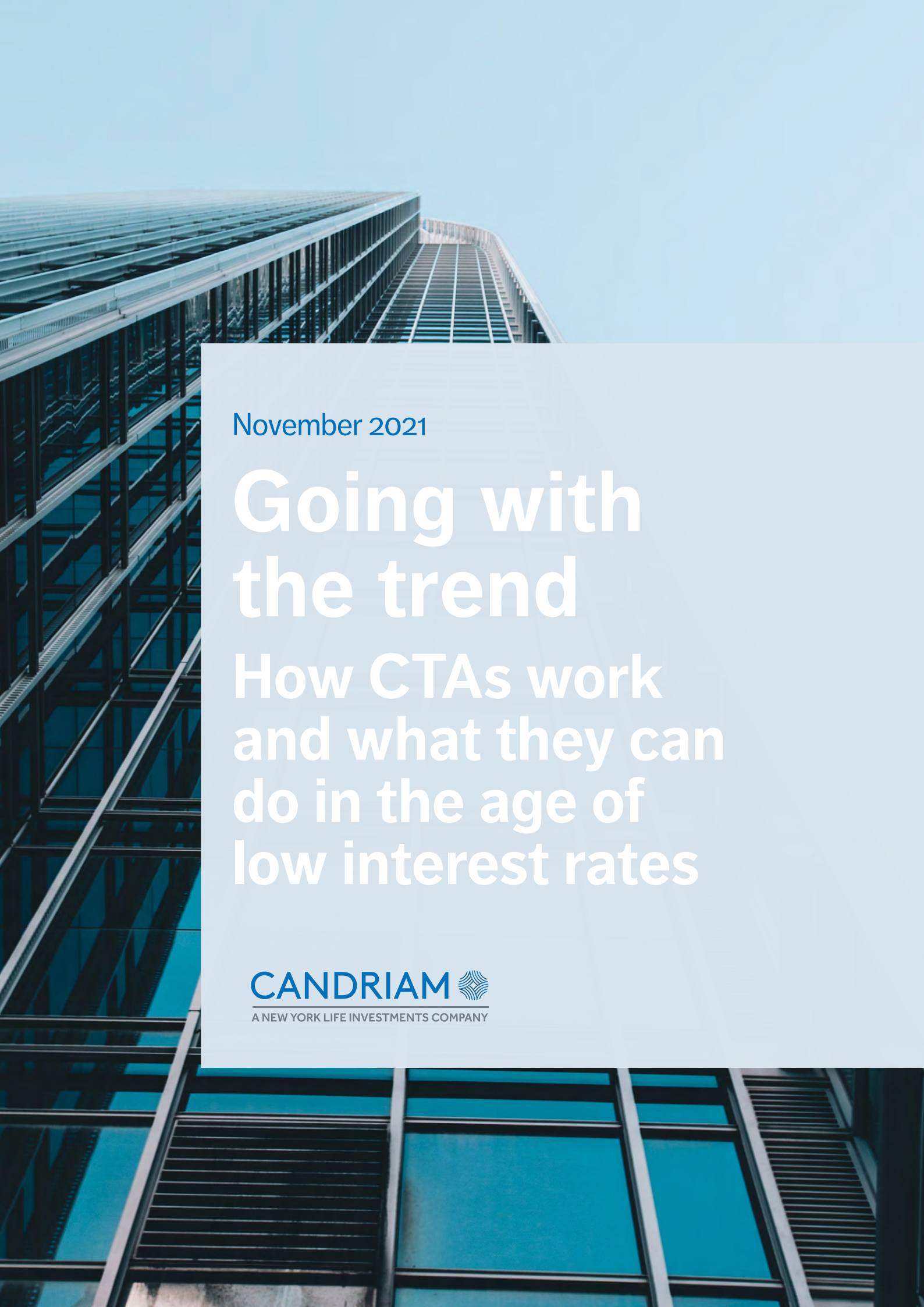

November 2021

Going with the trend

How CTAs work and what they can do in the age of low interest rates

CANDRIAM

A NEW YORK LIFE INVESTMENTS COMPANY

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Executive Summary

Commodity Trading Advisor (CTA) strategies are an investment success story. They have attracted large inflows of assets, drawn in by their ability to generate returns through investment trend following despite a negative risk-free yield environment.

Like hedge funds, CTAs invest in futures to capitalise on market trends regardless of market direction. This ability is difficult to underestimate in today's low interest rate environment, particularly because government bonds cannot be used to the same extent as in the past to mitigate the impact of equity corrections on balanced portfolios. CTAs' tool box can unlock other benefits too, including volatility management and access to returns that are lowly correlated to traditional asset classes. These strategies can be used to get exposure to different trends across almost every asset class.

However, despite their growing popularity among many types of investors, CTAs remain something of a mystery. Where did they come from? How do they work?

In this paper, we will look at why CTAs have become so relevant in the age of low interest rates, and their long term performance and volatility record relative to the main asset classes. We will also examine the effect of their active, flexible and dynamic market risk management on the performance of a balanced portfolio. We will then look at CTAs' origins back in the 1970s and key milestones in their development, before and after the digitalisation of financial markets.

Having reviewed CTAs' history, we will turn to the qualities of modern-day CTAs and dispel a couple of myths. We will discover that not only CTAs help to mitigate volatility but that their performance can be fuelled by it.

Some CTAs focus more on long-term trends, while others are more short term. We will look at CANDRIAM's approach to CTAs and outline why we believe in the importance of finding the right balance between a focus on a long term and taking full account shorter-term market movements. Providing added-value, distinctive, long-term investment approaches has always resonated with our values as an asset manager. CANDRIAM is recognised among leading European absolute return providers, having launched our first fund of this type in 1996.

Finally, we will review CTAs' past performance to determine when is the best time to invest in these interesting investment vehicles.

A world of negative risk-free rates and CTAs: a match made in heaven?

The COVID-19 market shock placed central banks, once again, in a hot seat. As country after country instigated their own national lockdowns and some of the spheres of life came to a sudden stop, many companies' balance sheets started to flash red. The response from major central banks and their governments has been unprecedented, both in terms of monetary accommodation and the extent of fiscal stimulus.

