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LOMBARD ODIER
INVESTMENT MANAGERS

Rethink your core portfolio using multi-asset

Multi-asset · Asset allocation
July 2017

At a glance

- The aftermath of the global financial crisis of 2007-09 has created unprecedented challenges for asset owners as fixed income is no longer able to provide capital preservation, yield and liquidity all at the same time.
- These challenges are forcing investors to rethink how they build their portfolios. This includes searching for a new core strategy that can provide liquidity, stable returns and capital protection.[1]
- We believe a multi-asset strategy can meet investors' core objectives provided certain principles are followed. These centre around maximising diversification and actively managing drawdowns.
- The key principles:
  1. Be long all major asset classes all the time
  2. Take advantage of market inefficiencies and behavioural biases
  3. Keep a balanced risk exposure at all times
  4. Control the downside by dynamically sizing the portfolio
  5. Implement the portfolio in a liquid format.

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A core strategy should invest in liquid instruments and seek to provide investors with a stable return profile and capital protection[1]

Lombard Odier Investment Managers
For further information
Contact Alain Forclaz: a.forclaz@lombardodier.com
Or visit www.loim.com

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[1] Capital protection/Capital preservation represents a portfolio construction goal and cannot be guaranteed.

Rethinking portfolio construction in the new fixed income paradigm

The aftermath of the global financial crisis of 2007-09 has created unprecedented challenges for investors, with profound implications for how investors construct their portfolios.

Unprecedented challenges

Since the crisis, central bank interventions such as quantitative easing and negative rates have durably reshaped the investment landscape, and this is particularly true of fixed income, which traditionally forms a large part of investor portfolios. Overall, in our view, this has led to three structural challenges facing fixed income investors:[1]

1. Widespread low or negative yields in key markets: many asset owners now face low expected returns and even material negative carry in their fixed income allocation, forcing them to look elsewhere for yield
2. Increased market risk: investors have extended maturities to find positive yields, issuers have taken advantage of cheap financing costs to borrow long-term, and as a result holders of bonds now face heightened sensitivity to interest-rate moves. Limited scope for yields to go lower means that that bonds currently provide only limited diversification against equity market risk, especially given increased herding among fixed income investors
3. Fractured liquidity: central banks now hold up to 30%[2] of all outstanding government debt, reducing the corresponding free float. At the same time, tightened regulation is reducing banks' ability to hold and trade bonds as market-makers. Both of these facts have materially damaged liquidity conditions in fixed income.

Implications for portfolio construction

In this new world, fixed income can no longer provide capital preservation, yield and liquidity at the same time. Also, equities – traditionally counted on to meet investors' capital growth needs – require a very selective approach given the prolonged rally experienced by some key markets. This presents investors with significant and broad-reaching asset allocation challenges. As these challenges seem unlikely to disappear anytime soon, investors are being forced to rethink portfolio construction.

A new approach

We believe that investors should focus on each of the basic outcomes they wish to achieve and then look for solutions that can deliver those outcomes in the new fixed income paradigm. This amounts to a reassessment of how investors construct the core and satellite portions of their portfolio.

For their **yield** objectives investors should, in our view, consider increasing their exposure to credit risk through an allocation to corporate credit, in particular crossover credit.[3] However, their approach to investing will be as critical as their asset class selection: given the fractured liquidity and increased market risk in bond markets, we believe that focusing on higher-quality issuers mitigates credit risk and reduces the need to trade. Furthermore, holding such higher quality portfolios to maturity effectively insulates investors from interest-rate risk, thereby leading to a much safer implementation of investors' ongoing search for yield. It follows however, that such a strategy should not be counted on for investors' short-term liquidity needs given its relatively long investment horizon.

For **capital growth** in a world where traditional asset classes offer lower return potential and are more highly correlated, we believe investors should invest with high conviction in attractively-valued equities while also considering illiquid asset classes, eg, private equity. In our view, these investments are most likely to meet investors' growth objectives if they are implemented via high conviction value calls, although they require a reasonable time frame to play out. As with yield, the growth-seeking objective is at odds with investors' needs for liquidity and, indeed, a stable return profile across cycles.

Depending on specific investor requirements, **a risk-mitigation allocation** can be considered to cover specific risks or hedge against tail scenarios.

As a consequence of the above, investors will also need to establish a **core allocation** that they can convert easily into cash if needed, ie, an allocation that meets their core objective of liquidity, as well as seeking to preserve capital and generate stable

[1] For more information please read: A New Paradigm in Fixed Income.
[2] Source: GS Research, Bruegel database of sovereign bond holdings developed in Merler and Pisani-Ferry.
[3] For more information please read: Rethink your approach to corporate credit.

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returns.[4] By establishing a robust core allocation, investors can then afford to look to less liquid or higher risk investments for their yield and growth needs, such as the strategies mentioned above.

