LGIM America

August 2023

Liability Disinterested Investing

Risk Management for Cash Demands on Total Return Portfolios

Executive summary

Investors concerned about the stability of equity-bond correlations can implement several approaches to mitigate or avoid any permanent loss of capital during a market drawdown when liquidity is needed. Depending on an institution's specific objectives and preferences, we could implement one or a combination of:

- Cash flow matching a portion of their fixed income assets to expected spending needs.
- Creatively managing credit risk and interest rate duration risk to better balance total returns with diversifying or hedging benefits.
- Utilizing equity option structures to protect against outcomes where diversification within asset allocation may not sufficiently reduce risk.

It is not only the hard lessons of 2022 that may make these approaches appealing, but also instability in relationships underpinning optimized portfolios, the trend toward higher allocations to illiquid assets and the conundrum of maintaining a long-term view in the face of short-term disruptions. We outline our rationale and various implementations that we believe can help institutional investors meet the demands of their sponsoring organizations while potentially minimizing any trade-offs against long-term expectations for market risks and rewards.

Introduction

Rising inflation was widely anticipated in early 2021. Volumes were written across the investment industry, not only about the nature of rising inflation, but also about the potential effects on asset performance and correlations. As inflation concerns came to fruition, hard lessons were learned about portfolio diversification (and plenty has also been said about the returns of a balanced portfolio in 2022). It was the worst of times for total return investors, yet the best of times for corporate pensions, with estimated average funded status hovering at the highs of the last decade.[1] And while our client base is highly diversified, we are well-recognized as an industry leader in long duration fixed income and liability-driven investing.[2] This has led to several provocative conversations with clients and prospects about the role and nature of fixed income in their portfolios. The conversations have focused on two general questions:

1. How much can I rely on fixed income – particularly U.S. government bonds – to diversify the risk of return-seeking assets (primarily equity)?
2. To the extent that I rely on fixed income for diversification, does the duration profile of my allocation matter?

This practical and philosophical reexamination of duration's utility is coming from endowments & foundations (E&Fs), healthcare and public plan pensions alike. In some cases, the sharper focus on duration is motivated both by its potential diversification benefits as well as the support offered to total portfolio returns from all-in yields that are their highest in almost 15 years. In other cases, clients are focused very explicitly on avoiding a permanent loss of capital due to cash outflow demands (e.g., for grant-making or medical equipment CapEx) during a period where most, if not all, holdings are marked down. In nearly every case, clients attest that they are less concerned about liabilities than they are about the ability to source liquidity – expediently and cost-effectively – from their asset portfolio should the need arise. In our view, it is a critical time for these 'liability curious' investors to reevaluate their approach to fixed income.

It is common for total return-oriented investors to utilize a constrained mean-variance optimization (MVO) framework, despite its well-documented limitations. These limitations

have given rise to other portfolio construction approaches, such as risk parity, that reduce the number of required parameter estimates but are often impractical – if not impossible – to implement at a total portfolio level (ignoring further any implications of the use of leverage and the shape of the yield curve on such strategies). So, we rely on MVO on the justification that it is intended to capture average relationships over a full market cycle. The approach relies on historical data that is often exponentially weighted, meaning more recent data points are given more emphasis in parameter estimates.

We believe this approach leaves investors more prone to disappointment now because of three factors. First, it is obvious that the interest rate environment no longer resembles the secular, low volatility decline that largely characterized the end of the great financial crisis, a protracted period that would weigh heavily on an optimization. Second, the shift in market environment is colluding with a significant increase in the average allocation of institutional portfolios to illiquid asset classes like private equity. Third, investor cashflows have their own idiosyncratic cadence, and do not wait patiently for full market cycles to manifest their long-term average relationships; they happen in the short-term, often on-demand, and occasionally at very inconvenient times.

