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Liability Driven Investing

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Sponsors of pension plans should have one overarching goal: to ensure that all payments promised to plan participants and beneficiaries can be made. As part of this process, many plan sponsors have adopted an investment approach known as Liability Driven Investing ("LDI"). This paper provides an overview of LDI, including an assessment of where and why it is used, how it can be implemented and maintained, along with its considerations.

What is LDI?

LDI is a framework for gaining a better understanding of the interest rate sensitivity (i.e., duration) of a plan's assets to the present value of its future liabilities.[1] In its most basic or general form, a plan sponsor has adopted an LDI framework when their liabilities are valued independently from their assets. The primary objective of LDI is to ensure that the investment portfolio can generate the cash flows needed to pay out future liabilities, regardless of market fluctuations or changes in interest rates.

The extent to which a plan sponsor seeks to match the plan's assets to its future liabilities will typically determine the portfolio structure. For example, a plan that wishes to fully match assets to its liabilities will typically invest a material portion of the portfolio in bonds and/or interest rate derivatives that provide bond-like exposure.[2] LDI portfolios are usually designed with a focus on risk management and downside protection, rather than maximizing returns. This is because the primary goal is to ensure that the portfolio can meet future liabilities, not to generate the highest possible returns.

[1] The present value of a stream of liabilities represents the current value of all future cash flows that an entity is expected to pay out in meeting its financial obligations. It first requires estimating future cash flows that the plan sponsor is expected to pay out in meeting its financial obligations, typically using actuarial methods. To convert the future cash flows into present value, a discount rate is applied to account for the time value of money.

[2] For more information on the use of derivatives within a pension plan, see Meketa's Viewpoint dated July 2021 (https://meketa.com/leadership/overlay-strategies/)

Who uses LDI?

Corporate pension plans – Many corporate plan sponsors utilize some form of LDI as it generally aligns with funding regulations and FASB accounting principles in the US. Liabilities are required to be measured by a discount rate determined by corporate bond yields. Hence, typically the best way to minimize fluctuations in the liabilities is to invest the assets in corporate bonds with a similar duration as the liabilities. While these assets are not expected to generate long-term growth relative to other investment options, the benefits to the plan sponsor of predictable cash requirements often outweigh the need for portfolio growth.

Insurance companies – Like defined benefit plans, insurance companies are exposed to long-term liabilities that require management of interest rate and inflation risks. Accordingly, insurance companies generally engage in some form of enterprise risk management.[3] The use of LDI strategies by insurance companies may differ from that of pension plans due to the differences in the nature of their liabilities and business models. However, the principles of LDI investing remain applicable in both contexts.

[3] While LDI is a specific investment strategy focused on matching the cash flows of assets to a specific set of liabilities, enterprise risk management is a broader approach that considers the entire balance sheet and may involve an LDI approach coupled with other risk management techniques.

US Public and multi-employer pension plans – Liabilities in the public and multi-employer (i.e., Taft-Hartley) space are not governed by the same regulations as corporate plans. Generally, these pension plans discount their liabilities using a flat discount rate that is aligned with the long-term expected return on assets ("EROA"). As a result, LDI is rarely utilized for US pension plans outside of the corporate space. However, some plans will consider asset-liability matching strategies more broadly, and the logic for implementation is consistent with that of LDI.

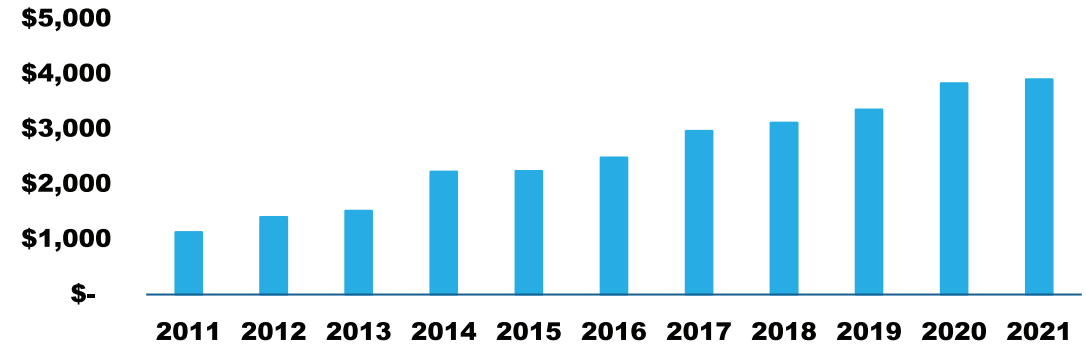

FIGURE 1
Total Global LDI Assets (billion)

Source: Pensions & Investments Research Center, as of 10/13/22.