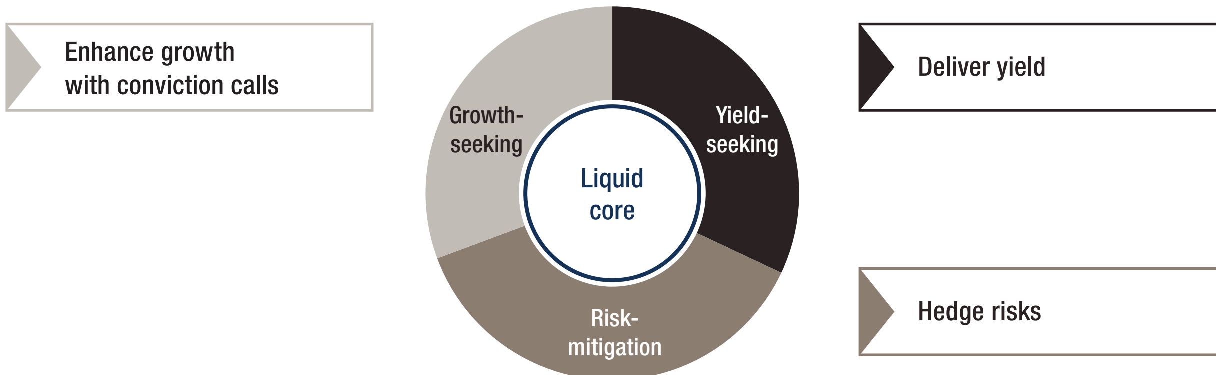
In this paper we focus on the core portfolio allocation and discuss how a multi-asset strategy that is managed according to a number of key principles can meet investors' liquid core allocation needs, in our view.

Multi-asset as the new core: liquidity, capital protection and stable returns

To be a viable core allocation, a strategy must invest in liquid instruments AND provide investors with a stable return profile and capital protection.[4] We believe liquid multi-asset strategies are best placed to fulfil these core objectives, in particular those that maximise diversification and actively manage drawdowns in addition to being highly liquid. We believe that five key principles – described in this paper and central to our All Roads Multi-Asset strategy – are key for effective multi-asset investing.

All Roads is designed to be an integral part of any diversified portfolio. In order to satisfy the needs of the broadest possible set of investors, we have put liquidity, simplicity, transparency and scalability at the heart of that design, which translates into a long-only implementation, while staying true to our systematic investment approach. As a case in point, the Lombard Odier Pension Fund has adopted All Roads as its core liquid allocation and currently invests 26% of its assets in this strategy (please see the case study at the end of this paper).[5]

FIG. 1 – PORTFOLIO CONSTRUCTION IN THE NEW FIXED INCOME PARADIGM



Source: LOIM. For illustrative purposes only.

[4] Capital protection/Capital preservation represents a portfolio construction goal and cannot be guaranteed.
[5] As at June 2017. Holdings and/or allocations are subject to change. The LO Pension Fund is a representative account which is being referenced for illustrative purposes only and is not available for direct investment.

Multi-asset investment principles designed to meet core objectives

At Lombard Odier Investment Managers we have developed a multi-asset strategy – called All Roads – with the explicit aims of achieving the outcomes of stable returns, capital preservation[6] and liquidity. Our objective is to follow the key principles listed below:

1. Be long all major asset classes all the time
2. Take advantage of market inefficiencies and behavioural biases
3. Keep a balanced risk exposure at all times
4. Control the downside by dynamically sizing the portfolio
5. Implement the portfolio in a liquid format

In this paper we discuss each principle and explain how we apply it in practice.

1. Be long all major asset classes all the time

As a starting point, the portfolio invests in a wide range of markets including: sovereign bonds (duration) – encompassing inflation-linked debt and emerging market sovereign credit (hard currency); credit – including high yield; equities (developed and emerging market) and commodities. This allows the portfolio to extract traditional market risk premia, meaning that the bulk of returns stem from macroeconomic developments such as changes in growth rates or inflation.

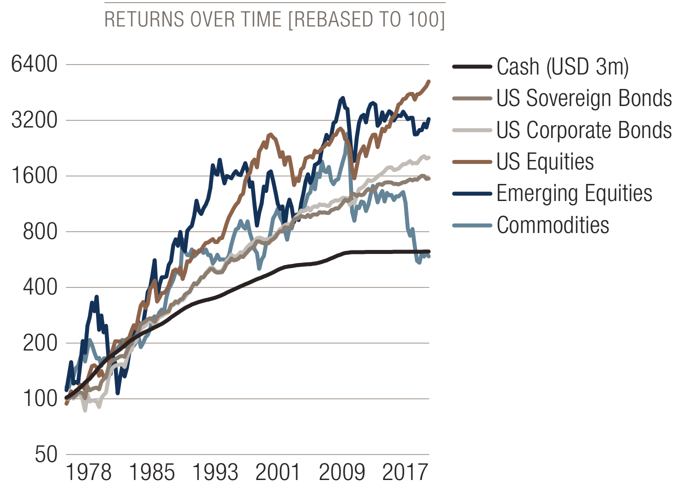
We believe that it is important to be long all major asset classes all of the time since they all perform in the long-run but they each perform differently in various macroeconomic scenarios.

In Fig. 2 we see that all major asset classes deliver positive risk-adjusted returns in the long-run (top two charts). The bottom chart shows how, within this overall timeframe, specific macroeconomic regimes impact risk-adjusted returns versus their full-sample statistics. For example, duration and credit perform better than average during slowdowns while equities come to the fore in periods of growth. During periods of high inflation, commodities perform better than their long-term average and it is the only risk premia to do so.

