Duration Gap Management

BAKER GILMORE

Many pension plan sponsors are re-evaluating how they approach risk management associated with policy asset mix. The heightened volatility of equity markets and the material growth in the value of liabilities resulting from the long-term decline in interest rates has led to a risk management evolution. It started with plan sponsors embracing a liability driven investing (LDI) process and paying closer attention to maturing liabilities when determining asset mix. However, a more fundamental evolution now transpiring involves an increased willingness to dynamically manage risk and change policy asset mix in response to market outcomes as opposed to a traditional approach that considered only expected returns.

Terminology

Duration	Measure of how the value of bond (or liabilities) change in response to changes in interest rates
Effective duration	A duration calculation for bonds with embedded options that takes into account that expected cash flows will fluctuate as interest rates change
Non-parallel duration	Measure of how the value of bond (or liabilities) change in response to a 1% yield curve steepening (with long-maturity yields held constant)
Convexity	Measure of how the value of bond (or liabilities) change in response to large interest rate changes (recognizes that price/ yield relationship is not linear)

For pension plans with multiple investment managers, implementing a dynamic risk management approach can be complex. Introducing a duration gap management tranche can streamline implementation of the desired total portfolio duration target over time without necessarily impacting other investment manager mandates. This is achieved by investing through a specialist portfolio aimed at achieving the overall desired duration target and ensuring accountability for managing the complexity.

THAT WAS THEN, THIS IS THE NOW?

A traditional approach to risk management involved establishing the policy asset mix based on expected returns. The mix was typically reviewed every three to five years, but for most pension plans the policy asset mix rarely changed.

Over time, however, equity market volatility and the material growth in the value of liabilities resulting from the long-term decline in interest rates has led to closer attention being given to maturing liabilities and an acknowledgement of the benefits of a liability driven investing (LDI) process. While measuring mismatch risk through a LDI process was a good first step, it did not help the bigger issue facing many plan sponsors of how to manage portfolio and funding risk.

We are now witnessing the next stage in the evolution of risk management, namely the willingness to dynamically manage risk and change policy asset mix based on market outcomes instead of expected returns. The initial policy asset mix is established in the same way as for the traditional approach; what is different between the approaches is how the asset mix and risk profile under the dynamic approach changes over time based on pre-determined trigger points.

Adopting a dynamic approach appears on the surface to solve many of a plan sponsor's challenges, including behavioural influences on the timing of asset mix changes for plan sponsors who have decided to de-risk. However, for pension plans with multiple investment managers it can introduce new challenges associated with the complexity of implementation.

RISK MANAGEMENT FRAMEWORK

What is needed is a dynamic risk management framework to help avoid implementation delays and unnecessary transaction costs. The framework includes:

1. Understanding liabilities (cash flows)
2. Defining the objectives for the pension plan
3. Developing a process to meet the objectives
4. Determining the endgame policy asset mix
5. Implementing and monitoring the asset mix changes.

To illustrate how such a framework functions in practice, this article includes analysis from recent case studies undertaken by Baker Gilmore & Associates on behalf of plan sponsors.

Understanding the plan liabilities

Since most pension plans have historically had a relatively low allocation to fixed income assets it was not necessary to be too precise with respect to matching fixed income risk factors relative to the liabilities. This was because by far the largest source of risk for the pension plan came from the return-seeking assets, such as equities. Duration was therefore the key liability measure for most pension plans, since there was little perceived benefit of improving the matching precision.

However, as plans have gravitated towards increased allocations to fixed income, additional risk factors such as key rate durations have become increasingly important, since the biggest source of risk is any fixed income mismatch.

