

On the economic rationality of CTAs



JUNE 2023

Marketing communication



About the authors.

Johann Mauchand

Senior Systematic Fund Manager



Johann Mauchand has been a Systematic Fund Manager at Candriam since 2013.

He began his career as a statistical arbitrage analyst at HSBC in 2005, joining Candriam a year later as a quantitative alternative management analyst. He took up his current role in 2013.

He has master's degrees in mathematics from the University of Dijon in France and in financial engineering from the University of Evry in France.

Steeve Brument

Head of Quantitative Multi-Asset Strategies
Deputy Global Head of Multi-Asset



Steeve oversees CANDRIAM's systematic and global macro funds. He started his career in 1997 within the private client group of Merrill Lynch before moving to Refco Securities as in the equity derivative division in 1999. He joined CANDRIAM as a Systematic Fund Manager in 2001, when he conducted extensive research on trading systems and systematic portfolio allocation. In 2007, he became Head of Systematic Funds, and became one of the first to diversify from the traditional trend following, by mixing trend following, pattern recognition and counter trend models. His team was among the first in the industry to offer an CTA UCITS fund. Steeve holds a Masters with honors from the Ecole Supérieure de Gestion-Finance in Paris.

Table of contents.

Summary	03	Return analysis	11
CTA: From observation to modeling...	04	Economic cycle and asset class performance	11
Hope for the best, prepare for the worst	04	More than just returns: analyzing risk/return profiles	14
Trends are CTAs' performance drivers	05	Conclusion: CTAs are a mathematical modelling of an economic reality	15
The three performance drivers of CTAs	06	Index description	17
Are CTA strategies "economically rational"?	07	Risks	18
Business cycle and macro trends	07	Notes & References	18
Defining macroeconomic cycles	08		

Summary.

With the onset of the inflationary cycle and the change in central bank monetary policy, markets have entered a new paradigm, leaving investors uncertain as to the direction that markets will take next, and the timing of the transition into the next phase of the economic cycle.

The merits of CTA (Commodity Trading Advisors) strategies in periods of crisis/recession are often touted: decorrelation from the main asset classes, resilience of performance even in times of crisis, reduction of volatility and drawdowns when added to a balanced portfolio. **Do these qualities hold true in all phases of the business cycle?**

Although trend-following strategies are based on mathematical modelling, **they are not disconnected from economic activity**. Macro factors are part of their performance drivers. **So can CTAs be considered "economically rational"?**

To verify this, we have analyzed their behavior in the various phases of the cycle: recovery, expansion, peak and recession. We came up with the following observations:

- CTAs deliver positive performance in all phases of the cycle.
- Adding them to a traditional 60/40 balanced portfolio is a performance enhancer in all phases of the cycle except the expansion phase - in which no asset class outperforms equities.
- If we extend the analysis to risk-adjusted returns, the positive contribution of CTAs is observed in all phases: the risk/return profile of the balanced portfolio is improved in all periods under review.

In view of these factors, it seems clear to us that investors, even when plunged into uncertainty about the position in the economic cycle and the direction the markets will take, will generally be well advised to include a CTA allocation in their portfolio.



Mathematics is about proving the obvious by complex means.

- George Pólya (1887-1985)

CTA: From observation to modeling...

Hope for the best, prepare for the worst

One year... is all it took for the major central banks to return to interest rate levels not seen since the global financial crisis of 2008. And with good reason: the galloping inflation triggered by the 2020-2021 lockdowns and the war in Ukraine in 2022 pushed the main indicators to levels not seen for decades.

To date, year-on-year Core CPI stands at 5.3% in the USA, 5.3% in the European Union and 7.1% in the UK, for key interest rates of 5.25%, 3.5% and 5% respectively.¹ Although inflation has generally eased, a number of questions remain, representing sources of risk for investors: the dynamics of monetary policies and their impact on inflation, which remains high and far from the target level, the issues faced by US regional banks in the face of massive customer withdrawals and their bailouts (SVB, First Republic), questions linked to the full-employment market and wage increases... Can we still hope for a soft landing and continued growth, or should we expect a general tightening of macroeconomic conditions, leading to a recession?

What to do in the face of so much uncertainty? In any case it is in the investor's best interest to prepare for the various possible scenarios.

