

Rolling Cash Flow Immunization: A Solution for Managing Corporate DB Plan Benefit Payments

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KEY TAKEAWAYS

- Historically, the duration mismatch between assets and liabilities has been one of the biggest contributors to a defined benefit plan's funding ratio volatility.
- To bridge the duration gap, many plans have relied on long-duration assets, only to experience cash flow misalignment, particularly in the early years of benefit payments.
- Incorporating corporate bonds in a rolling cash flow immunization solution can help boost cash flows in the early years of a pension plan while maintaining a desired level of funding ratio volatility.

We believe that plan sponsors' demonstrated acceptance and adoption of the liability-driven investing (LDI) framework shows their focus on de-risking. An LDI framework enables plan sponsors to reduce a plan's funding ratio volatility while seeking to improve its funding ratio in a systematic way. In practical terms, it entails identifying plan assets as either return seeking assets (RSA) or liability hedging assets (LHA) and focusing primarily on risk factors: interest hedge ratio (HR) and credit hedge ratio (CHR).

For a typical pension plan, adopting an LDI framework generally leads to increasing the HR by reducing the mismatch between the duration of assets and liabilities with an increased allocation to long-duration assets. However, this can lead to cash flow misalignment, particularly in the initial years of benefit payments.

Given this limitation, we analyzed a modified asset allocation for pension plans that incorporates a rolling cash-flow-immunization allocation. In this paper, we show that such an allocation can potentially maintain a plan's targeted HR while reducing the cash flow mismatch in initial years.



Focusing on Increasing Hedge Ratios Alone Can Contribute to Cash Flow Misalignments

To highlight the interplay between duration mismatch and the funding ratio volatility of a pension plan, we considered three hypothetical allocations (see illustration below). Each assumed 70% of the plan's total assets were allocated to hedging assets and 30% to equities (risk assets). We maintained each allocation's credit risk at 60% (CHR: 60%), while varying the interest hedge ratio from 100% to 60%. By keeping the credit risk and asset allocation between risk assets and hedging assets constant, our objective was to isolate the impact of duration mismatch on funding ratio volatility.

As shown in the illustration below and in line with our expectation, Allocation A (longer duration) with the highest HR has the lowest funding ratio volatility, while Allocation C (shorter duration) with the lowest HR has the highest funding ratio volatility.

RISK METRICS OF THREE HYPOTHETICAL ALLOCATIONS WITH VARYING INTEREST HEDGE RATIOS

	LIABILITY HEDGING ASSET (LHA)	ASSET ALLOCATION	INTEREST HEDGE RATIO (HR)	CREDIT HEDGE RATIO (CHR)	FUNDING RATIO VOLATILITY (12/31/2000 - 12/31/2018)	MAX. DRAWDOWN (12/31/2000 - 12/31/2018)
ALLOCATION A	70%	10% Treasury STRIPS 25+, 30% Long Treasury, 30% Long Corporate	100%	60%	4.7%	-18.4%
ALLOCATION B	70%	19% Treasury STRIPS 25+, 28% Interm. Corporate, 23% Long Corporate	80%	60%	5.3%	-20.8%
ALLOCATION C	70%	11% Interm. Treasury, 15% Long Treasury, 19% Interm. Corporate, 25% Long Corporate	60%	60%	6.3%	-22.8%

Source: Bloomberg, Barclays, Citigroup, Standard & Poor's. Loomis Sayles analysis. See Disclosure for index definitions. Hypothetical examples are shown for illustrative purpose only and are not intended to represent actual portfolios or recommendations. Credit hedge ratios calculated using the weighted sum of the duration times spread (DTS) of each underlying block relative to the liabilities for each asset allocation. Funding ratio volatility calculated using a 12-year-duration liability stream, discounted with the Citigroup AA Pension Discount Curve. S&P 500 Index used to represent the return-seeking asset (RSA). The asset allocation of hedging assets was rebalanced annually to keep interest hedge ratio and credit hedge ratio at the target level. Drawdown is defined as the drop in the net asset value of an asset class from the peak.

