LOMBARD ODIER
INVESTMENT MANAGERS

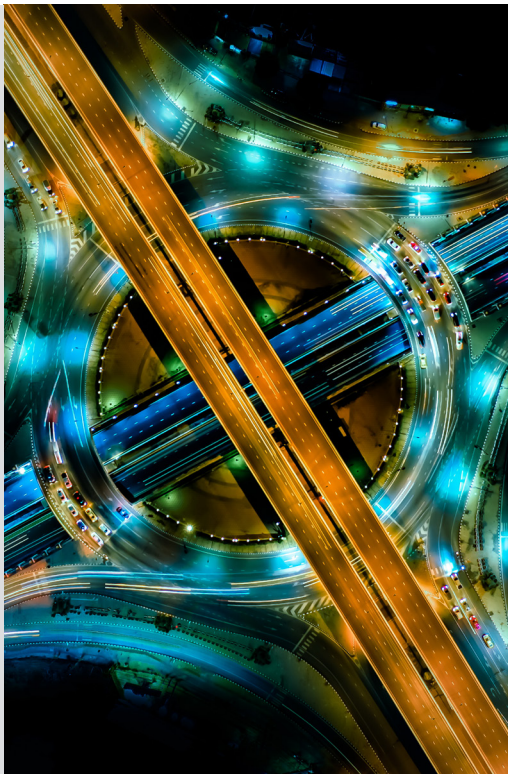
Simply put
Quarterly edition

Clear insights into multi-asset investing, macro and research

For professional investor use only • Multi Asset **Q2 2023**

Key points

- Faced with a multiplicity of scenarios, being wedded to a single one is unwise – we prefer the nimbleness of a risk-based process. **See p.2-4**
- Our process suggests it is not a good time to be adding to risky assets. The blurred picture emerging from the current flurry of scenarios favours cash and improved diversification. **See p.5-6**
- Our core scenario has moved from expecting a 'soft landing' to a 'normal landing' over the quarter – a fifth scenario that balances hard and soft elements. **See p.8-10**
- Sustainability will continue to be one of the key drivers of future risk and return, and the integration of these objectives into portfolio construction does not need to come at the expense of other core objectives, in our view. **See p.11-14**
- A systematic strategy may benefit from carefully crafted signal smoothing to find a good reactivity-to-turnover balance. The climate transition will impact the commodities universe through supply and demand imbalances, ultimately affecting future performance. **See p.15-17**



Contents

When the number of scenarios grows, uncertainty dominates markets and investors' positioning is weak and unstable, possibly switching from one scenario to the next too fast or too frequently.

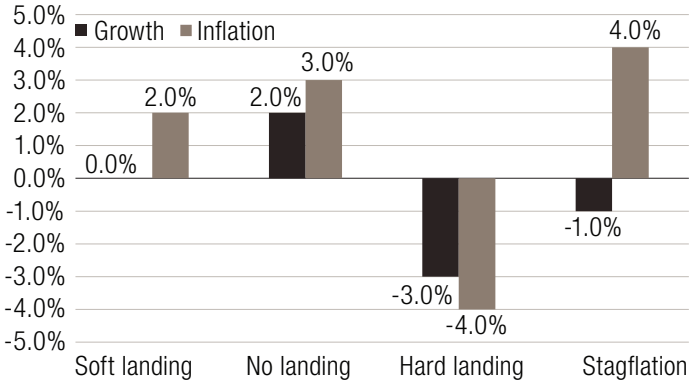
THE CIO'S PERSPECTIVE
Faced with multiple scenarios? Don't be wedded to just one

Aurèle Storno
Chief Investment Officer

In a nutshell

- Macro and market risks have presented investors with at least four different scenario , including a "hard landing" and a "no-landing" situation.
- Each scenario comes with very different market implications, which should prompt investors to select different asset allocations.
- Risk-based investing means smoothly adapting portfolios to what we know about the current environment: using such a process means not being wedded to a single scenario, which is a core principle of our portfolio construction philosophy.

FIG. 1 THE FOUR SCENARIOS



Source: LOIM, Bloomberg.

Between the banking sector's rising risk, higher systemic risk and the uncertain disinflation trend, a multitude of possible scenarios have emerged of late. Remaining loyal to our investment philosophy, we believe that betting on just one scenario is a risky idea. Diversification is not only about combining asset classes, but also making sure that the techniques and indicators we use to combine them are flexible enough to adapt to changing and uncertain news flow. This opening section delves into this topic, with our long-held mantra: don't be wedded to just one scenario. Here is why.

Four scenarios set by markets

One of the most confusing elements of today's market conditions is the wide variety of scenarios that are possibly driving asset volatility. This question of scenario setting has often animated our investment debates and research efforts. When the number of scenarios is limited (even though tail risks always remain), confusion can reign across markets but at some point, investors end up agreeing on a given scenario, leading to a reduction in uncertainty and trending markets.

When the number of scenarios grows, uncertainty dominates markets and investors' positioning is weak and unstable, possibly switching from one scenario to the next too fast or too frequently. Higher volatility and changing trends are a reflection of uncertainty and disagreement among investors. As the reader will be aware, one of our key investment principles is to be open and flexible, and not be wedded to a specific single scenario, but rather aiming to adapt and rebalance smoothly and progressively.

As of today, we have narrowed down the list of current macro scenarios to four dominant cases, presented in figure 1.
We characterise them using two simple and key variables: growth and inflation (presented in annualised terms):

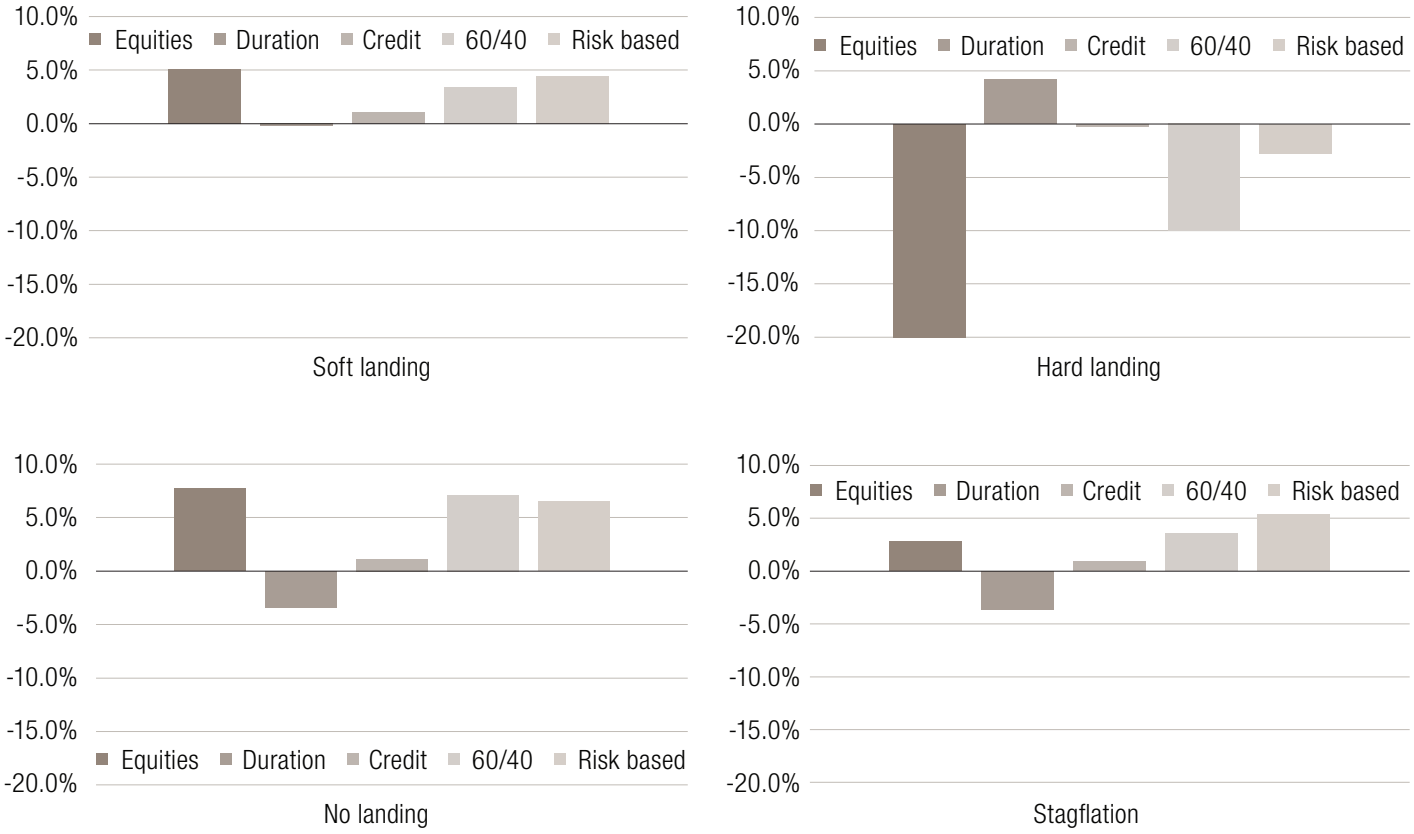
- Soft landing: growth is expected to remain flat, while inflation returns to bearable levels.
- No landing: growth returns to trend, no need to seek a slowdown for inflation to come down.
- Hard landing: a deep(er) recession unfolds, leading to deflation.
- Stagflation: slightly negative growth, with inflation running above central bank targets.