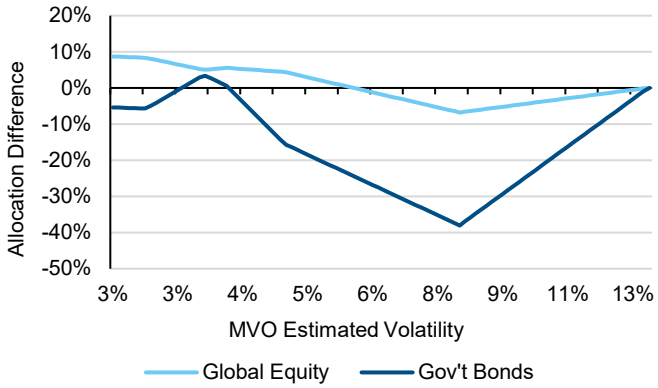
Even for investors who do not focus explicitly on the cashflow demands of their sponsoring institutions, we believe that there are important corollaries to liability driven investing that are advantageous and applicable more broadly. Next, we outline the challenges faced by total return focused investors when market environments conspire against their long horizon orientation. We also suggest several possible solutions that may, individually or in concert, provide greater short-term certainty and stability without detracting from that long-term focus and, most importantly, help meet institutional goals more consistently.

Implications of MVO instability

As we have demonstrated previously, there is a great deal of path dependency in achieving institutional objectives, and the highest performing asset over a given horizon may yet have an intolerable amount of volatility within that period (or lack of liquidity throughout it). To demonstrate this, we created a series of mean-variance optimal portfolios over time and examined the ex-ante and ex-post risk and return characteristics of those efficient frontiers.[3]

Figure 1 shows the difference in target asset allocations to US equity and US government bonds for a given portfolio volatility, holding both return and volatility assumptions constant but substituting the realized correlation over the subsequent 36 months (unweighted) for the estimated correlation at the beginning of that optimization period. In other words, what if the investor had perfect foresight of the pairwise correlations?

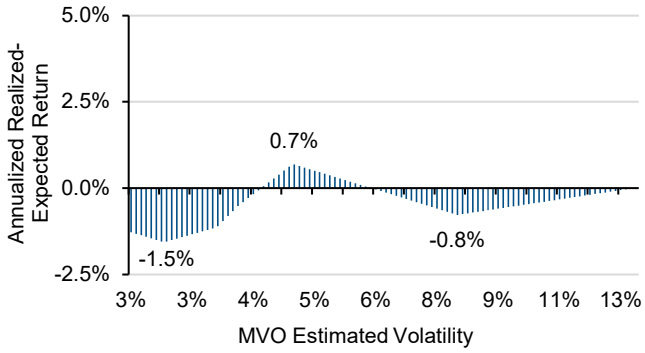
Figure 1: Allocation Effect of Correlation Foresight



Source: Bloomberg, LGIM America Calculations. Data as of June 30, 2023. For illustrative purposes only.

We see enormous swings in each allocation relative to the rest of the portfolio, which would have affected portfolio returns by as much as 1.5% p.a (Figure 2). However, that return difference may not be what you expect. Nearly a quarter of the portfolios with perfect foresight into future realized correlation underperformed their estimated correlation peers, and the relative performance is anything but linear across estimated volatility levels.

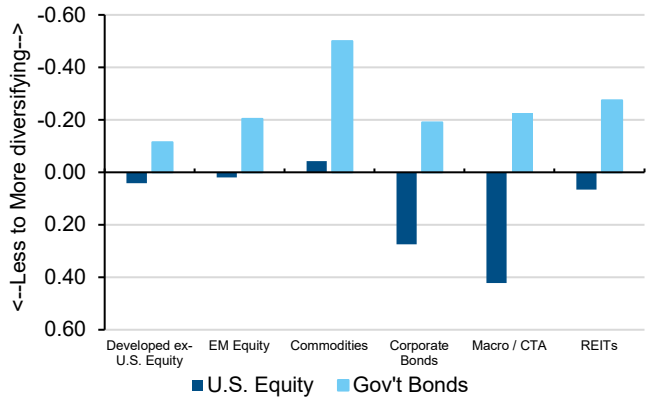
Figure 2: Performance Effect of Correlation Foresight



Source: Bloomberg, LGIM America Calculations. Data as of June 30, 2023. For illustrative purposes only.