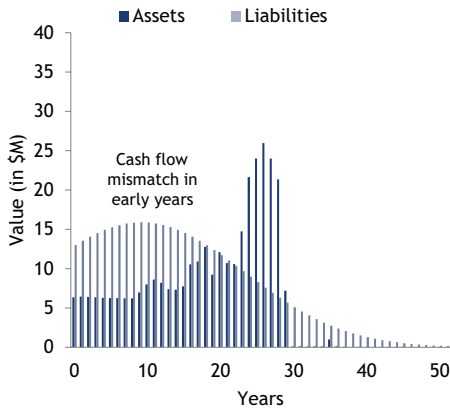
Interestingly, the cash flow profiles resulting from these hypothetical allocations highlight another important potential outcome. While it is desirable for plans to have lower funding ratio volatility, allocation decisions based solely on increasing HRs can lead to cash flow misalignments. As shown in the illustration below, Allocation A, with the highest HR and lowest funding ratio volatility, has a significant cash flow mismatch from zero to five years. In contrast, Allocation C, with the lower HR and higher funding ratio volatility, has better cash flow alignment for the same period.



HYPOTHETICAL ALLOCATION WITH A HIGHER INTEREST HEDGE RATIO CAN LEAD TO POOR ALIGNMENT OF CASH FLOWS

ALLOCATION A

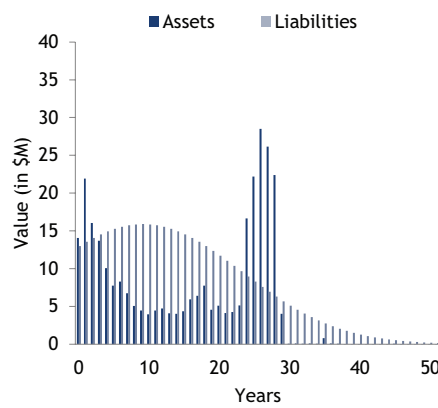
Interest Hedge Ratio : 100%
Credit Hedge Ratio : 60%



Asset Allocation: 30% S&P 500, & 10% Treasury STRIPS 25+, 30% Long Treasury, 30% Long Corporate

ALLOCATION B

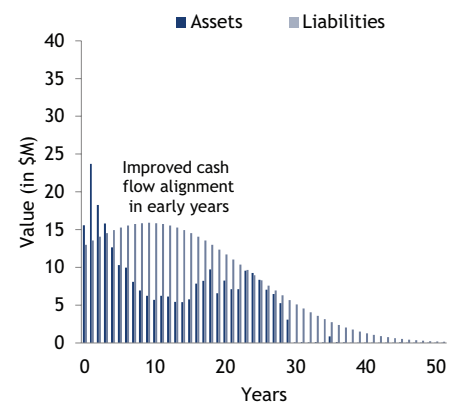
Interest Hedge Ratio : 80%
Credit Hedge Ratio : 60%



Asset Allocation: 30% S&P 500, & 19% Treasury STRIPS 25+, 28% Intermediate Corporate, 23% Long Corporate

ALLOCATION C

Interest Hedge Ratio : 60%
Credit Hedge Ratio : 60%



Asset Allocation: 30% S&P 500, 11% Intermediate Treasury, 15% Long Treasury, 19% Intermediate Corporate, 25% Long Corporate

For illustrative purposes only. Allocations relative to 12-year duration liability stream, discounted with Citigroup AA Pension Discount Curve. Source: Bloomberg, Barclays, Citigroup, Standard & Poor's. Loomis Sayles analysis.

POTENTIAL BENEFIT OF REDUCING CASH FLOW MISMATCH

Mismatched asset and liability cash flows can force pension plans to sell assets to make benefit payments. Selling assets during a market selloff at depressed prices can result in significant opportunity costs. In the table to the right, we highlight the average one-year return earned by various asset classes following a drawdown.