The numbers presented in figure 1 have been calculated to be consistent with US data due to the exercise we are performing, but they could be adjusted either up or down to reflect the fate of the Eurozone or Emerging markets. The conclusion remains the same: we are currently confronted with a wider-than-usual variety of probable scenarios, adding to the current market uncertainty across all regions. Now, the next question is: what kind of market action can we expect for each of these macro environments?

Fifty shades of performance

Figure 2 presents estimates for the average expected returns of equities, sovereign bonds and credit, for each of the four macro scenarios. This analysis was derived from a dataset of returns we used in the context of some prior research called "The Next Decade" covering a data sample dating back over 70 years. The values

FIG. 2 ESTIMATED PERFORMANCE OF ASSETS AND STRATEGIES PER SCENARIO



Source: Bloomberg, LOIM.
Reading note: these charts show the expected performance of assets and asset allocation schemes based on non-parametric regressions performed over the 1947-2023 period.

presented in the chart are obtained from a non-parametric regression, which avoids the issue of bucketing values for growth and inflation (and deciding how wide each bucket should be). The outcome speaks for itself as each scenario comes with distinct values:

- Equities suffer in the scenario of a hard landing but benefit otherwise.
- Bonds suffer in the scenarios of no landing and stagflation.
- Credit spreads perform positively in all scenarios (especially no landing) except a hard landing.

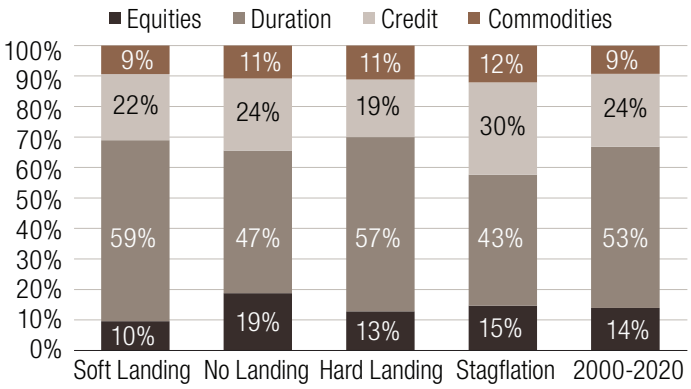
With these very different performances, asset allocation schemes obviously enjoy (or suffer) various fates. Unsurprisingly, a traditional 60/40 (equities / bonds) allocation should thrive in a no-landing situation, outperforming a standard risk-based asset allocation. What these charts also show is how adaptive a risk-based allocation can be: a 60/40 allocation outperforms a risk-based solution in a "no landing" scenario, but not in other cases and it underperforms widely in the case of a hard landing. This highlights the versatility of a dynamic risk-based solution and calls for more explanation regarding how asset allocation can vary depending on each scenario.

The versatility of a risk-based rebalancing process

We like adaptability. A risk-based process, simplified here, continuously changes its asset allocation as market information evolves. The numbers presented in figure 3 go one step further and highlight the risk-based allocations that correspond with the various scenarios previously discussed. In this example, the risk-based portfolio is fully invested (no leverage, no cash) and only its composition varies. We also show its average asset allocation over the 2000-2020 period, as a comparison point. This chart carries a double message:

- First of all, a risk-based allocation is an investment scheme that is always on the lookout for the next source of diversification, be it in bonds or commodities in this simplified example. By doing so, its capital allocation varies significantly: its bond allocation reaches 51% in a hard landing scenario, while a stagflation allocation only allocated 40% to bonds. The commodity allocation varies from 9% to 12% depending on the macro features of the regime.
- Second of all, when compared to a static 60/40 portfolio, the risk-based allocation stands a better chance of being successful because of this adaptability. The 60/40 assumes that constant exposure to 40% bonds will be enough to diversify equity market shocks in the case of a hard landing, oblivious to the fact that the shock could also come from bonds, just as it did in 2022.

FIG. 3 ALLOCATION OF RISK-BASED PORTFOLIOS PER REGIME



Source: LOIM, Bloomberg.

In essence, static capital allocation strategies are *wedded to one single scenario* (based on long-term assumptions) and this can be particularly unwelcome, especially as we are currently witnessing a fast-paced change in the macro scenarios favoured by markets.

Figure 4 illustrates this point. With this final chart, we rank the year-to-date performance of the four risk-based allocations attached to each scenario, each one having been invested independently and statically over the period. In January, the "no landing" scenario generated the highest returns for two weeks in a row, while soft and hard-landing portfolios lagged. February saw a continuation of week-to-week fluctuations between soft- and no-landings, reflective of uncertainty. The cards were then reshuffled: the hard landing portfolio suddenly gained momentum to the point of having now gained some distance over its peers. The stagflation scenario was the worst performer, as the market priced in a slowing of inflation and some hard landing stress linked to the recent banking-related uncertainty.

This demonstrates how quickly the prominence of each of these scenarios can fade and how important it is to retain flexibility to navigate through these unstable weather conditions, especially across the macro, trend and drawdown management signals we scrutinise, we keep seeing cautionary warnings. Uncertainty prevails, and uncertainty calls for adaptability.

The following sections will walk you through several indicators: what has driven our asset allocation recently and where do we see macro signals heading? We also review the construction of our equity pocket, highlighting a couple of interesting features for how sustainability and liquidity can be integrated within a risk-based framework. Finally, the research section highlights current topics of interest that we are investigating to continuously enhance our processes.

Simply put, faced with a multiplicity of scenarios, being wedded to a single one is unwise – we prefer the nimbleness of a risk-based process.

FIG. 4 RANKING OF THE PERFORMANCE OF THE FOUR PORTFOLIOS SINCE THE START OF THE YEAR

	10/01/2023	18/01/2023	26/01/2023	03/02/2023	13/02/2023	21/02/2023	01/03/2023	09/03/2023	17/03/2023
Top	Soft landing	No landing	No landing	Soft landing	No landing	No landing	Soft landing	Soft landing	Hard landing
Second	No landing	Soft landing	Soft landing	No landing	Soft landing	Soft landing	No landing	No landing	Soft landing
Third	Hard landing	Stagflation	Stagflation	Hard landing	Stagflation	Stagflation	Stagflation	Hard landing	No landing
Fourth	Stagflation	Hard landing	Hard landing	Stagflation	Hard landing	Hard landing	Hard landing	Stagflation	Stagflation

Source: LOIM, Bloomberg.

PORTFOLIO TRENDS
A 60/40 portfolio with a (bearish) twist

Alain Forclaz
Deputy CIO

In a nutshell

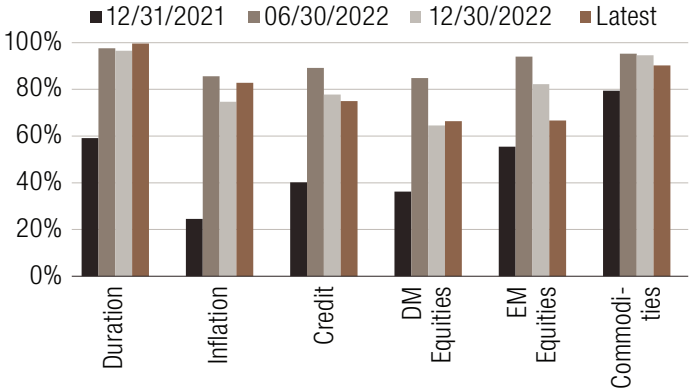
- Having ended last year with a prudently positioned asset allocation, Q1 has not made us more optimistic.
- Risk levels have risen on all fronts, limiting our market exposure.
- Our tactical overlay highlights that our core scenario points to a more pessimistic "soft landing" at the moment.

Faced with the multiplicity of economic scenarios described in section 1, our asset allocation process has smoothly repositioned itself throughout the quarter, trying to make the most sense of our market and macro signals. The quarter has been quite volatile. January came with rising 'no landing' pricing, February saw macro data challenge the disinflation narrative and, finally, March faced a near banking crisis. The quarter closes with a blatant lack of market direction, as most asset classes have experienced both ups and downs. As risk-based investors, we have continuously monitored the evolution of our allocation and its implied macro scenarios. As we write this piece, our allocation is now – roughly speaking – a 60/40 portfolio with a bearish twist: 30% cash, 30% bonds and 40% risky assets. From the 'soft-landing ready' allocation that we had back in Q4, this new allocation is slightly more pessimistic: here is why.

Realised volatilities are sky high

One of our most closely monitored charts is figure 1 which shows a percentiled volatility measure across risk premia, based on our proprietary risk measures. When we try to identify where the volatility of each asset lies in comparison to its history, we conclude: whatever the risk premium the situation is the same, risk has increased on all fronts and all risk premia now suffer higher-than-average volatility. Even worse, the asset class whose risk deviates most from its historical level is government bonds, the ultimate portfolio diversifier of the last ten years. If the volatility of government bonds in December 2021 was still around its 50th percentile (its median), it now stands at around its 99th percentile. For comparison, developed equities' volatility is fluctuating at around its 65th percentile and credit at around its 75th percentile. Commodities retains its high risk, with volatility reaching its

FIG. 1 ASSET CLASS VOLATILITY



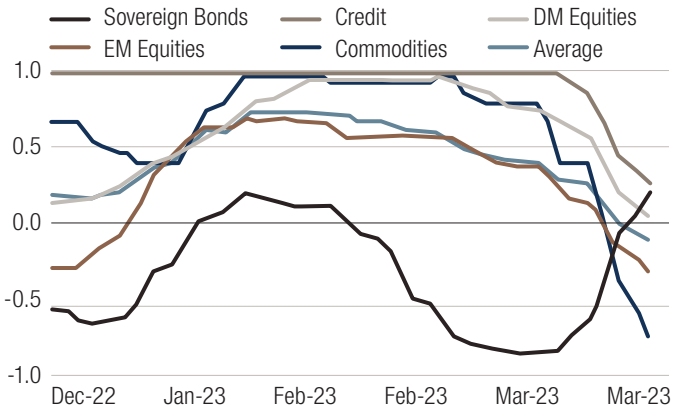
Source: Bloomberg, LOIM.

