the biggest problem is the volatility of the strategy, and more specifically, the drawdowns. The buy and hold portfolio would have lost approximately half of its assets at one point, and the VAMO portfolio (being equal-weighted) would have lost slightly more. A 50% drawdown is a very difficult experience for an investor to live through, and most investors simply cannot handle the losses and throw in the towel at the point of maximum pain, often not reinvesting until many gains have been missed.

As evidence of this, we need look no further than data published from the research group, Dalbar. Each year, Dalbar reports its findings on investor performance and behavior. In 2014, the average 20-year return of the S&P was 9.85%. And how did the average mutual fund investor’s return compare over the same time period? Just 5.19%.

Dalbar goes on to attribute a solid 50% of this underperformance to “psychological factors,” reporting “Behavioral biases that lead to poor investment decision-making is the single largest contributor to underperformance over time.” Top amongst these poor investment decisions is loss aversion, manifested by “panic selling.” Quoting Dalbar: “The fear of loss leads to a withdrawal of capital at the worst possible time.” While some have questioned the Dalbar methodology, Morningstar’s Russ Kinnel examines the impact of poor timing in his “Mind the Gap” piece, and finds 1-3 percentage points of underperformance by investors over the past 10 years versus buy and hold benchmarks.

Now, though the statistics are not in our favor, is there really nothing we can do besides sitting on our hands while the portfolio declines 50% (or even greater than 80% - which has occurred in the past in the US stock market)? Indeed, it is nearly impossible to find an equity market around the globe that has not declined by at least 66% at some point. While most commentators proclaim that it is impossible to time the markets, are there any common sense rules we can apply that may help to reduce the drawdowns of a buy and hold strategy?

DEFENSE

Since we applied both value and momentum rules to the stock screening process, what if we applied the same theory to the entire stock market as a whole to determine if we should be in stocks at all, and if so, how much?

Again, let’s apply similar broad generalizations to the overall stock market that we did to individual stock screening:

- 1. Don’t invest in stocks when the broad market is expensive.**
- 2. Don’t invest in stocks when the broad market is going down.**

There are many ways of examining, or quantifying the two criteria above, and again it doesn’t matter much which specific approach you choose as long as it follows these broad themes. In general, when a market is very expensive, or very cheap, almost all of the valuation indicators should say the same thing. Likewise, when a market is in an uptrend, or downtrend, most trend signals should be in agreement. We have published many thousands of words on our hedging strategies, and you can find more on the momentum and trend component in our paper [“A Quantitative Approach to Tactical Asset Allocation \(2007, 2013\)”](#) and more on the value component from our 2014 book [Global Value](#).

Below we will look at two basic methods of value and momentum hedging, again with help from our friends at Alpha Architect to see if there is anything we can possibly do to improve our risk-adjusted returns.

THE DEFENSIVE PLAYBOOK

When stocks are expensive, we will hedge half of the portfolio by shorting the S&P 500. Likewise, when stocks are going down, we will hedge half of the portfolio by shorting the S&P 500. This means the portfolio can be anywhere from 100% long stocks, to 50% hedged, to completely market neutral (long the stocks in the portfolio, but short the S&P 500).

Note: Another way to utilize the timing signals would be to sell the stocks and move to cash and/or the safety of bonds. Both the hedging and the cash choice have very similar results. Investors could also use inverse

funds, options, or many other hedging vehicles that may suit their individual situation for transaction costs, taxes, etc.

Below we distill the value and momentum theory into the simple rules below:

Don't invest in stocks when they are expensive – Exit or hedge stocks when they are in the top 20% overvalued territory.

Don't invest in stocks when they are going down – Exit or hedge stocks when they are downtrending, as defined by being below the long-term moving average on the S&P 500.