//

Uncertainty is the worst of all torments.

- Alexandre Dumas

Trends are CTAs' performance drivers

Economic cycles are reflected in directional movements on financial markets. With this in mind, *managed futures* or, more commonly, CTAs (Commodity Trading Advisors), are designed to seek to capture these upward and downward movements. To this aim, they implement long/short strategies based on mathematical models. In our paper "[Going with the trend](#)" we presented CTAs' performance drivers, namely macroeconomic cycles, behavioral finance and diversification.

CTAs are generally known and recognized for their behavior during periods of turbulence or even crisis, where they tend to offer decorrelation, performance generation, reduction of the volatility of a 60/40 diversified portfolio, and improvement of its risk/return profile. We illustrated these features in a previous article "[CTA's: Ride of the Valkyries](#)" where we analyzed the contribution of CTAs in various market stress situations: financial, geopolitical or health crises, and recession phases. We notably highlighted **their "tail risk hedge" function**. But beyond periods of market stress, how do these features behave in the various phases of the economic cycle? **Do CTA strategies perform better in some phases than in others?**

We thought it would be interesting to study the behavior of funds of *Managed Futures* during the different phases that form macroeconomic cycles: expansion, peak, recession and recovery.



The three performance drivers of CTAs

All CTA strategies, regardless of their approach, are fuelled by three key factors: macro cycles, behavioral 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 equities, bonds, commodities and currencies.

Behavioral finance studies key human traits or behaviors 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 eventually once they correct their positions having first effectively over- or under-reacted in their trading decision. CTA strategies can exploit biases in human behavior in financial markets. For example, investors tend to over- and underreact.

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 track 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.

Are CTA strategies "economically rational"?

CTAs are based on mathematical models that can appear complex. However, they are not disconnected from economic reality. As we just recalled, they capture and exploit trends, which in turn depend on the evolution of macroeconomic variables, and one of the most concrete factors explaining the performance of CTA strategies is the macroeconomic factor, more specifically macroeconomic cycles. Consequently, **could we say that trend-following strategies have "economic rationality", or that they are "economically rational"?**

The trends that CTAs seek to exploit depend on the sub-periods or the longer or shorter phases of a business cycle - **expansion, peak, contraction and recovery** - which themselves have trend patterns. The longer the periods last, the more momentum strategies are able to detect them and seek to benefit, through buy or sell positions, from the generated bullish or bearish movements. These phases can be observed on the various types of financial assets: equities, commodities, bonds and currencies.

Business cycle and macro trends

To illustrate our point, let's consider an environment of growing demand and consumption. Growth generates an increase in production and a subsequent need for raw materials, supporting the prices of base metals and energy. Countries producing/exporting these goods (Canada or Australia, for example) should legitimately see their GDP expand, along with local stock market indices and currencies, generating inflation. To counter inflationary risks, monetary policies will be put in place, inducing movements in local bonds, currencies etc..., self-feeding the process until the economy enters a phase of contraction.

In this example, several trends should materialize: bullish momentums on base metals and energy, Canadian and Australian dollars and local indices, and conversely, bearish momentums on local bonds due to rising rates. Readers wishing to delve deeper into this can refer to the work of Chordia and Shivakumar, 2006², which shows that trend-following strategies are linked to macroeconomic variables that are themselves linked to economic cycles (dividend rates, default spreads, three-month Treasury yields and term structure spread), or the work of Kessler and Scherer, 2010³, which highlights how well macro momentum strategies work during recessions. The latter is particularly interesting since CTAs are generally considered as a hedge against extreme risk, even though they may produce capital growth in all environments, as we shall see later.

