BANK OF AMERICA

FINANCIAL LIFE BENEFITS®

Foundations of liability-driven investing (LDI)

Liability-driven investing, or LDI, has become a focal point for many defined benefit pension plans. Its popularity comes from its effectiveness in helping to reduce interest rate risk.

Executive Summary

Liability-driven investing, or LDI, has become a focal point for many defined benefit pension plans. Its popularity comes from its effectiveness in helping to reduce interest rate risk. LDI is primarily a de-risking tool for plan sponsors who wish to reduce funded status volatility. This is accomplished by investing in assets that move in tandem with the plan's liability. Reducing interest rate risk can also reduce the volatility of other pension results like funding requirements, accounting expenses or ultimate settlement costs. As LDI has grown in use and evolved, so have the ideas and vocabulary surrounding it. This paper attempts to demystify these ideas by defining and explaining the core concepts of LDI.

For a more in-depth review of LDI, please see our paper *Next Generation Liability-Driven Investing (LDI)*. For a broader understanding of how pension investment strategies can be customized for a specific plan, please reference our white paper, *An Investor's Guide to Pensions*.

What is LDI?

As the name suggests, liability-driven investing (LDI) is an investment style focused on a liability. In simple terms, it's an investment technique that uses assets to hedge a liability. It's frequently used by single-employer defined benefit pension plans because their liabilities are very sensitive to interest rates. By hedging interest rate risk, LDI may reduce the volatility of a pension plan's funded status.

When LDI is implemented, a hedge is constructed that attempts to partially or fully immunize the plan sponsor from risks associated with interest rates. LDI is possible because a pension plan's liability has a quantifiable risk profile. Building an asset portfolio that has the same risk profile creates a liability hedge. This is LDI.

LDI has existed for decades. It became increasingly popular with pension plans shortly after the Global Financial Crisis of 2007–08. As interest rates continued to fall, more and more plan sponsors saw the benefit of using LDI to reduce interest rate risk. Adoption of LDI has continued to increase as plan sponsors have elected to freeze their plans and reduce their overall pension risk.

To understand LDI more fully, it's important to have a firm grasp on basic terminology.

Intended for plan sponsor and consultant use only.

Retirement and Personal Wealth Solutions is the institutional retirement business of Bank of America Corporation ("BofA Corp.") operating under the name "Bank of America." Investment advisory and brokerage services are provided by wholly owned nonbank affiliates of BofA Corp., including Merrill Lynch, Pierce, Fenner & Smith Incorporated (also referred to as "MLPF&S" or "Merrill"), a dually registered broker-dealer and investment adviser and Member SIPC. Banking activities may be performed by wholly owned banking affiliates of BofA Corp., including Bank of America, N.A., Member FDIC.

Merrill Lynch Life Agency Inc. ("MLLA") is a licensed insurance agency and wholly owned subsidiary of BofA Corp.

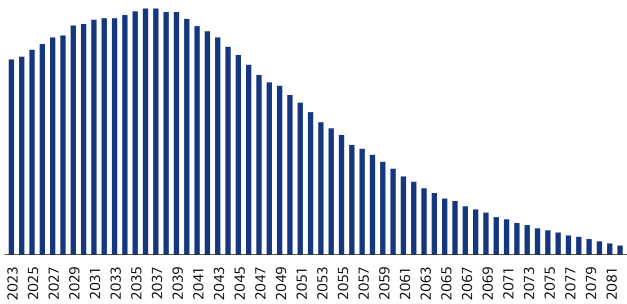
Investment products offered through MLPF&S and insurance and annuity products offered through MLLA:

Are Not FDIC Insured	Are Not Bank Guaranteed	May Lose Value
Are Not Deposits	Are Not Insured by Any Federal Government Agency	Are Not a Condition to Any Banking Service or Activity

Basic terminology

Projected cash flows — A stream of benefits that are expected to be paid in the future. Using a set of demographic assumptions and detailed census data, actuaries project the benefits payable to plan participants over many decades.

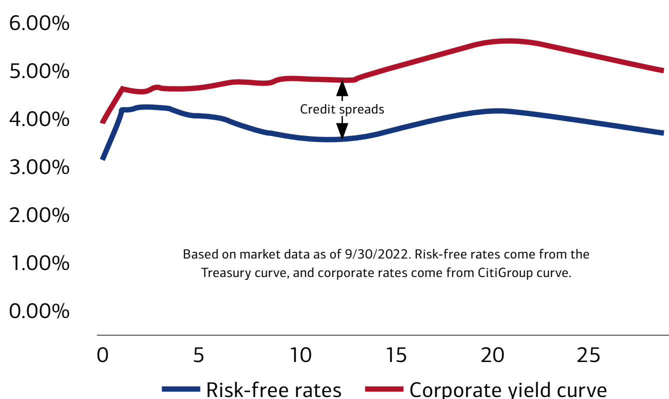
For illustrative purposes only – liability cash flows



Yield curve — A summary of the relationship between yield and time to maturity for debt instruments. Many different yield curves exist, but pension plans generally focus on those derived from high-quality, investment-grade corporate bonds. Yield curves can be broken down into two main components:

- **Risk-free rates** — Strictly speaking, these are the yields available on cash deposits. For pension plans, the yields available on bonds issued by the U.S. Treasury are considered to be risk-free.
- **Credit spreads** — The yield premiums that investors demand for bonds that are not risk-free. Credit spreads are tighter (lower) for higher-quality bonds where default risk is perceived to be low and wider (higher) for non-investment-grade bonds.