This further highlights the ephemeral nature of diversification – you simply cannot know which, if any, assets of a traditionally optimized portfolio will support your organization's cash needs at a specific point in time. Figure 3 shows the difference between estimated and realized pairwise correlations of the other asset classes in our stylized portfolios versus both US equities and US government bonds for the same 36-month window. These are material differences in nearly every case, and yet they still do not tell you what your asset class preferences should have been, nor when drawdowns in any of these assets occurred relative to any cash outflows. And this is with (partially) perfect foresight!

Figure 3: Realized vs estimated correlations



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Fixed income as an equity hedge

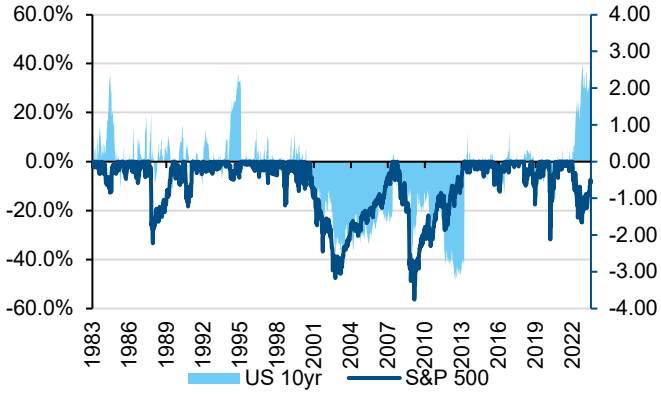
We will explicitly distinguish between a diversifier (i.e., an asset whose behavior is different) and a hedge (i.e., an asset whose behavior is opposite), although we concede that the characterization may operate on a spectrum. Fixed income can certainly be a diversifying exposure relative to equity, even if it is not always reliably so. The idea of fixed income as a hedge to equities largely stems from an assumed long-term negative correlation and the association of acute risk-off episodes with a flight to the perceived safety of government bonds.

Unfortunately, a negative stock-bond correlation – particularly a strong one during risk-off episodes – is a relatively modern phenomenon. Historically, rates have been flat to up about as often as they have been down when equities were under water, as can be seen in Figure 4.

How much, if at all, exposure to duration hedged an equity drawdown can be made even more explicit. Figure 5 shows what yield change would have been required from holding an equal starting allocation to 10-year Treasuries to offset the corresponding equity drawdown versus the actual yield change for that episode. Exposure to duration helped about half the time, and the magnitude of the potential hedge benefit varied by depth of equity drawdown, with more severe equity losses farther outpacing Treasury gains. Of course, the actual hedge benefit that could have been captured from duration exposure would depend on the relative allocation between equity and fixed income and how the duration exposure was spread across maturities.

This last aspect of where duration is sourced may be underappreciated. Generally, the price of a longer maturity bond will change more for a given change in rates than compared to a shorter maturity bond. Further, we know that the shape of the Treasury curve also changes depending

Figure 4: US 10-year Treasury yield changes during equity drawdowns



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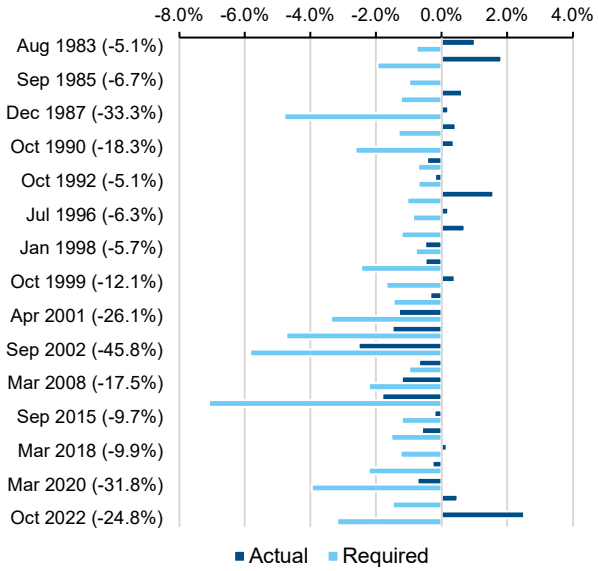
on the macroeconomic scenario or episodic event. (In other words, both Figures 4 and 5 would look different if they illustrated the change in the 2-year or long bond yields.) Using long duration fixed income as a hedge to equities makes sense, then, contingent upon a negative stock-bond correlation assumption. It is effectively a way of leveraging your fixed income allocation – more duration exposure for the same dollar of capital allocated. Of course, leverage works both ways, and it may have exacerbated many investors' woes in 2022. Moreover, in periods of very acute stress such as the COVID-19 pandemic, longer maturity bonds, even Treasuries, can become prohibitively expensive to trade, reducing any potential hedge or liquidity benefit.