90th percentile. This is no coincidence of course: part of the bond risk reflects the risk of energy inflation and the associated geopolitical risk. For asset allocators, this environment makes it very challenging to identify preferences and set a hierarchy of expected returns across assets. For risk-based investors, these changes to realised risks are modifying the core "recipe" of our allocation, diverting it from bonds towards other asset classes.

Trends rolling over

The second element that has impacted our portfolio has been our trend signals. These signals are presented in figure 2. We started the quarter with a meaningfully positive signal for equities and credit, together with an underweight duration that was later neutralised. This tactical signal has had an interesting contribution to the overall strategy, adding to the rapid reallocation that operated throughout the first part of Q1. Then, with the inflation data was coming out as stronger than expected and the rise in banking risk, most of these indicators started to roll over. The momentum signal for sovereign bonds moved from negative to neutral, while the equity signal moved from being very positive back towards neutral. As we close this quarter, these indicators are rolling over again, the message is not yet bearish from a sentiment perspective, but history suggests that such tipping points are not usually a good sign for risk assets. Today, this contributes to a change from "soft landing ready" positioning to a marginally more bearish stance.

FIG. 2 TREND FOLLOWING SIGNALS



Source: Bloomberg, LOIM. As at 30 March 2023.

The macro does not disagree

The last element animating our allocation, our recently launched 'macro risk premia' (MRP) strategy, has also been adding its bit during Q1, moving from a bullish signal in January to a bearish one during the final days of March (Figure 3). The reason for this bearish allocation is a combination of factors. Among them, two clearly stand out: first, our growth indicator places the world economy in a 'soft landing' scenario, meaning a deceleration of the world's growth. This deceleration has been limited by the reopening of China, as detailed in the next section, but remains firmly in place across the key three regions we monitor: the US, the Eurozone and China. The second reason why MRP is bearishly positioned ties in with market sentiment. Since February, our risk appetite indicator has been calling for a softer exposure to markets globally, as it progressively declined from high levels. High-but-declining risk appetite usually signals periods of heightened volatility and negative risk premia performance. We close the quarter with the message – consistent with other signals – of a likely harder landing than expected, which is a good enough reason for us to move our allocation away from markets and adopt a more cautious allocation than at the end of Q4 last year.

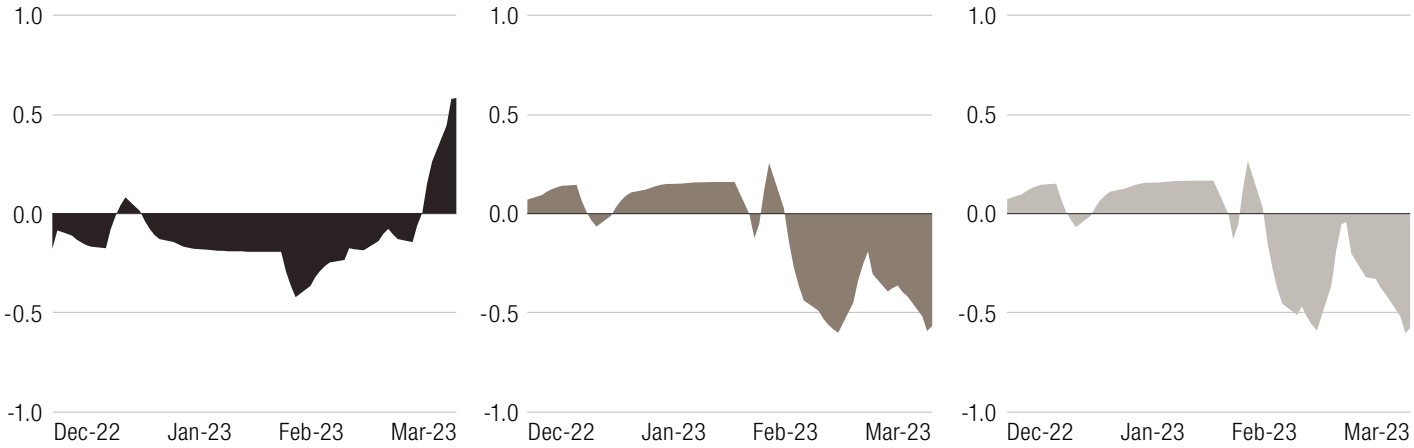
Less optimistic than a quarter ago

To conclude, figure 4 shows the current asset allocation of our most representative strategy. It highlights three key points:

- Our signals still see value in holding cash, as a reflection of the recent market performance and overall risk level.
- Our macro signals are currently directing most of the tactical conviction, diverting us from risky assets and counteracting our volatility models, which signal a lower duration.
- Once combined with our risk-based portfolio construction, the resulting capital allocation is roughly 60/40, but where half of the 60% diversification bucket is crucially made up of cash and volatility.

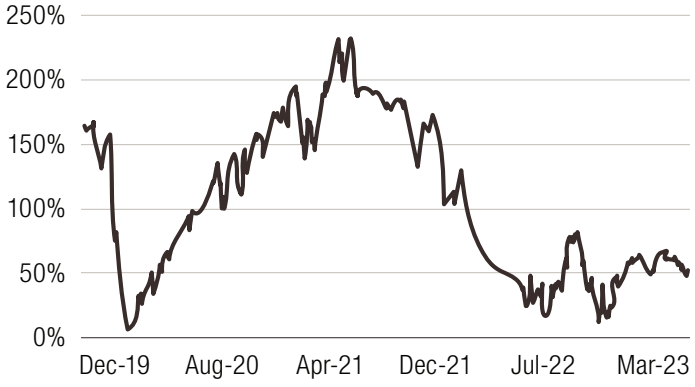
Simply put, Our process suggests it is not a good time to be adding to risky assets. The blurred picture emerging from the current flurry of scenarios favours cash and improved diversification

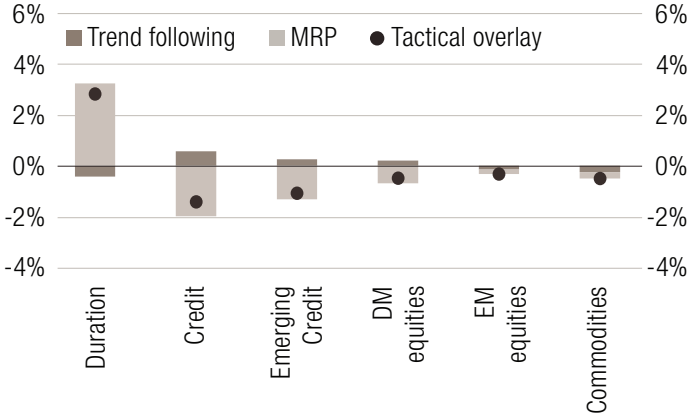
FIG. 3 MACRO RISK PREMIA RECENT SIGNALS

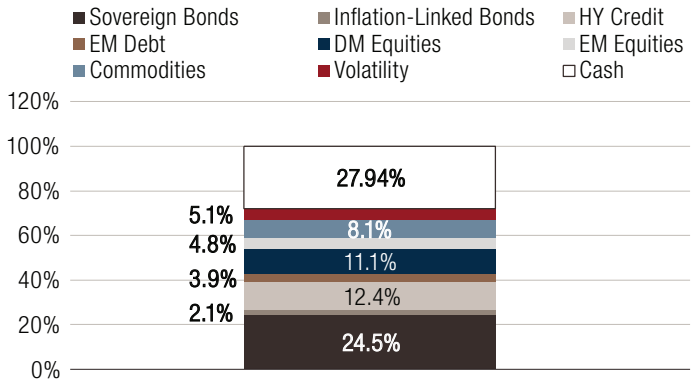


Source: Bloomberg, LOIM, as at 30 March 2023.

FIG. 4 TOP: MARKET EXPOSURE (LEFT) AND TAA ALLOCATION (RIGHT). BOTTOM: CURRENT ALLOCATION OF OUR MOST REPRESENTATIVE STRATEGY.







Source: Bloomberg, LOIM, as at 30 March 2023.

MACRO
Normal landing strikes back

Florian Ielpo
Head of Macro

In a nutshell

- Our macro indicators currently still point in the direction of a soft landing: a limited economic contraction with disinflation.
- The services industry globally remains too strong for something worse to happen, even with goods consumption and investment both declining.
- The banking crisis could change that situation, forcing banks to lend less to the economy and precipitating its slowdown. This would turn a 'soft landing' into a 'normal landing'.

Recent macro data carried with it the first signs of a significant growth slowdown, and this ties in with a soft-landing scenario. The challenge macro-observers are currently faced with is reconciling post-pandemic economics with what we know of the business cycle: the industrial sector is showing signs of blatant contraction, the consumer goods sector is contracting in real terms and yet, the economy remains strong. The key element here is the unusual strength of the services sector. Usually, no serious economist would care about the services sector and yet, today, it is behaving in a surprising way and explains why growth remains too high, given the context. Services inflation is high and so is employment growth in the services sector. The recent banking confidence crisis could see an end to that, as rising austerity could limit access to credit by the private sector.