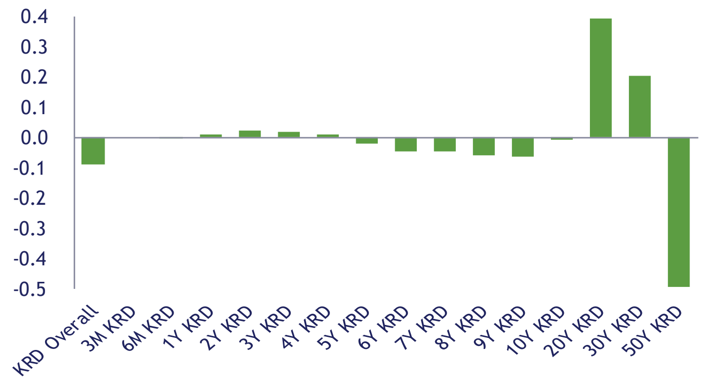
The liability profile for a pension plan that was de-risking and planning to increase the fixed income allocation over time is shown in Table 1. The plan sponsor's goal was to invest the fixed income assets in a mix of assets benchmarked against the DEX Universe Index (25% of fixed income) and the DEX Long Bond Index (75% of fixed income).

Table 1 - Liability risk factors versus benchmark

Portfolio	Effective Duration	Non-Parallel Duration	Convexity
25% DEX Universe / 75% DEX Long	11.88	0.79	1.11
Liabilities	11.96	0.82	1.18
Difference	-0.09	-0.03	-0.07

Based on the traditional risk factors the fixed income structure appears to be a good match. However, consideration of additional factors, such as key durations, reveals that the benchmark has a very different profile in the longer-dated key rate duration buckets.

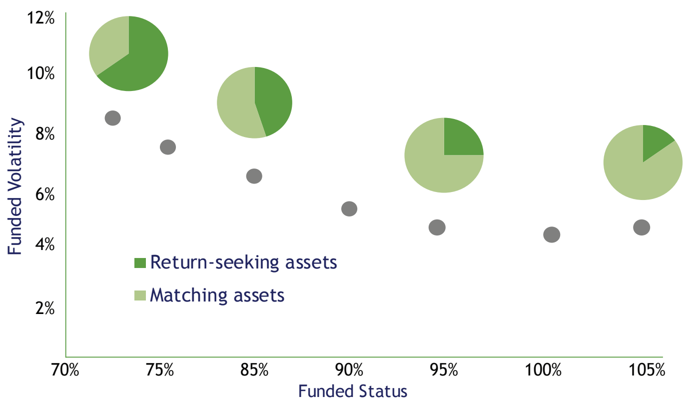
Chart 1- Benchmark relative to liabilities



Define objectives and process to meet objectives

The plan sponsor's objective was to reduce the funding volatility and to achieve this through a dynamically managed risk process. The changes to policy asset mix were to be based on the actual improvement in the financial health of the pension plan using pre-determined trigger points. Chart 2 shows the pre-determined triggers based on the plan's funded status. As the funded position improves money is switched from return-seeking assets to matching assets until the endgame policy asset mix is reached when the plan is slightly more than fully funded.

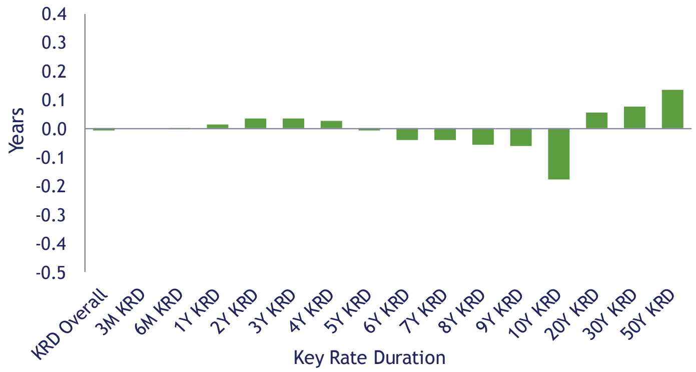
Chart 2- Dynamic triggers



Endgame policy asset mix

The plan sponsor's endgame policy asset mix was 85% matching fixed income assets and 15% return-seeking assets. As noted earlier, analysis of the liability benchmark relative to the liability profile highlighted differences in the longer-dated key rate duration buckets. Following further analysis, it was decided to incorporate an allocation to strip bonds in addition to the DEX Universe and Long Bond allocations. Chart 4 shows that the introduction of strip bonds materially reduces the mismatch of the benchmark relative to the liabilities.