Figure 5: Equity duration charts



Source: Bloomberg, LGIM America Calculations. Data as of June 30, 2023. For illustrative purposes only.

Implementing portfolio hedges including fixed income

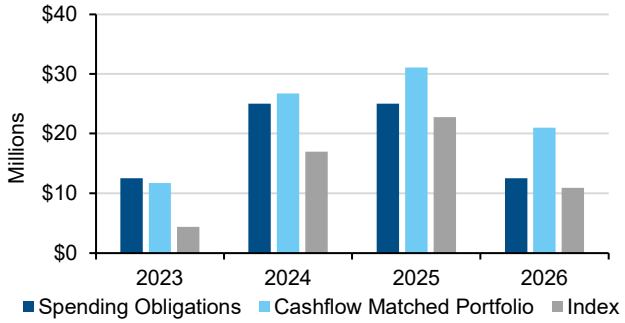
We understand that investors' goals for portfolio diversification include a smoother path toward their objective, and a collection of assets that can provide stability and liquidity in periods of equity risk without significant disruption or permanent loss of capital. We have also demonstrated that fixed income pleases some of the people all the time and all of the people some of the time in those respects. This is particularly true of total return investors who most commonly implement fixed income exposure against broad, market-based benchmarks such as the Bloomberg US Aggregate Index.

Recall that we defined a hedge simply as an asset that has the opposite behavior of another asset or, by extension, a liability. Institutions outside of corporate defined benefit plans do not have the relative convenience of a market-based discounting mechanism for liabilities – which greatly narrows the selection of a hedging asset – but this doesn't mean that the liability can be ignored. Public plans obviously have a defined liability; E&Fs have a liability that is simply the perpetuity of their payout rule; healthcare organizations may budget a payout or their cashflow needs may be a little more idiosyncratic. Once those cash needs are budgeted, assets can be invested against them that can also protect the overall portfolio. We see three potentially useful steps to accomplish this.

First, investors can invest a portion of their fixed income such that proceeds from coupons and maturing positions (allowing for any potential defaults) meet the short-term cash needs of the organization. This approach is common among insurance companies and some pensions, regardless of their discounting mechanism or return objectives. Importantly, these assets can be invested in ways that safely meet (or even exceed) market returns offered by short duration benchmarks. This ensures that there are some assets in the overall portfolio that provide liquidity and certainty, regardless of the market environment for any other assets, including other fixed income. The remainder of the fixed income assets can be reoptimized around market benchmark risk factors or in accordance with a custom strategy tailored to an organization's objectives.

We believe this step may prove critically important. Some investors have sourced exposure exclusively via the longest duration instruments (e.g., STRIPS), and have been let down by higher rates – regardless of whether these moves are transient or enduring – and higher transaction costs. Very long duration assets may well be a good fit for a total return portfolio over the long term, but cashflow matched credit may be an integral part to fully realizing those long-term goals. For example, utilizing very long duration fixed income benchmarks may provide more negative equity beta in certain periods of stress, but rising rates make this a double-edged sword, particularly when counting on fixed income to provide liquidity during those periods. More directly, for investors who have increased allocations to private asset classes (which mark-to-market on a significant lag), the proportional allocation to long duration fixed income will decline at an accelerated pace when rates rise, leaving far less liquid assets available to the plan and at unattractive valuations. A cashflow matching approach for short-maturity needs ensures the availability of money-good liquid assets and avoids a permanent loss of capital. Figure 6 demonstrates a portfolio that balances meeting expected cash needs for the first three years – particularly by avoiding any early shortfalls – while closely matching the market benchmark (Bloomberg US Aggregate) across several other common measures of fixed income risk (Figure 7).

