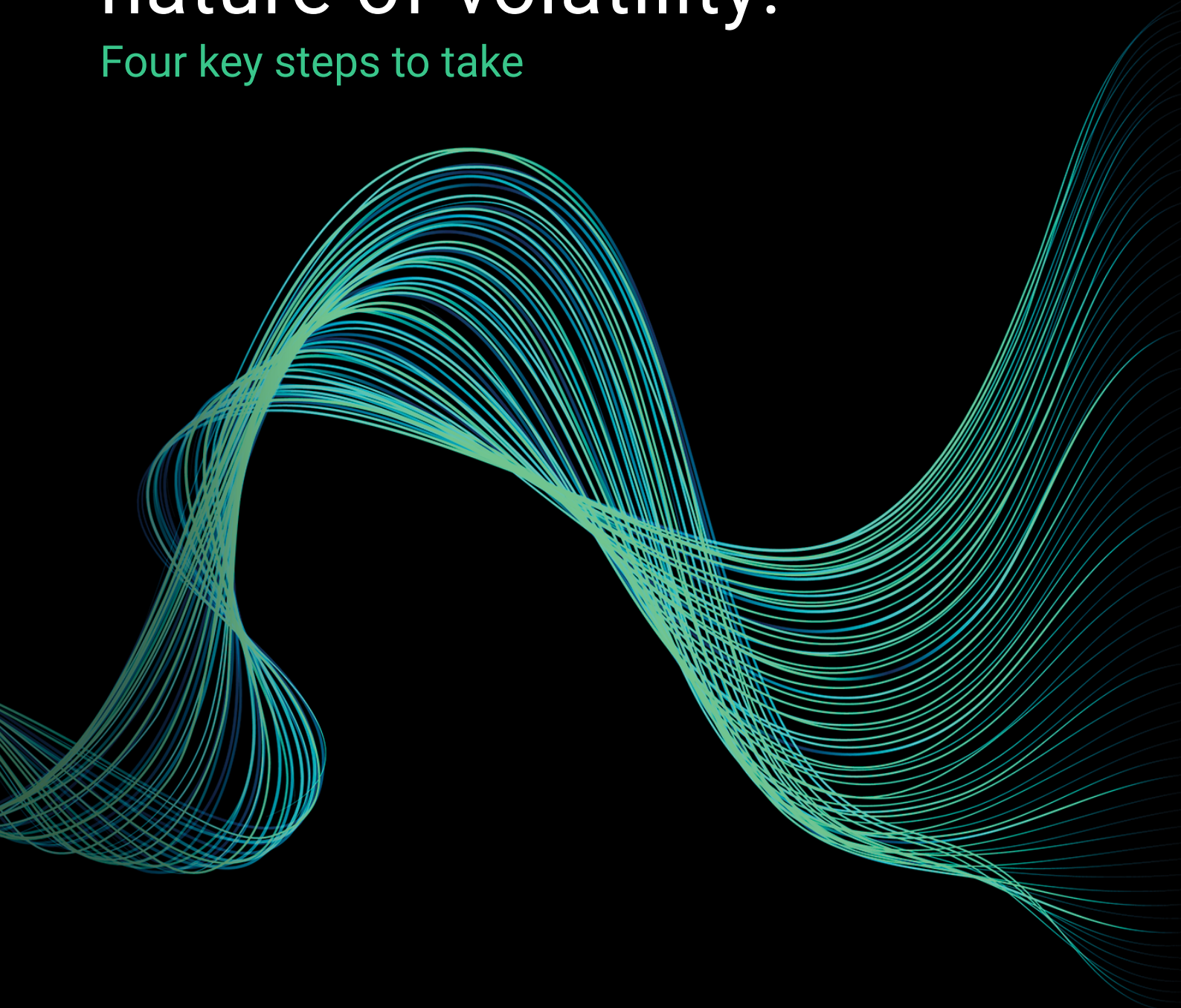
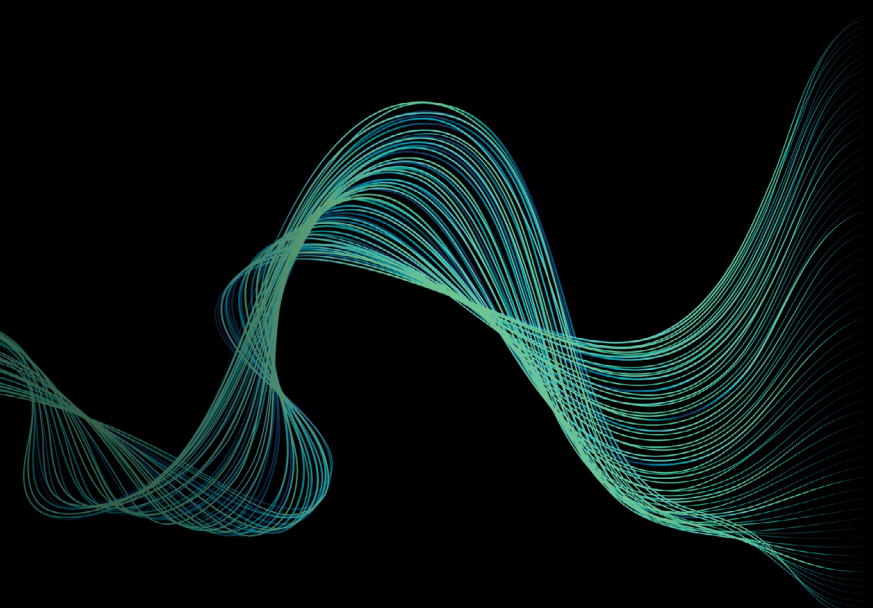


The changing nature of volatility:

Four key steps to take





The true investor
welcomes volatility...

a wildly fluctuating market
means that irrationally low
prices will periodically be
attached to solid businesses.