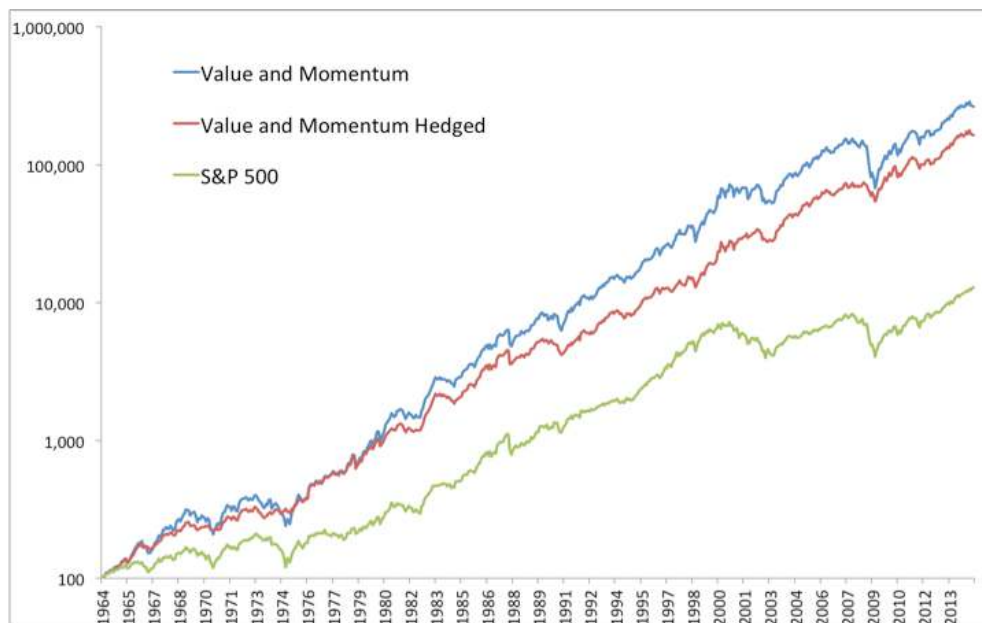
(We expand more on the specifics of the value and momentum signals at the end of the paper.)

Does the hedging help? If you have read our prior research, you can probably guess the answer. The below table shows the VAMO portfolio long only, the VAMO portfolio with value and momentum hedges, and the S&P 500.

Results (1/1/1964 - 12/31/2014)

	VAMO	VAMO HEDGE	S&P 500
Returns	16.68%	15.59%	9.98%
Volatility	18.70%	14.19%	14.90%
Sharpe	0.62	0.74	0.33
Max Drawdown	-56.05%	-27.12%	-50.95%

The results are hypothetical results and are not an indicator of future results and do not represent returns that any investor actually attained. The simulation does not reflect management or trading fees. Volatility is calculated as annualized standard deviation of monthly returns. Maximum Drawdown is calculated at the monthly timeframe, and daily drawdowns would be higher. The risk-free rate for the Sharpe calculation was 5.11% over the period



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The portfolio maintains most of the outperformance of the original stock screen strategy, but with more reasonable volatility and drawdown numbers. The hedging cut the maximum drawdown roughly in half. The average returns for the S&P 500 during the worst five years since 1964 was -22.46%. The returns to the long-only VAMO portfolio were similar at -19.45%, but the hedged portfolio had much more tolerable returns of -2.24%.

For those looking for the market timing Holy Grail, we are sad to disappoint but this article isn't it. Many market-timing approaches work not by massively increasing returns, but rather by reducing volatility and drawdowns. This is one reason many think that market timing isn't possible – all they do is focus on returns when basic market timing works potentially by not doing really dumb things, such as buying into bubbles and holding during long bear markets. But remember, playing defense is just as important to long term investment survival as offense!

Now some will say that the reduction in drawdown from roughly 50% or 56% to 27% isn't that big of a deal. If you can rationally sit through such drawdowns then you may not need a hedging strategy at all. There are some buy and hold investors that realize drawdowns are inevitable, even opportunistic, and have the fortitude to sit through the drawdowns.

One of the richest investors in the world, Warren Buffett, proclaims, "Unless you can watch your stock holding decline by 50% without becoming panic-stricken, you should not be in the stock market." His partner Charlie Munger chimes in, "This is the third time Warren and I have seen our holdings in Berkshire Hathaway go down, top tick to bottom tick, by 50%. I think it's in the nature of long term shareholding of the normal vicissitudes, of worldly outcomes, of markets that the long-term holder has his quoted value of his stocks go down by say 50%. In fact you can argue that if you're not willing to react with equanimity to a market price decline of 50% two or three times a century you're not fit to be a common shareholder and you deserve the mediocre result you're going to get compared to the people who do have the temperament, who can be more philosophical about these market fluctuations."