Given that it is difficult to time or predict with certainty macroeconomic conditions, it is better, in our view, to remain exposed to all asset classes all the time, especially given the target objectives of stable returns and capital protection.[6]

FIG. 2A – ALL MAJOR ASSET CLASSES PERFORM IN THE LONG RUN

RETURNS OVER TIME [REBASED TO 100]



SHARPE RATIO

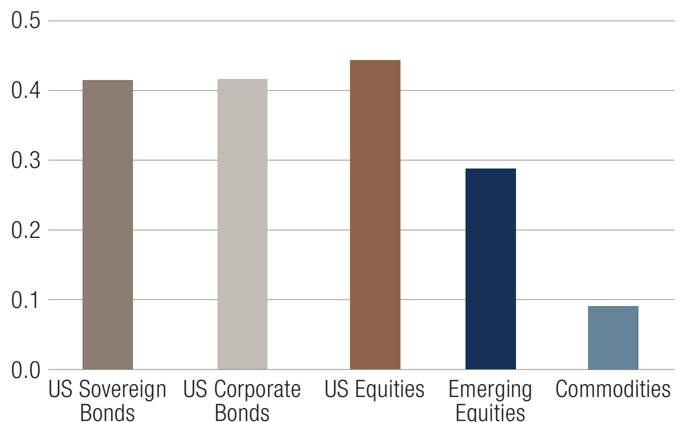
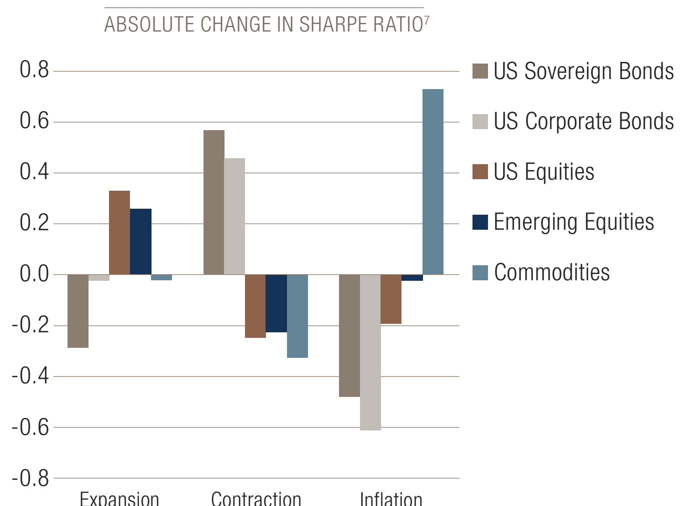


FIG. 2B – PERFORMANCE VARIES ACCORDING TO MACRO REGIME

ABSOLUTE CHANGE IN SHARPE RATIO[7]



[6] Capital protection/Capital preservation represents a portfolio construction goal and cannot be guaranteed.
[7] Relative to Sharpe Ratio for full history, as shown in the middle chart.
Source: Bloomberg, LOIM calculations. For illustrative purposes only. Past performance is not a guarantee of future results. Data from 1977-2017. Indices used: Commodities: GSCI USD; Risk free: CITI USD 3M T-Bills; Credit: Barclays USD Corp Inv Grade; Duration: Barclays USA GOV; Equities: MSCI USA ND USD; EM Equities: Hang Seng USD (until 31 December 1987) then MSCI EM (chained). For illustrative purposes only. Target performance/risk represents a portfolio construction goal. It does not represent past performance/risk and may not be representative of actual future performance/risk.

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2. **Take advantage of market inefficiencies and behavioural biases**

We believe that investors should look beyond traditional asset classes for further sources of diversification and returns.

Such opportunities arise because of investors' behavioural biases or market inefficiencies and have been shown to persist systematically in decades of academic and practitioner research. Important examples are "carry" (the ability of higher-yielding assets to outperform low-yielding ones) and "trend following" (the tendency of assets' recent performance to persist).

In All Roads, we select alternative risk premia that have a clear theoretical justification, can be implemented using liquid instruments, and which we believe can provide substantial and persistent diversification benefits alongside the traditional risk premia already present in the portfolio to add value as shown in Fig. 3A.

Our alternative risk premia are implemented as an overlay that adjusts the exposures of the traditional risk premia down to a minimum zero weighting, respecting our long-only approach. Specifically, we adjust our risk-based allocation based on carry and cross-asset trend, described briefly below.

Carry
A typical carry strategy can be summarised as: to buy a financial asset with a high yield and fund it through an asset with a lower yield and then collect the income linked to the yield differential. Carry strategies include:

- Carry Bonds: involves exploiting the risk premium in the yield curve, eg buy government bonds with the highest yields or associated with the steepest yield curve and sell those with lowest yields or the flattest underlying yield curves; if yield curves remain unchanged, investors can benefit from the interest rate differential.
- Carry FX: involves borrowing a low interest rate currency and investing in a high interest rate one. If the currency spot prices remain unchanged, investors can benefit from the interest rate spread.
- Carry commodities: relative value strategy driven by curve structure (contango/backwardation) differences in global commodities.

Cross-asset trend
Momentum (or trend-following) strategies seek to capitalise on the observed tendency for rising asset prices to rise further and falling prices to keep falling. Such strategies take advantage of the persistence of directional moves in a large universe of assets, which find their grounding in behavioural finance.