The implementation of LDI

Implementing LDI can be summarized in three steps:

1. Select the discounting method for determining the present value of liabilities
2. Create the asset allocation(s) to achieve a target long-term expected return on assets while maintaining the desired level of funded status volatility
3. Monitor the strategy for effectiveness, making adjustments as necessary

1| Define the liability benchmark

As previously mentioned, plan sponsors use a variety of discounting methods (e.g., flat rates, segmented rates, yield curves) to determine contribution requirements for actuarial valuations. The discount interest rates used for LDI are independent of the actuarial assumptions as the liability is specifically intended to guide the investment decisions.

To accomplish this, plan sponsors may discount liabilities using the yield curve associated with a pre-specified level of credit quality. For example, a sponsor that wishes to use investment grade credit (i.e., corporate bonds rated AAA thru BBB) to satisfy future obligations would discount liabilities using current investment grade credit yields. The present value of liabilities discounted using this yield curve is referred to as the "liability benchmark." Figure 2 illustrates the interest rates that would be used for two sample methods for discounting liabilities.

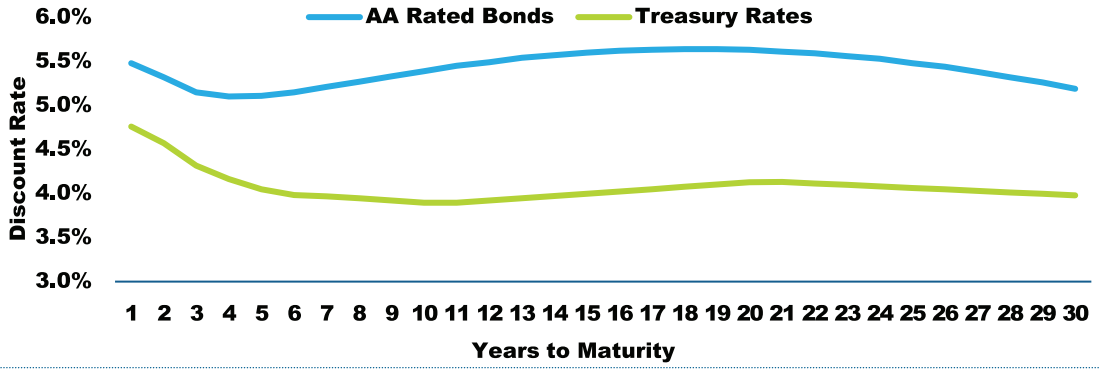

FIGURE 2
Yield Curve for Treasuries and AA-rated Corporate Bonds

Source: Bloomberg as of 12/31/22. Note that the yield curve was inverted at this time, which is atypical.

2 | Create the asset allocation(s)

Typically, when a pension plan makes the initial decision to adopt an LDI approach, they implement it gradually. To make a smooth, deliberate transition, a plan may adopt a "glide path" that sets specific milestones for making changes to their portfolio.

The first step in glide path construction is to determine the "end state" funded status (i.e., the funded status the plan sponsor wishes to maintain for the lifespan of the plan). The asset allocation at the end state will typically be a combination of long-term bonds with a similar credit quality as the liability benchmark as well as diversifying assets, such as equities.

The next step will often be to reduce the equity exposure and offset this reduction with an increased exposure to longer duration fixed income investments. Implementation milestones may depend upon market conditions (e.g., prevailing interest rates) or, more often, on a plan's funded status. In the latter case, as the funded ratio increases, typically the plan gradually allocates more capital to longer-term fixed income securities, with the final milestone at the end state. As a result, the reduction in the plan's funded ratio volatility and expected return will occur gradually rather than all at once. When applicable, it is important that the investment advisor work closely with the plan sponsor and the plan's actuary to determine the proper funding status at which to begin reducing equity exposure (i.e., to determine the milestones).

Figure 3 provides an example of a glide path. In this example, the plan's liabilities have an average duration of thirteen years. Hence, the asset allocation is designed to increasingly match this duration and thus strongly correlate the value of the plan's assets with the value of its liabilities at every step.[4]

[4] For more information on glide path portfolio construction, see Meketa's thought leadership dated May 2019 (https://meketa.com/leadership/the-dual-portfolio-framework-2/)

Trigger Point	Step 1 80% Funding	Step 2 90% Funding	Step 3 100% Funding	Step 4 - End State 110% Funding
Equity (%)	**45**	**30**	**20**	**10**
US Equity (%)	30	20	15	7
Foreign Equity (%)	15	10	5	3
Fixed Income (%)	**55**	**70**	**80**	**90**
Long-Term Corporate Bonds (%)	50	62	71	80
STRIPS (zero coupon Treasuries) (%)	5	8	9	10
Expected Return (%)	**7.7**	**7.1**	**6.7**	**6.3**
Standard Deviation (%)	*11.6*	*10.8*	*10.7*	*10.9*
Funded Status Risk (%)	*6.7*	*4.4*	*2.7*	*1.7*
Average Bond Duration (years)	*14*	*14*	*14*	*14*
Average Portfolio Duration (years)	*8*	*10*	*12*	*13*

FIGURE 3
Sample Glide Path

Source: Bloomberg as of 12/31/22. Note that the yield curve was inverted at this time, which is atypical.