All in all, we think that our endeavour to gauge which scenario shows the highest probability will require three things: understanding recent macro data; understanding what is specific to the services sector; and understanding how monetary policy could find its way to the economy faster in the quarter to come. The odds of the 'soft' landing scenario becoming a 'normal' landing scenario are growing.

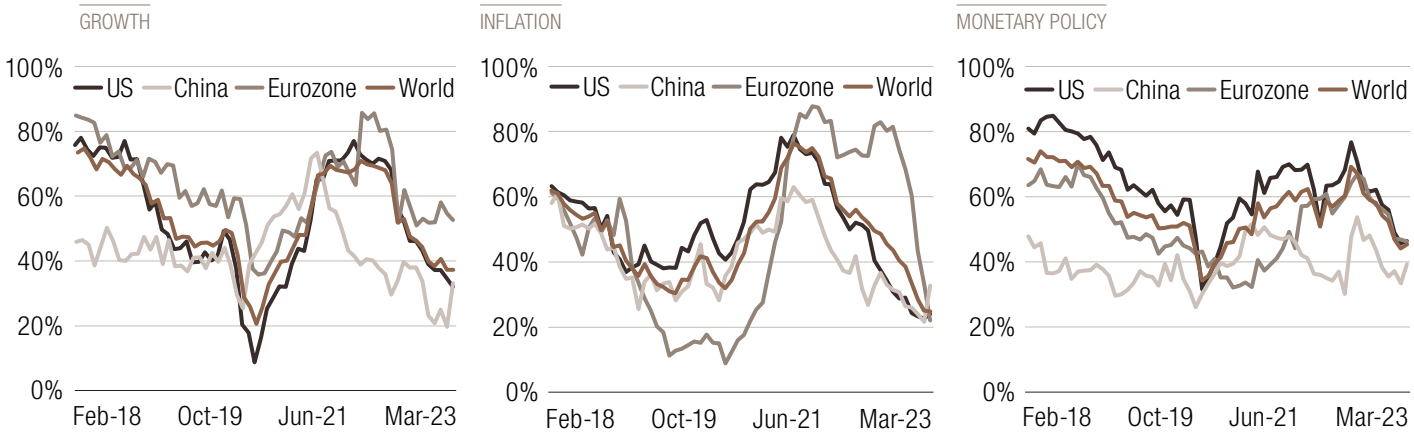
Follow the data

First and foremost, the essential part of our macro analysis delves into our nowcasting indicators. The most recent evolutions of these indicators are shown in figure 1.

- Most of the world's economy is already experiencing a soft landing. Growth forces have deteriorated in the US, are deteriorating in the Eurozone, and are bouncing back from low levels in China. The combination of these three different trajectories is likely to indicate a deterioration of growth as a whole in Q2.
- Inflation has been following a similar path. Inflationary forces are now giving strong signs of evaporating from the three economies we scrutinise through these indicators. It can sound puzzling, but really, outside of the services sector, the hard data does not suggest otherwise.
- Monetary policy since Q4 last year has seen a turn that is now becoming more and more obvious: from aggressively hawkish to a period of moderation. The pivot is not there yet, but our indicators have been calling for what is currently unfolding with the Federal Reserve (Fed): one or two more hikes should suffice. The European Central Bank (ECB) is lagging this trend, but our Eurozone indicator has been progressively converging toward that of the US.

This explains the positioning of our macro strategy, as detailed in the previous section, which is derived from these indicators. The resulting positioning is rather bearish: in this context of softer growth, inflation and moderating central banks, risky assets historically offer a volatile performance at best, if not negative. And yet, when looking at the hard data such as GDP numbers, the US job market and US inflation, not much of that bearishness has transpired. Are we missing something?

FIG. 1 LOIM NOWCASTING SIGNALS



Source: Bloomberg, LOIM.

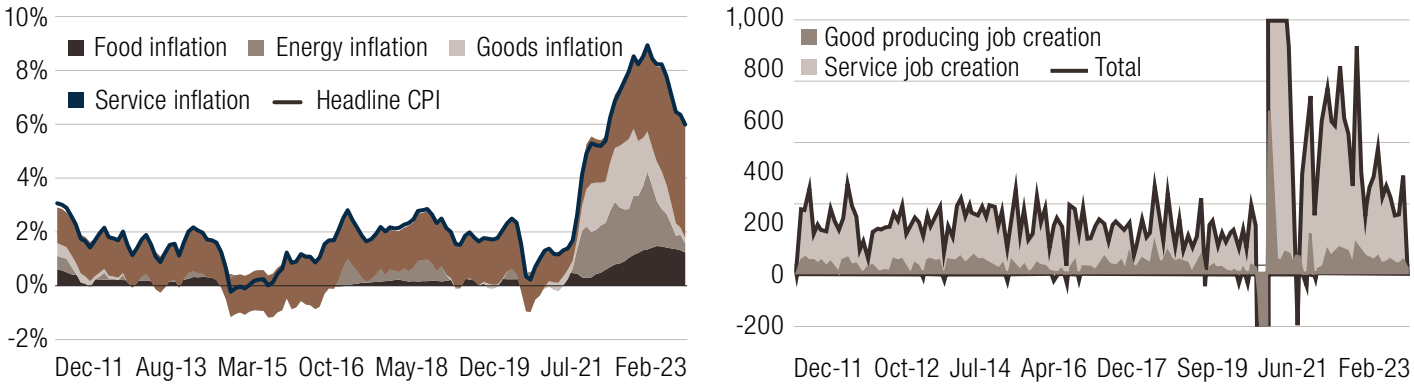
An odd situation

In this short cycle, something unusual is happening: the services sector is driving the cycle. An obvious way to see this involves looking at the decomposition of the US inflation and jobs reports, as displayed in figure 2. Both of them share one thing in common: their services component is surprisingly strong. In the US, we now collectively know that the 'shelter' component in services inflation has contributed strongly to the still elevated inflation number. However, when looking at the rest of the progression of items that make up services inflation, it becomes more and more obvious that the services sector is broadly enjoying a fate which differs significantly from that of the rest of the economy. The same applies to job numbers: out of the large-scale job creation that has taken place during Q1, most of it explained by hires in the services sector.

As shown in figure 3, this is far from cosmetic: the left-hand chart shows the rebased evolution of economic growth across sectors since Q3 2020. What is important to read in this chart is how, in real terms, goods production has declined by 2.3% since its peak in June 2021, while investment has declined by 5% since March 2022.

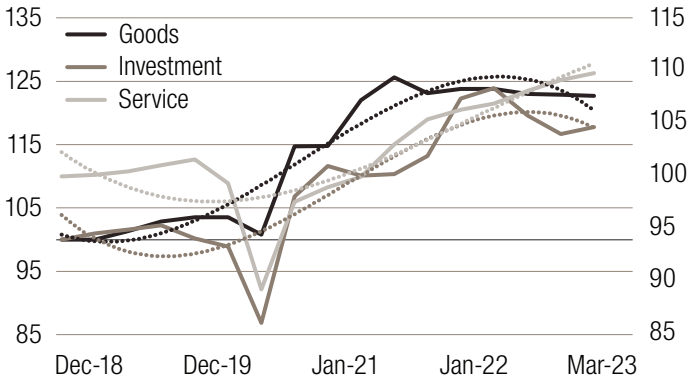
The decline in economic activity has already started, but just not in every sector of the economy. Since the start of the consumer goods contraction, the services industry has been growing at a remarkable pace of +4.3%, in annualised terms. This number compares to a pre-covid growth rate of 1.7% per year: the recent growth in services is more than double this number. So, are investment, goods and services production unrelated? Can we see two of them decline without the third following suit? History disagrees with this: the right-hand chart of figure 3 shows a simulation of how the recent decline in investment and goods could impact services: with their contraction, services could be expected to decline by about 1% in the next year or so. This is far too limited to be a slowdown and translates into how slow services as an industry usually is to react. Should we just write off inflation fighting then? If the service industry keeps on growing at this pace, ending inflation will prove to be nearly impossible. Well, with the banking crisis and the monetary tightening over the past quarters, there are reasons to hope for a better situation.

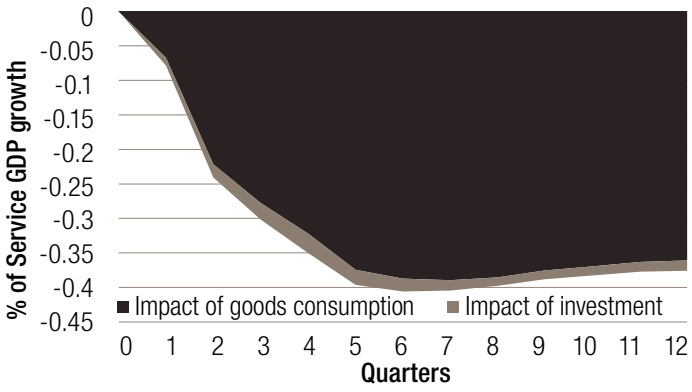
FIG. 2 US INFLATION DECOMPOSITION (LEFT) AND US JOB CREATION DECOMPOSITION (RIGHT)



Source: Bloomberg, LOIM.

FIG. 3 US GDP DECOMPOSITION (LEFT) AND SIMULATED IMPACT OF THE RECENT DECLINE IN GOODS AND INVESTMENT GROWTH (RIGHT)





Source: Bloomberg, LOIM.

