



Volatility Investing in a Strategic Portfolio Allocation

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Abstract

We have incorporated the Eureka hedge CBOE Long Volatility and Relative Value Volatility Indices into two traditional baseline portfolios (60-40 and simplified volatility-parity). The enhanced portfolios have less equity and interest rate exposure, which addresses the concerns, currently being raised by market participants, with respect to future returns from government bonds and equities. At the same time, these portfolios show a convincing historical performance.

Martin Dudler
Fund Manager

Foreword

In his previous article, my colleague Martin Dudler investigated the differences between long and relative value volatility strategies. He found that volatility strategies can significantly improve the risk-return characteristics of an equities portfolio, more than doubling the Sharpe ratio.

In this piece, he further analyzes how and why these strategies can enhance the risk return characteristics of a balanced portfolio. He demonstrates once again that diversification is the last “free meal” in investing. There is a diversification within the benchmarks, as each volatility manager has its own investing style. And there is diversification at portfolio level, where each “brick” (bond, long volatility, RV volatility) brings different characteristics to the “protection wall” that investors can build around equities and other risk assets.

When I make the argument about the diversification benefits of volatility strategies with investors, I usually joke there is a good bottle of Bordeaux waiting for anyone who will not see an improvement in their portfolio after running the numbers. So far, nobody has claimed it.

Pierre de Saab, *Partner*

Introduction

Several recent publications have indicated dampened expectations for equity and government bond returns (see for example *AQR - Portfolio Solutions Group 2021* and *TWO SIGMA - Client Solutions Team 2020*). As a potential solution, we are proposing the enhancement of traditional portfolios with volatility strategies. As a standard proxy for these strategies, we are utilizing the quasi-investable Eureka hedge CBOE Long Volatility and Relative Value Volatility Indices that we presented in a previous article, see (Dudler 2020). We have included these two Volatility Indices in two potential portfolio allocations. The first one is an extension of the traditional 60-40 balanced portfolio, the second one represents an adjustment to a simplified volatility-parity type of portfolio. Both proposals are non-radical tilts to the baseline portfolio.

First of all we discuss the data we are using in the analysis. Thereafter, we compare the various defensive characteristics of Volatility Indices with US Treasuries by means of the *Goldman Sachs Systematic Trading Strategies Defensive Framework* (Baltas, Slokoski and Benkirane 2020). We provide a simple, concrete and practical execution of their ideas and guiding principles, with the emphasis on investable volatility strategies. Based upon core elements within the framework we are able to highlight the relatively contractual protection of Volatility Indices versus the economical statistical hedging characteristics of US Treasuries.

The defensiveness analysis is crucial in showing why the presented volatility benchmarks, together with US Treasuries, are a powerful addition to a portfolio, which primarily requires its equity risk to be hedged. The portfolio view can be seen in the final section of this paper.

Data

Figure 1 shows the instruments used in our analysis. We looked at the monthly data from September 30 2005 to the end of 2020. The data source is Bloomberg. All tickers are total return indices, meaning that only minor implementation fees are not taken into account. Both the combination of Long & Relative Value Volatility¹ and the US Treasury Index² show a positive long-term performance, in addition to their valuable hedging characteristics, during equity market turmoil. The Relative Value Volatility Index has recently shown an upward trend again, after having slowed down between 2017 and 2019. The Long Volatility Index shows explosive bursts, but is subject to high insurance costs. US Treasuries show a steady upward trend, which has even accelerated in recent years.