The potential benefits of combining a trend-following strategy with a traditional portfolio include an increased Sharpe ratio and lower drawdowns. Trend-following strategies tend to have a low correlation to traditional asset classes and can offer an attractive pay-off. For example, a trend-following strategy displays negative correlation to equities when the latter experience stress periods – see Fig. 3B.

FIG. 3A – HISTORICALLY TREND AND CARRY HAVE ADDED VALUE OVER TIME

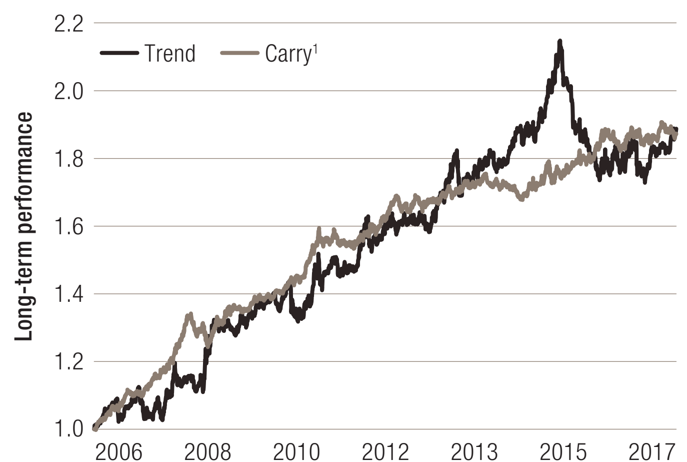
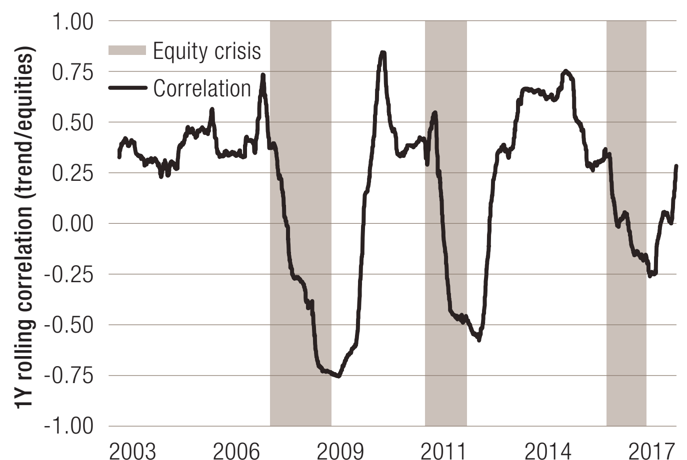


FIG. 3B – TREND PROVIDES FURTHER DIVERSIFICATION DURING EQUITY CRISIS PERIODS



[1] Equal-weighted average performance of carry bond, carry credit and carry commodities strategies.

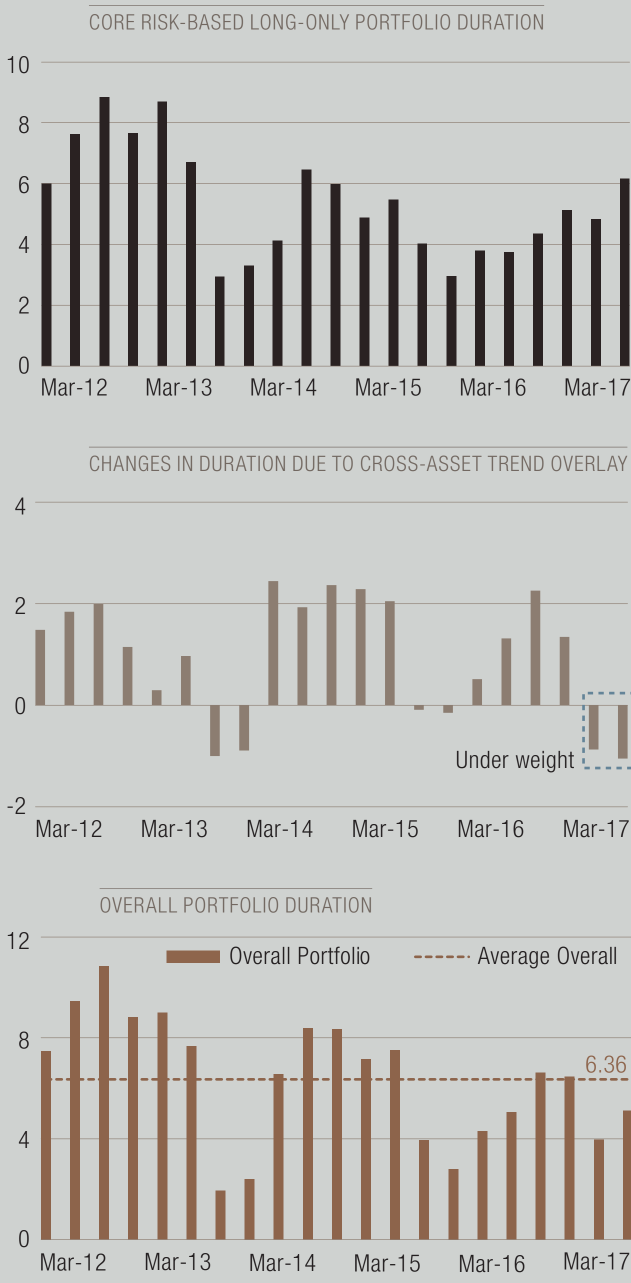
Source: LOIM, Bloomberg. Trend and Carry: LOIM strategies, backtested, daily data, between September 2006 and December 2016 in local currency. These performance results are backtested based on an analysis of past market data with the benefit of hindsight, do not reflect the performance of any LOIM product and are being shown for informational purposes only. While the results presented are based on certain assumptions that are believed to reflect actual trading conditions, these assumptions may not include all variables that can affect, or have affected in the past, the execution of trades. The hypothetical portfolio results are based on the following assumptions:

