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Effective LDI: Don't Sweat the Small Stuff

Executive Summary

- When risk assets are a substantial component of a DB asset allocation, reducing the tracking error of the fixed-income assets has little impact on overall funded status tracking error.
- Even for bond-heavy plans, it is extremely difficult if not impossible to reduce tracking error much below the levels provided by simple long-duration allocations.
- In general, a plan is better off leaving its fixed-income allocation in a simple long-duration mandate and focusing its strategic efforts in areas where it can make a substantive difference, such as insuring that overall asset returns keep up with or exceed those on plan liabilities.

Introduction and Summary

In pension management as in life, simple is usually better. There are all kinds of complex fixed-income strategies a plan can engage in to reduce risk, but our research indicates that these provide little or no advance over simple derisking moves. Our advice is “Don’t sweat the small stuff.” Complex strategies look good on paper, but in practice, they accomplish very little despite costing a great deal of effort. Meanwhile, they may distract from more important tasks, such as achieving an asset allocation that will generate enough asset return to maintain or improve funded status with tolerable levels of risk.

We’ll work through two examples of these points. First, we show that when risk assets are a substantial component of the defined-benefit (DB) asset allocation, reducing the tracking error of the (long-duration) fixed-income component has little impact on **overall** funded status tracking error. Second, we point out that even for bond-heavy plans, it is extremely difficult if not impossible to reduce tracking error much below the levels provided by simple long-duration allocations.

In each of these cases and many others, a plan is better off leaving its fixed-income allocation in a simple long-duration mandate and skipping a complicated fine-tuning program. Not sweating the small stuff allows the plan to focus on strategic decisions where it can make a substantive difference.

In adhering to our own “don’t sweat the small stuff” advice, the following analyses highlight the most general points and considerations behind our thesis; mathematical details and finer points of argument are set aside in the paper’s footnotes and citations.

De-Risking Part Of Your Assets?

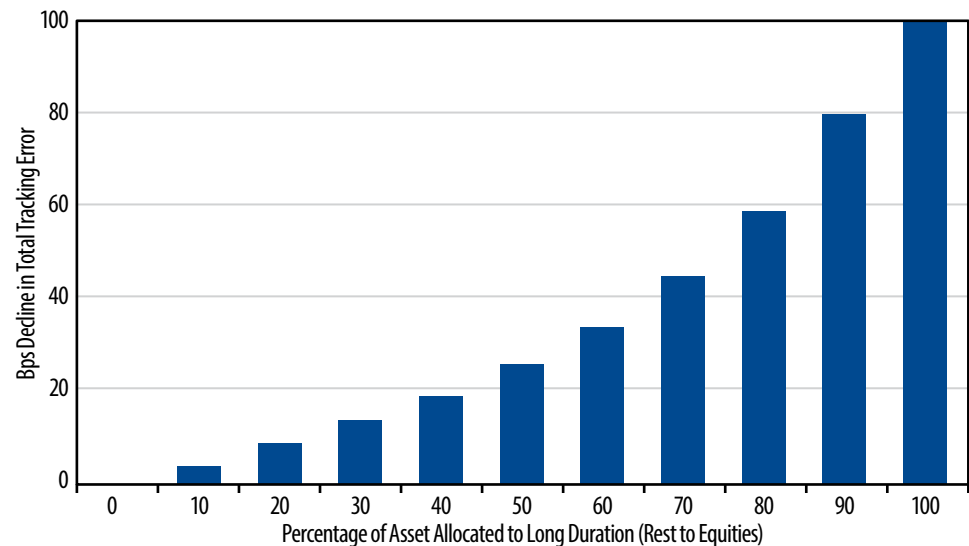
Suppose a plan were allocated 60% equities and 40% simple long duration (long G/C). Historically, the long-duration allocation has shown a tracking error to typical DB liabilities of about 3.7% per year and the equity allocation a tracking error of about 21.9%. With a 60/40 equities/bonds split, overall funded status tracking error would have been about 13.8% per year.