Defining macroeconomic cycles

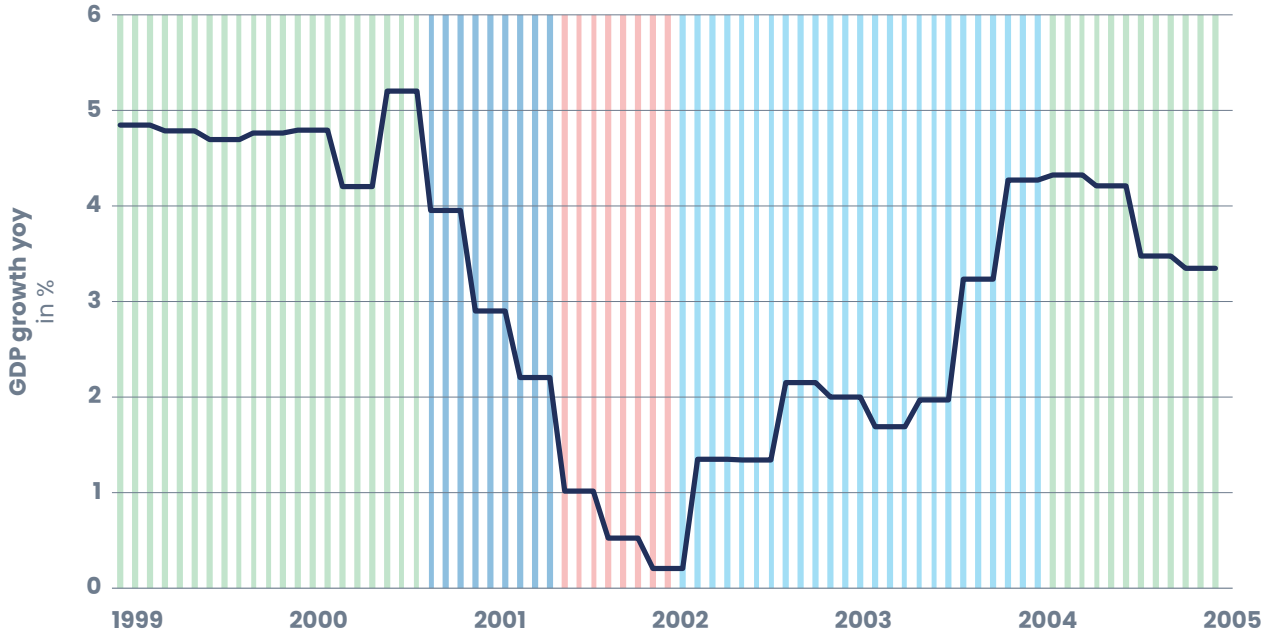
While it is generally accepted that **economic activity evolves in successive phases of expansion and slowdown, forming cycles**, there is no single definition of their components, and the number of these components varies from one author to another. For the purposes of our analysis, we had to define these phases.

We based our analysis on the *recession* and *growth* cycles defined for the USA by the NBER (US National Bureau of Economic Research), which seemed natural to us insofar as the US economy plays a major role in the pace of the global economy.

While these periods of recession and growth are clearly identified, the phases of recovery, expansion and peak are usually only described as sub-periods of the **growth** cycle - so we also needed to define them. Taking annual US GDP growth as a reference, we define **recovery** as the period during which GDP growth returns to its observed average level; we define **expansion** as the period during which growth evolves smoothly around an average level; and **peak** as the period when GDP begins to decline until the **recession** phase starts.