Note: Funded status risk is defined as the one standard deviation annual funded status change due to market sensitivities.

This approach has designated milestones that represent various funding levels at which the plan shifts its asset allocation. The benefit of this gradual approach is that it attempts to maintain sufficient return potential to reach funding goals for underfunded plans, while also systematically decreasing the mismatch risk between the plan's assets and the liability benchmark. The glide path should also allow a plan sponsor to dynamically adjust the asset allocation based on beneficial movements in the market, reducing the impact of subsequent negative market movements. The result is an asset allocation intended to maintain its desired funded status into perpetuity.

3 | Monitor and maintain the strategy

LDI requires regular monitoring and maintenance to facilitate shifts in allocations happening at the appropriate time. For example, if the market rallies and a funded status milestone is achieved, there could be a time-sensitive shift that would help capture the benefit of the market conditions. For governance purposes, it is important to have a formal process for tracking the market environment such that milestone achievements can be documented and acted upon.

In addition, LDI is based on a series of assumptions that can and most likely will change over time. Among these are the assumptions the actuary uses in forecasting the projected liabilities, as well as how closely the discount rate for the liability benchmark tracks an investable set of assets. It should be expected that not all assumptions will match real world experience. As a result, periodic maintenance should be expected to confirm the strategy is still appropriate.

Why long-term bonds?

Long-term bonds offer modest return potential but a high amount of volatility (due to their extended duration), therefore they are often not included as optimal investments on the efficient frontier of assets. However, when comparing risk versus the liability benchmark, they are an optimal investment for investors seeking to minimize their funded status volatility.

Figures 4 and 5 illustrate an "efficient frontier" from two perspectives: traditional (i.e., absolute return) and funded status.[5] From a traditional risk-return framework (Figure 4), the volatility of long-term bonds places them well below the efficient frontier. However, when the measure of risk is re-defined from volatility of returns to volatility of funded status, long-term bonds fall squarely on the efficient frontier (Figure 5). As such, long-term bonds present themselves as an asset class that can work to minimize the funded status volatility.

[5] An efficient frontier refers to a set of optimal investment portfolios that offer the highest possible return for a given level of risk, or alternatively, the lowest possible risk for a given level of return.

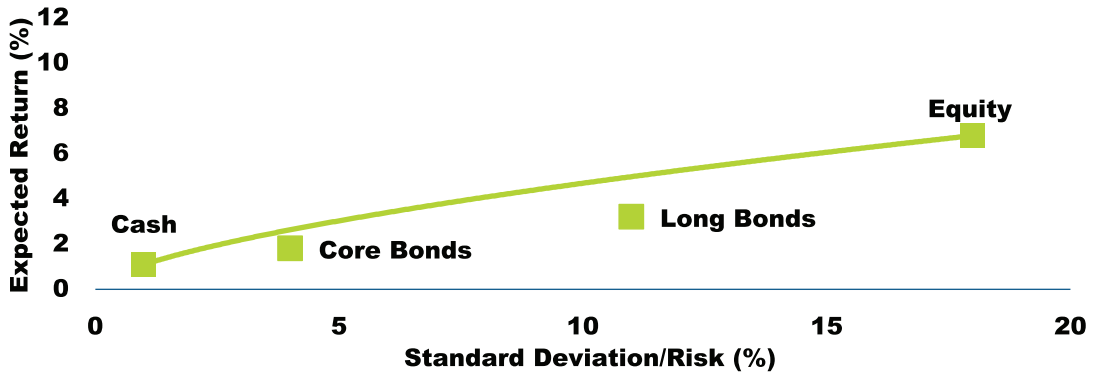

FIGURE 4
Traditional Asset-only Efficient Frontier

Source: Meketa Investment Group, 2023.