Now, suppose you could have identified some fine-tuning strategy that would have reduced your long-duration tracking error by 100 basis points (bps), to 2.7% per year. That strategy would have reduced overall tracking error by only about 20 bps, to 13.6% per year.

The results are only a little different at a 40/60 equities/bonds split. For that allocation, historical tracking error has been about 9.9% per year. Shaving 100 bps off the long-duration tracking error would have reduced overall tracking error by only 30 bps, to 9.6% per year.

The historical tracking error from equities has been so much larger than that for long duration that it provided the dominant source of overall tracking error. Fine-tuning the long-duration allocation would have had little overall effect so long as equities were a large portion of assets.¹ Exhibit 1 illustrates this point more generally. It shows the reduction in **overall** tracking error resulting from a decline of 100 bps in the tracking

Exhibit 1
Reduction in Total Funded Status Tracking Error Resulting from a 100 Bps Decline in Tracking Error for the Long Duration Allocation



Source: Barclays, Western Asset

error of the **long-duration component**, for different allocation splits between equities and long duration. As seen there, unless long duration comprise more than 70% of total assets, fine-tuning the long-duration allocation is “sweating the small stuff” with very little overall benefit.

Complex Derisking of All Your Assets?

Of course, this begs the question of whether fine-tuning a long-duration allocation is even productive for bond-heavy allocations. Is it even possible for complex derisking strategies to meaningfully reduce tracking error below the levels provided by simple long-duration indices? Our research suggests not. Current market structure simply does not offer DB plans the tools necessary to precisely hedge the reporting risks of their liabilities.

When a corporate spot yield curve is used to discount plan liabilities, each future benefit payment within the plan’s liability set is discounted by a different point on the spot yield curve.² Each such payment has the duration and valuation of a zero-coupon (ZC) corporate bond yielding the relevant spot rate. In effect, a DB liability valuation behaves like a portfolio of ZC corporates.

Furthermore, the maturities of these cash flows often extend to 80 years or more. Further yet, these flows are discounted with AA spot rates, making them equivalent to AA rated ZCs. Last, these cash flows are not subject to downgrades or defaults the way actual corporate bonds are. For all these reasons, available market instruments cannot precisely hedge DB liability valuations.

Corporate ZCs do not exist in any substantive volume, let alone AA rated ZCs. Available **couponed** corporate bonds that match the duration of a particular cash flow will have a longer maturity, so they won’t match the key-rate sensitivity of the cash flow, and couponed bonds that match the maturity of the cash flow won’t be able to match the duration. Furthermore, even couponed corporate bonds do not exist in substantive volume past the 30-year maturity. Finally, whereas DB liability valuations do not suffer from the effects of downgrades and defaults, corporate bonds certainly do. For all these reasons, our research finds that portfolios of targeted-maturity corporate bonds cannot reduce tracking error meaningfully below the levels achieved by simple long-duration mandates.³

As for Treasuries, STRIPS are ZC bonds, so they can match both the maturity and duration of DB cash flows. However, STRIPS feature no sensitivity to AA spreads, and they also are not available at maturities past 30 years. Our research finds that even dedicated portfolios of key-rate-duration or cash-flow-matching STRIPS actually provide higher tracking error to DB liabilities than do simple long-duration indices that include credit.⁴ The same can be said with respect to attempting to hedge liabilities via cash-flow-matching swaps.⁵

Finally, even if AA rated, default-free, corporate ZCs were readily available in maturities out to 80 years, funded balance tracking error would still be substantial, because of the effects of actuarial changes. For all these reasons, a hard floor exists under which funded balance volatility cannot be reduced. Our research puts this floor at about the same range of 300 to 400 bps as arises from simple long duration mandates. Fine-tuning fixed-income allocations in an attempt to breach this floor is sweating the small stuff with little or no prospect for potential gain.