Beware the tightening lending standards

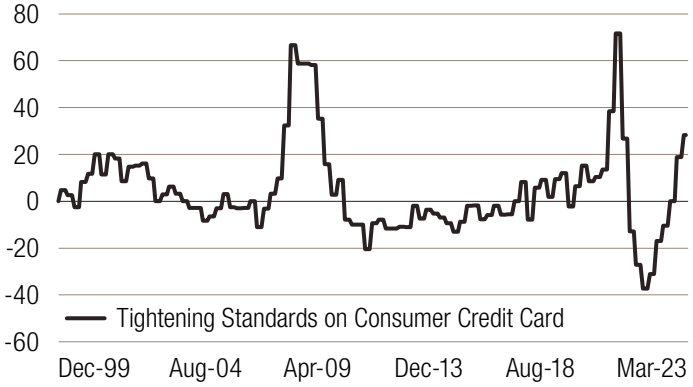
When looking at the dynamics of services, the reader could be overwhelmed by the feeling that the soft-landing and no-landing scenarios are the probable way forward. Where we see a reason to disagree with that – and are happy with our current portfolio positioning – stems from the aftermath of the banking crisis in Q1.

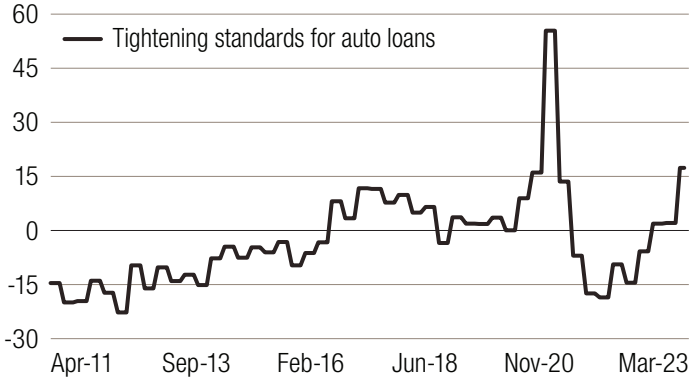
What can seem to be a collection of idiosyncratic events could also be seen as the first consequences of a year of tightening monetary policy. More importantly, even without seeing non-performing loans rise, the incentive for banks to lend money to the economy in abundance is gone. Banks need to show signs of austerity in an effort to regain public confidence in their ability to stay safe and that in itself justifies a very prudent policy in terms of credit attribution. With that, ECB President Christine Lagarde's frustration with the slow transmission of monetary policy to the economy is likely to find an end.

The truth is, tightening standards – banks' willingness to give credit to the private sector – were already rising fast in the US during Q4 last year. This is shown in figure 4 and a similar conclusion could be reached from the ECB's lending survey. If conditions were getting tighter without the crisis of confidence in banks, imagine what will happen now. This is the first step to a more material contraction in economic activity and of the services industry itself. With that, we could simply observe a 'normal' landing will happen instead of a soft one, with growth slowing on a par with historical recessions before rebounding later. Such a scenario would balance a soft and hard landing and is quite consistent with the way our strategies are positioned today.

Simply put, our core scenario has moved from expecting a 'soft landing' to a 'normal landing' over the quarter – a fifth scenario that balances hard and soft elements.

FIG. 4 US FED LOAN OFFICER SURVEY OF TIGHTENING STANDARDS FOR CREDIT CARDS (LEFT) AND AUTO LOANS (RIGHT)





Source: Bloomberg, LOIM.

QUARTERLY FOCUS
Spotlight on All Roads' Developed Market Sustainable Equity Portfolio

Pankin Bhagat
Portfolio Manager

In a nutshell

- We strongly believe that sustainability will remain high on the investor agenda in 2023 and beyond, and the integration of these considerations should not come at the expense of any other core philosophies, in our view.
- We use sophisticated frameworks, such as Multi-Objective Optimisation, to integrate sustainability without compromising on our core objectives which include remaining liquid, focusing on fundamentals and risk diversification.
- We are convinced that the integration of sustainability objectives into our All Roads process will further enable our strategy to fulfil its core objective to provide stable returns and preserve capital.

Multi-asset strategies such as ours can serve as a core allocation for any portfolio. However, to qualify as such, it is important that the strategy must not only invest in liquid instruments and provide a stable return profile with capital protection, but also integrate sustainability as part of its investment process: what we broadly define as 'quality returns'. In order to fulfil these core objectives, we have integrated sustainability criteria into our strategies since 2020 while remaining true to our philosophy of remaining highly liquid, transparent and balanced in terms of risk at all times.

In this special focus, we put a spotlight on how we have incorporated our proprietary 'Environment Social & Governance' (ESG), 'Carbon Footprint' and 'Implied Temperature Rise' (ITR) metrics to improve the overall sustainability of our Developed Equity implementation versus a representative market-cap reference.

Before we dive right in, our readers should be reminded that our strategies remain absolute return vehicles. As such, they do not track any benchmark per se at either a global portfolio level or sub-asset class level. Therefore, while we do use traditional market-cap (such as the MSCI index) references as our risk factors, our underlying equity implementation is not meant to follow market-cap rules. Instead, we strive to build our own custom-developed market equity basket that seeks to overcome some of the challenges of market-cap indices, such as geographic concentration, naïve market-cap weighting, low sustainability profile and higher climate transition risk. We build our equity allocation out of a variety of explicit objectives and this special focus should help the reader better understand how we achieve that combination of objectives.

A tale of four objectives

When investing in equities, we aim to balance four core objectives. Our four objectives are:

- **Objective 1: Sustainability.** Here we leverage the expertise of our dedicated team, which has developed proprietary company-level scores to gauge sustainability risk. We factor these proprietary scores into our basket construction by tilting our baskets towards enhanced sustainability companies. Specifically, we calculate consolidated sustainability scores for each individual equity future in our universe by aggregating bottom-up company-level 'ESG materiality', 'Carbon Footprint and 'Implied Temperature Rise' scores for each company in the underlying index. Using these aggregate scores for each future, we seek to improve the overall sustainability score of our equity basket compared with a typical market-cap reference.
- **Objective 2: Liquidity.** With this objective, we seek to ensure that our equity basket is as liquid, flexible and scalable as possible. We measure liquidity from the average daily volume of futures instruments for the past three years with more weight assigned to recent years. Using this liquidity measure for each future, we can construct a best-in-class liquidity-weighted portfolio as a reference. Our multi-objective optimiser then seeks to reduce the Euclidian distance of the optimised portfolio to this best-in-class liquidity-weighted reference portfolio.
- **Objective 3: Fundamental Factors.** Here, we seek to ensure that our equity basket's country weights are (notably) consistent with the economic importance of each county. To do this we rely on a country-level GDP weighting scheme.
- **Objective 4: Risk Diversification.** With this objective, we seek to build well-diversified equity baskets in terms of risk. To do this, we construct a best-in-class risk-diversified portfolio using long-term volatility and the correlation models of the underlying futures instruments.

Once these four objectives have been laid out, our multi-objective optimisation framework aims to balance them.

Multi-objective optimisation

Following extensive research, we have developed a sophisticated genetic algorithm that can help identify a set of robust portfolio solutions that seek to optimally improve each of our four pre-defined objectives. The algorithm begins by creating a set of random initial populations (i.e., a set of initial portfolios) for its first generation. It scores all portfolios in each across all four pre-defined objectives we are seeking to improve.

In each generation, the algorithm chooses a set of elite portfolios (i.e., the highest-scoring portfolios) as parents and passes them on to the next. In the subsequent generation, it sets out to produce new child portfolios from these elite parents either through mutation (tweaking a parent portfolio to create a new child portfolio) or crossover (combining two parent portfolios to create a new child portfolio). Once it generates a pre-set maximum number of child portfolios , it again chooses a handful of elite portfolios as parents and passes them on to the next generation.

By moving in recursive steps, from one generation to another, the algorithm identifies a set of robust portfolios that reside on a multi-dimensional efficient frontier, also called the Pareto Front. Each dimension on the Pareto Front represents the pre-defined four objectives that we seek to optimise using this recursive algorithm. Furthermore, each point on the Pareto Front represents one of the optimal solutions that can only be further improved on any one objective by degrading one of the other objectives.

Figure 1 is a high-level graphical depiction of the conceptual filtration processes performed under this type of multi-objective optimisation framework.

How does such an optimised basket compare to a traditional market-cap reference?

In figure 2, we present the resulting equity basket, alongside the changes in metrics compared to a market-cap allocation. Several key comments can be made in terms of allocation and metrics:

- Allocation:
  - The resulting basket is tilted towards Europe and the US versus Asian Equities.
  - Within the US we observe a tilt towards the NASDAQ given its better Sustainability profile compared to the Russell.
  - Lastly, within Europe we observe a bias towards the DAX and the Large-Cap Euro Stoxx, again on the grounds of better Sustainability scores for these indices.
- Metrics:
  - The resulting allocation brings improvements across each of the four objectives versus the market-cap reference.
  - In particular, we see an improvement in the ESG-Materiality score and in Temperature.
  - Finally, we see a meaningful reduction in the distance of the basket to a best-in-class Liquidity weighted, GDP weighted and Risk Diversified portfolio reference.

