2Q19

TOPICS OF INTEREST

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LDI glide path creation

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Introduction

Liability Driven Investment (LDI) poses the plan sponsor with a set of challenges, balancing the plan sponsor's desire to be risk averse with a responsibility to be cost effective in order to fulfill its promise to beneficiaries. As a result of this dynamic, LDI frameworks must be responsive and nimble.

While there are multiple ways of generating a glide path (surplus volatility focus, traditional linear interpolation, a mixture, etc.), this paper will describe a preferred, hybrid approach that fuses cashflow with risk. The objective of this approach is to balance the two competing objectives in order to maximize the likelihood of achieving the plan's goals.

Building a successful glide path

A successful glide path is one that will simultaneously de-risk the portfolio and improve its funded status, provided, of course, that assumptions about performance and contributions are accurate. To make this happen the glide path must be tailored to the unique characteristics of the plan and have explicit objectives upon which progress can be evaluated.

With these two elements, one can calculate the contributions and portfolio return needed to achieve a given objective. While this objective may change depending on the end goal (annuitization or hibernation), the plan's status (frozen, closed and accruing, or open), or the characteristics of the target LDI portfolio itself (and its associated surplus volatility), the calculation will result in a target funded status based on these

characteristics. One example of such an objective is to attain a funded status of 110% by the end of 15 years, another would be to improve the funded status measure from say 80% to 90% over 10 years.

So long as the pension's financial health relative to its obligations is improving and risk is reduced along the way, then the plan is protecting the promise being made to beneficiaries. This lies at the heart of the framework and is the determining factor for supporting a plan's objectives.

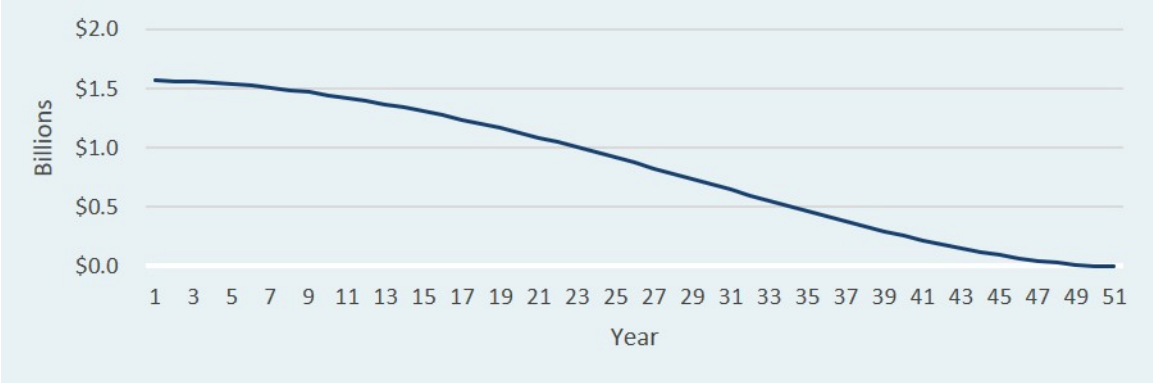
Next is an illustration of this framework on a fictional, fully frozen pension. This includes considerations that may require adjustment to assumptions, objectives, or the glide path itself.

Assume a sample pension with the following characteristics found in Exhibit A and B below:

EXHIBIT A – PROJECTED BENEFIT PAYMENTS

Source: Verus

EXHIBIT B – PROJECTED ACTUARIAL LIABILITY



Source: Verus

Exhibits A and B show a current liability of roughly $1.5 billion and annual benefit payments starting at $75 million, increasing over the next 15 years, then declining till the pension is expected to end in 50 years. This example assumes a flat discount rate of just 4.5% each year but note that in practice this would be changed to the explicit curve and methodology as applied by the plan's actuary.

As mentioned, the analysis needs a firm objective. This example sets an objective to become fully funded over a 20-year period. Note that the determination of the objective (and its timeline) may be iterative depending on the financial strength of the sponsoring entity and its risk tolerance. In addition, a target of 105% or 110% for a plan targeting hibernation may be more appropriate to compensate for potential deviations in actuarial assumptions or adverse market experience. This example assumes perfect information and selects an end point of 100%.

When building the glide path in relation to an objective, each allocation on each point within the curve should support the goal of improving funded status and ensuring that the associated risks are acceptable. To stay concise, the analysis is simplified by ignoring regulatory considerations, such as PGBC premiums and minimum required contributions[1]. In addition, a flat contribution assumption of $15 million a year for 10 years and $0 thereafter is made. With this information one can calculate the return necessary to achieve the objective no matter the funded status.

