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QIS - a Viable Alternative to Volatility Hedge Funds?

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Abstract

The wide range of quantitative investment strategies ("QIS") fosters competition within volatility investing. We look at the performance of these sell-side products. Not surprisingly, they show great similarity to the buy-side, as know-how travels through the industry. We argue in favor of the QIS suite when targeting a specific risk factor exposure, but favor established funds when it comes to a strategic volatility allocation.

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Foreword

In this document, our research team classifies quantitative investment strategies in the volatility space and compares them with established volatility funds. While the historical performance of both groups is similar, our study highlights the specific advantages of volatility funds. There is no doubt that QIS have improved substantially from the early days, as advances in knowledge and technology have led to more sensible implementation – goodbye, naked short variance! For volatility managers and their investors, it means their "raison d'être" is shifting from their technical expertise – building a specific derivatives portfolio with fixed risk characteristics – to their capacity to add value in actively managing derivatives exposures.

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Introduction

Quantitative Investment Strategies have won broad acceptance within the investing community over the past years. Offered by sell-side institutions, QIS are rule-based investment programs packaged into investable vehicles. Both, end-investors and hedge fund managers value their appealing characteristics. Hedge Funds may use them to temporarily tweak a portfolio's risk factor exposure. Whilst end-investors regard them as cash efficient, liquid and transparent investment vehicles.

In this paper, we examine exclusively QIS in the volatility space – one of the largest groups among the various QIS styles – and understand how they differ from actively managed volatility funds. Hence, we apply a clustering algorithm to a large selection of volatility QIS. As anticipated, we recover the well-known investment types – long volatility, short volatility & relative value volatility – and compare our clusters with volatility fund benchmarks. We also show why investing in established volatility funds still remains our preferred option for a strategic volatility allocation.

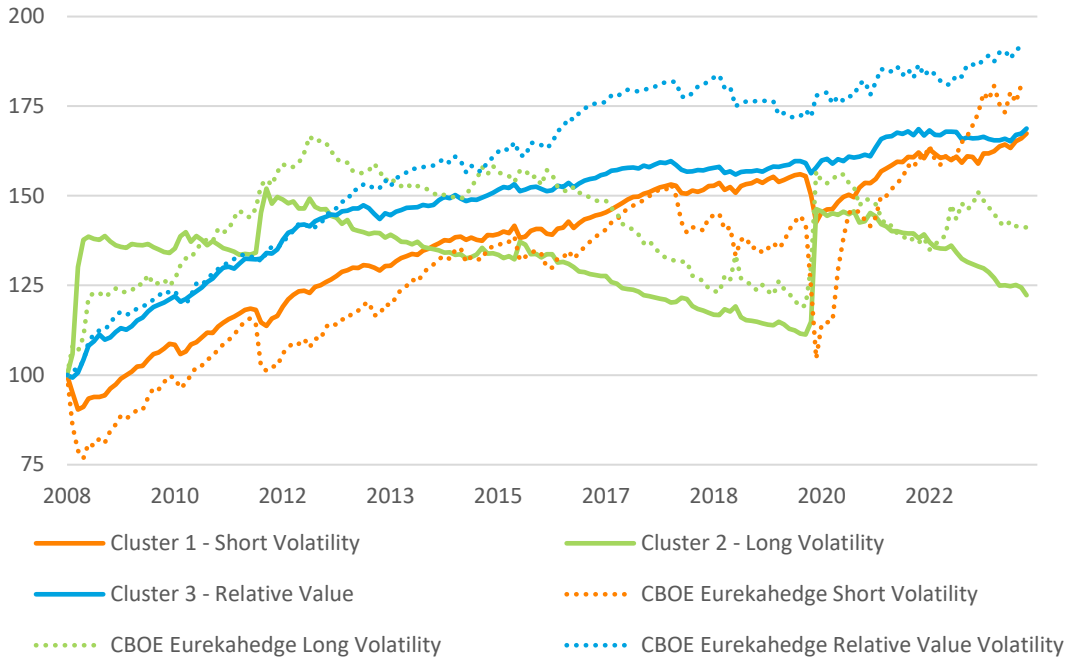
Data & Clustering

We analyzed the returns of 265 volatility QIS indices that have been gathered from various data providers. The data ranges from September 2008 to July 2023. It should be noted that many of the strategies are a concatenation of a simulated and live window. In our dataset, roughly 50% of the time series have a live period below 5 years.