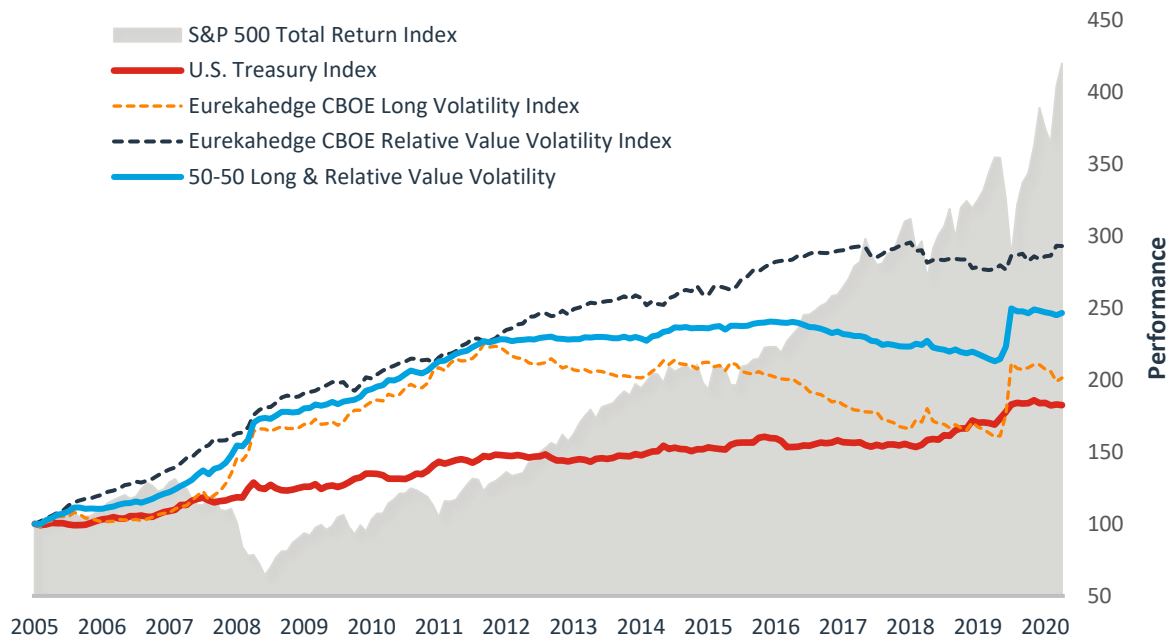
It appears that Long & Relative Value Volatility played a similar role to US Treasuries in a portfolio with substantial equity risk³. Noteworthy, however, are the rapid gains of the volatility portfolio during severe equity market downturns and the rather gradual but prolonged positive performance of US Treasuries during such periods.

¹ 50-50 Long & Relative Value Volatility stands for 50% Long Volatility Index + 50% Relative Value Volatility Index with monthly rebalancing

² We used the Bloomberg Barclays US Treasury Total Return Unhedged USD Index, which excludes T-Bills.

³ Clearly, the capacity of volatility strategies is a fraction of the US Treasuries market.

Figure 1: Performance of S&P 500, US Treasuries and Volatility Indices



Source: Dominicé, Bloomberg (Bloomberg tickers are SPXT Index, LUATTRUU Index, EHFI451 Index, EHFI452 Index)

Defensiveness: US Treasuries vs. Long & Relative Value Volatility

Reliability, reactivity, convexity and carry are important characteristics in the *GS STS Defensive Framework*. The first three quantifiers are related defensiveness metrics. They jointly assess the likelihood of a compensation for a loss in the benchmark⁴. Carry, on the other hand, is about potential long-term cost that comes with the desired hedging qualities. For the formal definitions, please see (Baltas, Slokoski and Benkirane 2020).

- **Reliability** refers to the probability of yielding a positive performance when the benchmark underperforms⁵ (conditional hit ratio).
- **Reactivity** stands for the expected return normalized by the unconditional standard deviation when the benchmark underperforms.
- **Convexity** is seen as the conditional Beta when the benchmark underperforms.
- **Carry**⁶ stands for the expected return normalized by the unconditional standard deviation when the benchmark performs.

⁴ Here, the benchmark is the S&P500 Total Return Index.

⁵ By underperformance, we refer to monthly returns below a threshold.

⁶ This metric deviates from the standard carry definition.

In simple terms, given a bad outcome in the benchmark, reliability is about the chance of a gain, whereas reactivity gives an idea of the potential magnitude of such a gain. Convexity refers to the co-movement with the benchmark.

In what follows, we empirically apply these metrics to our data. The benchmark portfolio is considered to be the S&P500 Total Return Index. Figure 2 summarizes the empirical results. Note the unusual X-axis of the first three diagrams. Obviously, some prudence is required when interpreting the results, especially in the extreme left or right tail of the S&P500 monthly returns⁷. The top 2 diagrams allow for a favorable initial observation that holds for both US Treasuries and the volatility combination. The larger the loss in the benchmark, the higher the probability and expected magnitude (measured in multiples of standard deviation) of a gain. We will now take a closer look at the individual metrics of all 4 diagrams.