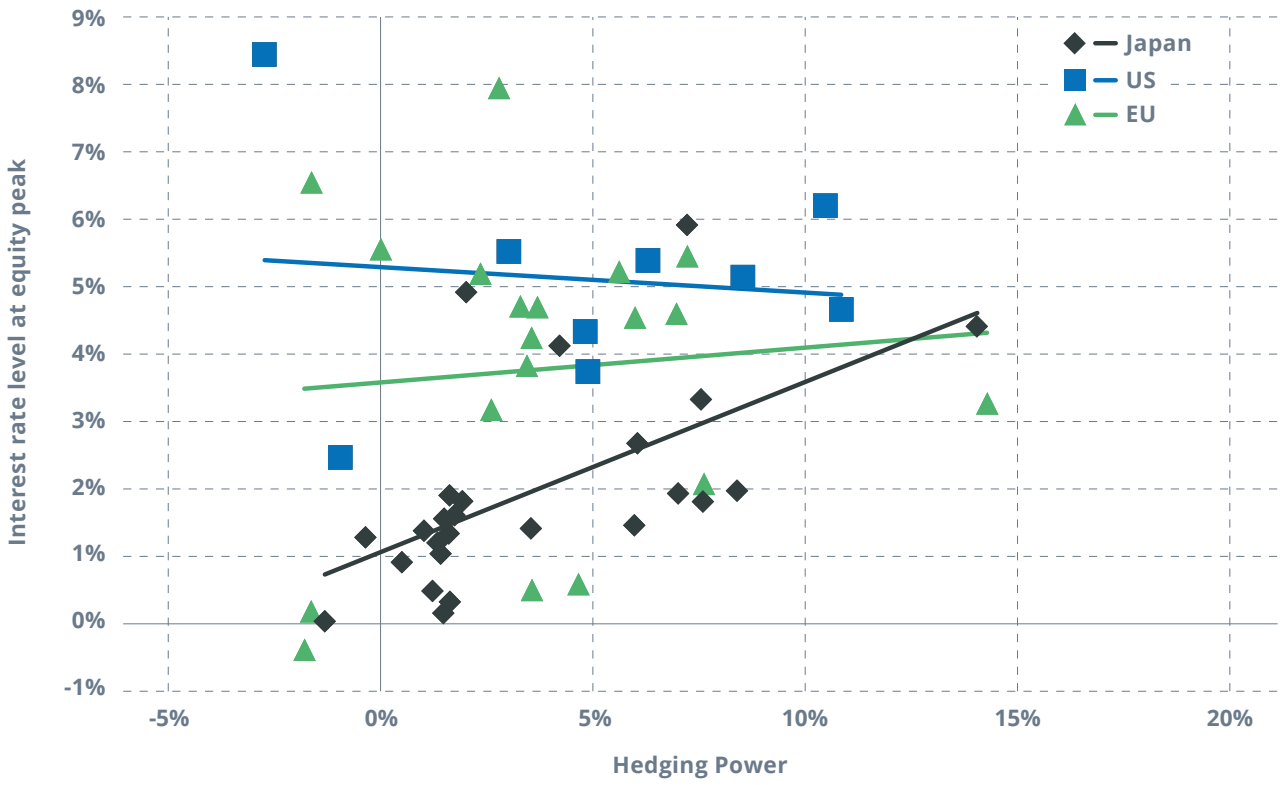
A lot of central bank support was also about liquidity in the bond markets – so that those companies that wanted to borrow during the troubled times in the markets could do so. This has had the effect of pushing credit downgrades and defaults down the line – but not indefinitely.

In the meantime, some sectors were hit more than others, which is now clearly evidenced in the widened dispersion of returns across the markets driven by corporate activity. This, in addition to heightened market volatility, has presented more opportunities for active management to add value, but also lead to higher investment risks.

Historically, diversified portfolios have been relying on the ability of government bonds to mitigate the impact of equity corrections. In the times of equity market stress, investors tended to reallocate some of their assets from equities to bonds, which typically translates to attractive price appreciation for fixed income during such periods. Today, with interest rates close to zero or even negative, it is less certain that government bonds can provide risk mitigation function as effectively as they did when interest rates were above 2%.

In fact, we know that they are very unlikely to. Japan can be a good historical example as it experienced long periods of very low interest rates several times in the past. In Figure 1, every point of equity peak just before a market correction of over 15% is indicated by a spot of a different shape and colour – for Japanese, US and Eurozone equities. The vertical axis shows the 10 year local government bond yield. The chart shows that US and Eurozone government bonds have been providing better risk mitigation abilities given that at government bonds yields at the point just before the correction where higher than those of their Japanese peers.

Figure 1 : Hedging power of bonds during an equity correction of over 15%, based on the level of 10 year government bond yields at equity peak



Source: Bloomberg, Candriam - data from 1.05.1990 as at 31.07.2021

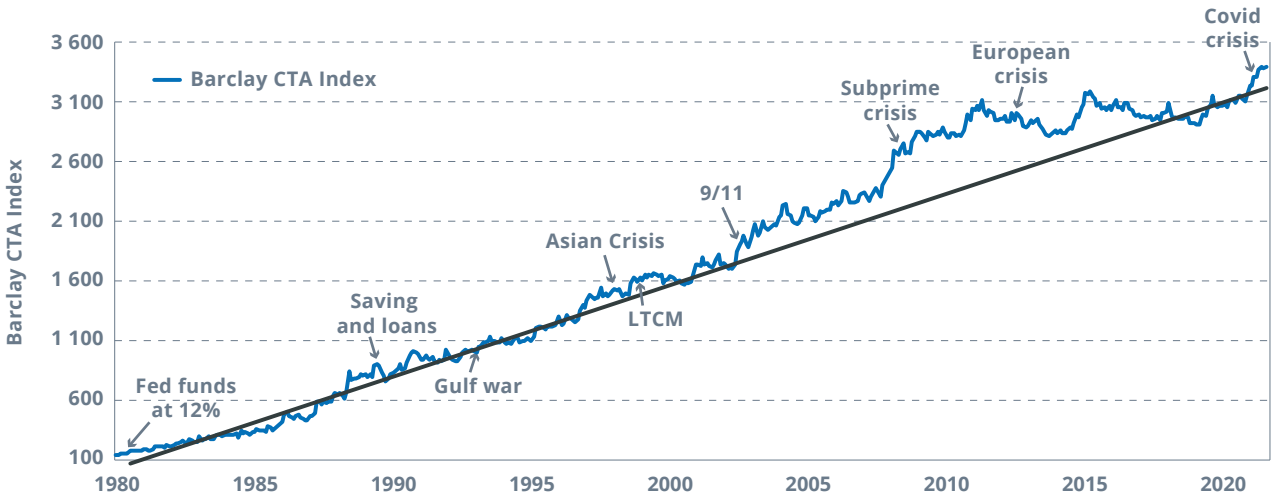
So if not government bonds then what else can provide risk mitigation while equity markets are in a bear territory? It is unsurprising that increasing numbers of investors thought that CTAs clearly fitted the bill as they can profit from market trends regardless of their direction. CTAs could track trends not only in the equity markets but also fixed income, in the commodity and currency markets by investing in exchange traded futures and options and OTC forward contracts.

It has been a winning formula for these strategies as they attracted by over USD300 billion globally since 1974. It was then that US legislation recognised the "Commodity Trading Advisers", which at that time operated predominantly within the commodities markets. Gradually they expanded into other sectors and markets with the emergence of futures contracts in currencies, bonds and various indices. This process was helped by the wider use of futures and advances in trading technology.

These strategies are also becoming more sophisticated, and fast. For example, latest developments in low latency market connectivity have also helped to enhance strategies through automated trading. Low latency refers to the application of algorithmic trading to react to market events faster than market peers and thus increase profitability of trades.

All this will help to ensure that CTAs will continue to deliver attractive returns, as they have done for the past 40 years, which were marked by several significant bear markets and periods of market stress (see Figure 2).

Figure 2 : Performance of CTAs over the past 40 years (as represented by the Barclay CTA Index)



Source: Bloomberg, 01.01.1979 – 31.07.2021
Past performance is no guarantee of future returns.

CTA's resilience is related to their low correlation to the performance of traditional asset classes (see Figure 3), which makes them an attractive tool for investors looking to diversify their portfolios and mitigate specific investment risks.