EXHIBIT C – RETURN NECESSARY FOR FULL FUNDING: 20 YEARS

Source: Verus

Exhibit C shows the return necessary to achieve full funding in 20 years, dependent on the current financial status of the plan. The better the funding (i.e., the more money the plan has relative to its liability) the less is needed from the market.

For this example, the plan is assumed to be approximately 80% funded resulting in a return of approximately 5.7% to become fully funded after 20 years.

To know if this is a reasonable expectation, capital market assumptions are incorporated. An

added complexity can be considered with the usage of derivatives (and the willingness to employ leverage), but this is ignored with a note that for a client which can invest in such instruments, more efficient glide paths may be available.

The example capital market assumptions assume two asset classes: growth assets that, in this case, are expected to earn 6.5% annually, and hedging assets that are expected to earn 4.5% annually[2]. From this return via the simplified CMA, a calculation for an allocation necessary to achieve the objective is shown on Exhibit D below.

EXHIBIT D – GLIDE PATH TARGET FULL FUNDING: 20 YEARS

Source: Verus

Exhibit D shows that if the plan were 70% funded, the necessary allocation would be heavily growth based, 100% allocated. It is likely that the risk profile posed by an allocation that is 100% allocated into growth assets is not within its risk tolerance. There are two levers one can pull to change the landscape. First, one can choose a less ambitious objective (say 90% funded after 20 years rather than 100%) and second, one can increase assumed contributions if they are affordable. This example will display the impact in changing contributions but changing the financial objective will have similar impacts.

But to know if an LDI glide path makes sense for the plan, and to design one which is likely to be successful, then an understanding of the financial objectives and constraints of the plan (and if those factors in combination are supported by these recommendations) is essential.

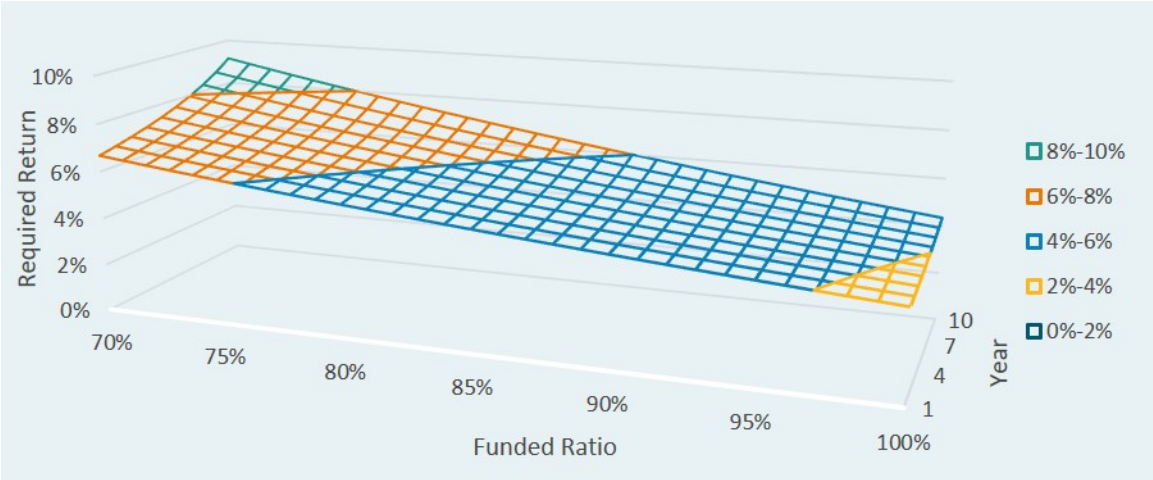
Glide path adjustments

Every year the plan's financial position will change. Investment performance will differ from assumptions, the plan will experience actuarial gain or loss, and the relative cost of the plan will pivot depending on the sponsor's ever-changing financial strength. The glide paths must be proactive to these movements and must contain a plan for any adverse experience.

To account for natural drift due to time, Exhibit E below shows a projection of the plan

through the next ten years. It calculates the return necessary to achieve full funding under every potential funded status that may occur in each future year.