WARREN BUFFET

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Introduction

Volatility is often a misunderstood concept. For most investors, it's something to be avoided if possible – a reflection of a fear we share, with regards to the next significant market correction. For some, however, once it's properly understood and analysed, it can provide as many opportunities as it does challenges. Knowing what to look for, and then plan and adapt, are important steps one needs to take towards developing a mindset to take advantage of this.

There has been quite a bit of news recently on the use of 60/40 funds as an investment solution for investors. In the UK, they have become one of the dominant 'balanced' investment funds, or fund of fund asset allocations, as represented by the billions held in these products. With their static allocation of equity and debt, these funds are often used by investors who are uncertain of how and where to invest their wealth, and sometimes with little regard to the investor's specific risk profile. The premise is that they offer some growth via their equity allocation, while the bonds provide a measure of downside protection. They have turned into the ultimate passive, or more succinctly, buy and hold investment decision.

Given the last 13 years has witnessed ever-rising stock markets and lower bond yields, most investors have been rewarded by this choice, and feel secure as a result. However, with several storm clouds brewing on the horizon – including rising inflation, lower growth, and environmental considerations – will they remain that way?


Unfortunately, most investors view market volatility negatively, something to be avoided if possible. It is ingrained in most of us to be fearful of the next major market correction and, as a result, we generally fall into two mindsets – sell everything before it happens or remain invested the same throughout.


At Collidr, we believe volatility is an important 'signal' that can be harnessed to deliver outperformance versus the 'buy and hold' investment strategy. Anticipating and reacting to volatility can help investors manage and protect their wealth.





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Step 1: Using volatility to enhance returns

The following summary illustrates how, by applying a few simple concepts, volatility can be used to enhance investment outcomes.

The nature of volatility

Volatility is often a misconstrued concept. In fact, it's no more possible to directly observe market volatility than it is to accurately gauge someone's confidence. A universal definition or perfect measurement of these variables doesn't exist, so in this sense they are not only subjective, but also hidden from direct view. The best we are able to do is use statistical inference and identify sensible proxies for these types of hidden variables, much like we can imperfectly infer a person's happiness from their general demeanour and emotional state. Therefore, we should focus our energy on making observations and collecting data that has the highest probability of telling us something useful about the future.

To that end, we take the stance that historical return data is actually a very weak predictor of future return (in anything approaching an efficient market). Thanks to advancements in academic research, however, a great deal is now understood about modelling and forecasting volatility, and using the magnitude, rather than the direction, of returns to guide us. We have found that volatility is "clustered" or "persistent" in the sense that returns of large magnitude (of either sign) tend to be followed by further returns of large magnitude (figure 1). This persistence encodes the way market shocks have lasting effects, with negative news often having a larger impact on volatility than positive news. These periods of high market volatility ultimately lead to unexpectedly extreme returns. But, eventually, as a cursory glance at a VIX chart clearly shows, volatility settles down and mean-reverts to long-run levels over time.

The first key takeaway is the notion that the expected size of upcoming market movements is much more predictable than the direction of upcoming market movements. Yesterday's measure of volatility tells us something meaningful about tomorrow's volatility.

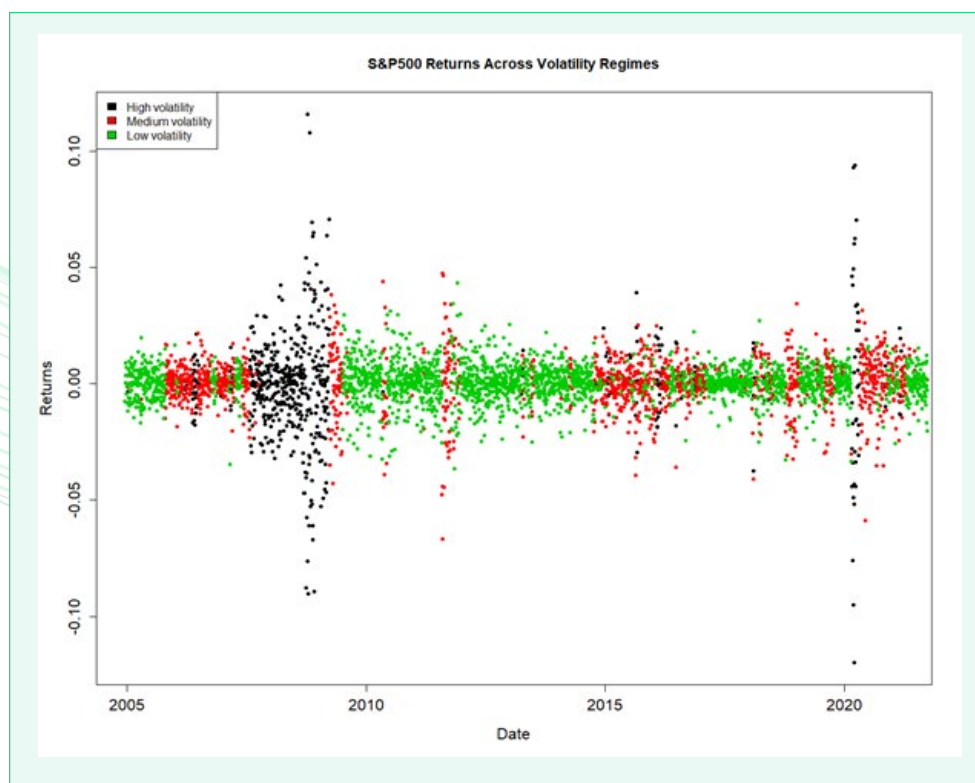


Figure 1: A plot of S&P500 Index Returns illustrating periods of clustered volatility. Source: Collidr and Bloomberg.