Yield curve illustration



Source: The Yield Book by FTSE Russell and U.S. Department of the Treasury.

Liability — The present value of the projected cash flows discounted using interest rates from the yield curve. This represents a single value that captures the time value of money of future benefit payments.

Discount rate — The single effective rate necessary to discount the projected cash flows and arrive at the liability value. The liability and discount rate can be thought of as simplifications of the projected cash flows and yield curve, respectively.

Duration — A measure of how sensitive the liability is to changes in the yield curve. It's typically communicated as a number that indicates how much the liability is expected to change due to a 100-basis-point shift in the yield curve or discount rate — for example, a duration of 12 means the liability will change 12% if interest rates change by 100 basis points.

Credit quality — A measure of a bond issuer's creditworthiness, or their ability to pay their debts. Credit quality is typically measured using credit ratings from credit agencies (Fitch, Moody's, and S&P). Bonds involve varying levels of default risk, the risk that coupon payments or principal payments will be missed should the issuer's financial position deteriorate. Higher-rated bonds (at least BBB by S&P and Fitch or at least Baa by Moody's) are described as investment grade bonds and are considered to be less risky.

Types of pension liabilities and interest rates

Several different measures of pension liabilities exist, and plan sponsors using LDI must decide which liability measure to focus on. Fortunately, there are similarities among the liability measures. They're mostly based on the yields available on investment-grade corporate bonds.

The yield curves used to derive discount rates vary somewhat by liability type. Financial accounting liabilities are usually based on AA bond yields, as explained in the shaded box on the next page. In contrast, lump sum derivations are based on the yields of bonds rated A or better as prescribed by Internal Revenue Code 417(e). Funding interest rates under ERISA are also tied to bond yields rated A or better but with possible smoothing mechanisms. For plan sponsors interested in settling liabilities through annuity purchases, insurer pricing is somewhat opaque, but it's generally understood to be primarily based on investment-grade bond yields. Therefore, whatever liability measure is most relevant for a given plan sponsor, investment-grade corporate bonds are typically the primary asset class used in implementing LDI.

Why accounting liabilities are based on AA bond yields

United States Generally Accepted Accounting Principles (U.S. GAAP) Codification Topic 715-30-35-43 specifies that for setting pension discount rates, "employers may also look to rates of return on high-quality fixed-income investments currently available and expected to be available during the period to maturity of the pension benefits." This single quote forms the entire basis for plan discount rates and LDI implementation so it's worth investigating each phrase individually:

- **High-quality fixed-income** — bonds with a rating of AA or above
- **Currently available** — bonds available as of a point in time with no smoothing or lookback
- **Expected to be available** — bonds that cannot be prepaid and lack callable features

This is what limits the bond universe most pension plans consider for discount rate purposes. The high-quality requirement eliminates bonds rated A or lower. The limit on callability eliminates most of the municipal and agency bond markets, where prepayment and callability are common. Treasury and other AAA bonds are usually ignored because these higher-quality bonds have lower yields. This leaves AA corporate bonds as the primary basis for pension accounting liabilities.

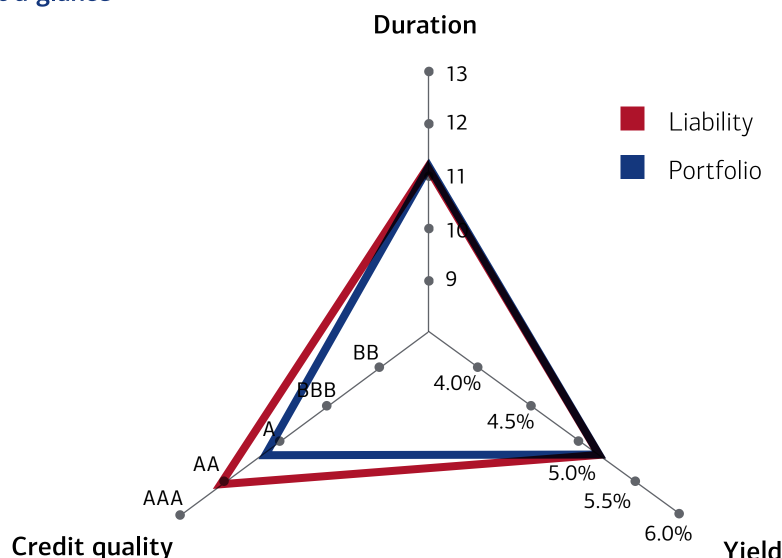
Implementation basics

To implement an LDI strategy, a plan sponsor first needs to decide how much of the plan assets should be deployed. Dedicating more assets to LDI typically allows a plan sponsor to hedge more of the liability, which should reduce the funded status volatility more. For example, the sponsor of a frozen, fully funded plan may choose to use nearly all of its assets to hedge all of the liability. In contrast, the sponsor of an open and ongoing plan may choose to use a small portion, say 20%, of the plan's assets to hedge a small portion of the liability.