ONE-YEAR AVERAGE RETURN FOLLOWING A DRAWDOWN (JANUARY 1998 TO DEC 2018)

ASSET CLASS	2.5% DRAWDOWN	5% DRAWDOWN	10% DRAWDOWN	MAXIMUM DRAWDOWN
US Large Cap Stocks (number of instances)	11.3% (16)	9.4% (9)	5.0% (4)	53.6% (1)
Emerging Market	13.7% (3)	6.9% (5)	8.5% (10)	92.1% (1)
US Treasury	4.8% (11)	6.5% (1)	NA	2.1 (1)
US Corporate Bonds	5.6% (8)	11.7% (3)	31.1% (1)	31.1 (1)
US High Yield Bonds	5.4% (10)	6.7% (8)	28.5% (3)	65.0% (1)

Source: Bloomberg, Barclays, Citigroup, Standard & Poor's. Loomis Sayles analysis. See Disclosure for definitions. Drawdown is defined as the drop in the net asset value of an asset class from the peak. For the purpose of this analysis, we have used three discreet cutoffs of 2.5%, 5.0% and 10.0% in addition to maximum drawdown to highlight variation in return profiles subsequent to a drawdown. The prevalence of positive values suggests that buying after a drop from peak has often been a successful strategy in the last two decades. We acknowledge that a similar analysis during a different time period may not materialize with similar conclusions. **Past performance is no guarantee of future results.**



Redesigning an Asset Allocation to Bridge a Cash Flow Gap

Historically, plans have used a combination of contributions and asset sales to make up for cash shortfalls to meet benefit payments. Neither action is optimal; the former is discretionary while the latter can lead to forced selling during market drawdowns (see previous page: Potential Benefit of Reducing Cash Flow Mismatch).

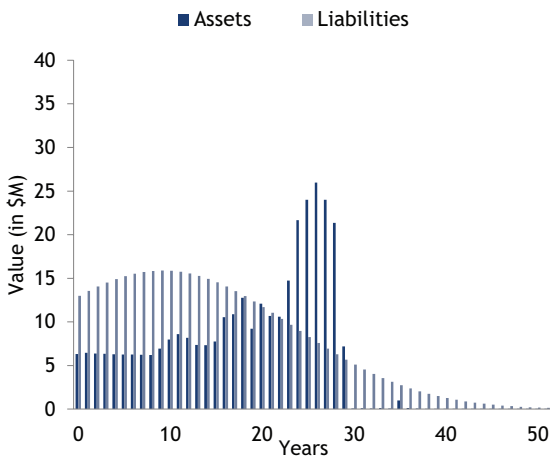
We believe pension plans should consider a cash flow immunization solution designed to pay off three to five years of annual benefit payments on a rolling basis. The average quality can be a function of the plan's risk tolerance. An all-Treasury solution would have the lowest risk with highest cost, while a 100% high yield solution would have the highest risk with lowest cost.

In the illustration below, we show the modified asset allocation for hypothetical Allocation A, which includes a 10% allocation to an immunized portfolio of high yield credits (average credit quality: B1/B2) while maintaining a similar HR and CHR to the prior allocation. The modified asset allocation shows better cash flow alignment between assets and liabilities in initial years while maintaining funding ratio volatility and maximum drawdown similar to those of the liabilities—an interesting outcome worth consideration for DB plans.

CASH FLOW PROFILE AND RISK METRICS OF "ALLOCATION A" BEFORE AND AFTER REALLOCATION

ALLOCATION A

Interest Hedge Ratio : 100% Credit Hedge Ratio : 60%



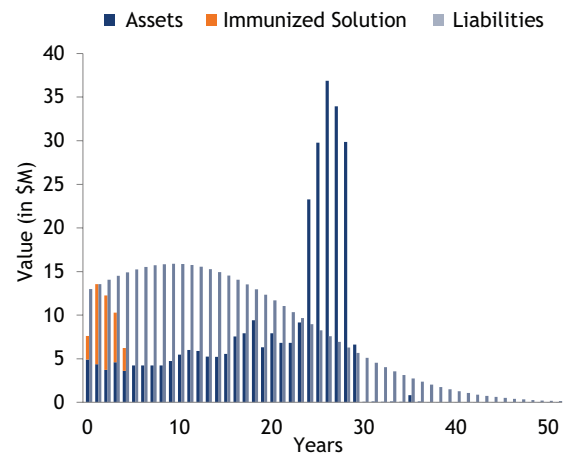
Funding Ratio Volatility: 4.7% (12/31/2000 - 12/31/2018)

Max. Drawdown: -18.4% (12/31/2000 - 12/31/2018)