Avoiding large losses to improve compounding wealth

The second point is an even simpler one, and centres around the idea of preserving capital (i.e. limiting losses or 'drawdowns'), and from this, by definition, allowing future wealth to compound from a higher starting point. We can't emphasise enough this important aspect. For example, if you were to invest £1000 and, due to bad timing, lose 50% in a market downturn, you would have £500 left. At this point you would require the market to rally and return 100% just to get back to your initial investment amount to break-even. However, if you could limit that drawdown to a lower level, say 10%, with the same 100% return to follow, you would finish with £1800. When it comes to all other investment decisions, including buy-and-hold behaviour, you don't even need to generate positive returns in difficult market environments to be ahead; you will end up out-performing on a relative basis.

How to limit your drawdown

The third and final point is to avoid conflating high volatility and negative returns to improve your chances of long-term financial success. This is based on the idea that all asset classes are not born equal, and some perform better in certain market conditions than others. To use an analogy, high volatility is not bad per se, but much like driving a racing car on a wet track, you have to be on the correct tyres for the current conditions. In this, we can approach volatility with the same opportunistic lens.

Based on our research, and using 'signals' generated by our proprietary technology, which fall within a protective volatility regime framework, Collidr applies these concepts – the goal of preserving capital to compound future wealth – with the aim to achieve outperformance. It is these signals which allow us to invest with conviction in good times, while acting more defensively during difficult periods. When you extend this kind of approach to a broad range of asset classes, derivatives, peer groups and benchmarks, and include advanced portfolio optimisation techniques, which themselves can be tailored to specific regimes, you end up with portfolios designed with the goal of exploiting prevailing market conditions.

General market and geopolitical uncertainty can be a harbinger of market volatility, which we can often, but not always, see on the horizon. Typical examples may include an election two months away, signs that the FED may taper stimulus, or global economies beginning to experience inflationary pressures in an economic climate of limited growth. Furthermore, we know how volatility behaves – it is persistent or clustered, and previous values tell us about future values due to the serial correlation present in the magnitude (or square) of the returns. We know it mean-reverts to long-term levels, and that negative shocks tend to have a greater impact than positive ones. We can quantify volatility quite accurately, even several weeks into the future. Compare this to what we know about the direction of tomorrow's market returns. In truth, despite being only a few hours away, we know very little about its direction. Determining whether it will be up, down or flat, is educated guesswork at best. The only thing we have any idea about,

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and can effectively measure, is the range of values tomorrow's return is likely to be sampled from. That range of values is governed by our best measure of yesterday's volatility, and, by logical extension, the volatility regime we currently reside in.

Instead of trying to forecast returns, the true advantage is, in essence, recognising and responding to a change in market volatility, or 'regime'. More fundamentally than this, a shift in volatility regime is the very time you need to consider a change in asset allocation, or exposures in your portfolio.

Investors need to stop framing volatility as rapid, unpredictable changes in an asset, but instead adopt a more holistic approach of seeing volatility, quite literally, as a constantly evolving geometric problem. And, when it comes to volatility, it's as much about relationships between assets as it is about extreme moves within a single asset class.

Step 2: All volatility is not the same

Let's use an example to help explain this concept. If it were to rain four inches in a single day, that would be an extreme and unusual weather event. Statisticians tend to call such events "outliers"; things that happen outside our normal experience or expectation. However, if it were to be sunny and 25 degrees in London whilst simultaneously snowing in Chelmsford mere miles away, that would be extremely unusual too, but for entirely different reasons. In the latter example, it is the stark contrast between the weather in London and a city just 30 miles away which is unexpected. Individually, there is nothing unusual about a temperature of 25 degrees in London or some snow in Essex. Put them together simultaneously, however, and you have a very strange occurrence indeed. The same is true of the financial markets; well established, usually stable, market relationships can deteriorate quite suddenly. When it comes to understanding volatility, it's not enough to simply look for large market moves, we also need to consider how the markets talk to one another when looking for unusual, or outlying, market behaviours.

Figure 2 attempts to illustrate this, using the example of three related US assets – a long duration Treasury Index, the S&P 500 Index and the VIX Volatility Index. By plotting the daily returns of each asset along three axes of a 3-D plot, one gradually forms a cloud of points (a set of three returns for any given day forms a single point in the cloud where they all meet). In this sample, all these returns come from a low volatility regime – as defined by Collidr's signals – and an ellipsoidal surface has been fitted to encompass approximately 95% of the observations. This surface can be thought of as a net, capturing the most likely range of daily values in these assets. The shape of this surface picks up the (regime-specific) negative correlation that exists between the VIX and the S&P500, and similarly between Treasuries and Equities. The typical sizes of movements are encapsulated in the surface geometry too, i.e. how stretched they are in each axis direction.

When it comes to volatility, it's not enough to simply look for large market moves, we also need to consider how the markets talk to one another.

But why stop at three dimensions? The world is, after all, vastly interconnected. This idea can be extended to any number of assets in an abstract mathematical sense, even though we can't visualise a hyper-ellipse floating in some multi-dimensional universe. The day's returns across hundreds of assets can be compared against this multi-dimensional expectation surface and unusual behaviour spotted immediately. Volatility is geometry, and volatility regimes manifest as distinct changes in geometry, not simply changes in raw magnitude. When we think about volatility, we should really be thinking about these types of multi-dimensional surfaces adapting slowly over time as market relationships do, much like blobs of wax in a lava lamp can warp and stretch.