Figure 1:
Illustration of GDP growth over a business cycle

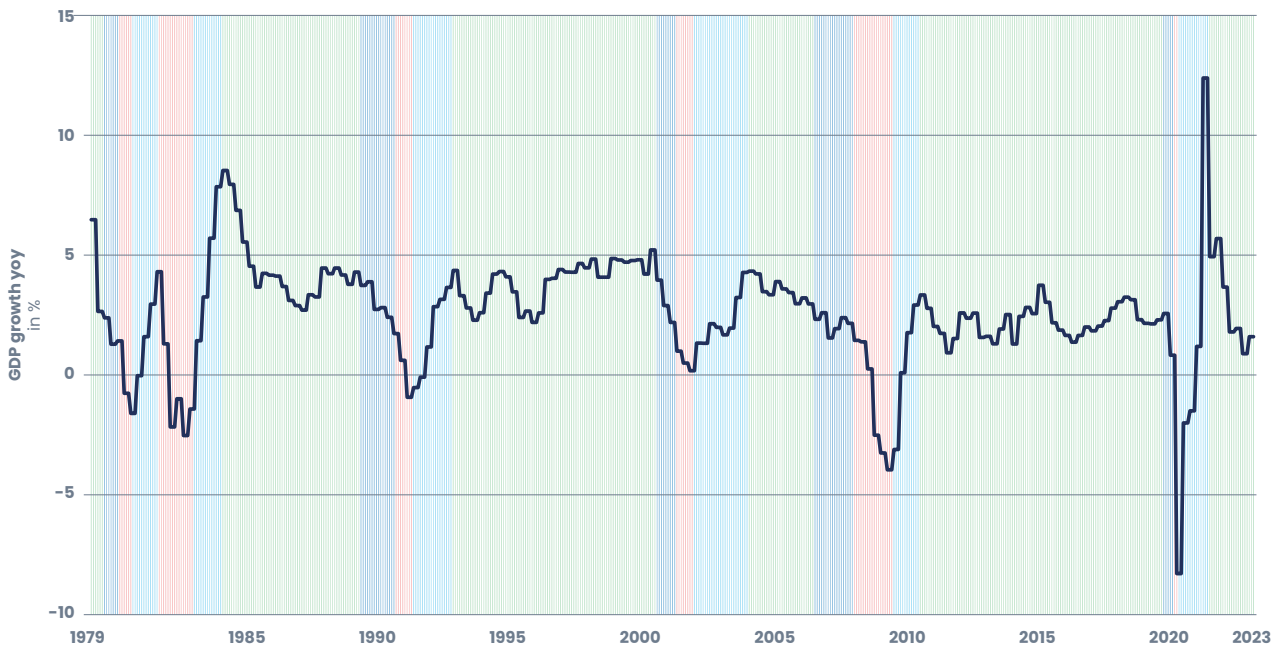
■ GDP Growth
■ Recession
■ Expansion
■ Recovery
■ Peak



Source: Candriam, Bloomberg, June 2023

Figure 2:
Evolution of US GDP and definition of business cycle phases, 1979-2023

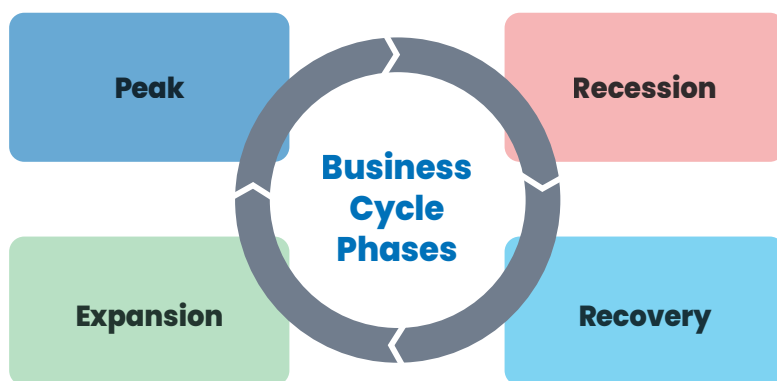
■ GDP Growth
■ Recession
■ Expansion
■ Recovery
■ Peak



Source: Candriam analysis, based on NBER and Bloomberg data, June 2023

Figure 3:

The four phases of the business cycle



Source: Candriam

Over the period 1980–2023, we analyzed the behavior of various asset classes during different phases of the cycle: equity markets (MSCI World Total Return Index), bond markets (Barclays Aggregate Bonds Index), CTAs (BARC CTA Index) and gold (XAU Currency). You will find the definitions in the appendix.

Return

Return analysis.

Economic cycle and asset class performance

Equity markets tend to perform well during periods of recovery and expansion, but their returns weaken drastically at the end of the growth cycle (after the peak) and suffer during recessions. Conversely, bond markets perform best during peak and recession phases: as equity markets begin to slow down and perceptions and probabilities of recession risks increase, portfolio allocations shift towards a greater proportion of bonds, with the flight to quality fuelling the trend.

During periods of recovery and expansion, as the bond market generates less value, investors shift to equity markets, releasing some buying pressure from bond markets. Gold is often identified as a "safe haven" and known for offering decorrelation from equities and resilience during crises.