Using hierarchical clustering, an unsupervised machine learning technique, we grouped the strategies into three clusters for in-depth analysis. Since returns of different strategies are not synced up (i.e. events may affect strategies with varying lags), we used Dynamic Time Warping to measure the similarity between time series. Unlike the Euclidean Distance metric, Dynamic Time Warping is robust against time shifts, which is a crucial consideration when dealing with financial time series where correlations might exist at various time lags. Dynamic Time Warping is capable of aligning time series of different lags. Thus, only the order of the values matters.

As a result, we obtained 3 main clusters with 122, 72 and 71 constituents. Figure 1 shows the performance of the equally weighted cluster portfolios.

Figure 1: Clusters vs. CBOE Eurekahedge Volatility Indices



Source: Dominicé, Bloomberg

It is immediately apparent that each cluster has a corresponding CBOE Eurekahedge Volatility index. To be precise, Cluster 1 can be interpreted as short volatility, Cluster 2 as long volatility and Cluster 3 as relative value volatility. For instance, the correlation between Cluster 3 and the Relative Value Volatility Index is close to 0.67 with a similar drift. Obviously, cluster constitutions and corresponding performances change when testing various clustering algorithms. However, the overall picture remains the same. Table 1 shows the most common performance metrics.

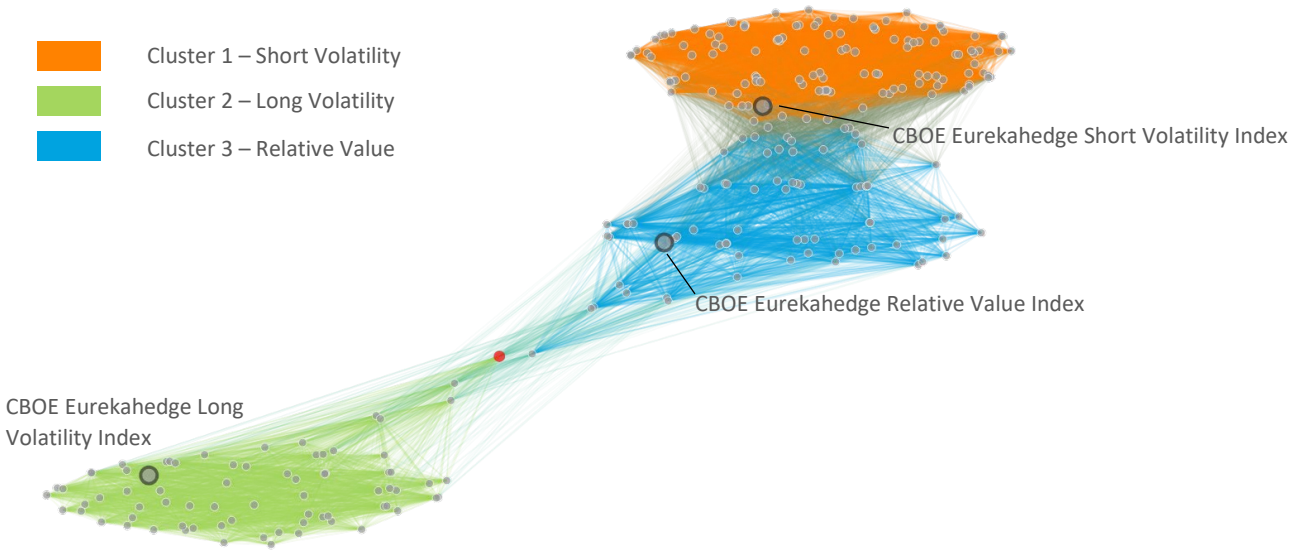
Table 1. Performance statistics of the 3 equally weighted clustered portfolios and CBOE Eurekahedge Indices.