EXHIBIT E – REQUIRED RETURN: FIXED 20 YEAR FUNDING GOAL

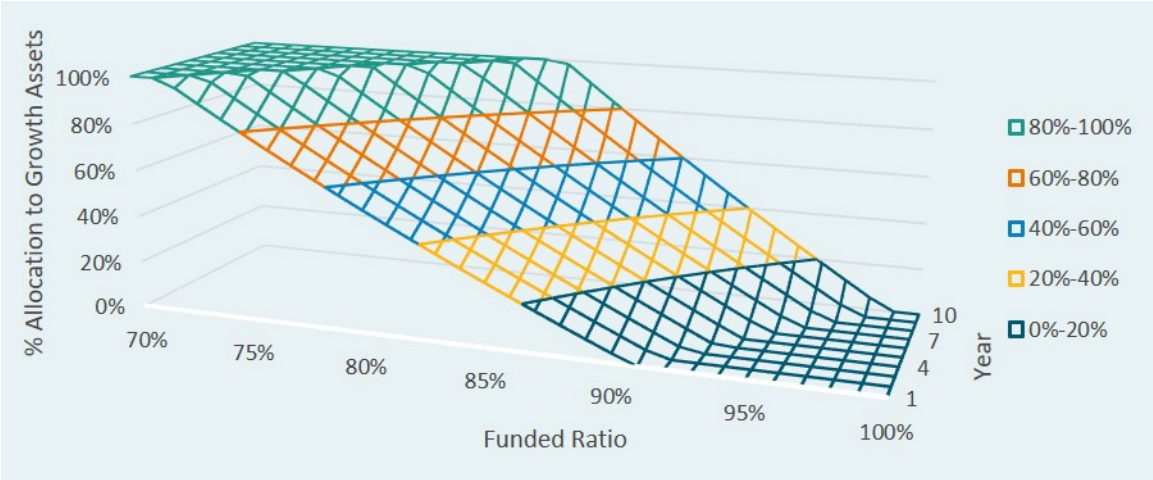


Source: Verus

On the vertical axis is the required return, the return necessary to become fully funded at the end of 20 years. On the horizontal axis is the funded status of the plan, and on the last axis, years. That is, if one moves the plan forward one year and has any given funded status, one can calculate the return necessary to be fully funded.

And to copy the exercise done earlier, transform this into a baseline allocation in Exhibit F.

EXHIBIT F – GLIDE PATH GROWTH ALLOCATION OUTLINE



Source: Verus

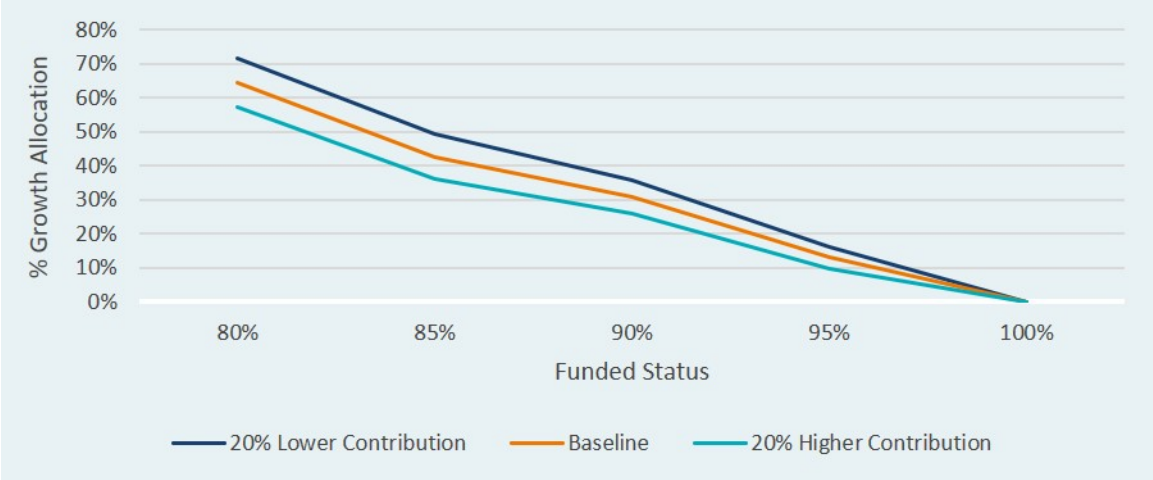
Exhibit F provides a much better idea of the landscape. It displays an allocation for the plan that supports the objective regardless of the funded status and the year it is experienced. From this one can select points on the curve and ask questions regarding the risk profile of the target allocation, the costs implied in getting there within the time horizon, and any applicable regulatory considerations.