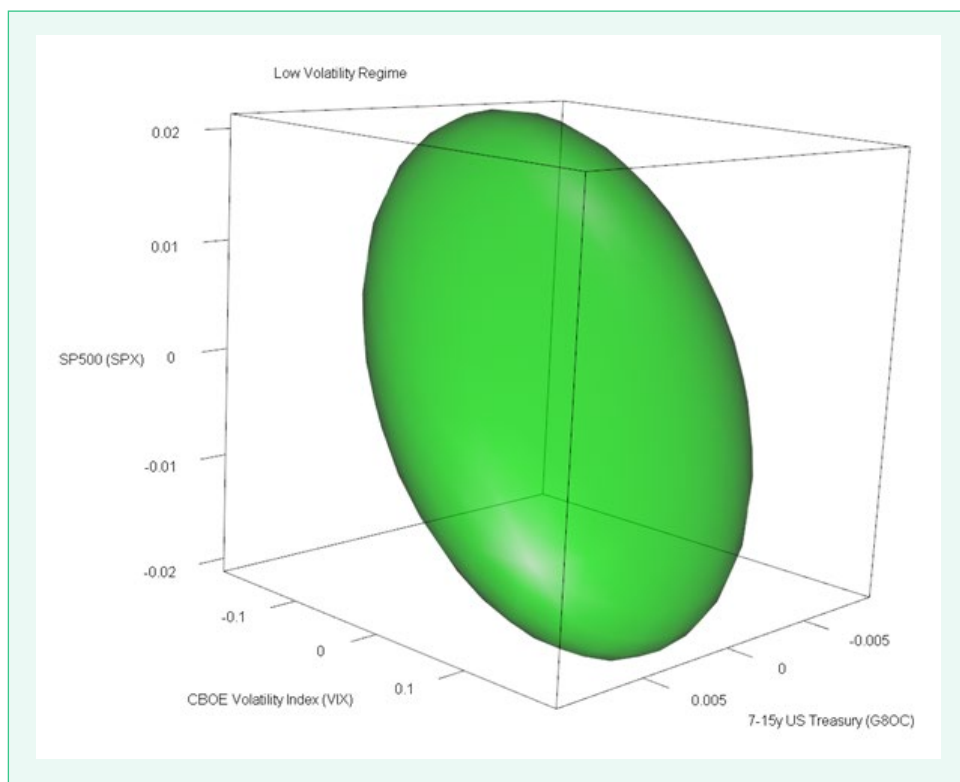


Figure 2: An ellipsoidal surface capturing the most probable range of daily returns from three related assets. Note the different axis scales given that the typical daily movements in the VIX Index are much larger than those seen in the Treasury Index. Source: Collidr and Bloomberg.

In reviewing the established low regime surface in our example (figure 2), the next question which might be asked is – what constitutes an unusual set of returns? Let's start by imagining a set of daily returns (the red dot in figure 3) that, on the face of it, seem very modest: -1.3% in the S&P500, -0.5% in the Treasury Index, with the VIX remaining unchanged. We can see that the red dot lies comfortably outside the surface boundary that encompasses our most probable values. In this example, these returns aren't in accordance with the established relationship between the bond index and the equity index, and this makes the set of returns more unusual. In terms of raw magnitude, they aren't particularly unusual, but it is uncommon for both the bond and equity index to go down together given that they are usually anti-correlated. This is not dissimilar to the earlier sun and snow weather analogy, though clearly less extreme.

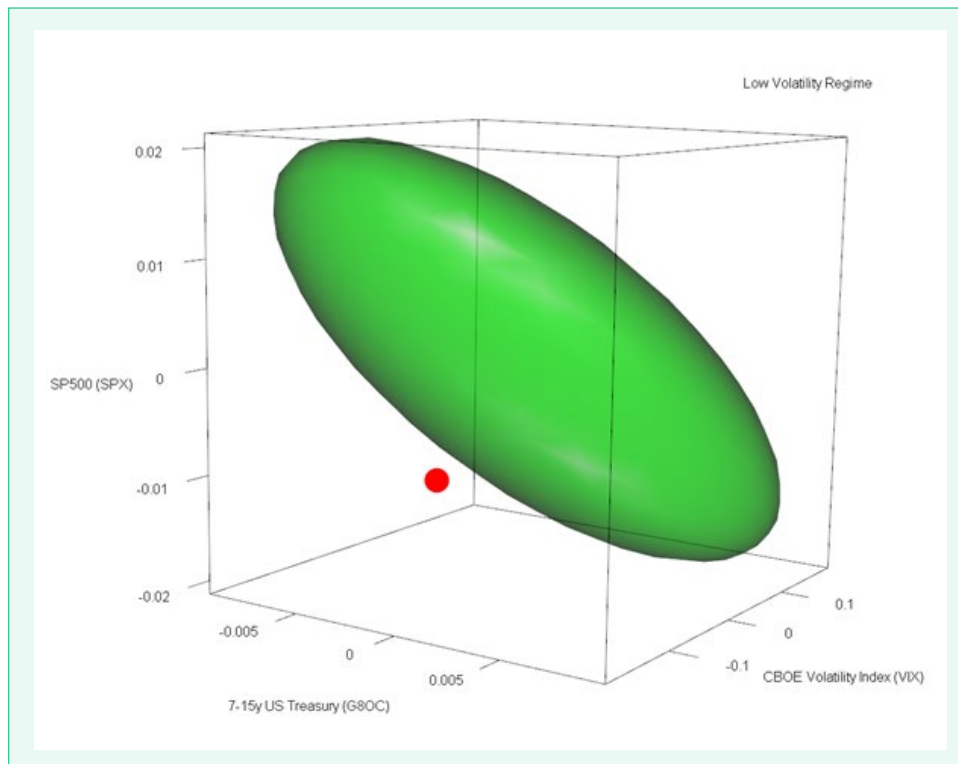


Figure 3: The red point illustrates a set of daily returns that lie outside of our expectations given established relationships over recent history. Source: Collidr and Bloomberg.

Now, is it possible to illustrate this kind of behaviour occurring in reality using a recent example? Let's look to the 20th September 2021 for such a case. Going into this trading day, Collidr's signals were in a low volatility regime. Throughout the course of the day, large market moves occurred, including a significant spike up in the VIX Index, and ended with negative returns across global equities and small increases in (price-based) bond indices (figure 4). Despite these market movements, however, the regime did not change.