FIG. 1

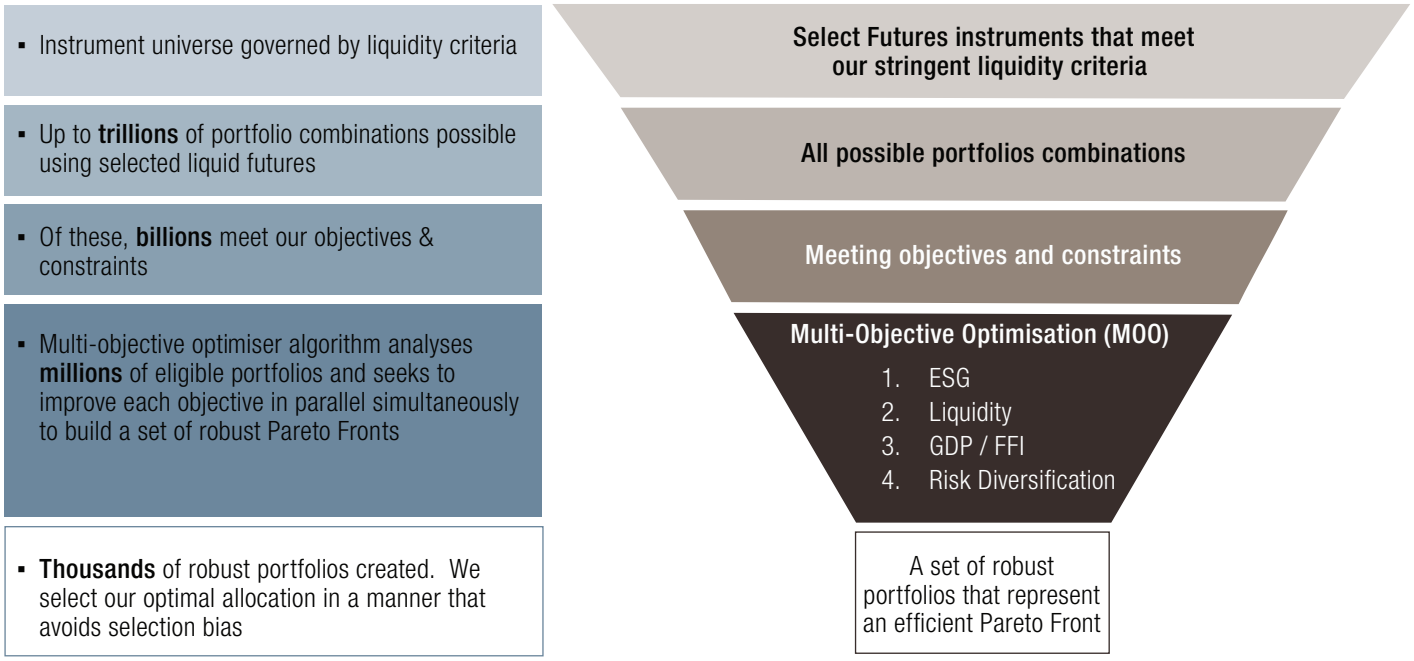
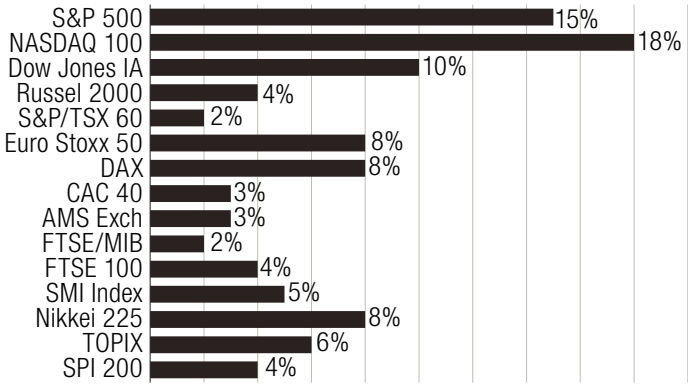


FIG. 2 DEVELOPED EQUITIES ALLOCATION (LEFT) AND METRICS (RIGHT)



	Market Cap[1]	All Roads Basket
Combined Sustainability score[2]	0.14	0.17
ESG-Materiality[3]	0.7	0.8
Carbon Intensity[4]	440	590
Implied Temperature rise[5]	2.84	2.74
Liquidity[6]	23%	7%
Fundamental Factor[7]	23%	15%
Risk diversification[8]	33%	19%

Source: Bloomberg, LOIM.

Source: LOIM. [1]**Market-cap** reference used for DM Equities is 'MSCI World'. [2]**Combined Sustainability score:** this is a consolidated and normalised sustainability score that combines our three metrics on ESG-Materiality, Carbon Footprint and Implied Temperature Rise [3]**'ESG-Materiality':** These are weighted LOIM proprietary 'ESG-Materiality' scores for equities. Higher the score the better. [4]**Carbon Footprint:** These are weighted Carbon Footprint scores used for Equities. Lower the score the better. [5]**Implied Temperature Rise:** These are our weighted Temperature scores used for Equites. Lower the score the better. [6]**Liquidity:** This is measured as the Euclidean distance to a Liquidity weighted portfolio. Smaller the distance the better. [7]**Fundamentals Factor:** This is measured as the Euclidean distance to a GDP weighted portfolio for Equities. Smaller the distance the better. [8]**Risk Diversified:** This is measured as the Euclidean distance to a risk diversified portfolio. Smaller the distance the better.

Actual equity implementation

Having developed a 'custom basket of equity futures' that is better aligned to our overall philosophy than a traditional market-cap reference, we moved on to building a structural 'core portfolio' of direct line stocks. We are seeking to build a 'core portfolio' that is not only better in terms of its sustainability metrics but is also positioned to specifically benefit from climate transition. Direct-line equities make that aim easier to achieve than futures as they allow for granular company-level analysis.

Our portfolio construction process aims to define a range of portfolios that maximise active risk among different sustainable opportunities and most material climate transition risks. In principle, our process seeks to overweight companies that possess better ESG-Materiality scores, lower carbon footprints and better temperature trajectories. We rely on an optimisation-based process to build a 'core portfolio' of stocks, that seeks to achieve the right balance between keeping a low ex-ante TE to our 'custom' basket of equity indices whilst further maximising our different sustainability objectives. Such an optimisation framework also enables the flexibility to respect stringent exclusion policies that would otherwise not be possible at the level of indices, while also allowing control over country, regional, and sector-level risk.

The result of such a process is a portfolio of 200 stocks, predominantly large-cap liquid names, that offers an enhanced sustainability profile and an acceptable tracking error risk which is predominantly composed of idiosyncratic / stock selection risk as opposed to any undue factor risk. Figure 3 summarises the key characteristics of our 'core portfolio' of stocks versus our custom benchmark, as well as market-cap reference (i.e., MSCI Word Index). With this process, we are able to:

- Improve the ESG-Materiality score of our portfolio by 0.10.
- Lower our portfolio implied temperature by 0.46 degrees.
- And reduce our carbon footprint score by about 180 points.

This highlights the benefits of direct-line equities versus liquid futures to improve the sustainability of our investments without sacrificing liquidity.

Lastly, the risk-based nature of our All Roads process means that our allocation to different asset classes dynamically evolves alongside risk. In the case of our Equity allocation, we combine our 'core portfolio' of direct-line stocks with a dynamic overlay of Equity Futures to retain a dynamic profile and to manage potential drawdowns. This allows our 'core equity' direct-line solution to remain structural in nature and thus have limited trading at all times.

FIG. 3 DIRECT-LINE PORTFOLIO CHARACTERISTICS

	No of Stocks	ESG Materiality[2]	Implied Temperature Rise[3]	Carbon Footprint[4]	Controversies Level 5[5]	LOIM Exclusions[6]
Core Equity Portfolio	199	0.9	2.28	402	0	0
Custom Benchmark[1]	1282	0.8	2.76	590	5	47
MSCI World	1509	0.7	2.84	440	6	49

Source: LOIM.

Source: LOIM. [1]**Custom Benchmark:** this is the output of our Multi-Objective Optimisation i.e., basket of world equity indices / futures. [2]**'ESG-Materiality':** These are weighted LOIM proprietary 'ESG-Materiality' scores for equities. Higher the score the better. [3]**Implied Temperature Rise:** These are our weighted Implied Temperature Rise scores used for equities. Lower the score the better. [4]**Carbon Footprint:** These are weighted Carbon Footprint scores used for equities. Lower the score the better. [5]**Controversies:** This is measured as the Euclidean distance to a Liquidity weighted portfolio. Smaller the distance the better. [6]**LOIM Exclusions:** This is measured as the Euclidean distance to a GDP weighted portfolio for equities. Smaller the distance the better.