In practice such a complex strategy may not be put into an IPS. First, the pathway is granular enough that making portfolio decisions on such small movements may be impractical (movements in funded ratio may trigger re-risking or de-risking on a daily basis) or expensive (such small trades into a complex LDI strategy may be too expensive) which would hinder progression toward the client's objectives. Second, the plan may have structural changes over the next decade that make the pathway invalid. And third, important concerns like risk tolerance, liquidity needs, and a buffer to account for the assumptions made (such as a shock to the mortality assumption) has yet to be added.

While the preference is to keep time as a factor (keeping the analysis 3D), a non-time dependent glide path can be generated that would be easier to visualize. Note that these potential glide paths are supported from the surface chart found in Exhibit F.

From Exhibit F one will incorporate a view on trigger points (generally 3-5%), limit the time horizon, and address the impact of changing assumptions (in this case, a 20% change in contributions) to create options. The results of this illustrative exercise are found in Exhibits G, H, I, and J below.

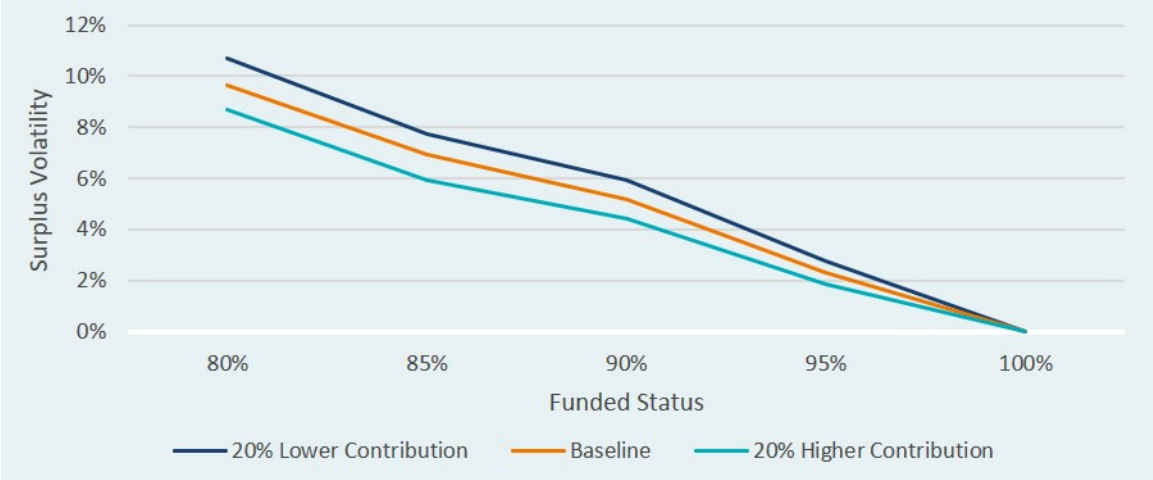
EXHIBIT G – EXAMPLE GLIDE PATHS



Source: Verus

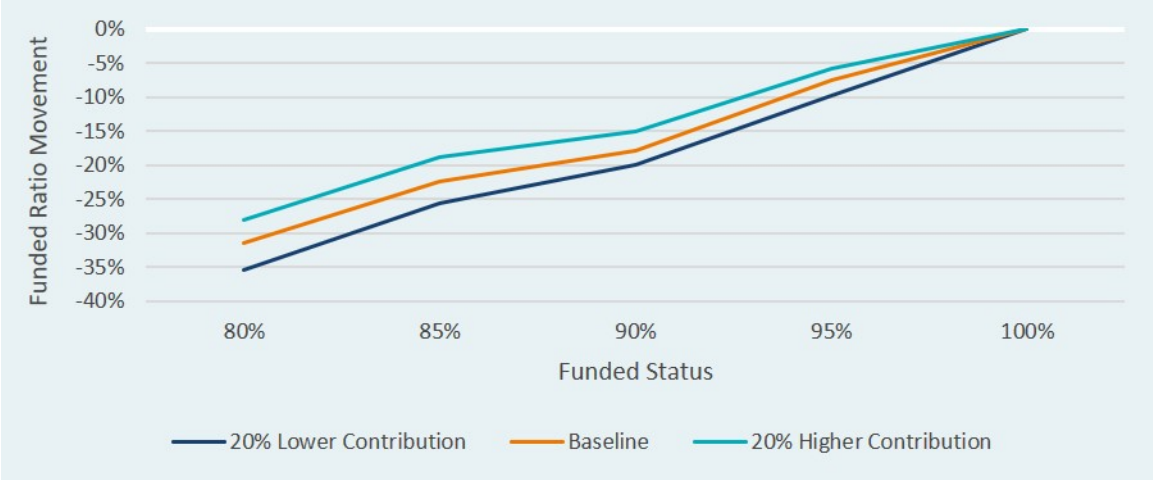
Representative risks associated with each of these pathways can be seen in Exhibits H and I below.