Figure 3 : The correlation of CTA strategies to the main traditional asset classes

Correlation	CTA 10Y	CTA 3Y	CTA 1Y	CTA GFC
US Equities (MSCI World)	0,07	0,23	0,60	-0,18
US Fixed Income (JPM GBI US)	0,34	0,24	0,04	0,25
European Fixed Income (JPM GBI EU)	0,33	0,05	-0,55	0,12
Commodities (S&P GSCI)	-0,10	0,09	0,74	-0,24
Hedge funds (HFRX Global HF)	0,22	0,23	0,83	-0,27

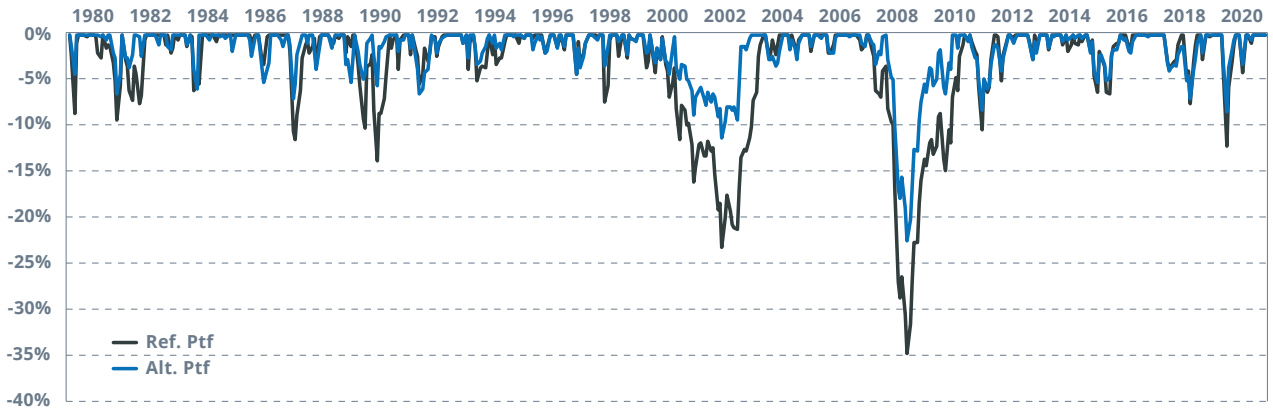
Source: Bloomberg
CTA: Société Générale CTA Index. Data as at 30/04/2021
GFC: Global Financial Crisis - 30/09/2007 - 31/03/2009
Past performance is no guarantee of future returns.

Moreover, allocating part of a balanced portfolio to a CTA-based strategy can also enhance its risk-return characteristics, helping to improve its long-term returns while reducing both the level of volatility and the extent of drawdowns.

To illustrate this point, we have taken a model portfolio comprising 60% equities (MSCI World Total Return) and 40% bonds (Bloomberg Barclays Global-Aggregate Total Return Index), called the Reference Portfolio (Ref. Ptf). We then compared its performance to another portfolio (Alternative Portfolio - Alt.Ptf) which invested 30% of its assets in CTAs (Barclay CTA Index), while keeping the rest (70%) in the previous mix of 60% equities / 40% bonds.

Figure 4 shows how the presence of managed futures in the Alternative Portfolio (Alt.Ptf.) helps to reduce drawdowns, namely from 20% in 2001 and 35% in 2008 to 10% and 22% respectively.

Figure 4 : Drawdown of two model portfolios: one not investing in CTAs and another with 30% in CTAs



Source: Candriam, 01.01.1980 to 31.07.2021

The scenarios presented are an estimate of performance based on evidence from the past on how the value of this investment varies, and/or current market conditions and are not an exact indicator. What you will get will vary depending on how the market performs and how long you keep the investment/product.

If we look at the key return characteristics of both portfolios (see Figure 5) then we discover that introducing CTAs to a balanced portfolio helps to significantly reduce volatility and drawdown, while improving risk-adjusted returns, when compared to our first, more conventional model portfolio.

Figure 5 : Risk and performance benefits of CTAs for a balanced portfolio

	CTA	Ref. Ptf	Alt. Ptf
Returns	8.82%	9.12%	9.33%
Volatility	13.51%	9.57%	7.89%
Risk Adj. Returns	0.65	0.95	1.18
Max Drawdown	-15.66%	-34.99%	-22.64%

Source: Candriam, the Barclay CTA Index, Statistics from 01.01.1980 up to 31.07.2021

The scenarios presented are an estimate of performance based on evidence from the past on how the value of this investment varies, and/or current market conditions and are not an exact indicator. What you will get will vary depending on how the market performs and how long you keep the investment/product.

CTA's engine room: spotting and following market trends

CTA managers generate returns through trend-following strategies, boosting risk adjusted performance of diversified portfolios in both bull and bear markets.

CTAs can generate gains in down markets because they can take short as well as long positions across many different asset classes. They track a range of momentum indicators, such as price moving average or use price channel breakout models, and sometimes (like is the case with CANDRIAM's own CTA strategy), use other tools when the market lacks momentum.

As we mentioned at the beginning of our previous chapter, the development of CTAs took off in mid 1970s after the Commodity Futures Trading Act in the US. Up until the late 1970s, this market was dominated by positions in agricultural (soft) commodities. CTA strategies were managed manually, based on fundamental rather than quantitative approaches but the principle was the same: they followed momentum indicators, such as price moving average or looked at price channel breakouts.

When a market shows a clear uptrend, a CTA strategy automatically takes a long position in that market. Similarly, if the market shows a decline trend, CTA strategy makes money by shorting the asset/assets affected by the trend. This major feature offers investors important diversification benefits.

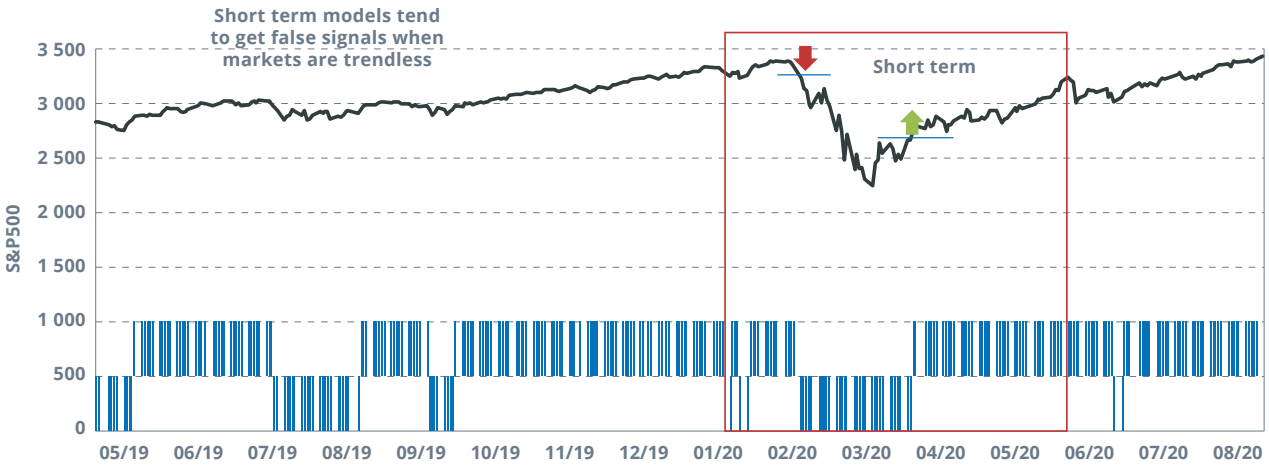
The big change for the futures industry took place in the 1990s, which was marked by a revolution in digital technology. Data providers like Bloomberg and Reuters had made many financial indicators readily available, while new computer technologies allowed CTAs to build more efficient statistical / quantitative models.

CTA strategy traders could now use computer programmes to test large chunks of performance data to improve their analytical capabilities. In the early 2000s, this has expanded into wider and more academia-based areas of fundamental research, looking at such topics as price forecasting, continuous trading and portfolio optimisation.