Performance review

The final part of this analysis focuses on the outcome of this process in terms of performance. We looked at this through two different angles i.e., we showcase the performance of our 'core portfolio' since its inception and then we specifically zoom in on Q1 2023. Figure 4 shows the performance and relative performance over both time periods and calls for two individual comments:

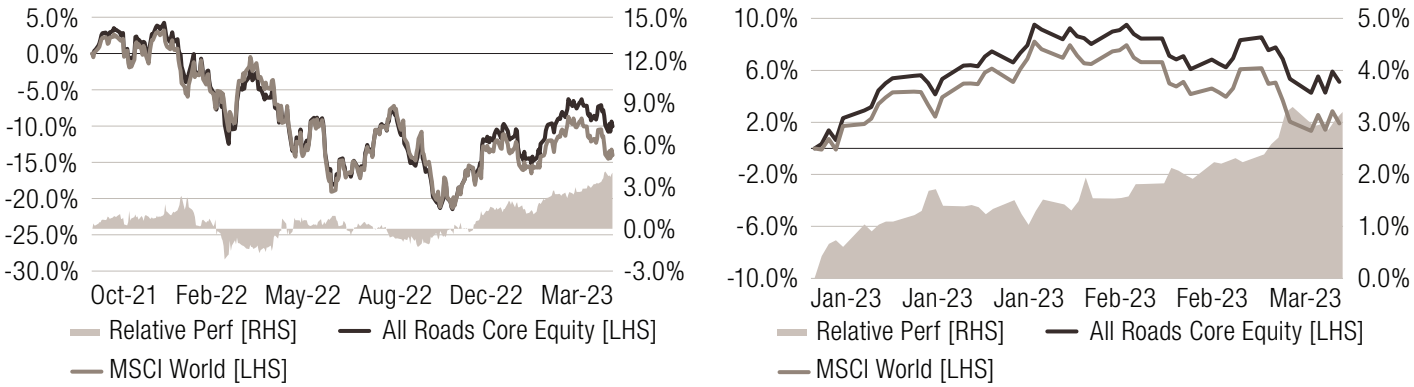
- Since the inception of our 'core portfolio' in Oct 2021, markets have faced some unprecedented challenges in the form of exceptionally high inflation, tight financial conditions, the ongoing energy crisis and a war in Europe. While such a period has been challenging for many sustainability factors, our portfolio behaved relatively well thanks to our multi-dimensional portfolio construction methodology that takes several objectives into account, including but not limited to Sustainability considerations. In the left-hand chart below, we see that the core equity portfolio was able to deliver returns close to the MSCI World Index from inception up to Q3 2022.
- The right-hand chart focuses on the portfolio's performance in Q1 2023. Our focus on ESG-Materiality and Climate Transition risk meant that our portfolio tilts started to be a benefit in Q1 2023 as the markets' focus moved away from some of the challenges, such as higher inflation and the energy crisis which dominated in 2022. Secondly, we observe that the portfolio was also able to avoid exposure to several of the financial companies that have come under acute pressure in recent weeks. Specifically, the portfolio completely avoided exposure to the US regional banks that have come under fire due to their sub-par ESG-Materiality, CO2 Footprint, and / or Implied Temperature scores.

Both examples show how one can balance the investment need for performance with sustainability, without giving up on liquidity.

Reading note: All Roads Core Equity versus MSCI World [EUR Hedged] on the left and relative 1Y performance [All Roads Core Equity versus MSCI World [EUR Hedged] on the right.

Simply put, Sustainability will continue to be one of the key drivers of future risk and return, and the integration of these objectives into portfolio construction does not need to come at the expense of other core objectives, in our view.

FIG. 4 RELATIVE Q1 2023 AND 1-YEAR PERFORMANCE COMPARISON



Source: LOIM, Bloomberg.

RESEARCH UPDATE
Strike while the iron is hot – or should you…?

Julien Royer
Quantitative Analyst

Laurent Joué
Head of Systematic Alternatives

In a nutshell

- As investors, our goal is to build solutions that adapt to the changes in our investment universe. Such changes, however, may follow different timescales and require different responses.
- For short-term changes, strategies are often dynamically adapted according to signals that require smoothing to balance t-costs with the hit ratio.
- For long-term disruptions, adapting strategies requires coherent scenarios based on long-term equilibria forecasts to harvest potential trends.

As investors, we are faced with an ever-changing world, be it on a relatively short term horizon – for example, in terms of changes in macroeconomic regimes – or a relatively long term horizon – such as the ongoing transition towards a greener economy. Regarding the former, as systematic investors, our decision process is often based on high-frequency continuous signals that need to be transformed into an investment decision. On the other hand, the latter requires the identification of trends and a rethinking of the process needed to harvest them.

In this section, we will treat the two subjects separately. First, we will present how to turn a rough signal into a smooth investment trigger. Then, building upon our commodity investment team research, we investigate how the industrial metals and materials universe could be adapted for the ecological transition.

From rough to smooth: how to forge a more finely-grained signal

Systematic investing is built upon the development of signals to aggregate a potentially large set of information such as macroeconomic variables, financial statistics or market characteristics. These indicators are then translated into investment decisions through a rules-based transformation. However, given a signal is merely a volatile representation of the universe, the investment process faces a dilemma: should the strategy be updated based on a rough signal that may generate high turnover or should it rely on a smooth signal with the risk of less reactivity? In the following, we propose two prominent smoothing techniques to illustrate our recently developed Macro Risk Premia (MRP) signals:

- Time-series smoothing: the smoothed signal is a weighted combination of the most recent rough signal and the past value of the smoothed signal.
- Cross-sectional smoothing: rather than smoothing the signal, the smoothing is applied to the weights in the strategy directly.

Time-series smoothing is a very general setting, among which exponential smoothing is probably the most common. The idea is to select the strength of the updating step of a signal in a linear equation of the form:

$$\tilde{s}_t = \rho \tilde{s}_{t-1} + (1-\rho) s_t$$

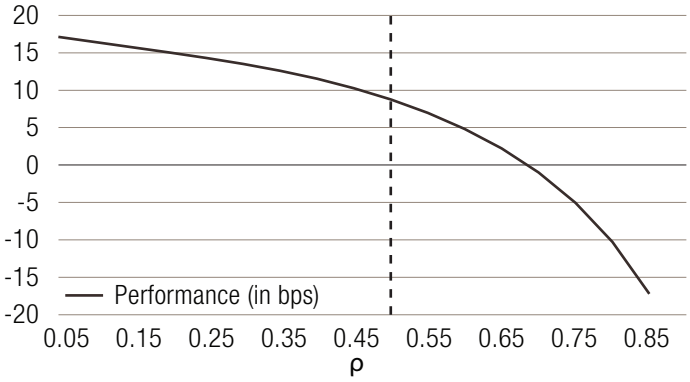
where s_t denotes the raw signal, which is optimal in frictionless rebalancing, $\tilde{s}_t$ denotes the smoothed signal at time t, and $0 \leq \rho \leq 1$ denotes the smoothing strength such that if $\rho = 1$ the signal is constant and if $\rho = 0$ no smoothing occurs, hence $s_t = \tilde{s}_t$. The left-hand chart shown in figure 1 presents the simulated performance of the MRP strategy as a function of ρ and emphasises the expected deterioration of the tactical strategy when the reactivity of the signal diminishes. Of course, such charts hide the implementation toll of the strategy: although the raw signal carries more information, smoothing reduces turnover and may compensate for a loss in performance by lowering the implementation cost of the strategy. Such benefits can be measured by the breakeven trading cost, which is the trading cost that equalises the performance between the raw and smoothed signals:

$$r - b_\rho(\tau - \tilde{\tau}_\rho) = \tilde{r}_\rho \Leftrightarrow b_\rho = \frac{r - \tilde{r}_\rho}{\tau - \tilde{\tau}_\rho}$$

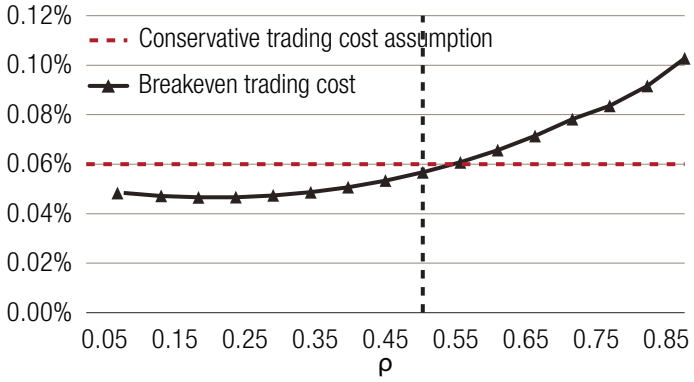
where r and $\tilde{r}_\rho$ respectively denote the performance of the raw signal and the smoothed signal with parameter ρ and τ and $\tilde{\tau}_\rho$ the corresponding turnovers. The breakeven trading cost thus provides a convenient measure to target a particular smoothing strength as a function of the implementation cost of the signal. The right-hand chart in figure 1 presents the breakeven trading costs underlying the smoothing of the MRP signal.

FIG. 1 EFFECT OF TIME-SERIES SMOOTHING ON THE MRP SIGNAL

PERFORMANCE AS A FUNCTION OF THE SMOOTHING STRENGTH



BREAKEVEN TRADING COST AS A FUNCTION OF THE SMOOTHING STRENGTH



Source: LOIM.