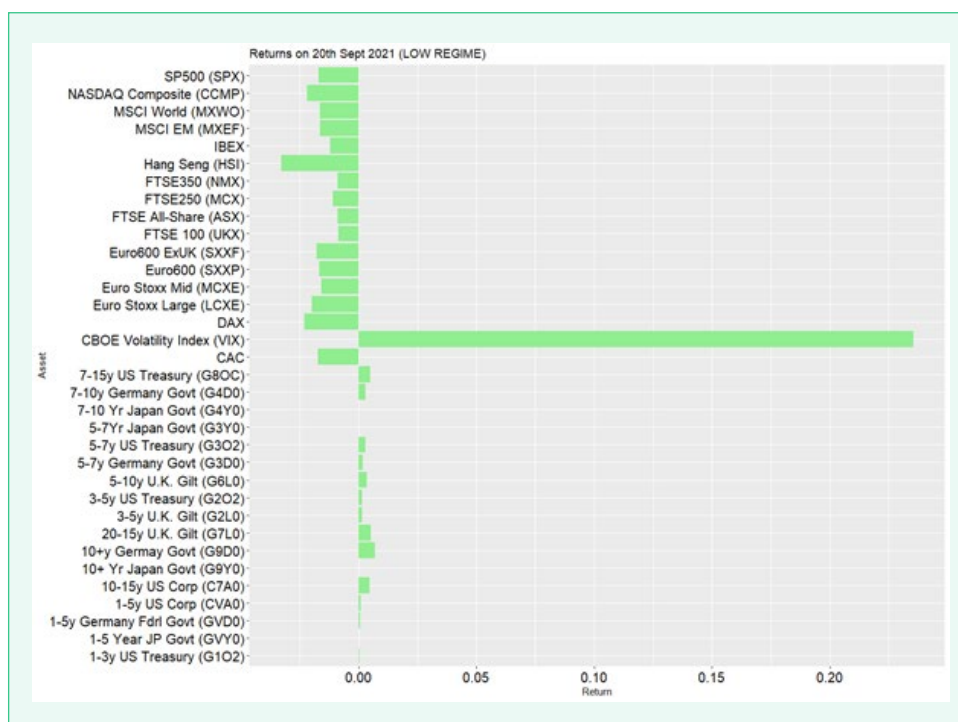


Figure 4: A set of daily returns across various global indices for the date 20th September 2021. Source: Collidr and Bloomberg.

Yet, a few trading days later, similar market movements occurred, which did trigger a regime change from low to medium. The important point to note is the different directions of the global bond index returns, as shown in the lower portion of figure 5 compared with figure 4. Without doubt the large increase in the VIX for the following session would have been a contributory factor, but a second key element to the regime shift was the way bonds and equities moved down together, as bond yields increased.

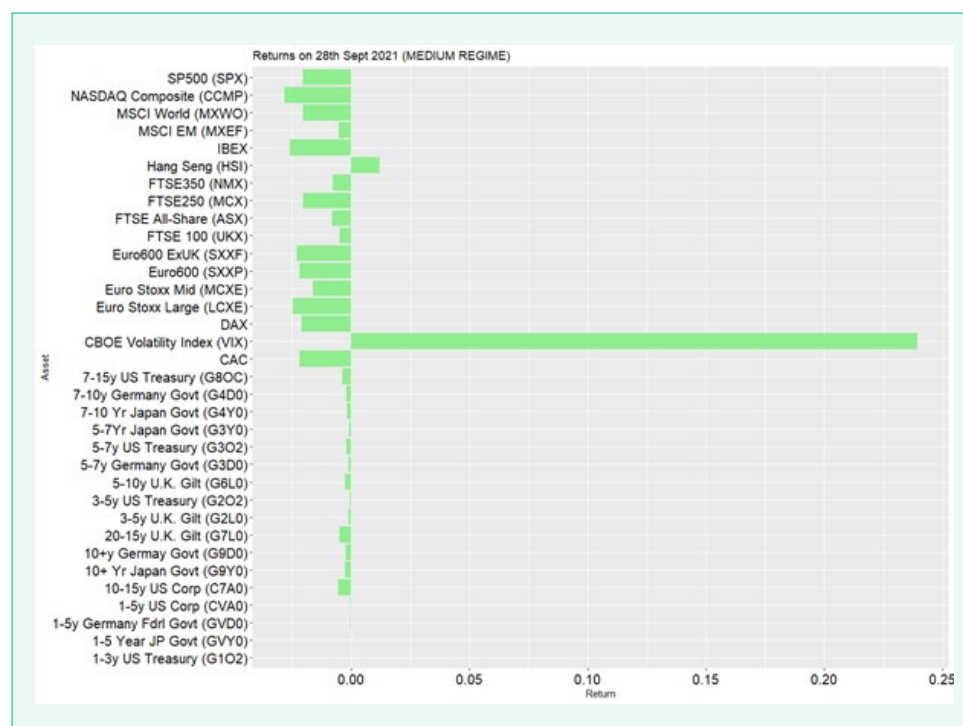


Figure 5: A set of daily returns across various global indices for the date 28th September 2021. Source: Collidr and Bloomberg.

New information changes our beliefs.

Having established a geometric view of volatility (as seen in figure 2), we are able to distil a large global set of assets' daily returns into a metric that represents how ordinary, or otherwise, they are. This measure of market "uncertainty" can then, in turn, be used as an input to more complex probabilistic models that determine the current market regime. Once again, this is all inference, and we do not employ simple thresholds, but rather use a probabilistic model that maximises the likelihood of observing the data we have seen up until that point. As new data flows in, it adds yet more context around yesterday's values, so this likelihood changes all the time. New information changes our beliefs.