We largely agree. However, most individual investors don't universally share the investing mental-toughness of Buffett and Munger. And the comfort of long-term average returns mean little to the investor who's going through the pain of a 50% drawdown. But 50% isn't the worst-case scenario. The worst-case scenario is far worse.

While the dates of this simulation only go back to the 1960s, market historians will note one very major omission here. The biggest bear market in the US stock market would have seen losses over 80% - could you live through that? Often the massive bear markets occur simultaneous to significant upsets in the regular economy, so many people are unemployed and investment returns are far from their priority list – rather, survival is.

Nearly every global stock market around the globe has declined by 66% or more in history. Some, like Russia and China, closed altogether. We may think the United States is a special case, but it has happened here, and is currently happening (and usually is), in various markets around the world. Residents of Russia, Greece, Cyprus, and Brazil currently would probably wish they had a hedging insurance policy in place.

STRONG OFFENSE, SMART DEFENSE

Enough doom and gloom for now – talking about insurance is never fun when markets are performing well. This has been the case largely in the US since the bottom in 2009.

What would the system be calling for now?

As of the date of this publication (September 2015), the outlook for buy and hold are currently very poor with the US stock market being both expensive and in a downtrend – a six-year bull market will often do that to equity valuations. Stocks were cheap by the CAPE ratio in 2009, but how many investors were buying rather than selling?

If buy and hold is your system, then by all means, stick to your system! But for many investors concerned with big drawdowns—or more specifically, for investors concerned with their ability to hold on to their positions during painful, big drawdowns it may make sense to consider hedging their long US stock holdings. (For comparison, foreign developed and emerging indexes such as the MSCI EAFE and EEM are in slightly more favorable territory, being cheap but likewise in a downtrend.)

As you think about your investment strategy, are you comfortable with only playing one side of the ball? Are your emotions suited to your system and all of the possible outcomes, or would it make more sense to play both offense and defense with your equity strategy?

There are many ways to improve or alter these ideas so test your own variants and find a system that works for your own personal situation.

SUMMARY

- **Offense** - Value and momentum factors historically have improved the returns of a buy and hold portfolio.
- **Defense** - Value and trend hedging systems historically have improved the risk-adjusted returns of a buy and hold portfolio, mainly by reducing volatility and drawdowns. Buy and hold investors may want to consider simple hedging rules to potentially protect them from long bear markets and large drawdowns.
- **Offense and Defense** – Combining stock screening and tactical hedging has the potential benefit of outperformance as well as improved risk and drawdown parameters.

Valuation-Based Signal:

Almost any valuation indicator should often be in agreement. While Alpha Architect uses a more involved indicator below, using something as simple as the CAPE ratio being above, or below, the rolling historical average would work just fine too.

We will use the Alpha Architect indicator, which is $1/\text{CAPE}$ as the valuation metric, or the “earnings yield,” as a baseline indicator; however, we adjust the yield value for the realized year-over-year (yoy) inflation rate, by subtracting the year-over-year inflation rate from the rate of $1/\text{CAPE}$. h.t., Gestaltu. A higher real yield spread is better than a low real yield spread.

To summarize, the metric looks as follows if the CAPE ratio is 20 and realized inflation (Inf) is 3%:

$$\text{Real Yield Spread Metric} = (1/20) - 3\% = 2\%$$

Some details:

- Bureau of Labor Statistics (BLS) publishes the CPI on a monthly basis since 1913; however, the data is one-month lagged (possibly longer). For example, the CPI for January won't be released until February. So when we subtract the year-over-year inflation rate from the rate of $1/\text{CAPE}$, we do 1-month lag to avoid look-ahead bias.
- We use the S&P 500 Total Return index as a buy-and-hold benchmark.
- **80th Percentile Valuation based asset allocation:** own stocks when valuation < 80th percentile, otherwise short the S&P 500 (or hold risk-free).
 - In other word, get out of the market if the real yield spread metric is extreme.

Momentum-based signal:

- Long-term moving average rule on the S&P 500 (own stocks if above 12-month MA, otherwise short the S&P 500 (or move to risk-free bonds) if below the 12-month MA).

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