Figure 6: Completion portfolio cashflows



Source: Bloomberg, LGIM America Calculations. Data as of June 30, 2023. For illustrative purposes only.

Figure 7: Key statistics

	Duration	YTW	YTM	Avg. Cpn
Cashflow Matched Portfolio	6.51	4.31	3.89	1.78
Bloomberg US Aggregate Index	6.24	4.59	4.59	2.82

Source: Bloomberg, LGIM America Calculations. Data as of June 30, 2023. For illustrative purposes only.

Second, investors can be pragmatic and creative by distinguishing the role of credit spreads from interest rate duration in the portfolio, even if the two aren't necessarily accessed independently. Excess returns to credit over equivalent maturity Treasuries typically have a weakly positive correlation to equity returns, and rarely are credit excess returns positive during a meaningful equity drawdown. Approaching fixed income as a market blend of credit and Treasuries may diversify your portfolio; treating them separately may actually hedge your objective. For example, very low duration or hedged credit portfolios that are not constrained to a market benchmark may be able to source better risk-adjusted spreads, and those allocations can be blended with other market benchmarks or custom fixed income portfolios to better match the objectives and/or

market benchmark of your policy. Figures 8, 9 and 10 illustrates how one can decouple their interest rate and credit spread objectives. In our illustrative example, the sponsor prefers to allocate to a low duration fixed income strategy, while employing an overlay to complete to the benchmark's overall duration. Additionally, one can expand into a multi-sector credit framework, allowing a manager greater flexibility across geographic, rating, or other credit criteria spectrums may also produce better risk-adjusted returns, particularly by avoiding the highest risk sectors during a downturn.

Figure 8: Asset summary

Physical assets	MV ($mm)	Duration (years)
Absolute Return Strategy	750	-
Treasury Overlay	250	50.0
Total Assets	1,000	13.9
Fixed Income Benchmark	1,000	13.9

Source: Bloomberg, LGIM America Calculations. Data as of June 30, 2023. For illustrative purposes only.

Figure 9: Asset allocation

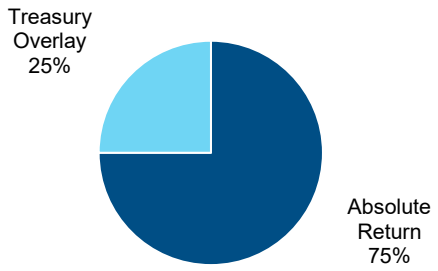


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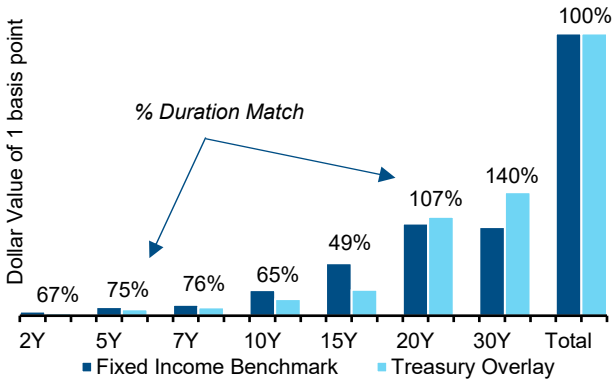
Figure 10: Duration match against asset allocation benchmark