	Cluster 1 - Short Volatility	Short Volatility Index	Cluster 2 - Long Volatility	Long Volatility Index	Cluster 3 - Relative Value	Relative Value Index
Annualized Return	3.5%	4.7%	1.4%	2.7%	3.6%	4.6%
Annualized Volatility	3.8%	10.4%	9.4%	8.5%	2.6%	3.8%
Sharpe Ratio	0.92	0.45	0.15	0.32	1.40	1.20
Max Drawdown	-8.8%	-31.7%	-27.0%	-28.6%	-2.7%	-6.5%

To give some additional insight into the data structure, the clusters are visualized in a graph representation. Broadly speaking, the graph confirms the observations from Figure 1. The volatility indices

are clearly attached to the corresponding clusters. Furthermore, the closer proximity between relative value and short volatility than between relative value and long volatility can be observed. This is to be expected as the aggregated short volatility and relative value volatility groups tend to have similar risk exposures (short gamma, short vega and sometimes even long delta) during calm periods which are the most frequent.

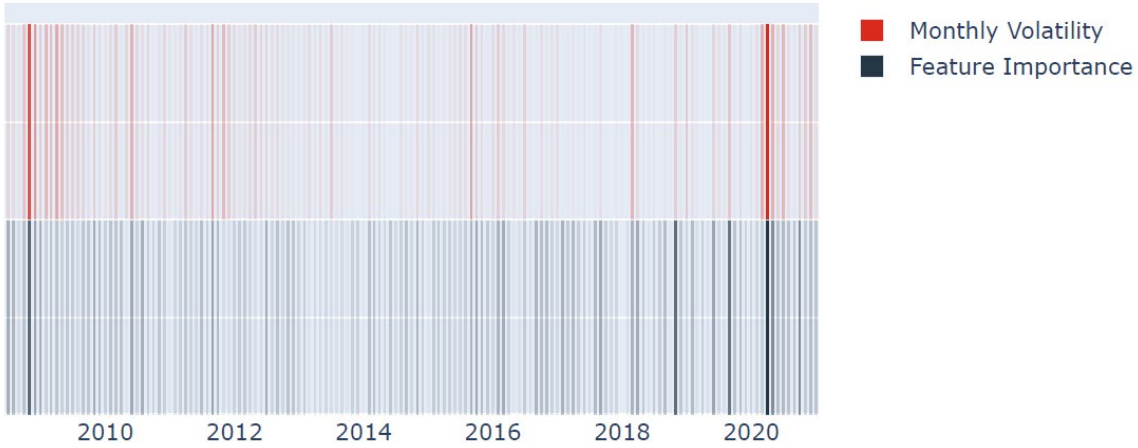
Figure 2: Graph View of Clusters and CBOE Eurekahedge Volatility Indices



Source: Dominicé, Bloomberg

Finally, we looked at the months that drive the cluster results. Through training a classification model on the log returns of the QIS indices, with the goal of predicting the cluster of each index, we were able to measure the importance of each date in determining the cluster. Figure 3 shows a comparison between the volatility of the indices per month and the importance of the dates in predicting the label, according to the model.

Figure 3: Months that Drive Clustering Results



Source: Dominicé

The classifier naturally focuses on months with a strong dispersion of returns in order to differentiate between strategies. These months are typically very volatile and can be linked to events that had a significant impact on the market, such as October 2008 (global financial crisis), August 2011 (European debt crisis), October 2018 (severe seasonal deleveraging) and March 2020 (Covid).

Combining QIS vs. Volatility Funds

The clusters reveal that a portfolio of QIS indices may achieve similar characteristics as a combination of volatility funds. This raises the question as to what speaks in favor of volatility funds? For illustration purposes, we examine the relative value volatility cluster, but our conclusions hold for other styles of volatility investing.

To do this we added to the previous statistics four specific metrics that are relevant for assessing volatility strategies:

- Convexity, calculated as a Sharpe ratio based on the strategy returns that occur when the benchmark (comprising 60% equity and 40% bonds) has returns lower than minus two standard deviations.
- Add-On, determined by computing the Sharpe ratio for strategy returns when the benchmark registers positive returns.
- Correlation with negative returns of the benchmark.
- Correlation with positive returns of the benchmark.

Table 2. Additional Performance metrics of the Relative Value equally weighted clustered portfolio and the CBOE Eurekahedge Relative Value Index.