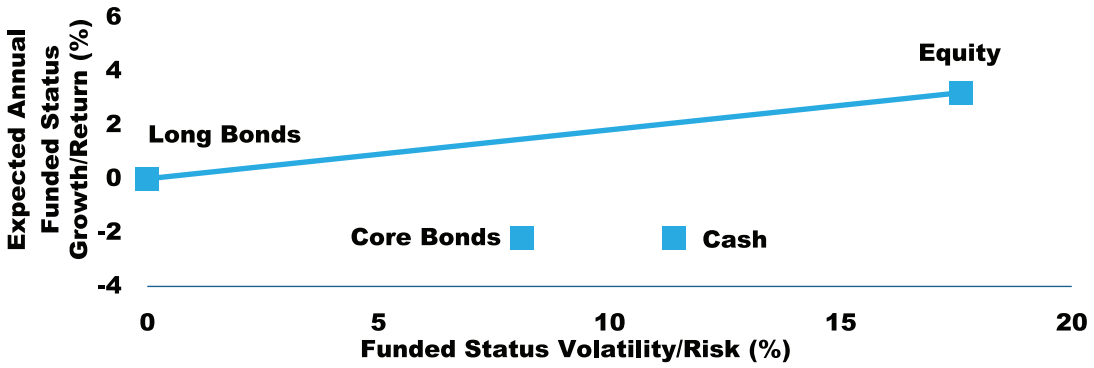

FIGURE 5
Funded Status Efficient Frontier

Source: Meketa Investment Group, 2023.

High-level considerations with LDI

The main drawback of an LDI strategy is opportunity cost. A pension plan that is invested primarily in bonds will have an expected return lower than a plan that invests much of its assets in equities and other riskier assets. This cost can be significant, depending on its structure (e.g., a long-term Treasury portfolio could give up an estimated 300 to 600 basis points per year relative to equities).[6] Hence, over the long term, a plan that adopts an LDI approach will likely require higher contributions, all else equal. A gradual approach to LDI implementation will partly mitigate opportunity cost, at least over the near and intermediate term.

As briefly discussed above, another risk inherent in the LDI approach is the uncertainty surrounding liability projections. There is potential for a large difference between the expected future liabilities and the actual future liabilities. Many factors go into the calculation of the estimated liabilities of a plan. Assumptions include such factors as life expectancy, retirement age, and inflation. Hence regular monitoring should occur to help the plan sponsor make course corrections in the event of any drift from the expected path.

Balancing the desire to achieve and preserve an optimal level of funded status against optimizing returns on invested assets may require plan-specific analysis.

Implementation and portfolio construction

Plan sponsors can implement liability driven investing through many investment vehicles. For example, plans can invest in long-term bonds by using a passive (indexed) investment strategy, such as a long-term Treasury commingled fund or exchange-traded fund ("ETF"). This approach enables a plan to increase duration in a straightforward and inexpensive manner. Alternatively, a plan sponsor may employ customized separate accounts run by investment managers. A customized portfolio will enable a plan to more closely align the duration of their assets with their specific liability profile.

A plan sponsor may also utilize derivatives to implement an "interest-rate overlay strategy." This derivative overlay can be used to maintain a desired duration while

[6] From 1926 through 2022, the ten-year risk premium for US equities (as proxied by the S&P 500 index) over the yield for 10-year Treasuries has averaged 5.4% per annum.

using less of a plan's "capital." While a derivative overlay approach can provide investors with considerable flexibility in design, it requires careful and ongoing monitoring, as it introduces other operational and investment risks associated specifically with derivatives (e.g., collateral, counterparty and mark-to-market risks).

An additional implementation consideration concerns the types of bonds to use. Government bonds are the most widely used securities, as they provide nearly "pure" interest rate exposure. However, the yield on government bonds is the lowest among US fixed income securities. In contrast, corporate bonds typically offer higher yields, and thus a higher expected long-term return. Corporate bonds introduce credit risk, however, which must be measured and managed carefully.

Summary

LDI attempts to measure, and to some extent match, a pension plan's current assets against the present value of its future liabilities. That is, LDI is a framework for gaining a better understanding of the interest rate sensitivity (i.e., duration) of a plan's assets to that of its liabilities. Because liabilities are often long term in nature, one of the best ways to offset their sensitivity to interest rates is by investing in long-term bonds or derivatives linked to interest rates. LDI is utilized mainly to reduce the volatility of future contributions to a pension plan. If an LDI approach is implemented properly, it can provide defined benefit plans with a greater likelihood of paying all future liabilities to the plan's beneficiaries.

An LDI approach is subject to several challenges, including opportunity cost (e.g., a potentially lower EROA that would accompany a shift from equities to bonds) and the uncertainties associated with liability projections. However, these can be partially mitigated by using a glide path approach to implement the LDI structure and by engaging in ongoing monitoring and maintenance of the LDI program.

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