Asset Allocation: 30% S&P 500
 10% Treasury STRIPS 25+
 30% Long Treasury
 30% Long Corporate

REALLOCATION A

Interest Hedge Ratio : 100% Credit Hedge Ratio : 60%



Funding Ratio Volatility: 5.0% (12/31/2000 - 12/31/2018)

Max. Drawdown: -19.0% (12/31/2000 - 12/31/2018)

Asset Allocation: 30% S&P 500
 22% Treasury STRIPS 25+
 14% Long Treasury
 10% Long Corporate
 10% Immunized Solution



Source: Bloomberg, Barclays, Citigroup, Standard & Poor's. Loomis Sayles analysis. For illustration purpose only. Immunized solution is constructed using high yield corporate bonds with maturity less than 5 years to improve cash flow profile during initial years of benefit payments. Allocation relative to 12-year-duration liability stream, discounted using Citigroup AA pension discount curve.



Conclusion

As DB pensions age, we are seeing more and more plans being closed or frozen with risks transferred to insurance companies. In this era, LDI frameworks need to evolve to incorporate holistic asset allocations that lower funding ratio volatility—potentially improving the funding ratio and availability of cash for pension payments.

In this paper, we have highlighted a rolling cash flow immunization solution with three key potential benefits:

1. The described allocation can provide necessary cash flows in the initial years—a solution relatively easy to integrate within a DB plan asset allocation.
2. It can maintain a plan's target HR and CHR by reallocating existing assets without changing the risk-return profile.
3. This approach seeks to improve operational efficiency by eliminating the need to rebalance to meet cash flow needs for benefit payments.

Disclosure

Drawdown is defined as the drop in the net asset value of an asset class from the peak. For the purpose of this paper, we have used three discreet cutoffs of 2.5%, 5.0% and 10.0% in addition to Maximum drawdown to highlight variation in return profile subsequent to a drawdown. The prevalence of positive values suggests that buying after a drop from peak has often been a successful strategy in the last two decades. We acknowledge that a similar analysis during a different time period may not materialize with similar conclusions.

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*The ability of an actual portfolio to deliver required cash flows is **not guaranteed** and is subject to a variety of factors including, but not limited to, the availability of bonds, transaction costs, default risk, rebalancing risk, liquidity risk and management risk.*

The analysis reflected in this presentation is limited to certain recent periods for which data is available. We make no representation that the experience of any other periods is comparable. It is not possible to invest directly in an index.

Key Risks

Credit Risk, Issuer Risk, Interest Rate Risk, Liquidity Risk, Non-US Securities Risk, Currency Risk, Prepayment Risk and Extension Risk. Investing involves risk including possible loss of principal.

Past experience is not a guarantee of future performance.

Definitions

Bloomberg Barclays US Intermediate Corporate: Unmanaged index that includes dollar-denominated debt from US and non-US industrial, utility, and financial institutions issuers with a duration less than 10 years.

Bloomberg Barclays Long US Corporate Index: Unmanaged index that includes dollar-denominated debt from US and non-US industrial, utility, and financial institutions issuers with a duration of 10+ years.

Bloomberg Barclays US Corporate Investment Grade Index: Unmanaged index composed of publicly issued US corporate and specified foreign debentures and secured notes.

Bloomberg Barclays US Corporate High Yield Index: Unmanaged index that includes fixed rate, non-investment grade debt.

Bloomberg Barclays US Intermediate Treasury: Unmanaged index includes all publicly issued, US Treasury securities that have a remaining maturity of greater than or equal to one year and less than 10 years, are rated investment grade, and have \$250 million or more of outstanding face value.

Bloomberg Barclays US Long Treasury: Unmanaged index that includes all publicly issued US Treasury securities that have a remaining maturity of 10 or more years, are rated investment grade, and have \$250 million or more of outstanding face value.

Bloomberg Barclays Treasury STRIPS 25+ Index: Unmanaged index of zero-coupon bonds (coupons separated from the bond or note).

S&P 500: A market capitalization weighted index consisting of 500 US industrial, transportation, financial, and utility companies, calculated on a total return basis with dividends reinvested.

MSCI EM Index: Represents the performance of large- and mid-cap securities in 24 emerging markets. As of September 2018 it had more than 1100 constituents.

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