Starting with reliability (top left), both, Long & Relative Value Volatility and US Treasuries show a convincing hit ratio. US Treasuries show a positive return in roughly 80% of all months with the S&P500 down more than 3%. The percentage is even slightly higher for the combination of the Volatility Indices. The Relative Value Volatility Index appears to be less reliable.

When it comes to reactivity (top right), the Long Volatility Index excels. If we look at a substantial negative return in the equity market, the Long Volatility Index is expected to yield a positive monthly return roughly 1.5 times its unconditional empirical monthly standard deviation. The presence of some contractual protection, through put options for example, is certainly an important driver of this strong reactivity⁸. The mixed reliability of the Relative Value Volatility Index translates to a modest reactivity characteristic.

Continuing with convexity (bottom left), the positive Beta of US government bonds stands out; a peculiar observation at first glance. This does not mean, that these bonds perform negatively when the S&P500 is extremely down, as is confirmed by the reactivity measure. It simply means that the bond returns tend to become less positive with extremely negative equity returns. Furthermore, given strong negative equity returns, we observe an interesting convergence between the Beta of the Long Volatility and the Relative Value Volatility Indices. This is very likely due to long volatility funds already starting to realize a portion of their gains, while relative value volatility investors sense an opportunity by increasing their long Vega and/or Gamma position, for example.