All these advances in technology and methodology have made **quantitative approaches** more sensitive and efficient in spotting trends. Modern CTAs continue to follow momentum indicators, such as price moving average or use price channel breakout models and today they also use much more sophisticated models. They became much better at following short term trends than before, which led to the emergence of two distinct approaches: **long term trend** following and **short term trend** following.

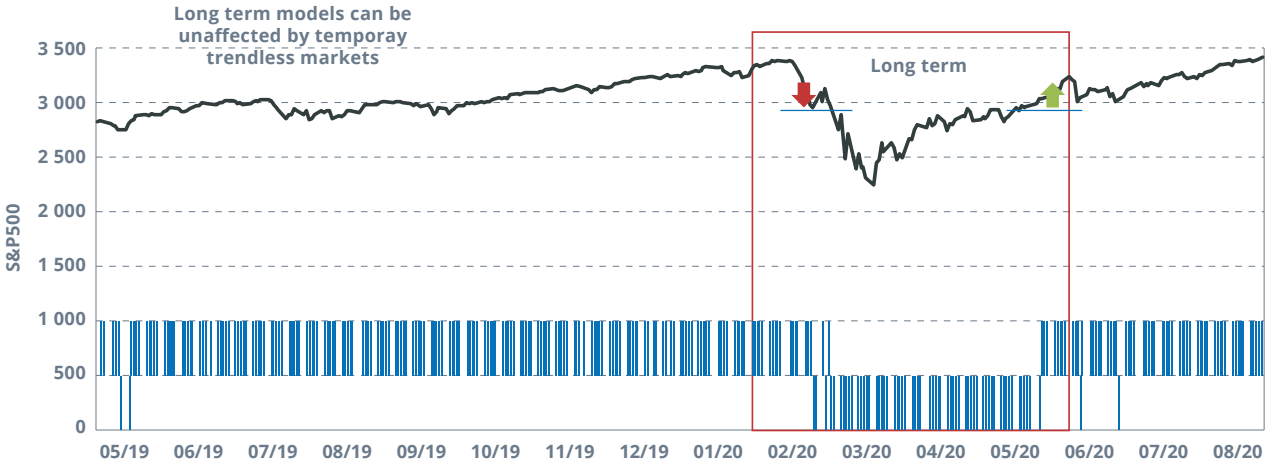
Figure 7 shows that CTAs' long term approach takes some time to adjust to a change in market direction. Figures 6 displays the contrasting example of a short term approach which, as we can see, quickly re-adjusts to follow a new market trend but is also very sensitive to signals, which can often be false. Figures 6 & 7 show the performance of the S&P 500 Index, and the blue lines below signify momentum signals: long (above 0) and short (below).

Figure 6 : CTAs' short term trend following



Source: Candriam as at 31 July 2021
Past performance is no guarantee of future returns.

Figure 7 : CTAs' long term trend following



Source: Candriam as at 31 July 2021
Past performance is no guarantee of future returns.

In our chapter about CANDRIAM's approach, we will discuss our own way of striking the right balance between the long-term and short-term trend following in CTA investing.

All CTA strategies, regardless of their approach, are fuelled by three key factors: macro cycles, behavioural finance and diversification.

Macro cycles: market participants tend to allocate assets differently in different stages of the economic cycle, which creates powerful market trends. Trend following strategies are designed to capture them. The longer a trend lasts, the more effective CTA strategies are in detecting and exploiting it to generate attractive returns. Once the strategy starts to follow a cycle trend, it covers a range of contracts across different asset classes, such as equites, bonds, commodities and currencies.

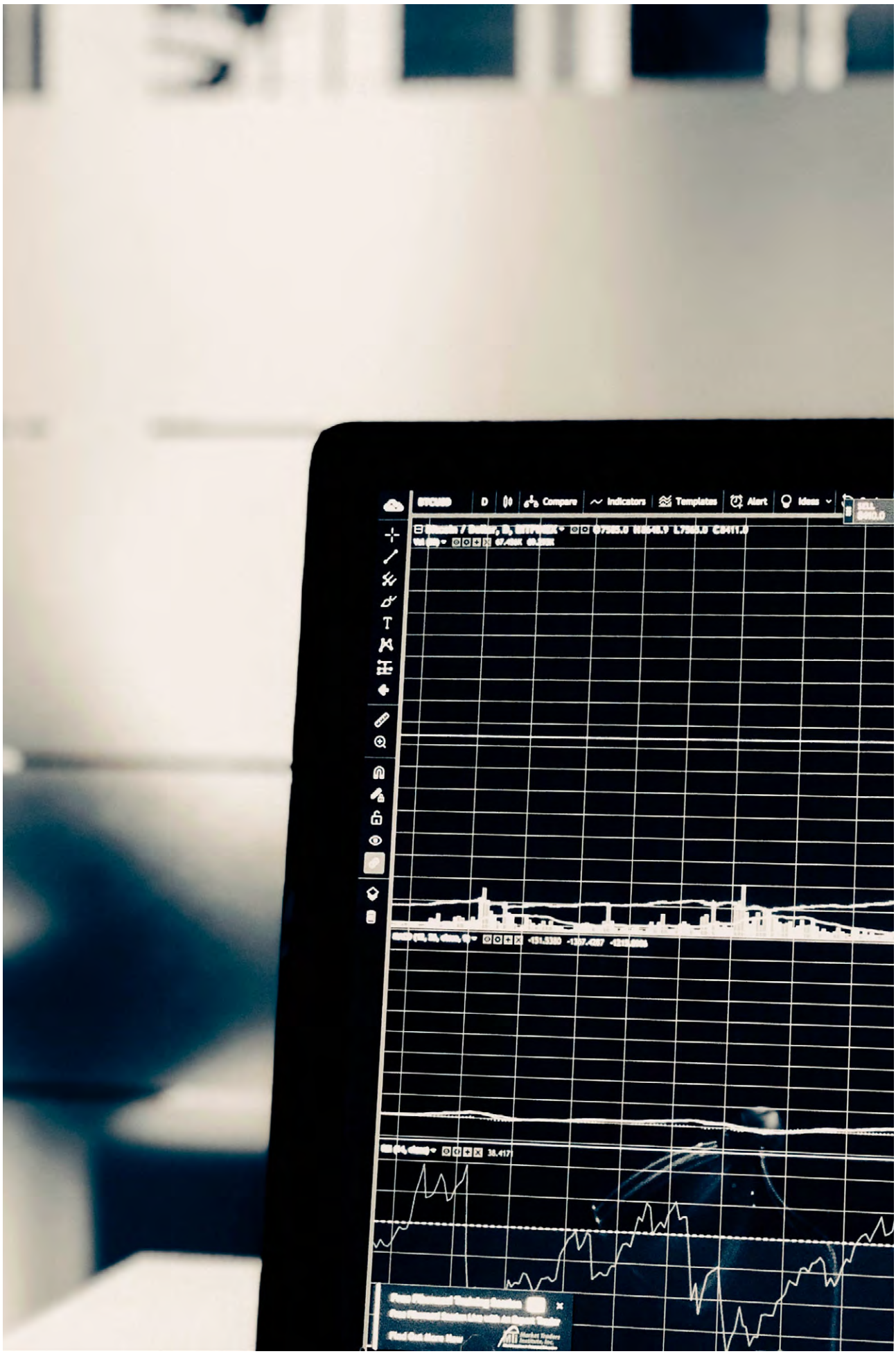
Behavioural Finance studies key human trains or behaviours that investors exhibit when they make decisions to buy or sell financial instruments. In contrast, pure CTA strategies are based on algorithms that rely on extensive research and mathematical and statistical models, fully back-tested, where each decision is carefully judged and weighed. In other words, trading signals that are generated by CTA strategies are not affected by human emotions like fear, stress, enthusiasm, happiness or greed. So we would expect to see a situation when positions taken by a CTA strategy may initially look quite different from the prevailing market sentiment, only to be followed by discretionary traders eventfully once they correct their positions having first effectively over- or under-reacted in their trading decision.