EXHIBIT H – SURPLUS VOLATILITY



Source: Verus, MSCI BarraOne

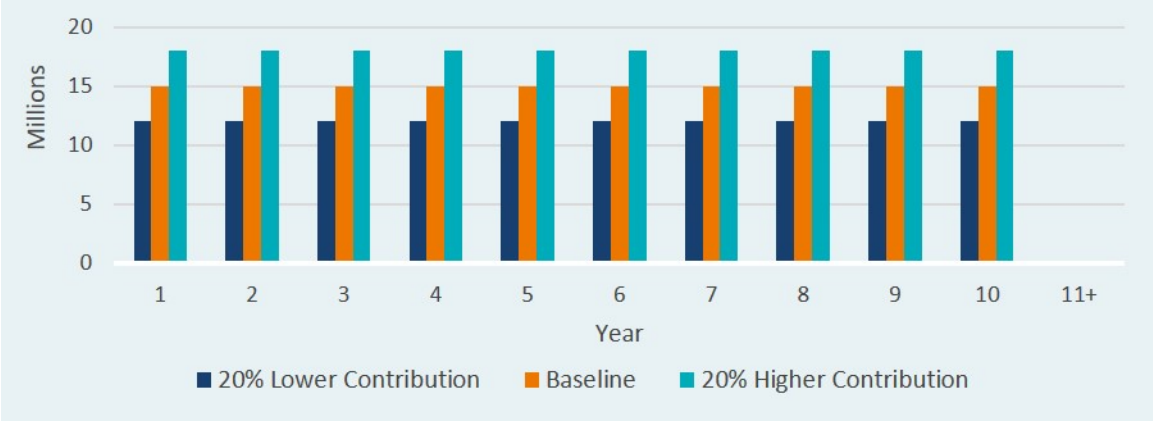
EXHIBIT I – STRESS TEST IMPACT: 2007-2009 SUBPRIME CREDIT CRISIS



Source: Verus, MSCI BarraOne

The cost associated with each glide path in the form of contribution assumptions is also shown below.

EXHIBIT J – ASSUMED ANNUAL CONTRIBUTIONS



Source: Verus

While it is not feasible to determine the right pathway for a client in purely quantitative terms, the costs and risks associated with each choice can be illustrated. By focusing on cashflow and risk, the framework ensures that no matter what is recommend the ultimate objectives of the plan sponsor and its beneficiaries are supported for the long term.

Summary

The glide path methodology promises to protect the plan's funded status gains using two mechanisms. The first is to reduce volatility in the allocation by investing in less risky assets and (as a bonus) to incorporate some cashflow matching in the allocation. The second is to insulate the plan's liability value from discount rate changes that occur via movements in the yield curve. If correctly applied, movement in the plan's liability metric (via changes in the yield curve) would have near equivalent impacts to the portfolio's market value, causing the funded status to remain constant. In addition, depending on the precision of the cashflow matching that was applied, liquidity concerns may diminish. While perfect hedges are impossible, close hedges are often attainable for mature plans.

However, these benefits need to be in balance with the broader objectives of the plan. That is, improving its funded status by moving along the glide path over a reasonable timeframe. A pure focus on risk, return, or any other variable will not necessarily be inclusive of this broader objective, putting the plan at risk for abandonment of the glide path and its LDI allocation. This challenge necessitates the inclusion of cashflow and the infusion of the risk characteristics that it implies. This framework is designed such that each segment of the glide path supports the allocation it espouses on a fundamental level.

Finally, after the LDI allocation is selected, the construction of the portfolio itself presents a complex undertaking that would incorporate cash flow requirements, duration hedges, bond

issue limitations, synthetic exposures, and its relationship to the growth portfolio. Using LDI correctly is a challenge that would require wide ranging expertise and institutional resources, but starting with the right glide path will improve the odds of its success.

Notes & Disclosures

1. *In practice these costs are incorporated as a form of dynamic, path-dependent contribution assumption that would materially impact the results and the resulting glide path. For the purposes of this paper, such relationships are difficult to display concisely.*

2. *In practice, the hedging asset return assumption may change depending on the unique liability stream posed by the pension and its associated discount rate curve.*

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