Chart 4 - Benchmark relative to liabilities - including strips



Implementing and monitoring

As the saying goes:

> **It's the little details that are vital. Little things make big things happen.** ~ *John Wooden*

Implementation is often an area of least interest for many plan sponsors, but it is vital to the success of a dynamic de-risking strategy. The process typically includes:

1. Calculation of liability value
2. Calculation of asset values
3. Review to determine if de-risking triggers have been hit
4. Transfer of cash between assets classes when the triggers have been hit
5. Adjustments to the risk factors for the fixed income component of the portfolio
6. Ongoing reporting to the committee on progress.

There is a direct correlation with the complexity and challenges associated with de-risking implementation and the number of investment manager mandates that a pension plan has. The type of challenges often encountered may include:

- **Calculation of risk exposures:** Determining trigger values and required changes to the overall plan and liability risk factor exposures is complex
- **Communication and co-ordination:** There are many parties involved when triggers prompt changes to the portfolio and/or benchmark that adds to the complexity
- **Rebalancing across multiple managers:** If not executed well, rebalancing may result in unnecessary and costly transactions in multiple-manager structures
- **Information lag:** The receipt of funded status or other trigger information may happen with a considerable lag if the appropriate resources are not in place to calculate and update the asset and liability values
- **Governance structure:** Some governance structures make it difficult to change asset mix in real time due to the decision-making process at the plan sponsor and the limited frequency of meetings.

DURATION GAP MANAGEMENT

The goals of duration gap management are to reduce the complexity associated with the implementation of a dynamic de-risking strategy. The complexity is managed through accountability by having a single investment manager responsible for managing duration and other risk factor exposures between assets and liabilities as dynamic triggers are hit.

The type of involvement a duration gap manager can fulfill includes:

- **Support role:** Here the duration gap manager provides support to the plan sponsor in monitoring when the dynamic triggers are hit and making the appropriate fixed income portfolio adjustments from a total fund perspective.
- **Outsource function:** Here the duration gap manager is responsible for the dynamic trigger monitoring and execution of changes to the portfolio. This could include executing through synthetic exposures to interest rates or synthetic exposures to both interest rates and return-seeking assets, such as equities.

Since duration decisions and/or co-ordination all goes through the duration gap manager, other fixed income investment managers are unaffected in how they manage their respective mandates. Ultimately, this approach results in the least amount of disruption to the overall portfolio as the de-risking evolves.

What's needed?

The two key parties involved in the process are the duration gap manager and the plan sponsor. What's needed from each party are:

- **Duration gap manager:** Needs to have a robust risk infrastructure in place that can provide real-time liability and asset valuations, along with the ability to create custom liability benchmarks and measurement of comprehensive real-time risk exposures.
- **Plan sponsor:** Needs to embrace the approach, which requires a willingness to form a closer relationship with an investment partner than they are typically accustomed to. The plan sponsor needs to share more information about the plan's objectives and goals to ensure the de-risking approach is consistent with the overall plan of execution. The plan sponsor also needs to be willing to give access (through the custodian) to asset class and manager market values, as well as other data.

MIND THE GAP

Participating in a dynamic de-risking journey should be an option for solving a plan sponsor's risk management goals while not adding to the list of time consuming challenges. Using a duration gap manager to facilitate the implementation and monitoring of the program can achieve this while providing a number of benefits:

- Reduced complexity as the plan sponsor only has to co-ordinate with the duration gap manager
- Improved efficiency as adjustments to overall fixed income risk factor exposures are implemented while limiting transactions within a multiple-manager structure

The duration gap manager can provide a supportive role for smaller pension plans, or a full outsource role that may include synthetic overlay for the larger plans, but in both cases offers a key strategic relationship.

For further discussion about the ideas discussed in this article contact the co-authors:

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