Next, the plan sponsor needs to build the LDI portfolio so that its risk and return profile matches the plan liability's risk and return profile. Ideally, a well-executed LDI strategy would match: (1) the portfolio duration to the liability duration; (2) the portfolio yield to the liability discount rate; and (3) the portfolio's credit quality to the implied liability quality. Unfortunately, there's no such thing as a perfect hedge, and those three components pull in different directions. For example, lower-quality bonds tend to have higher yields but adversely affect the portfolio's overall credit quality. Similarly, long-duration Treasury products can lengthen duration, but that may adversely affect the portfolio's overall yield. Successful implementation of an LDI strategy means balancing yield, duration and credit quality. This means considering bond and bond products of different qualities, maturities and yields.

Portfolio positioning at a glance

September 30, 2022



For illustrative purposes only.

Intended for plan sponsor and consultant use only.

Implementation approaches — full versus ETF

When building an LDI portfolio, there's no prescription that requires a certain approach. Any fund, security or product that helps a plan sponsor re-create their liability's risk and return profile may be appropriate.

As LDI has continued to evolve, two differing approaches have gained popularity: Fully Custom LDI and Fund-Based LDI. A high-level overview of these approaches is provided below, but for more details, please see our paper *Next Generation Liability-Driven Investing (LDI)*.

Fully Custom LDI	Fund-Based LDI
Implementation style: Individual bonds with a wide range of maturities are purchased by the plan and held in a separate account.	**Implementation style:** Several investment funds (mutual funds, exchange-traded funds (ETFs) and others) are purchased by the plan and blended together to create LDI exposure.
Potential benefits: • Customization allows the portfolio to be finely tuned to the liability's risk and return profile. • The plan owns the individual securities. Separate accounts provide greater transparency to the underlying investments.	**Potential benefits:** • Fund fees tend to be lower than the cost of hiring a separate manger, especially for smaller plans. • Many investment funds, especially ETFs, are highly liquid, so repositioning the portfolio is a simple exercise.
Potential drawbacks: • Due to the expertise required, a specialized LDI manager is typically needed.	**Potential drawbacks:** • Due to the simplified nature, the hedge may be less effective in immunizing against changes in the shape of the yield curve.

Conclusion

LDI can be complicated, but it doesn't have to be. By understanding the core concepts of LDI, plan sponsors can feel confident about their investment strategy.

At Bank of America, we have a wealth of experience with LDI. For nearly two decades, we've helped plan sponsors understand whether LDI is appropriate for their plans and implement flexible strategies consistent with their goals. As LDI continues to evolve, so do we. Each pension plan is unique, and LDI isn't a one-size-fits-all solution. We combine our internal expertise and a wide range of implementation options to deliver LDI in the right way for the plan sponsors we work with.

To learn more, please see our paper *Next Generation Liability-Driven Investing (LDI)*, which covers even more techniques and concepts about LDI.

For more information, please contact your Bank of America representative or visit go.bofa.com/retirementplans.

Intended for plan sponsor and consultant use only.

Equity securities are subject to stock market fluctuations that occur in response to economic and business developments.

Investing in fixed-income securities may involve certain risks, including the credit quality of individual issuers, possible prepayments, market or economic developments and yields and share price fluctuations due to changes in interest rates. When interest rates go up, bond prices typically drop, and vice versa.

Any guarantee by the U.S. Government, its agencies or instrumentalities applies only to the payment of principal and interest on the guaranteed security and does not guarantee the yield or value of that security.

Exchange Traded Funds are subject to risks similar to those of stocks. Investment returns may fluctuate and are subject to market volatility, so that an investor's shares, when redeemed or sold, may be worth more or less than their original cost.

Bank of America, Merrill, their affiliates and advisors do not provide legal, tax or accounting advice. Clients should consult their legal and/or tax advisors before making any financial decisions.

Investing involves risk, including the possible loss of principal. Past performance is no guarantee of future results.

Financial Life Benefits is a registered trademark of Bank of America Corporation. Bank of America and the Bank of America logo are registered trademarks of Bank of America Corporation.

© 2022 Bank of America Corporation. All rights reserved. | MAP5188461 | WP-11-22-0251.A | 00-63-1981NSB | ADA | 12/2022