CTA strategies can exploit biases in human behaviour in financial markets. For example, investors tend to over- and under-react. There is also the disposition effect, which relates to the tendency of investors to sell assets that have increased in value, while keeping those that have dropped in value. Herding effect is about investors ignoring facts and instead only following the decisions of other investors – just like the classic example of the gold rush.

There are different ways in which CTAs can take advantage of human biases. For example, the herding effect accentuates price movement, allowing CTAS to deploy managed futures to exploit the price anomalies. In addition, not being prone to the disposition effect, CTAs could cut their positions if trading signals revert, stopping false trend discoveries, as well as letting gaining trades up to the trend end.

Diversification: CTAs are able to track market trends affecting several different asset classes at the same time, which is one reason for low correlation to any particular asset class. CTAs tracks indicators across different asset classes to identify trends that are likely to last long enough to be profitable.

Some of the trends identified will be much more short term than others, which in itself is another source of low correlation. Sometimes a CTA strategy will benefit from a trend that lasts just few months, while nothing will be detected on the longer term. Therefore, CTA source part of their diversification benefits by tracking market trends at different frequencies.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Misconceptions: Not a Long Volatility Fund

CTAs are often seen as Long Volatility funds because they tend to perform well during market crises. However, this is wrong as they are actually "Long Gamma", i.e they will increase their long position if the price of the underlying asset goes up, and, similarly, the short position will strengthen if the price continues to decline.

Unfortunately, this misconception was actually borne out of misunderstanding some key terminology. When some research (including *Fung And Hsieh*, 1997a [1], *Fung and Hsieh*, 1997b [2] and *Fung and Hsieh*, 2001 [3]) concluded that trend-following managed futures shared some behavioural characteristics with Long Lookback Straddle strategies, some confused them with "Long Volatility". While the two start with the word "Long", they are quite different.

To prove that CTAs are actually Long Gamma, Figure 8 shows the scattering monthly returns of the Barclay CTA Index compared to the MSCI World Total Return from 1987 to end of July 2021. This shows CTAs being increasingly exposed to the market trend, regardless its direction, as the cured black lines shows. The Long Gamma effect is seen clearly in the chart, particularly at the fat tails of the global equity index.

Figure 8 : Monthly returns of Barclay CTA and the MSCI World Total indices

Source: Bloomberg, 01.01.1987 –31.07.2021
Past performance is no guarantee of future returns.

CTAs not only help reduce volatility but their performance is also fuelled by it

CTAs differ from Long Volatility strategies not only in that they follow momentum.

The main objective of Long Volatility strategies is to help reduce the level of volatility of a balanced portfolio. CTAs can do that too but they can also do what Long Volatility strategies cannot, namely generate capital appreciation. Moreover. The performance of CTAs is typically helped by volatility.

Let us consider the so-called volatility index, the VIX Index. It is widely used as a measure of market risk of the weighted average of the S&P 500 Index. The simplest way to hedge against a downside move in this equity market is through VIX futures. In order to maintain this hedge, positions in these futures will need to be rolled over every month, paying most of the time the cost of carry. Figure 9 shows the cost of holding such a position (dark grey line). The only time such hedge actually fulfils its objective is during a period of heavy volatility : 2008-2009 / 2011 / March 2020.

We can also see that CTAs (as represented by the Barclay CTA Index) consistently provide protection during equity market stress and generate gains.

Figure 9 : CTAs and market volatility

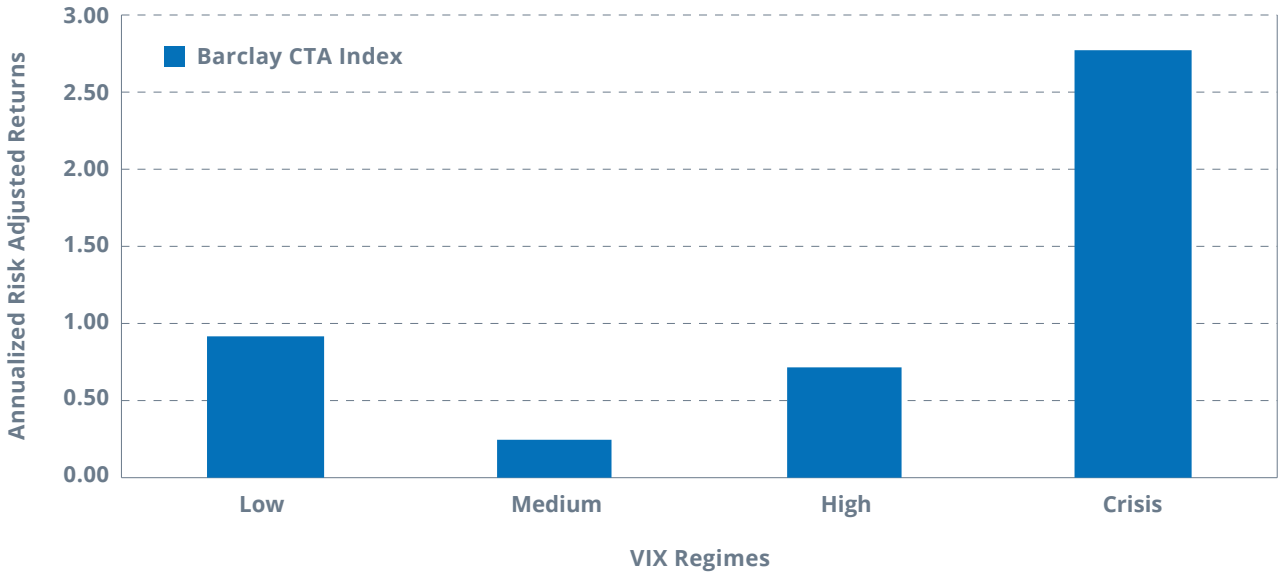
Source: Bloomberg, 01.01.2004 –31.07.2021
Past performance is no guarantee of future returns.

We can also look at the performance of CTAs in different volatility conditions (Figure 10). Based on the Regime Switching Model*, we assessed the performance of the VIX Index returns. We identified 123 monthly periods of low volatility, 148 of medium volatility, 92 of high volatility and 16 of periods of crisis volatility conditions**. For each level of volatility, we then looked at annualised returns adjusted by volatility for the Barclay CTA Index during the each of the periods identified for the VIX Index. We can see that CTAs performed best during the periods of market stress identified through the VIX Index (see Figure 11).

* In the regime switching model, the time series is divided into several regimes that represent different hidden patterns and one specific prediction model can be designed for each regime. In our case, we divided them into the regimes of low, medium, high and crisis volatility.