Cross-sectional smoothing follows a different route. Consider a naïve case where a continuous signal, defined between 0 and 1, is transformed into an allocation based on thresholds. For example, the strategy switches between three static portfolios when the signal is either below a first threshold, between the first and a second threshold, or above a third threshold. Of course, such a dynamic allocation will generate a high turnover when the signal oscillates around a threshold, as the whole strategy switches from one portfolio to another. Cross-sectional smoothing aims to limit this effect by constructing a weighted combination of the three portfolios that depend on the raw signal. A common weight function is the cumulative distribution function of a Gaussian random variable, with volatility parameter *h* acting as the smoothing parameter

$$\phi(s_t) = \int_{-\infty}^{s_t} \frac{1}{\sqrt{2\pi h}} \exp\left\{-\frac{(x-\lambda_i)^2}{2h^2}\right\} dx$$

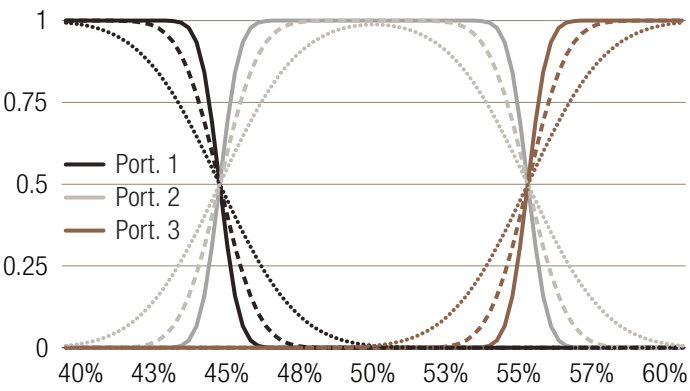
where λ_i is the *i*-th threshold. The left-hand chart in figure 2 presents the weight functions for two thresholds at 45% and 55% and different values of *h*. Of course, as *h* tends to 0, the weight function gets closer to a discontinuous function and the smoothing becomes less important. As an illustration, consider the diffusion index of our growth nowcaster. This indicator helps to identify the direction of growth from its current level (the current regime): when it is below 45%, growth is decelerating; while when it is above 55%, growth is expanding. Different portfolio allocations are thus defined depending on these thresholds, making it a good example of cross-sectional smoothing. The right-hand chart in figure 2 presents the performance of the MRP strategy using both time-series smoothing and cross-sectional smoothing.

From both experiments (time series and cross-sectional smoothing), we highlight two conclusions in the specific context of MRP:

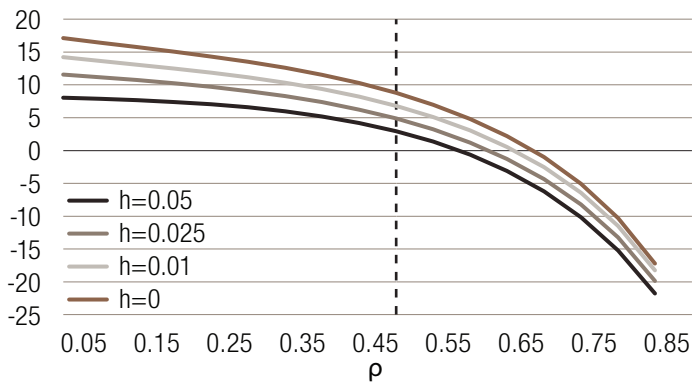
- Time series smoothing makes sense, up to a smoothing parameter equal to 0.5 as it helps balance turnover and t-costs.
- Cross-sectional smoothing is worthless as the turnover generated by crossing thresholds is worth enduring considering the performance it brings in our simulation.

FIG. 2 EFFECT OF CROSS-SECTIONAL SMOOTHING ON THE MRP SIGNAL

WEIGHT FUNCTIONS FOR H=0.02 (DOTTED LINES), H=0.01 (DASHED LINES) AND H=0.005 (FULL LINE)



PERFORMANCE AS A FUNCTION OF THE SMOOTHING STRENGTH FOR DIFFERENT CROSS-SECTIONAL SMOOTHING WEIGHT FUNCTIONS



Source: LOIM.

Regarding the materiality of the commodities transition

While short-term changes can be assessed through some quantitative signals, long-term disruptions are more difficult to measure as they may convey evolutions not yet incorporated into market information. To adapt a portfolio to such changes, an investor needs to identify future trends that will be carried by the transition towards this future new environment.

Recently, the transition towards a green economy can seem like a tidal wave, while it may lift all the assets that are exposed to this transition, it may also submerge those assets that decide to ignore it. While most of the industry's attention has been focused on companies that can either benefit or contribute to this transition, little consideration has been carried out on its impact on the commodities universe. In fact, a significant part of traditional commodity indices remains adversely exposed to the transition. For example, oil & gas still has a weighting of more than 60% of the S&P GSCI Index.

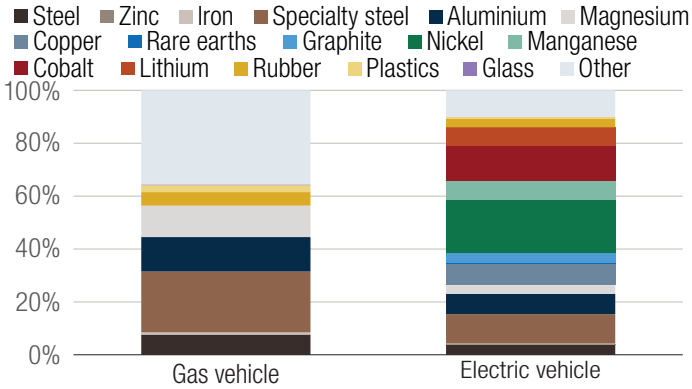
To identify commodities that may benefit from (and contribute to) the transition towards a net-zero economy, we believe one must identify future disruptions in the supply and demand chain. Indeed, constrained supply and growing demand for commodities positively exposed to the transition should put pressure on their pricing. Demand for green solutions is surging as customers and governments become more and more aware of the climate transition risk. However, the transition to a low-carbon economy may require the use of different commodities, yielding a change in the demand for commodities that should factor in additional aspects, such as substitution, recycling or efficiency potential.

The left-hand chart in figure 3 presents the different materials used in the manufacturing of personal vehicles, one of the green technologies with the highest expected adoption rate. The need for new materials is clearly identifiable – for example technology-related metals, such as cobalt, lithium or manganese, or biobased materials – yet their relative weights in traditional commodity indices remain low or nil. Additionally, even if the resulting mining, processing and transformation activities contribute directly to pollution, climate change, loss of biodiversity and social concerns, these materials replace a far worse system and can still have a positive impact in supporting the transition to a low-carbon economy, as emphasised by the right-hand chart in figure 3.

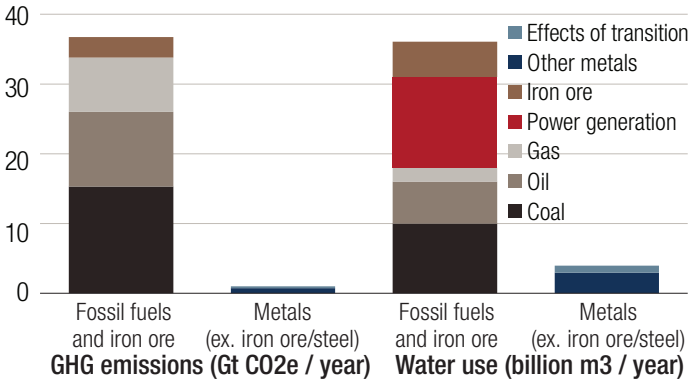
Simply put, a systematic strategy may benefit from carefully crafted signal smoothing to find a good reactivity-to-turnover balance. The climate transition will impact the commodities universe through supply and demand imbalances, ultimately affecting future performance.

FIG. 3 TRANSITION MATERIALS

PERCENTAGE OF THE PRICE OF PASSENGER VEHICLES PER COMMODITIES USE



PENVIRONMENTAL FOOTPRINT OF SELECTED COMMODITIES



Source: LOIM.

IMPORTANT INFORMATION

FOR PROFESSIONAL INVESTOR USE ONLY.

This document is issued by Lombard Odier Asset Management (Europe) Limited, authorised and regulated by the Financial Conduct Authority (the "FCA"), and entered on the FCA register with registration number 515393. Lombard Odier Investment Managers ("LOIM") is a trade name.

This document is provided for information purposes only and does not constitute an offer or a recommendation to purchase or sell any security or service. It is not intended for distribution, publication, or use in any jurisdiction where such distribution, publication, or use would be unlawful. This material does not contain personalized recommendations or advice and is not intended to substitute any professional advice on investment in financial products. Before entering into any transaction, an investor should consider carefully the suitability of a transaction to his/her particular circumstances and, where necessary, obtain independent professional advice in respect of risks, as well as any legal, regulatory, credit, tax, and accounting consequences. This document is the property of LOIM and is addressed to its recipient exclusively for their personal use. It may not be reproduced (in whole or in part), transmitted, modified, or used for any other purpose without the prior written permission of LOIM. This material contains the opinions of LOIM, as at the date of issue.

Neither this document nor any copy thereof may be sent, taken into, or distributed in the United States of America, any of its territories or possessions or areas subject to its jurisdiction, or to or for the benefit of a United States Person. For this purpose, the term "United States Person" shall mean any citizen, national or resident of the United States of America, partnership organized or existing in any state, territory or possession of the United States of America, a corporation organized under the laws of the United States or of any state, territory or possession thereof, or any estate or trust that is subject to United States Federal income tax regardless of the source of its income.

Source of the figures: Unless otherwise stated, figures are prepared by LOIM. Although certain information has been obtained from public sources believed to be reliable, without independent verification, we cannot guarantee its accuracy or the completeness of all information available from public sources. Views and opinions expressed are for informational purposes only and do not constitute a recommendation by LOIM to buy, sell or hold any security. Views and opinions are current as of the date of this presentation and may be subject to change. They should not be construed as investment advice.

No part of this material may be (i) copied, photocopied or duplicated in any form, by any means, or (ii) distributed to any person that is not an employee, officer, director, or authorised agent of the recipient, without Lombard Odier Asset Management (Europe) Limited prior consent. In the United Kingdom, this material is a marketing material and has been approved by Lombard Odier Asset Management (Europe) Limited which is authorized and regulated by the FCA.