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Finally, direct hedges can be added, and these can take several forms. As we demonstrated above, a large equity drawdown is unlikely to be fully protected by exposure to duration. It is unlikely that investors seeking relatively high total returns would be able to allocate sufficiently to fixed income (without utilizing significant leverage) to offset a more severe equity drawdown completely, even assuming rates decline in that environment. In this case, investors can utilize deterministic scenarios to identify the magnitudes of equity drawdowns that may be intolerable to their organization. That may include accepting the full first 10% of equity losses, none of the next 15-20% of losses (i.e., 25-35% drawdown), and all losses thereafter; or it could be protecting against true tail risk of drawdowns greater than, say, -25%. At that point, the relative cost-benefit of outright equity option purchases, systematic equity protection strategies, and even more exotic structures can be evaluated more effectively. While both strategic implementations of equity option structures and the implementation of systematic protection strategies are quite common, more exotic structures are less frequently utilized. Nevertheless, they are worthy of consideration. For example, options are available that protect against equity drawdowns contingent upon rates rising by a given amount or to a certain level, and these options are cheaper than the equivalent vanilla puts. They are cheaper because of the embedded correlation requirement, which many investors are typically averse to. However, that these options benefit from the realization of a positive correlation between stocks and bonds is in fact what makes them one of the most direct hedges against the negative correlation assumption on which portfolio design is so pervasively predicated.

Conclusion

When rates rise, particularly on a short to intermediate horizon, only some institutional investors benefit directly. The rest of us may face difficult decisions on asset liquidations, portfolio rebalancing and how best to support the needs of our organizations. The crux of the matter is the stock-bond correlation assumption is embedded in the long-term expectations of most portfolios. Without debating the validity of that assumption or getting into more complicated and esoteric models to estimate correlation, there are concrete steps investors can take that directly address the challenge. Those solutions can include a combination of cash-flow matching and other custom or blended fixed income exposures that provide greater cashflow certainty while closely maintaining the characteristics of an investor's benchmark or objectives, and may also include more direct equity or rate hedges. So, while more recognized forms of liability-driven investing may not suit everyone, there are risk management philosophies of LDI that are broadly applicable and should not be overlooked.

For further information about LGIM America, find us at www.lgima.com

About LGIM America

LGIM America (LGIMA) was founded in 2006 with the purpose of helping people achieve their long-term financial goals. We offer a range of strategies to help our institutional clients (corporations, healthcare agencies, non-profit, education, public plans and Taft-Hartley) manage their investment objectives, which can range from market-based alpha-oriented strategies, derivative overlays, equity solutions and those that are designed to be more liability-centric. Encouraging a diverse and inclusive environment coupled with a solutions-focused culture allows us to increase our breadth of knowledge and the likelihood of improved client outcomes and stronger financial performance. We have teams of experienced, innovative professionals committed to helping plan sponsors meet their pension promises, managing investment exposures efficiently to seek enhanced returns while mitigating risks, and working to generate returns while making a positive societal difference.

1. Source: LGIM America Pension Solutions Monitor
2. Source: Chief Investment Officer, 2022, Asset Management & Service Providers survey. Nominees are anonymously submitted by their peers across the industry. Finalists and winners are chosen from the nominee pool by the CIO editorial team in conjunction with an advisory board of former and current CIOS. LGIMA did not compensate CIO for its award. This award does not imply that LGIMA will or has been successful in its product offerings or services.
3. Sources: Bloomberg, LGIM America. Data calculations as of March 31, 2003 – May 31, 2023. Hypothetical make-up: US Equity: MSCI US Index Total Return, Net; Developed ex-US Equity: MSCI World ex-US Index Total Return, Net; EM Equity: MSCI Emerging Markets Index Total Return, Net; Government Bonds: Bloomberg Barclays US Treasury Total Return Index; Credit: Bloomberg Barclays US Aggregate Credit Total Return Index; Macro/CTA: HFRX Macro/CTA Index; Commodities: Bloomberg Commodities Roll Select Index; REITs: Wilshire Global REITs Index. Hypothetical portfolios constructed using monthly returns of the aforementioned indices for the period noted. Portfolios were constructed with a minimum of 10 years of data. Optimizations relied on a 7-year half-life for exponentially weighted moving average covariance. Portfolios were assumed to be rebalanced monthly, and efficient frontiers were recalculated after each additional 3 years of monthly data. We chose 7 years for the half-life to reflect an approximation of an average market cycle and 3 years for the re-optimization period to reflect governance and other practicalities of implementing a new strategic asset allocation policy for institutional investors.