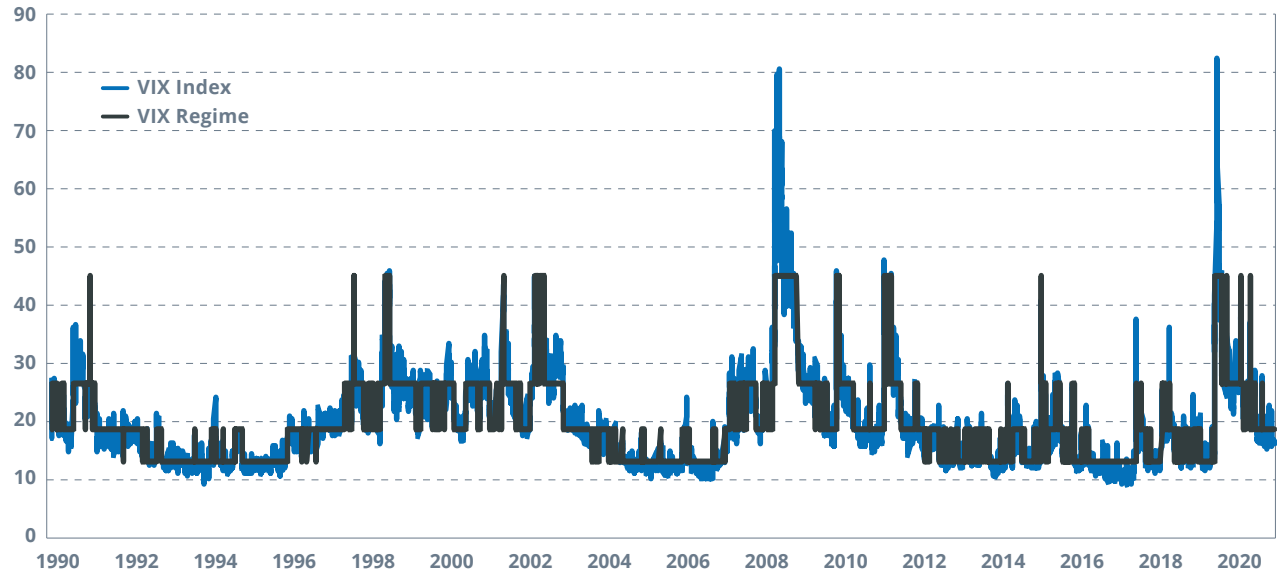
** The volatility bands to classify each period of volatility were determined by an algorithm based on the VIX Index. Currently, for illustration purposes only, the low volatility level averages around 12.7%, medium 18.2%, high volatility 26.4% and the crisis level is at 44.8% (Source: Candriam as at 11.08.2021)

Figure 10 : Different levels of volatility



Source: Candriam, Barclay CTA Index, 31.07.2021
Past performance is no guarantee of future returns.

Figure 11 : Market volatility from 1992 (based on the S&P 500 Index).



Source: Bloomberg, 01.01.1992 – 31.07.2021

Our CTA strategy: how does CANDRIAM do it?

CANDRIAM is recognised among leading European absolute return providers as one of the most experienced and long-established. Having launched our first fund of this type in 1996, we are proud to have delivered market-leading risk-adjusted performance and expertise.

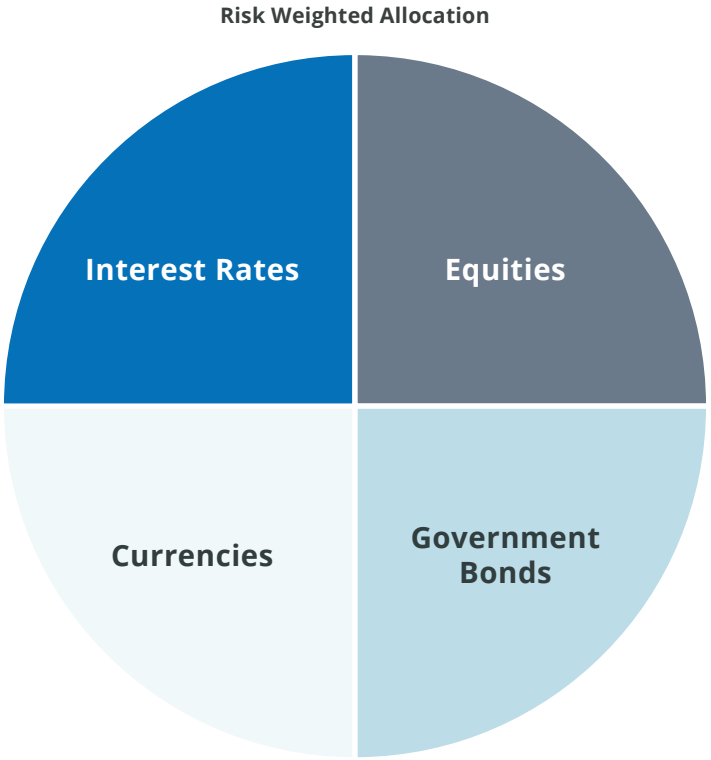
When we built our CTA process, two things were very important to us. We have always been very committed to being responsible caretakers of our investors' assets, particularly in market crises. We believe that trend following strategies can fulfil that function very well. So we wanted to instil this feature within our approach and investment process. We set out to build resilience into our trend-following approach designed to protect performance during changes in market direction or when markets remain trendless for a prolonged period. To achieve this, we considered the merits and characteristics of **both long- and short-term** trend-following models.

A very long-term market trend approach is usually less affected by market's ups and downs over the short term but typically, can be quite unwieldy and hard to manoeuvre if an asset manager does want to take advantage of a short-term market trend. Focusing on short-term trends, on the other hands, carry the required ability to be flexible over the short term but it also can react to market signals that are proved to be false after the strategy changes its allocation in response to them.

Taking all of this into consideration, we have built an approach with **two complimentary models.** It has enough sensitivity to quickly take advantage of opportunities while mitigating the undesirable effects. It achieves, in our view, the appropriate combination of reactivity and resilience that our investors expect.

Within our investment universe we focus on the most liquid assets which allow us to be less affected by falls in liquidity, that tend to occur in times of investor risk aversion. Being caught in market with no liquidity would affect our ability to quickly adopt a new trend.

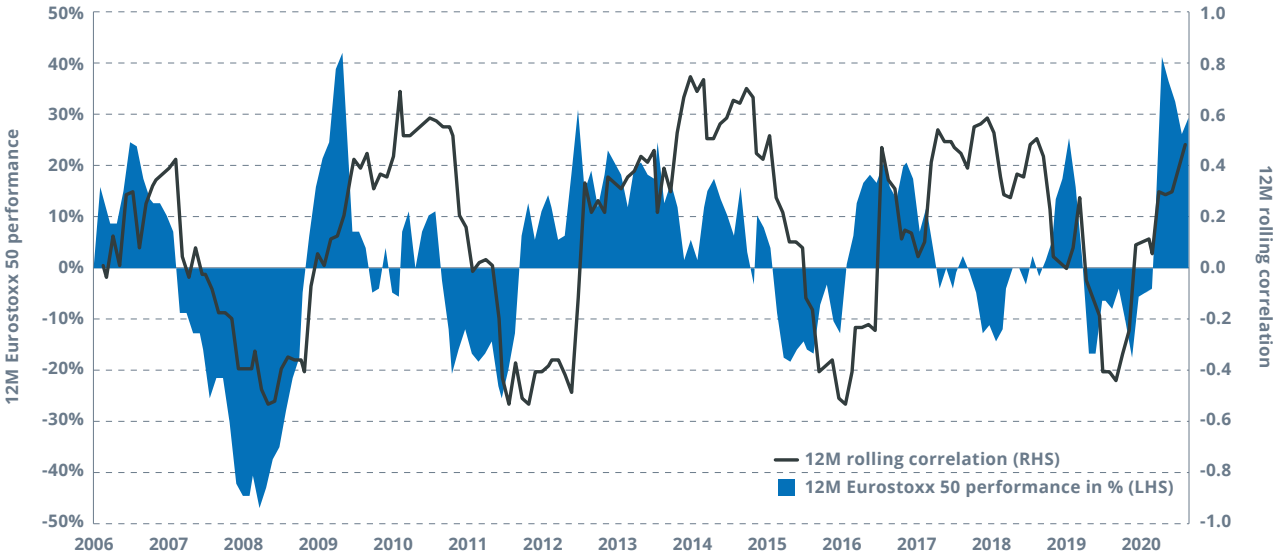
To offer valuable diversification benefits, our strategy has adopted a risk-adjusted allocation process across the main asset classes, allowing us to benefit equally from trends taking place in any of the asset classes we cover.