a. The hypothetical portfolio record does not include deductions for brokerage commissions, exchange fees, or slippage.
b. It assumes purchase and sale prices believed to be attainable. In actual trading, the prices attained may or may not be the same as the assumed order prices.

Case study: using a cross-asset trend strategy to manage duration

The charts below illustrate how a trend-following component can be combined with a risk-based long-only portfolio to dynamically adjust the portfolio's duration exposure. From top to bottom, we can see: 1) the fluctuating exposure to duration (sovereign bonds) over time, through the risk-based allocation process; 2) the over-/under-weight adjustments coming from the trend-following strategy (for example underweight in the last quarterly periods charted); and 3) the resulting overall exposure, which varies dynamically over time.

FIG. 4 – CASE STUDY: DYNAMICALLY MANAGING DURATION



Source: LOIM. Please see important information on case studies at the end of this paper.

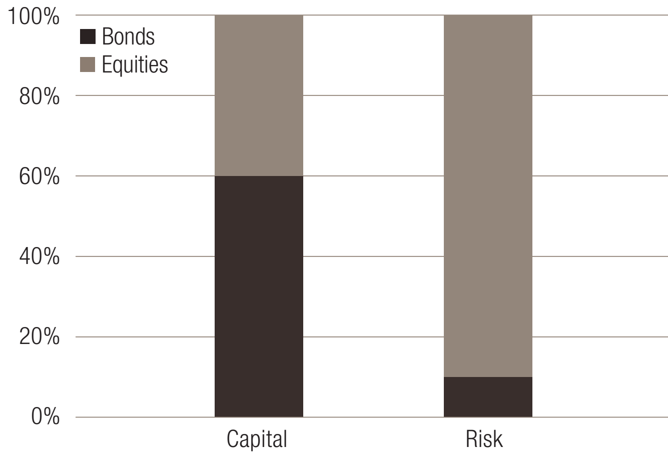
3. Keep a balanced risk exposure at all times

Effective diversification is not only about selecting a wide range of assets and risks. It is also about how you weight them in the portfolio. Under the All Roads risk-based approach, capital allocation and portfolio rebalancing are not driven by targeting specific capital weightings, but rather specific risk weightings.

By giving less weight to more risky assets and factors (and vice versa) it is possible to achieve a better balance of each factor's contribution to total portfolio risk. This, in our view, has two important advantages over traditional fixed capital allocation.

First, it avoids the danger of concealing the portfolio-risk contribution of a factor or over-concentration of portfolio risk in a factor: for example, a traditional 60/40 portfolio may look balanced, but because equities are so much more risky than bonds, more than 80% of the portfolio's risk can be attributed to equities alone as shown in Fig. 5.

FIG. 5 – CAPITAL VERSUS RISK ALLOCATION IN 60/40 PORTFOLIO



Source: LOIM. For illustrative purposes only.

Second, when the risk allocation is predefined it means that the capital allocation fluctuates dynamically as the volatility and other risk characteristics of markets change, as they do moving through the economic cycle. The portfolio thereby constantly and automatically adapts to changing risk conditions, reducing the likelihood of being over-exposed to specific macroeconomic environments.

Targeting an optimal, balanced risk exposure that is agnostic to macro regimes

Our starting point is to build a portfolio that does not overweight any environment in particular. Our analysis over a multi-decade time horizon shows that growth scenarios (i.e. rising GDP) only occur around 40% of the time. Similarly, slowdown periods (i.e. declining GDP) occur around 40% of the time, and finally inflation shocks

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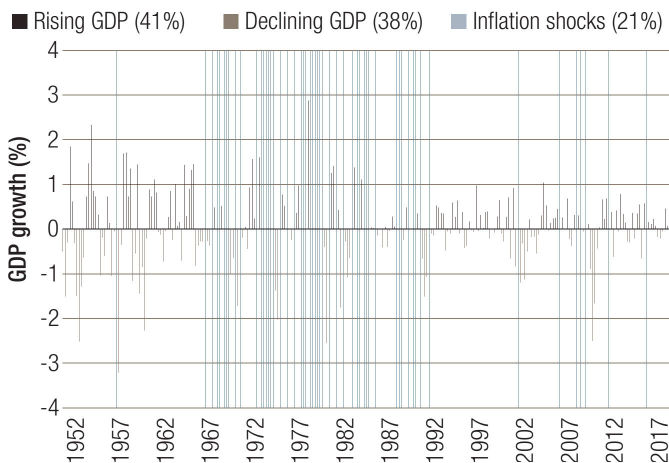
occur 20% of the time, as shown in Fig. 6. Based on these numbers, it is clear that a traditional 60/40 capital allocation puts an exaggerated bet on positive growth and measured inflation – the environment most favourable to equities. We reject this bet as a portfolio construction starting point and target instead a balanced risk allocation to these three macroeconomic environments.