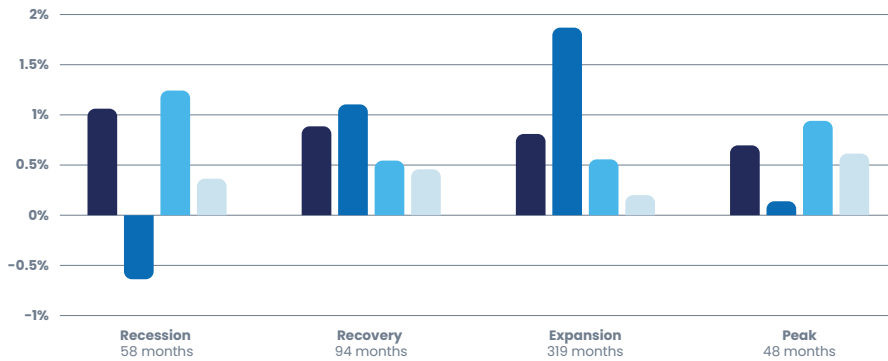
It's relatively easy to find an economic rationale for the behavior of these asset classes. What about CTAs?

Now that we have defined the four periods of the business cycle (figure 2), let's analyze the average monthly performance of the main asset classes during these phases.

Figure 4:

Average monthly performance of the main asset classes during the various phases of the economic cycle, 1980-June 2023

■ BARCCTA Index ■ BARC Bonds
■ MSCI World Total ■ Gold



It is during periods of recession that CTAs deliver their highest performance and reveal their main advantages. But they deliver positive performance in all phases of the cycle.

Past performance of a given financial instrument or index or an investment service or strategy, or simulations of past performance, or forecasts of future performance do not predict future returns.

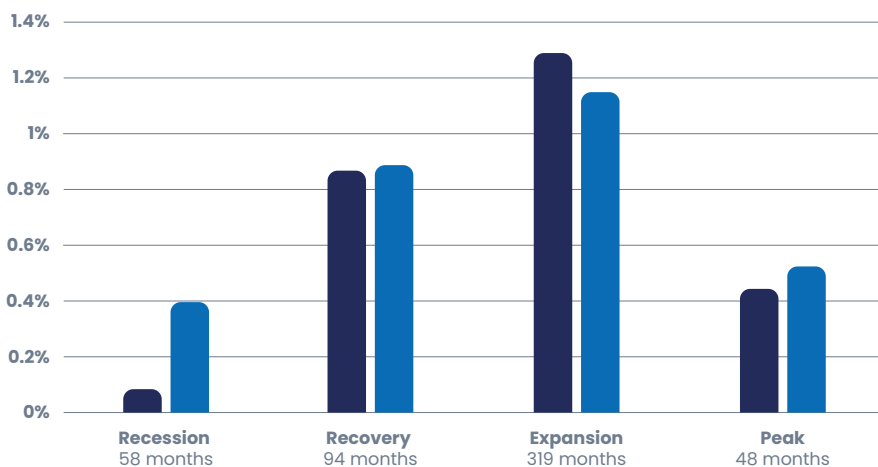
Source: Candriam, June 2023.

We also analyzed the behavior, over the same periods, of a 'traditional' portfolio (60% equities - MSCI World Total Return index - and 40% bonds - Barclays Aggregate Bonds index) compared with that of an 'alternative' portfolio (70% traditional portfolio, 30% BARC CTA index).

Figure 5:

Average monthly performance of a traditional reference portfolio (60% equities/40% bonds) and an alternative portfolio (70% traditional/30% BARC CTA index) over the various phases of the economic cycle (1980-June 2023)

■ Ref Ptf ■ Alt. Ptf



Adding CTA strategies to a traditional balanced portfolio improves performance in three of the four phases of the economic cycle.

Past performance of a given financial instrument or index or an investment service or strategy, or simulations of past performance, or forecasts of future performance do not predict future returns.

Source: Candriam, June 2023.

As we already mentioned in our article "[CTA's: Ride of the Valkyries](#)", it is during periods of crisis and recession that CTAs tend to deliver their best performance and reveal their main advantages. As such, it seems legit that they are seen as a risk-hedging investment. But as we have shown here (figure 4), they **are able to deliver value in all phases of the cycle**. What's more, of all the asset classes studied, Managed Futures present **the most robust profile across all phases**, displaying the lowest dispersion of their monthly returns (figure 6).