With more and more data, Collidr's signals are able to accurately determine the current market regime on a large number of global markets we monitor, some of which might even be considered obscure or irrelevant. Essentially, this boils down to searching for extreme returns and instability in market relationships that have been established over recent periods of time. The model adapts carefully over time to incorporate new relationships that might emerge, to make better judgments as it collects more data.

By means of a specific example, figure 6 shows the behaviour of our regime signals in February and March 2020, during the start of the Covid pandemic. The red line indicates that the regime switched from Low to Medium on 24 February 2020, and again from Medium to High on 26 February. As the chart shows, by avoiding the global equity index during the high volatility regime (green line), we were in a better position compared to the buy-and-hold investor (black line).

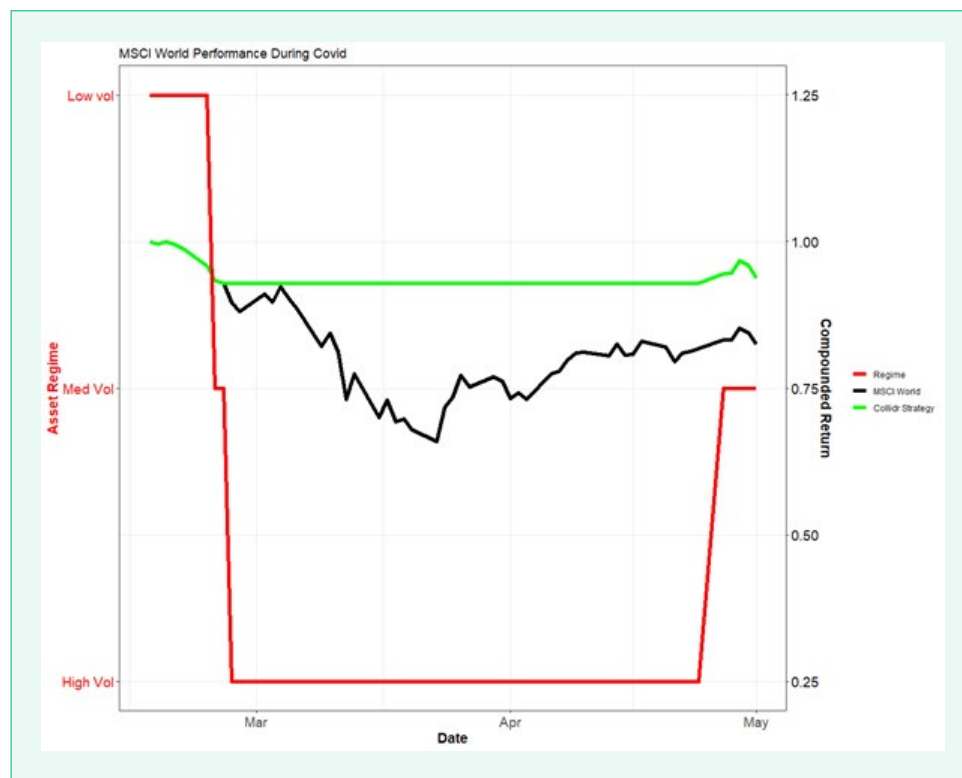


Figure 6: The green equity curve exits a long position in the MSCI World Index during high volatility regimes, preserving capital. Source: Collidr and Bloomberg.

Using Collidr’s signals, we are able to quickly react and implement a new investment strategy that suits the new volatility regime, because history tells us that various asset classes do better in certain regimes than others. It is this topic we focus on next.

Step 3: Asset Performance in Different Volatility Regimes

In order to understand volatility, and how assets behave, we continually assess a range of assets and see how they perform in different volatility ‘regimes’. It should be emphasised, once again, that high volatility is not necessarily always a harbinger of negative returns. In fact, some asset classes perform strongly in such regimes, so it is imperative that portfolios are tailored to best-match the current market regime.

As Figure 7 demonstrates, in a Low Regime nearly all assets considered here produce positive returns. As a general trend, we see strong equity performance and dollar weakness.

High volatility is not always a harbinger of negative returns.