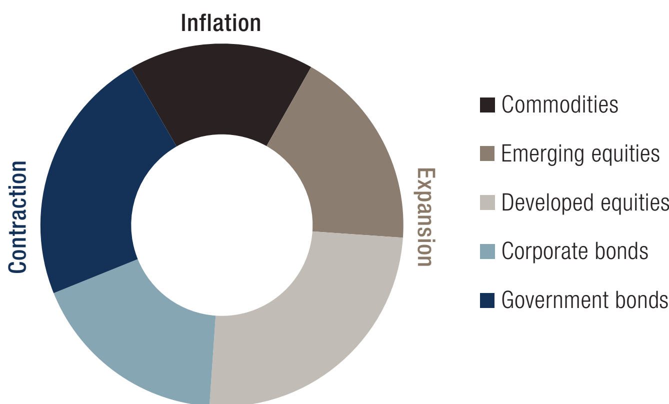
FIG. 6 – HISTORICAL GROWTH (%) AND INFLATION ENVIRONMENT



Source: Bloomberg, LOIM. Quarterly data 1950-2016. Based on US data (Output Gap and CPI).

As illustrated below our risk allocation reflects this implementation belief and achieves a balanced exposure to risk factors and underlying macroeconomic variables.

FIG. 7 – ALL ROADS RISK ALLOCATION



Source: LOIM. For illustrative purposes only. Holdings and/or allocations are subject to change.

Proprietary risk model

Our risk allocation principles are based on an in-house risk model which uses “expected shortfall” (also known as Conditional Value-at-Risk), or the risk of loss, as the key risk metric.

Given a total portfolio risk budget expressed as an expected shortfall over a one-year horizon with a 95% confidence level, the process aims to identify the best allocation across the selected risk premia which satisfies this risk budget.

Our risk model takes into account four key inputs: carry, volatility, tail risk adjustments and correlations.

Carry estimates reflect the expected returns offered by various risk premia under the assumption that current market conditions remain unchanged over a one-year horizon. They represent the centre of the expected return distribution and are broadly related to valuation (the higher the valuation the lower the carry and vice versa).

LOIM has developed a proprietary “pooled” volatility methodology, which combines various volatility measures on the market that each have distinctive features and aim to provide a more reliable overall risk estimation. This pooling approach also avoids specific model risk linked to a single measure and is consistent with our principle of diversifying risks at all stages, including when we measure variables.

Tail-risk adjustments are determined for those risk premia which demonstrate “fat-tail” behaviour, a typical example of which is credit.

Our proprietary correlation estimates are linked to the state of the economic cycle. We believe that static long-term average correlations are not sufficiently meaningful, while short-term correlation estimates are too unstable. Instead, we believe that correlation regimes exist between major assets classes and are driven by the evolution of macroeconomic variables (growth and inflation).

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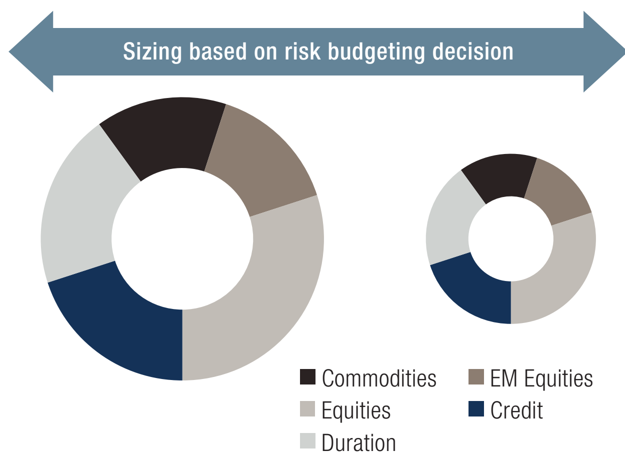
4. Control the downside by dynamically sizing the portfolio

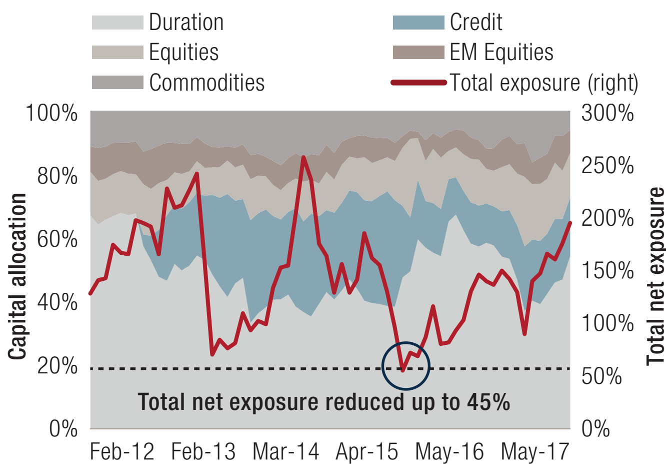
The All Roads risk allocation process is free of any judgment about whether one risk factor is better than another at any point in time: rather than making capital allocation decisions between one risk factor or another in response to the changing environment, the portfolio aims to maintain a balance between risk factors defined in Principle 3 above and instead adjusts the total portfolio risk exposure according to our active risk budgeting and robust, dynamic and systematic drawdown management technique.