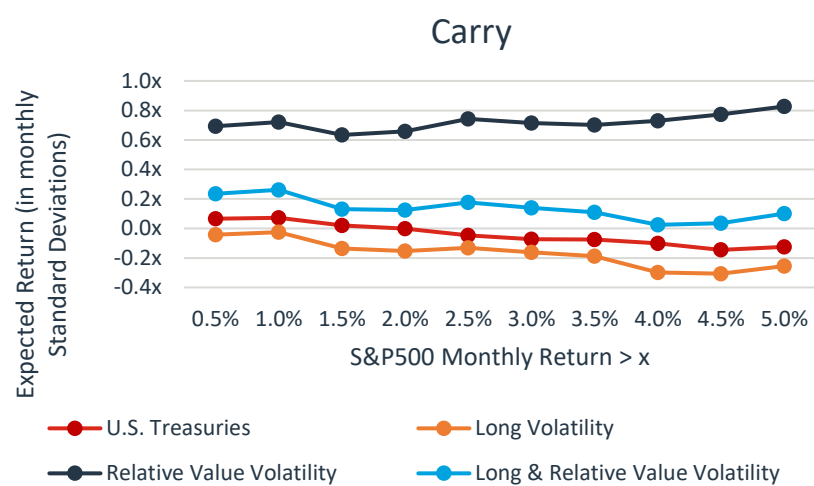
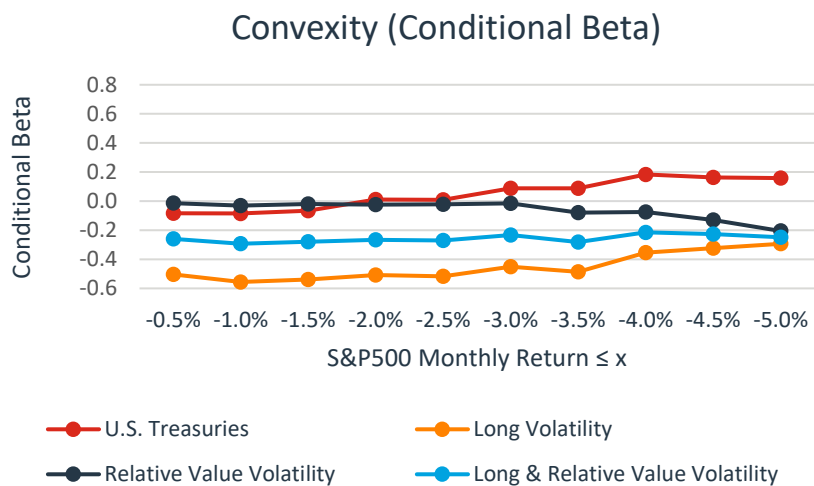
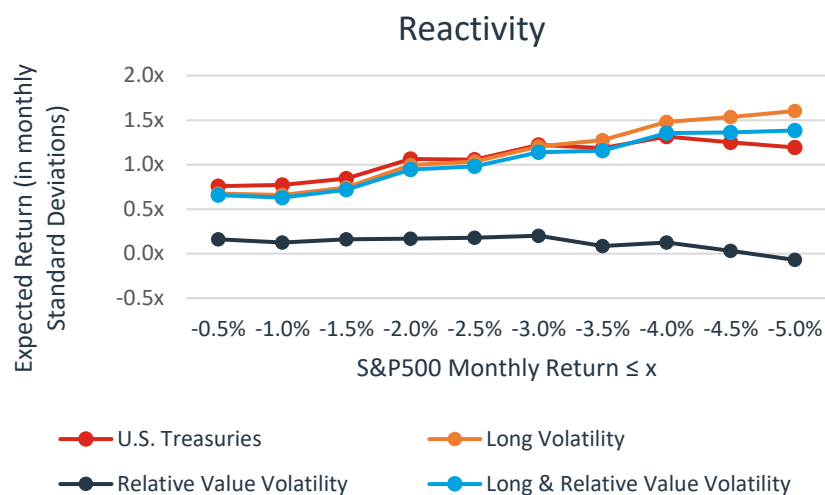
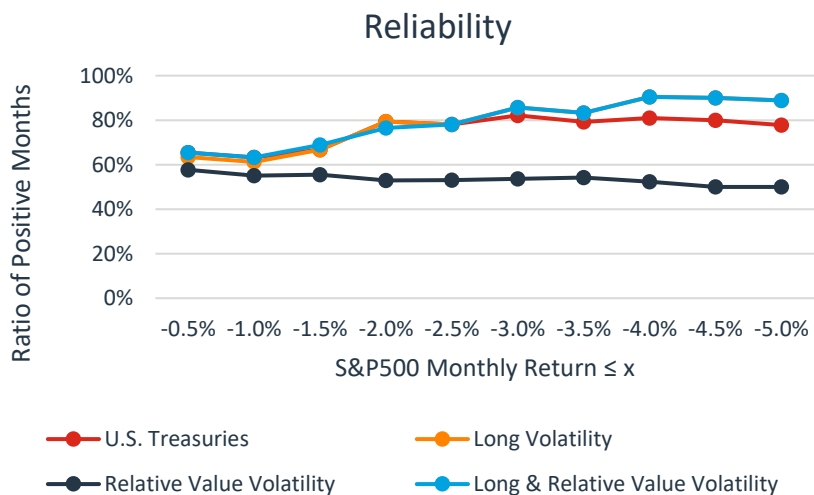
The last diagram (bottom right) looks at a favorable equity market environment. This gives us an indication on potential long-term hedging costs. In this scenario, the Relative Value Volatility Index is convincing. Its carry profile lifts the volatility portfolio above the Treasury Index. Furthermore, the costs for the outstanding reactivity become visible for the Long Volatility index.

To summarize, Long & Relative Value Volatility and U.S Treasuries show a similar reliability and reactivity behavior. The long-term empirical analysis highlights slightly preferable convexity and carry metrics for the volatility combination. Clearly, an isolated view of the last couple of years reveals stronger carry for US government bonds as seen in Figure 1. However, it is exactly the continuation of this trend, which is called into question.

⁷ We still have 19 observations given the S&P500 monthly return $\leq 5\%$ which closely matches the 10%-quantile in our dataset.