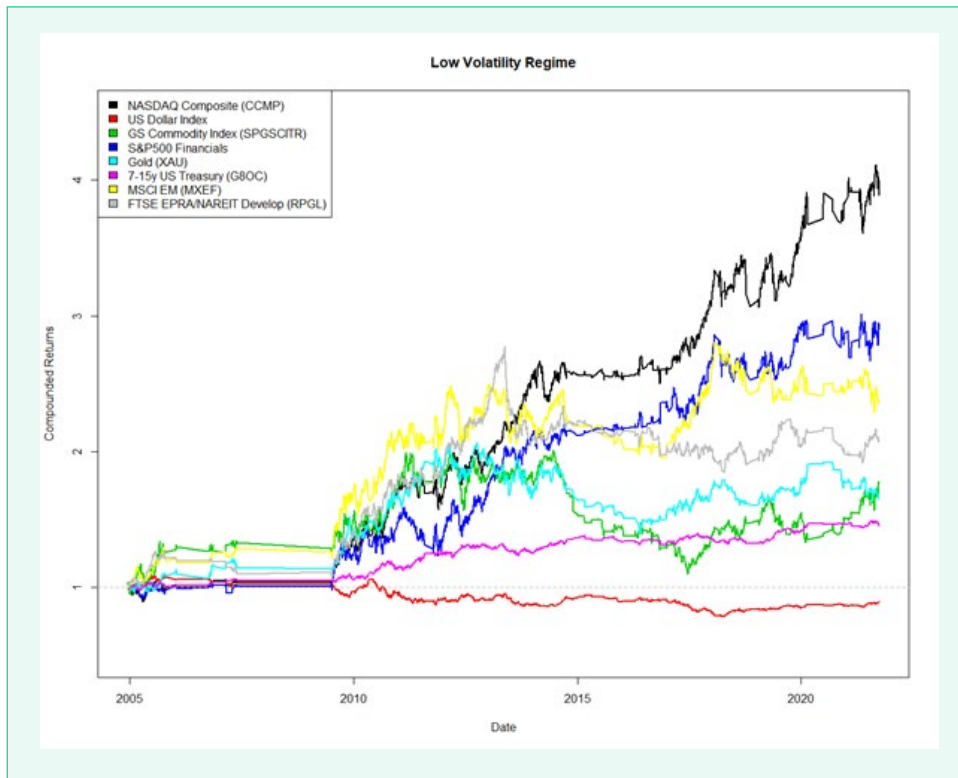


Figure 7: Compounded return performance across a set of assets in the Low Volatility Regime.
Source: Collidr and Bloomberg.

In the Medium Regime (figure 8) on the other hand, we often see higher absolute returns, but at the expense of increased volatility - i.e. performance on a risk-adjusted basis is lower. Intuitively this makes sense; where there is more risk, there can be more reward or higher returns, but it's always a double-edged sword. It's difficult to separate good (upside) and bad (downside) volatility, as they tend to happen concomitantly due to the clustered nature of volatility.

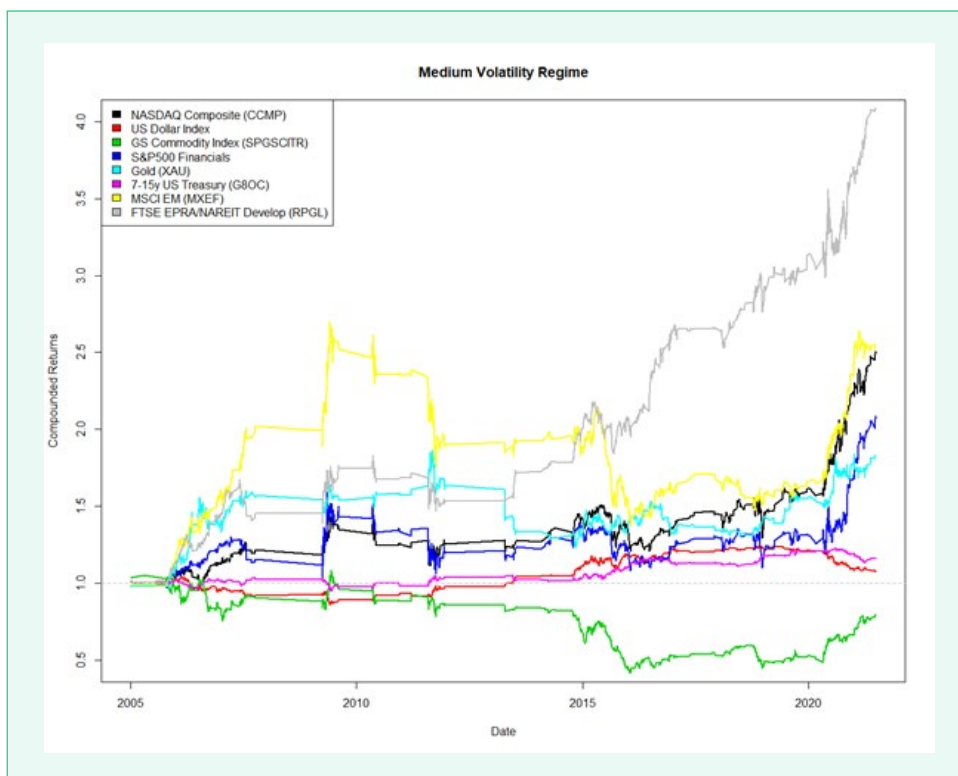


Figure 8: Compounded return performance across a set of assets in the Medium Volatility Regime.
Source: Collidr and Bloomberg.

Finally, in a 'High' volatility regime, only a handful of asset classes reliably help preserve capital, those being sovereign debt, safe-haven currencies, and gold.

There is no guarantee, however, that an asset that has historically performed well in a specific regime will continue to do so. Good decision-making should be about increasing the probability of success, and a quick look at the statistical properties of the S&P500 Index returns since 2005 in each regime is powerfully persuasive:

	Ann. Return	Ann. Std. Dev.	Ann. Sharpe
LOW	12.64%	12.14%	1.041
MEDIUM	13.16%	17.28%	0.762
HIGH	-19.01%	36.85%	-0.516