Figure 6:
Dispersion of monthly returns for the main asset classes (1980-June 2023)



CTAs have the lowest dispersion of their average returns throughout the different phases of the cycle.

Past performance of a given financial instrument or index or an investment service or strategy, or simulations of past performance, or forecasts of future performance do not predict future returns.
Source: Candriam, June 2023.

Furthermore, we showed in figure 5 that adding CTAs to a traditional portfolio produces attractive results in most phases, with the exception of the expansion phase. This comes as unsurprising to us, given the diversified nature of CTAs (underlying assets: equities, bonds, currencies, commodities, etc.), which makes them unable to compete with equity market returns in this expansion phase. The same applies to the contribution of bonds in a traditional portfolio.

In addition to these various advantages, we will not repeat the advantages of CTAs as market crisis buffers ("[CTA's: Ride of the Valkyries](#)"), as crises may occur at any time, including in expansion phases.

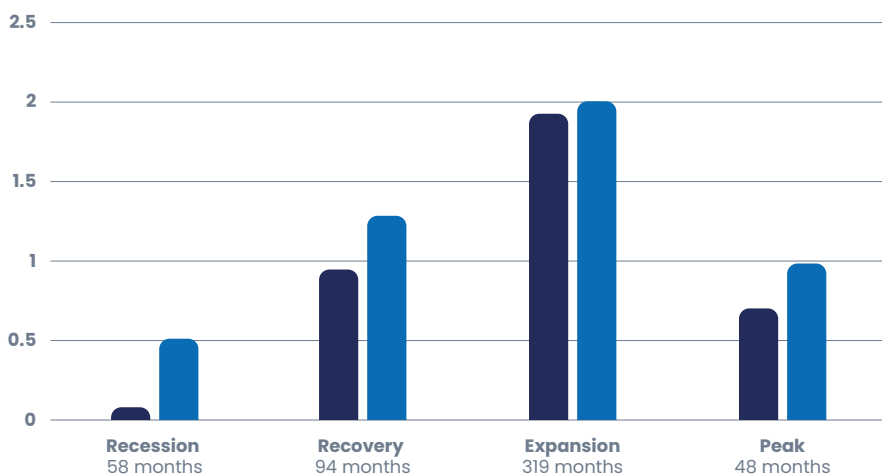
More than just returns: analyzing risk/return profiles

If we analyze risk-adjusted returns over the various periods, instead of focusing on average monthly returns, the findings are even more flattering. We can calculate a Sharpe ratio "proxy"⁴, by dividing average performance by an average volatility over each phase⁵. Figure 7, that displays this statistic, clearly shows how the addition of CTAs **improves the risk-adjusted returns of a balanced portfolio**.

Figure 7:

Risk-adjusted returns of a 'traditional' portfolio (60% equities/ 40% bonds) and an 'alternative' portfolio (70% traditional portfolio/ 30% BARC CTA index) over the various phases of the economic cycle (1980-June 2023)

■ Ref Ptf
■ Alt. Ptf



Adding CTAs to a balanced portfolio improves its risk-adjusted returns, in all phases of the cycle.

Past performance of a given financial instrument or index or an investment service or strategy, or simulations of past performance, or forecasts of future performance do not predict future returns.

Source: Candriam, June 2023.

Just like we can explain the behavior of traditional assets through the phases of the economic cycle with macroeconomic logic, we observe that **the performance of CTA strategies, which by construction are based on monitoring and exploiting trends, seem to capture these trends, regardless of the phase of the cycle or the macroeconomic factors generating them. In this respect, we claim that CTAs are "economically rational"**.

Conclusion: CTAs are a mathematical modelling of an economic reality.

The anxiety-inducing context of the recent years and the abrupt moves observed on the financial markets raise many questions about the paths markets could take in the near future. Indeed, the latest macroeconomic data make it difficult to draw a clear scenario for the short-term behavior of the world's various economies, and the G7 in particular. Add to this the fact that equity markets are at record highs, against a backdrop of drastic rate hikes – how bleak is the outlook?

In response to investors' questions, and with the aim of bringing perspective to their portfolio allocation dilemmas, we have studied the behavior of CTAs during the various phases of the economic cycle – expansion, peak, recession and recovery – and their contribution as diversifiers of a traditional 60/40 portfolio.