	Equally weighted Cluster 3 - QIS Relative Value Strategies portfolio	CBOE Eurekahedge Relative Value Volatility Index
Convexity	2.01	2.41
Add-On	2.37	2.53
Correlation to negative benchmark returns	-10%	-16%
Correlation to positive benchmark returns	11%	19%

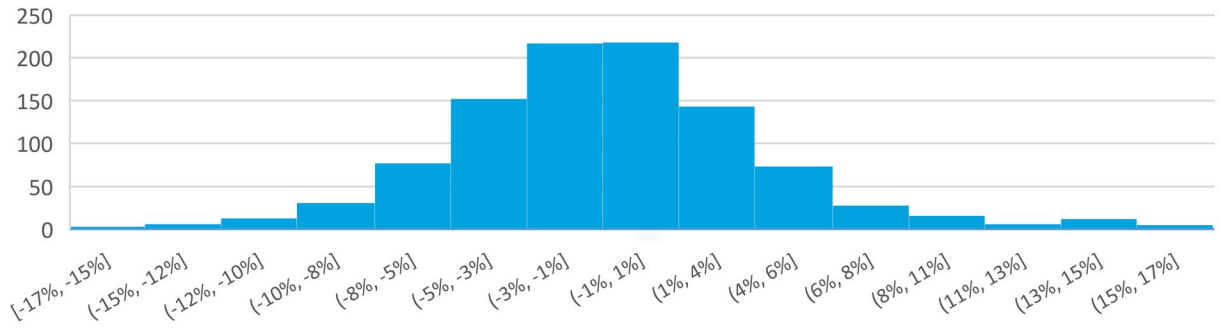
Compared to the cluster, the index brings more value when the benchmark portfolio is up (higher add-on) or suffers from a large correction (higher convexity). The change in the sign of the correlation to positive and negative returns of the benchmark indicates that both the cluster and the index can deliver positive returns in bull and bear markets, which is a typical feature of relative value strategies, but that effect is stronger for actively managed volatility funds.

In addition to active management, successful volatility investing requires a strong focus on risk management, particularly when constructing a portfolio of volatility trades. To emphasize this indispensable aspect, we look at a stress test example.

As mentioned earlier, the relative value cluster is made up of 71 constituents. Investors are unlikely to allocate capital to all volatility QIS. They rather tend to choose a handful of products. We were able to illustrate that such a decision can lead to an undesirable outcome by examining the COVID period (Feb-Mar 2020).

We assumed an investor is presented with the strategies of Cluster 3 before February 2020 and is asked to arbitrarily choose 3 strategies out of it. We repeat this choice 1000 times. The results of the simulation are presented in Figure 4.

*Figure 4: Simulated D*istribution of 2-months return.



Source: Dominicé

We observe that there is a real possibility of ending up with a bad outcome for the COVID scenario, as the probability for the 2-months return to be worse than -5% is close to 17%. This could be due to an unfortunate combination of negatively skewed strategies that are positively correlated, such as strategies that sell a volatility spread with signal-driven hedging or deleveraging mechanisms. The above scenario can quickly materialize if one is exposed to a basket of such products with the signals not working at the crucial moment.

Roncalli (Roncalli 2017) deals rigorously with the indicated thematic, which is not specific to volatility strategies. As he points out, combining "risk premia" strategies requires prudent portfolio construction techniques, e.g. drawdown control. This is simply not a given in an uninformed combination of several hard-wired investment strategies.

Additionally, many QIS indices have been live for a few years only, and the majority of the data is backtested. Even without studying further the performance deterioration between simulated and live windows, which is standalone topic, we must retain some skepticism about the previously shown statistics, as many of these strategies have not been truly challenged across various market regimes.

Finally, it is important to acknowledge that the parametrization of QIS indices is typically optimized and locked in upon commercial launch. We believe that an ongoing parameter reassessment and, more broadly, an innovation process – both of which are undoubtedly present in well-established volatility funds – are indispensable for long-term success.

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Conclusion

Active risk management at portfolio level is especially important when investing in volatility strategies with an absolute return target, because their daily returns often exhibit negative skewness. One key reason why many long-standing relative value volatility funds have outperformed their benchmarks over the last decade has more to do with their ability to successfully navigate market downturns than their capacity to deliver superior returns in quiet times.

Individual QIS are valuable building blocks that can be used tactically, but are not a buy-and-hold investment. Investors looking to establish a strategic allocation to volatility should consider established funds as a priority.

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

Bibliography

Roncalli, Thierry. 2017. *Alternative Risk Premia: What Do We Know?*

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