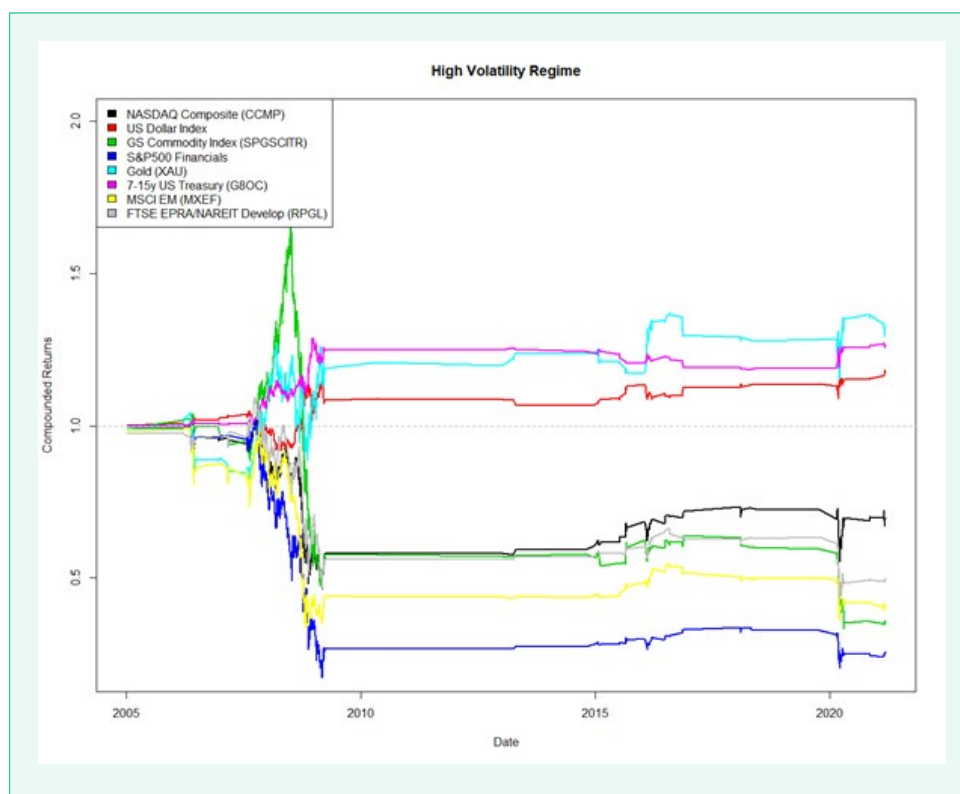


Figure 9: Compounded return performance across a set of assets in the High Volatility Regime. Source: Collidr and Bloomberg.

Step 4: How to structure a portfolio

As mentioned, good decision-making should be about increasing the probability of success. When it comes to anticipating and preparing for volatility, we have a strong sense of the historically best-performing asset classes in each regime, and using this to determine the most suitable instruments to invest in. From there, we can optimise portfolios using a variety of different methodologies (e.g. risk-parity, maximum sharpe, geometric mean maximisation, minimum variance, as well as our own proprietary objective functions) to achieve superior performance. In terms of generic sector allocations, a subset of examples, in no particular order, may include:

Low volatility regimes

- » REITs, US Equity (all capitalisations), Agriculture Sector, Japan Equity (small/mid), High Yield Bond, Healthcare Sector, UK Equity (small/mid)

Medium volatility regimes

- » Agriculture Sector, Technology Sector, China Equity, US Equity (all capitalisations), UK Equity (small/mid), Natural Resources Sector

High volatility regimes

- » Precious Metals, Global Bond, Inflation linked Bond, Currencies

What might a portfolio look like

A typical low volatility regime portfolio might therefore consist of asset class exposures, say, 60% equity, perhaps 15% Property and 25% allocated to Bonds (e.g. High Yield and EMD) whilst a typical high volatility regime portfolio might consist of a higher allocation of, say, 50% to Bonds (Global Government, Inflation-linked, Currencies etc), 25% alternative strategies (Market Neutral, Global Macro) and a lower exposure, say 25%, to equity sectors such as Precious Metals.

During high volatility regimes, it's quite normal for most investors to experience flat or slightly negative performance. These periods can still be used to insulate against larger losses (or drawdowns) compared to the buy and hold investor, to preserve capital and compound wealth during the inevitable recovery period. More sophisticated investors with a larger risk appetite and the ability to hold derivatives, however, could use the high volatility regime signals to actively short equities or commodities, and attempt to generate strong out-performance during such periods. Figure 9 shows this is eminently possible, but should be approached in a disciplined manner with well-defined trading rules in place (trailing stop-losses, take profit levels etc).

When it comes to periods of market turbulence and knowing when and where to invest, there are many signals an investor could turn to, some more reliable than others. But the one aspect investors seem to fear at times – volatility – is probably what they should be focused on. Collidr believes volatility tells us how to invest, increasing the probability of success in a world of uncertainty.

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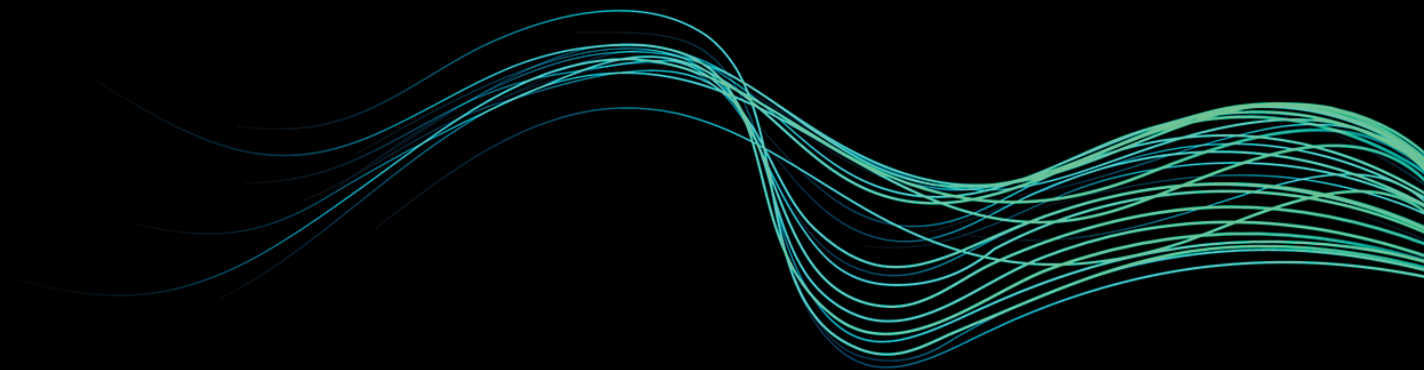
End note: [The Investment Association, Monthly Industry Data, Fund Sectors | The Investment Association \(theia.org\)](#)

Sources: Collidr, Bloomberg.




Investing in assets that are ill-suited to the current market conditions is akin to hammering square pegs into round holes. Understanding the nature of volatility provides us with an opportunity to plan ahead, adapt our portfolios and gently slot all the right pegs in the right holes. No hammer required.


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