We observe that **funds of Managed Futures generate positive performance in every phase of the cycle, with less dispersion than the other asset classes.** On the other hand, adding CTAs to a balanced portfolio enhances performance in all phases of the cycle, except the expansion phase – just as bonds struggle to add value to equities in an expansionary environment. However, **whatever the phase of the cycle, adding CTAs to a traditional balanced portfolio could help to improve its risk/return profile.**

Funds of Managed Futures are an essential portfolio diversification tool, not only in times of crisis but also in all phases of the cycle, for their contribution to performance and reduction of volatility and drawdowns. While we don't know what tomorrow will bring, our intuition suggests that, as time goes by, the probability of leaving the current expansionary cycle increases, making diversification through CTAs all the more attractive.



Uncertainty is still hope.
- Alexandre Dumas



Index description.

BarclayHedge CTA Index:

Bloomberg source

The BarclayHedge 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:

Bloomberg source

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:

Bloomberg source

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.

All investments involve risks, including the risk of capital loss.

The most significant CTA risks are:

- Risk of capital loss
- Interest rate risk
- Equity risk
- Currency risk
- Derivatives risk
- Volatility risk
- Emerging markets risk
- Arbitrage risk
- Leverage risk
- Counterparty risk
- Model risk.

This list is not exhaustive and more details on risks associated with investing in the strategy are available in the Prospectus and KID.

Notes & References.

- 1 Source : Bloomberg, June 2023
- 2 Chordia and Shivakumar, "Momentum, Business Cycle and Time-Varying Expected Returns," *Journal of Finance*, vol. 57, no. 2, pp. 985-1019, 2002.
- 3 Kessler and Scherer, "Macro Momentum and the Economy," *Working Paper*, 2010.
- 4 As our calculations do not take the risk-free rate into account, we cannot speak explicitly of a Sharpe ratio, but only risk-adjusted returns.
- 5 For a given phase, we calculate an average of the recorded volatilities, weighted by the length of each period in that phase.



€139 B

**AUM at end
December 2022***



600

**Experienced and
committed professionals**



+ 25 years

**Leading the way in
sustainable investing**

This commercial document is provided for information purposes only. It does not constitute an offer to buy or sell financial instruments, an investment recommendation or a confirmation of any transaction, unless otherwise specified. Although Candriam carefully selects the data and sources used, errors or omissions cannot be excluded a priori. Candriam cannot be held responsible for any direct or indirect damage resulting from the use of this document. Candriam's intellectual property rights must be respected at all times and the contents of this document may not be reproduced without prior written authorization.

Warning: past performance, simulations of past performance and forecasts of future performance of a financial instrument, index, strategy or investment service are not reliable indicators of future performance. Gross performance may be influenced by commissions, fees and other charges. Performance expressed in a currency other than that of the investor's country of residence is subject to exchange rate fluctuations, with a negative or positive impact on gains. Si ce document fait référence à un traitement fiscal particulier, une telle information dépend de la situation individuelle de chaque investisseur et peut évoluer.

Candriam recommends that investors consult the key investor information document, the prospectus and any other relevant information, including the net asset value of the funds, on its website www.candriam.com before investing in one of its funds. Investor rights and complaint procedures are available on the dedicated regulatory pages of the Candriam website <https://www.candriam.com/en/professional/legal-and-disclaimer-candriam/regulatory-information/>. This information is available in English or in the local language of each country where the fund is authorized for sale. In accordance with applicable laws and regulations, Candriam may decide to terminate the marketing arrangements for the funds concerned at any time.

*As of 31/12/2022, Candriam changed the Assets Under Management (AUM) calculation methodology, and AUM now includes certain assets, such as non-discretionary AUM, external fund selection, overlay services, including ESG screening services, [advisory consulting] services, white labeling services, and model portfolio delivery services that do not qualify as Regulatory Assets Under Management, as defined in the SEC's Form ADV. AUM is reported in USD. AUM not denominated in USD is converted at the spot rate as of 31/12/2022.



CANDRIAM. INVESTING FOR TOMORROW.
WWW.CANDRIAM.COM

CANDRIAM 
A NEW YORK LIFE INVESTMENTS COMPANY