⁸ Note that a pure long position in implied volatility is strictly speaking not a contractual protection as explained in (Baltas, Slokoski and Benkirane 2020)

Figure 2: Defensiveness Metrics



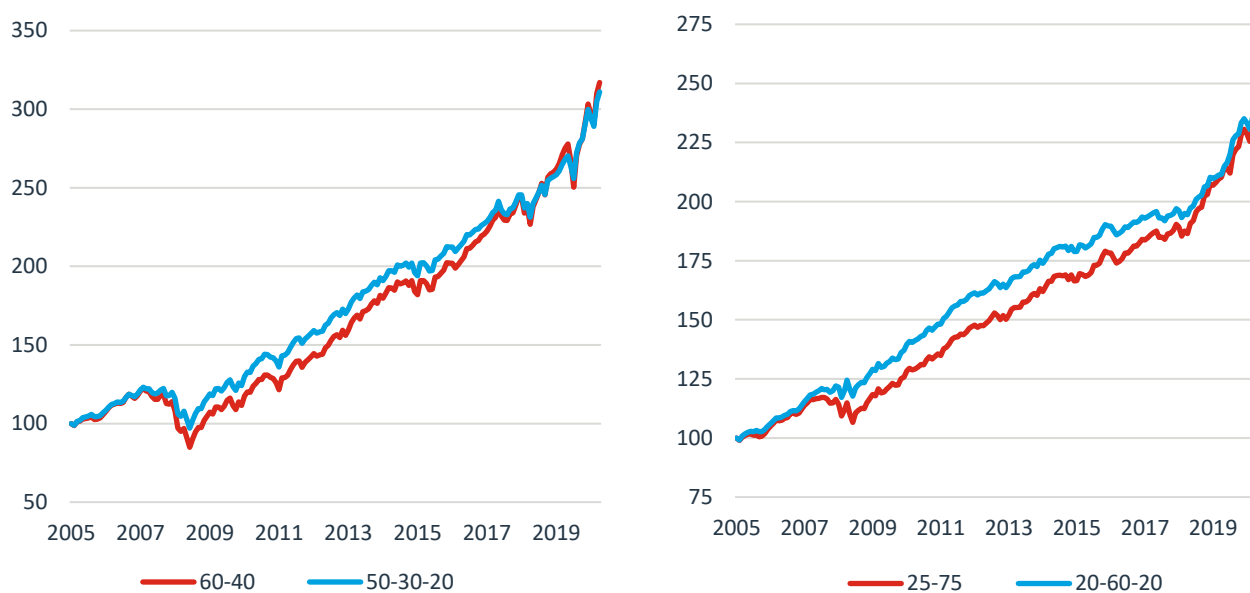
Source: Dominicé

Long Volatility & Relative Value Volatility in a Portfolio Allocation

We now constructed the following monthly rebalanced pro-forma portfolios⁹ as shown in Figure 3.

- a) 60% S&P 500, 40% US Treasury
- b) 50% S&P 500, 30% US Treasury, 20% Volatility¹⁰**
- c) 25% S&P 500, 75% US Treasury
- d) 20% S&P 500, 60% US Treasury, 20% Volatility**

Figure 3: Performance of the 4 pro-forma portfolios



Source: Dominicé

Table 1. Performance statistics of the 4 pro-forma portfolios.

	60-40	50-30-20	25-75	20-60-20
Annualized Return	7.9%	7.7%	5.7%	5.8%
Volatility	8.6%	7.0%	4.0%	3.3%
Sharpe Ratio ¹¹	0.91	1.10	1.44	1.76
Max. Drawdown	30.6%	21.1%	9.0%	5.4%

⁹ We used USD as the portfolio currency and assume the performance of the Volatility Indices to be in USD. See (Dudler 2020) for more details regarding the Volatility Indices.

¹⁰ 20% Volatility = 10% Long Volatility Index + 10% Relative Value Volatility Index

¹¹ For simplicity, we set the risk free rate to 0.

With hindsight it is obviously straightforward to set model-free and static weights that show a remarkable historical performance. One must therefore be cautious when interpreting the overall good historical results of the shown portfolios. It is, however, important to realize the relative improvement in risk adjusted returns when incorporating the volatility strategies. Both adaptations show a 20% higher Sharpe ratio than their corresponding baselines, as the portfolio volatility is significantly reduced. This is a direct consequence of the empirical results shown further above, i.e. the combination of the volatility strategies seems to offer better defensiveness characteristics than the US Treasury Index. Moreover, the reason of the defensiveness is complementary to that of US government bonds. Finally, the enhanced portfolios exhibit a lower equity exposure and are less sensitive to the future trajectory of interest rates.

Please contact ir@dominice.dom for a further discussion on volatility investing.

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