Our investment process also benefits from position sizing models that adapt quickly to the level of risk in each market. This approach has served us well, with the model reducing its notional market exposure with the onset of the COVID-related market crisis in 2020. It has been key for delivering our CTA's performance and resilience.

As a result, our strategy has demonstrated the flexibility of providing positive correlation in rising markets and negative correlation during the periods of risk aversion (see Figure 12), while at the same time maintaining no overall correlation with most asset classes over the long term.

Figure 12 : Performance of European equities and strategy correlation



Source: Bloomberg, Candriam from Jan 2006 to July 2021.
The EuroStoxx 50 Index is not a benchmark for any of Candriam's CTA-based absolute return strategies.
Past performance is no guarantee of future returns.


ICELAND
Faeroe Is.
(Den.)
Shetland
Orkney
Hebrides
Wick
UNITED
KINGDOM
Northern
Ireland
Belfast
Dublin
IRELAND
Limerick
Cork
Aberdeen
Dundee
Edinburgh
Glasgow
Newcastle
Leeds
Hull
Liverp
London
Cardiff
Bristol
Land's End
ENGLISH CHANNEL
Le Havre
Brest
Nantes
Bay of Biscay
Santander
Bilbao
Gijon
La Coruña
C. Finisterre
Vigo
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Sardinia
Cagliari
Balearic Islands
Palma
Barcelona
ANDORRA
Bejaia
Algiers
Skikda

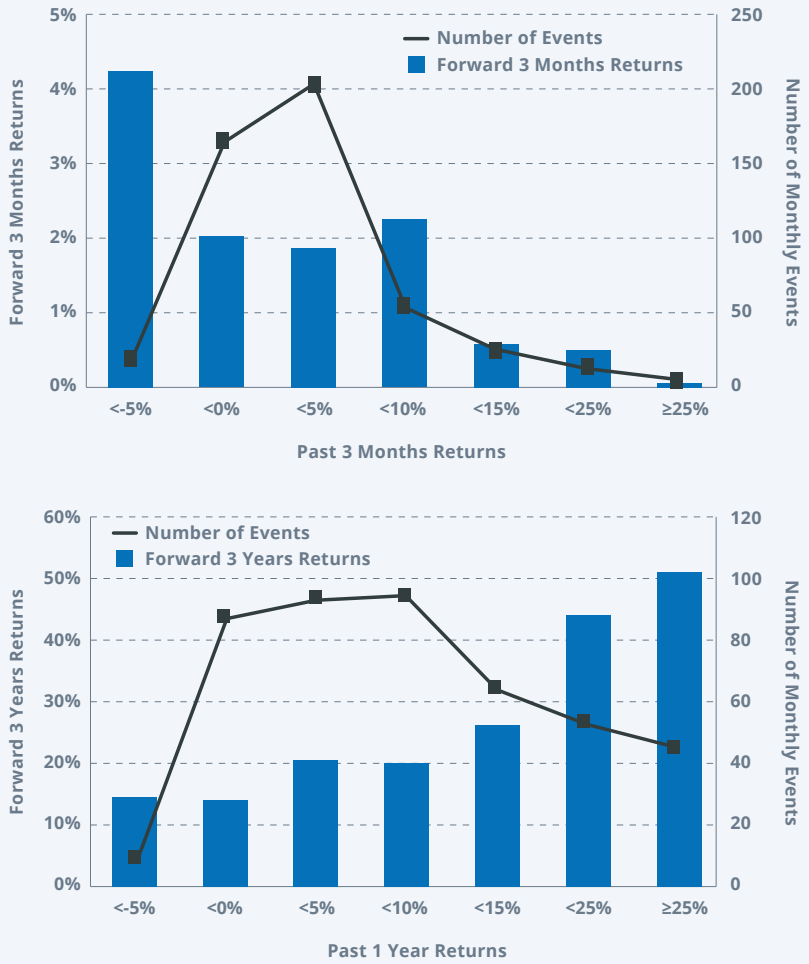
When is the best time to invest: buy low, sell high?

Can we apply a trend following strategy to time an investment into CTAs?

If we do, then it would mean investing after a period of their strong performance.

To answer that question we looked at the performance of CTAs (as defined by the Barclay CTA Index) over two different periods with different investment horizons.

Figures 13 & 14 : Performance of the Barclay CTA Index from Aug 1980 to July 2021



Source: Bloomberg, 01.08.1980 - 31.07.2021
Past performance is no guarantee of future returns.

First we looked (Figure 13) at how CTA performance may have changed over the 3 months following seven specific performance periods.

We found that the period of strong performance was followed, on average, by about three months of below average performance. This showed that CTAs are not well suited to be used as a short term momentum based investment strategy.

However, the three months of below average performance (typically returning under 5%) were typically followed by an above average performance. This means that investors trying to find the best point of entry could invest towards the end, or just after the end of the three months' period following the correction.

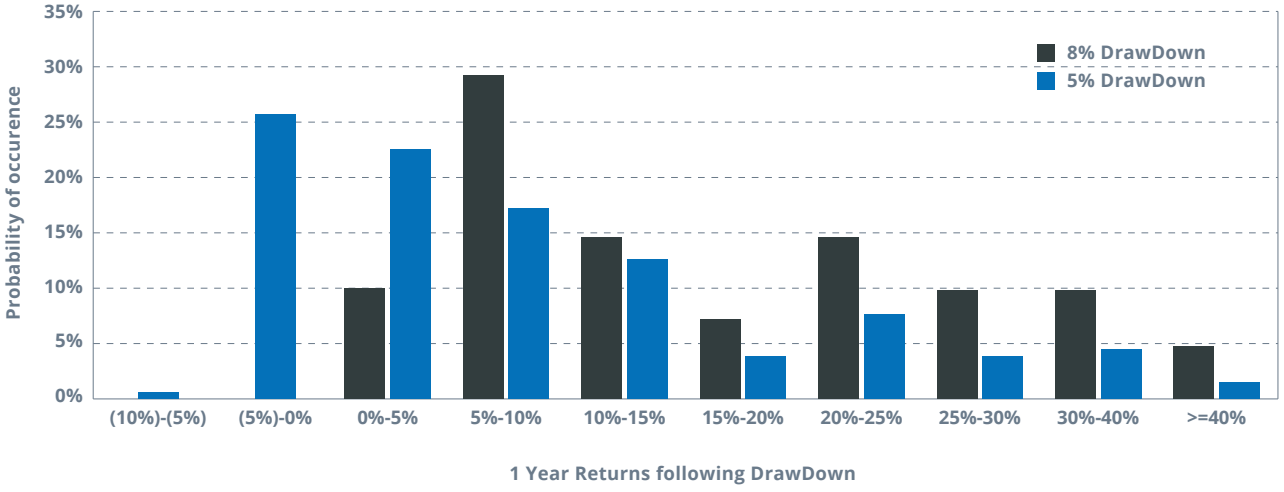
Then we looked at a 3-year investment horizon (Figure 14).The chart shows that the strongest performance over one year are followed by strong returns for the next three years.