FIG. 8 – DYNAMIC RISK CALIBRATION CONTROLLING PORTFOLIO SIZING



Source: LOIM. For illustrative purposes only. Allocation may change.
Capital protection/Capital preservation represents a portfolio construction goal and cannot be guaranteed. Allocations may vary over time.

FIG. 9 – DYNAMIC PORTFOLIO EXPOSURE AND CAPITAL ALLOCATION



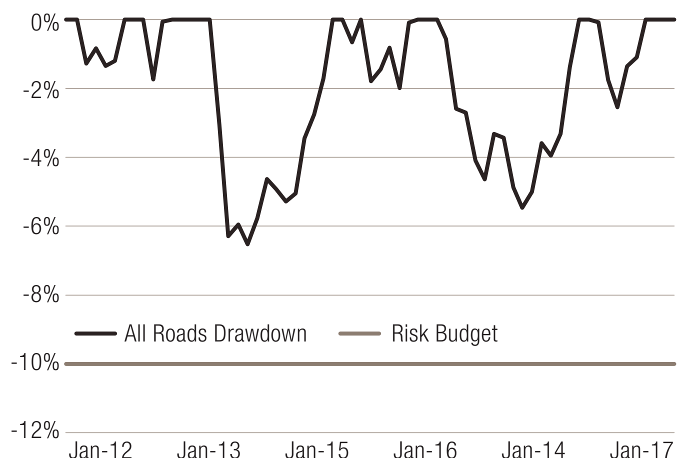
Source: LOIM. For illustrative purposes only. Allocation may change.
Capital protection/Capital preservation represents a portfolio construction goal and cannot be guaranteed. Allocations may vary over time.

So, with the overall risk allocation set, we then vary the amount of risk according to our preference (Fig. 8). In effect this means that if we wish to take less overall risk we sell a little of everything in the portfolio rather than crudely selling a portion of our equities allocation. Conversely, when our risk appetite rises, we don't simply increase our equity allocation, we buy a little of all asset classes.

The result of this dynamic risk management is that the portfolio's overall capital allocation can vary significantly (Fig. 9 red line). We can reduce (net or gross, which are the same for a long-only portfolio) exposure to 45%, which means that cash represents up to 55% of capital exposure. This allows the fund to reduce losses to within the assigned risk budget[8] as well as to levels significantly below those suffered by traditional allocations (see Fig. 10).

FIG. 10 – PROTECTION ON THE DOWNSIDE

- Aim: Max 1-year drawdown of 10%
- Achieved[1]: 6.5%



Source: LOIM. Past performance is not a guarantee of future results. Target performance/risk represents a portfolio construction goal. It does not represent past performance/risk and may not be representative of actual future performance/risk.

[1] Performance/data (as applicable) of LO Fund All Roads Class EUR N A, net of all fees and expenses. Capital protection/Capital preservation represents a portfolio construction goal and cannot be guaranteed.

[8] The example above shows a version of the All Roads strategy that operates with a risk budget of 10% max 1Y drawdown.

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5. Implement the portfolio in a liquid format

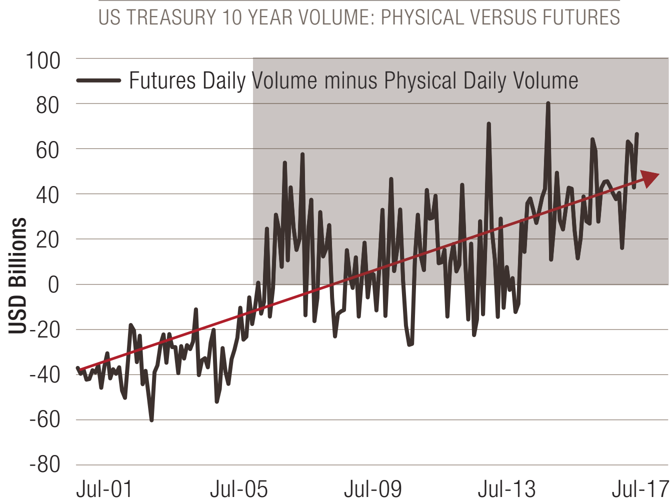
By implementing All Roads using highly-liquid derivatives, primarily exchange-traded futures, we reduce the need to access fractured liquidity in fixed income. As outlined earlier, liquidity in bond markets has deteriorated meaningfully since the financial crisis due to the bond purchasing programmes of central banks on the one hand, and tighter regulation reducing banks' ability to hold and trade bonds as market-makers, on the other. Indeed, futures markets today provide deeper liquidity than physical markets. (see Fig. 11 below).

Assessing and monitoring the liquidity of the individual instruments used in the All Roads portfolio is an integral part of the overall investment approach. We monitor liquidity very closely and take the liquidity properties of our instruments into account in our portfolio construction. This enables the All Roads portfolio to offer daily liquidity to its investors, providing the peace of mind that investors require from their core allocations, and it also helps maintain the flexibility quickly to adapt and optimise portfolio holdings in response to evolving market conditions, and implement active drawdown management as needed.

The All Roads portfolio predominantly comprises of cash and a small allocation to a basket of inflation-linked bonds. Part of the cash serves as collateral to gain exposure to various asset classes through liquid derivatives (which include futures, credit default swaps and total return swaps, as shown in Fig. 12).