Conclusion

The two complex derisking strategies we've analyzed here amount to a lot of sweat for little or no potential benefit. The same can be said for other complex derisking strategies. Furthermore, these efforts can distract a plan from its most pressing obligation: to ensure that overall asset returns keep up with or exceed those on plan liabilities.

As we have argued elsewhere, DB liabilities offer the yields of a corporate bond, but they are default-free like a Treasury. Most of the time, passive long-duration allocations simply can't match their return.⁶ To keep up with their liabilities, plans need to engage in active strategies (some allocation to return-seeking assets), active tactics (active management), or, preferably, both.⁷ Achieving such returns is "the big stuff." Plans do have a shot at achieving this, and they should "sweat" this issue.

Endnotes

1 The math dictates that if σ_e is the tracking error for equities, σ_b that for long duration, w_b the share of bonds in the allocation (so that the share of equities is $1-w_b$), and ρ_{eb} the correlation between equities' and bonds' tracking error, then overall tracking error is the **square root** of the following expression: $(1-w_b)^2 \cdot \sigma_e^2 + w_b^2 \cdot \sigma_b^2 + 2 \cdot w_b \cdot (1-w_b) \cdot \sigma_e \cdot \sigma_b \cdot \rho_{eb}$.

Note in the expression that it is the squares of the tracking errors multiplied by the squares of their portfolio shares that affect total tracking error. Equity tracking error is 5.9 times larger than bond tracking error, so that it contributes 34.4 (5.9 squared) times as much to overall tracking error. Furthermore, at a 60/40 mix, the share of equities is $\frac{3}{4}$ that of bonds, and this causes its contribution to tracking error to be $\frac{9}{4}$ yet greater than that of bonds. So, at a 60/40 split, the tracking error for equities against liabilities is about 77 times as important for overall tracking error as that for bonds ($34.3 \cdot \frac{9}{4}$). Even at a 20/80 equities/bond split, equities are still contributing more than twice as much to total tracking error as is the bond allocation. [$34.3 \cdot (2 \div 8)^2 = 2.1$].

Finally, even these results actually overstate the benefits of fine-tuning the bond allocation since the formula above implicitly assumes a 100% funded status. For under-funded plans, the tracking error formula becomes more complicated and even less sensitive to changes in bond allocation tracking error.

- 2 And when a single discount rate is used, rather than a curve, fine-tuning is just as unproductive. In this case, all cash flows are discounted by the same yield, so there are no key-rate durations, so targeting individual maturities offers not even a potential benefit.
- 3 See "Effective LDI: Persistence of Tracking Error Part 2: Corporate Bonds as LDI Hedges," Western Asset, October 2013.
- 4 See "LDI And The Persistence of Tracking Error," Western Asset, January 2013.
- 5 Swap spreads move quite differently from AA spreads. This results in tracking error between DB liability valuations and those of a cash-flow-matching swap, just as portfolios of cash-flow-matching STRIPS can be seen to exhibit large tracking error against liability valuations. Also, since bonds with maturities past 30 years are not widely traded, and since swap yields are generally below AA yields, the notional value of a cash-flow-matching swap will exceed that of the corresponding AA liability valuation, so that the pay-side of the cash-flow matching swap will sap returns more than the plan might be prepared for, increasing pressure on the plan's return-seeking assets.
- 6 See "Effective LDI: Keeping Up With Your Liabilities," Western Asset, August 2013. If the duration of DB cash flows is less than that of Long Governments and if Treasury yields are falling, with credit spreads rising, Long Governments or Long G/C could keep up with or surpass liabilities. Alternatively, since Long Credit is lower in quality than AA discounted liabilities, Long Credit could keep up with or surpass liabilities if long spreads were declining sharply and losses from downgrades and defaults were especially low. Clearly, both of these conditions are special cases, as discussed in the paper referenced here. With no presumption of falling yields or falling spreads, DB liability returns will tend to exceed those on Long Government or Long Credit for reasons stated in the text.
- 7 Engaging in both active strategies and tactics diversifies the quest for returns across activities, thus offering a lower-risk way of achieving required active returns.

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