In other words, the long term CTA performance record does not provide us with an obvious weak point which can serve as a good point of entry just before a pickup in performance. **When looking to invest in CTAs for the long term, the timing of investment does not matter so much.**

But how about the old rule of buying low, selling high? To confirm it, we looked (Figure 15), at the 1 year return of the Barclay CTA Index's after drawdowns of 5% and 8 %. From 1980 to July 2021, the index encountered 129 declines exceeding 5%, which included 41 instances when they exceeded 8%.

After a 5% drawdown, the 1-year performance was, on average, 8.7%, while the performance after a 8% drawdown was around 17.6%. This confirms that, for investors looking to time their entry, investing after a drawdown could represent a good time to buy.

Figure 15 : Bouncing back: CTA 1 year returns after declines of 5%-8%



Source: Bloomberg, 01.01.1980 – 31.07.2021
Past performance is no guarantee of future returns.

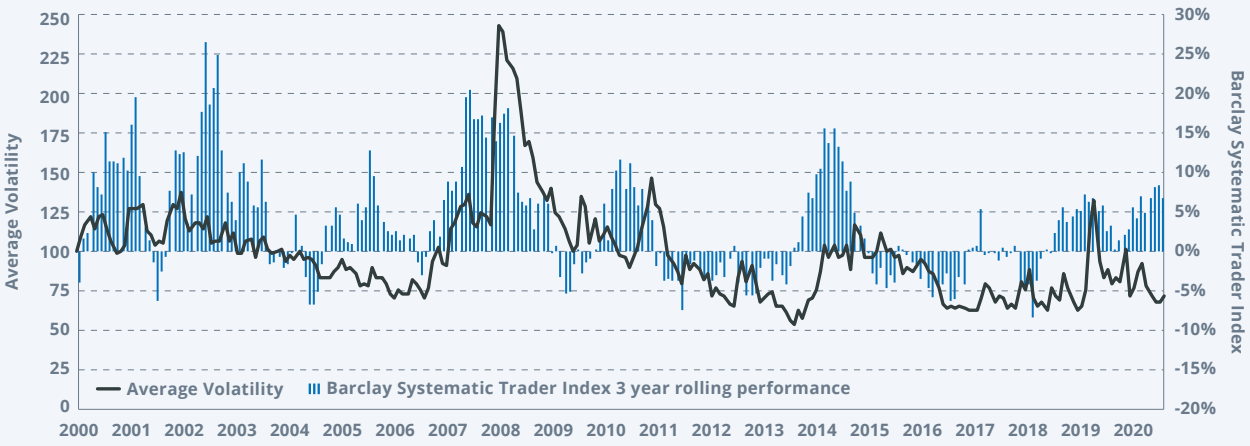
Market cycles and CTA performance

The average realised volatility of major asset classes can provide an insight into the prospects for CTA performance.

Although it is often thought that CTAs perform best during periods of particularly high market volatility, in fact our evidence shows that they require only a minimum level of volatility to perform in line with expectations.

Figure 16 shows that CTAs perform well during periods when the level of market volatility is either above its historical lows or expected to rise.

Figure 16 : Barclay Systematic Trader Index / Average volatility of the main asset classes*



*Equally weighted volatility across the equity, fixed income, currencies and commodities asset classes.
Re-based to 100 as at 01.09.2000.
Source: Candriam, Bloomberg, 01.09.2000 – 31.07.2021
Past performance is no guarantee of future returns.

Conclusion

In this paper, our objective was to give an overview of CTAs as a distinctive investment tool of absolute return strategies.

The CTA market has grown by leaps and bounds, particularly since the Subprime Market Crisis when they proved to be extremely effective in mitigating adverse market movements for balanced portfolios. However, they can still be often misunderstood by some investors. In this paper, we covered CTAs' main benefits, the source of their performance, their strengths and weaknesses in different market environments and explored the question of when is the best time to invest in CTAs.

We have also looked at how these strategies can be used to boost returns and enhance risk/return characteristics of a balanced portfolio consisting of equities and bonds. The data on historical performance and volatility we reviewed (see Figures 3, 4 and 5) showed that managed futures can be an efficient tool to mitigate risk.

Some of the most important benefits of CTAs originate from their ability to invest across several asset classes, which take account of, market cycles, behavioural finance and diversification. Having reviewed the performance of CTAs in different environments, we can conclude that they perform well across different levels of market volatility. During periods of market stress and dislocation, CTAs can serve very effectively as tail risk hedge.

Finally, we studied entry points for investing in CTAs. While investing in CTAs is recommended over the long term, our data pointed to periods of drawdown the best time to invest. In other cases, the very early stage of any significant investment theme is also a good entry points, regardless of whether this trend is in a rising or down market.

Indices Description

BarclayHedge CTA Index (Source: Bloomberg)
The Barclay CTA Index provides a benchmark of representative performance of commodity trading advisors (CTAs). In order to qualify for inclusion in the Index, a CTA must have four years of prior performance history. When a CTA already in the Index introduces an additional program, this additional program is added to the Index after its second year. In order to limit potential upward bias, only CTAs with at least four years of performance history are included in the Index and the performance history begins with year five, ignoring the first four years of performance. In 1999, 319 CTA programs were included in the calculation of the Barclay CTA Index. The index is unweighted and rebalanced at the beginning of each year.

Bloomberg Barclays US Agg Total Return Value Unhedged USD (Source: Bloomberg)
The Bloomberg Barclays US Aggregate Bond Index is a broad-based flagship benchmark that measures the investment grade, US dollar-denominated, fixed rate taxable bond market. The index includes Treasuries, government-related and corporate securities, MBS (agency fixed-rate and hybrid ARM pass-throughs), ABS and CMBS (agency and non-agency).

MSCI World Net Total Return USD Index (Source: Bloomberg)
MSCI Daily Total Return Net World USD. Morgan Stanley Capital International Equity Indices in US Dollars. Indices with net dividends reinvested use the same dividend minus tax-credit calculations, but subtract withholding taxes retained at the source for foreigners who do not benefit from a double taxation treaty.

Risks

The most important risks to CTAs are loss of capital, liquidity risk, derivatives risk, and model risk.

References

If you are interested to learn more about the mechanisms of market trend following and would like to read technical research on this topic, we would recommend the work of Chordia and Shivakumar, 2006 [4], which shows how momentum strategies are linked to macro-economic variables related to business cycles through dividend yields, default spreads, bond yields. In addition, Kessler and Scherer, 2010 [5] explain why macro momentum strategies perform well during recessions. This is particularly interesting, given that CTAs are usually seen as a tool for hedging tail risks, even though they also enhance capital growth in different market environments.

[1] Fung and Hsieh, "Empirical Characteristics of Dynamic Trading Strategies: The Case of Hedge Funds," *Review of Financial Studies*, vol. 10, pp. 275-302, 1997.

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[4] Chordia and Shivakumar, "Momentum, Business Cycle and Time-Varying Expected Returns," *Journal of Finance*, vol. 57, no. 2, pp. 985-1019, 2002.

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