FIG. 11 – LIQUID DERIVATIVES CAN PROVIDE HIGHER LIQUIDITY THAN PHYSICAL MARKETS

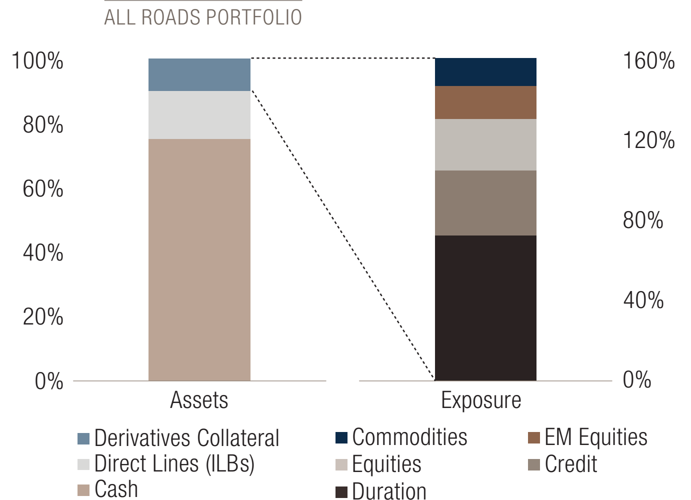
US TREASURY 10 YEAR VOLUME: PHYSICAL VERSUS FUTURES



Source: LOIM, Bloomberg, Federal Reserve Bank of New York. For illustrative purposes only.

FIG. 12 – EXPOSURE TO ASSET CLASSES MAINLY THROUGH HIGHLY LIQUID DERIVATIVES

ALL ROADS PORTFOLIO



Source: LOIM. Allocation as at April 2017. Allocation may change. For illustrative purposes only.

Conclusion and case study

We believe that in light of the challenges presented by the new fixed income paradigm, investors need to rethink portfolio construction and look for solutions that are best placed to offer liquidity, a stable return path and have the best chance of protecting capital[9] – all core requirements for a global portfolio. We believe that liquid, diversified multi-risk premia strategies such as All Roads can provide that solution.

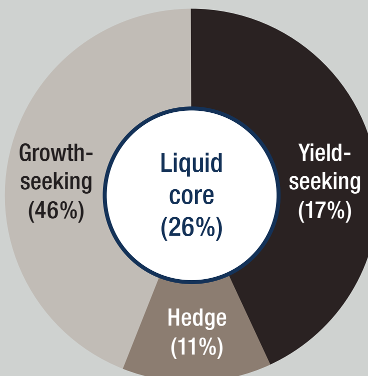
All Roads has a proven five-year track record of delivering on its target outcomes.[10] Further, it does not rely on the portfolio manager's judgment calls to generate returns, but rather on a well-researched and systematic investment process underpinned by maximum diversification, and active downside risk management. All Roads follows five key principles to seek to provide stable returns and target better capital protection against a backdrop of persistent uncertainty.

Case study: All Roads as a core pension allocation[11]

Faced with the same challenging fixed income paradigm that other investors have been experiencing, Lombard Odier's own pension fund (LOPF) decided to redefine its core portfolio allocation.

Upon a thorough review in 2015, LOPF's investment committee decided to invest in the All Roads risk-based multi-asset strategy as a core allocation. This allowed the pension fund to benefit from diversified risk premia coupled with dynamic risk budgeting and drawdown management, whilst ensuring that the core of the portfolio is invested in transparent and extremely liquid instruments at all times.

FIG. 13 – LOMBARD ODIER PENSION FUND CAPITAL ALLOCATION IN PERCENT



Source: LOIM. For illustrative purposes only.

We believe All Roads' risk-based approach is especially suitable for a pension fund that is required to target capital preservation, but also needs income and capital growth to ensure its ability to meet future liabilities.

[9] Capital protection/Capital preservation represents a portfolio construction goal and cannot be guaranteed.
[10] Past performance is not a guarantee of future results.
[11] The LO Pension Fund is a representative account which is being shown for illustrative purposes only and is not available for direct investment.

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Emerging Market: Emerging markets securities may be less liquid and more volatile and are subject to a number of additional risks including, but not limited to, currency fluctuations and political instability.

Currency: If the funds are denominated in a currency other than that in which the majority of the investor's assets are held, the investor should be aware that changes in rates of exchange may affect the value of the funds' underlying assets. The portfolio risk management process includes an effort to monitor and manage risk, but does not imply low risk.

Derivative: The strategy may include the use of derivatives. Derivatives often involve a high degree of financial risk because a relatively small movement in the price of the underlying security or benchmark may result in a disproportionately large movement in the price of the derivative and are not suitable for all investors. No representation regarding the suitability of these instruments and strategies for a particular investor is made.

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Alternative investments often engage in leverage and other investment practices that are extremely speculative and involve a high degree of risk. Such practices may increase the volatility of performance and the risk of investment loss, including the loss of the entire amount invested. Alternative investments may themselves invest in instruments that may be highly illiquid and difficult to value. This may also limit your ability to redeem or transfer your investment or delay receipt of redemption proceeds. We refer you to the offering materials for a more complete discussion of the risks relating to an investment in any particular alternative investment

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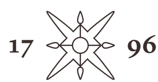

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