Are Your Risk Tolerance and LDI Glide Path in Sync?

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The Plan Sponsor’s Mission

Dual accountability to participants and shareholders

Plan sponsors must seek to ensure:

• Security of benefits for participants
• Prudent and efficient financing of plan, for shareholders

Thankfully, participant and shareholder interests align:

• Participants derive security from a strong and sound company
• Shareholders do not want to bear the cost of a funding shortfall
LDI Can Help Plan Sponsors Meet Objectives
A dynamic approach to liability-driven investing may be advantageous

Liability-driven investing (LDI) requires a different perspective:
• Investment outcomes should be measured relative to liabilities
• “Risk” redefined as the variability of funded status
  – For example, an immunization strategy seeks to eliminate risk by ensuring that changes in value of assets and liabilities offset each other

Moving toward fully funded status along a glide path makes sense:
• Follow a disciplined schedule
• Invest for return early on – let your assets work for you
• As funded status improves, switch to matching liabilities
As funded status improves, increase the downside protection sought.

- Reduce allocation to return-seeking assets, identify specific expected volatility/return contributions.
- Shift long duration holdings into A-rated corporates.
- Increase fixed-income allocation.
- Match duration of fixed income assets to liabilities.

Source: Capital Group.
For Glide Paths, One Size Does Not Fit All

Each plan sponsor’s risk tolerance is unique — their glide paths should be, too

It’s rational for each plan sponsor to react differently to changes in funded status, de-risking at different rates depending on their unique circumstances

Each plan sponsor has its own risk tolerance, defined by:

• Subjective factors such as the preferences of trustees or other fiduciaries
• Objective factors: plan and plan sponsor characteristics

Key objective factors that influence de-risking include:

1. Plan size relative to the sponsor’s balance sheet
2. Whether the plan is open or closed
3. Correlation between investment returns and the sponsor’s business
# A Closer Look at Three Factors

These objective measures are critical drivers of risk tolerance

<table>
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<tr>
<th>1. Plan size relative to sponsor’s balance sheet</th>
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<tr>
<td>• Economically, plan is part of balance sheet; generates volatility in proportion to its size</td>
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<td>• Larger plans should de-risk more quickly</td>
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<th>2. Whether the plan is closed or open</th>
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<td>• Closed plans can be de-risked with a high confidence interval</td>
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<td>• Growth plays a more important role in efficient funding of open plans</td>
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<td>• Relative sizes of retired and active populations</td>
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<th>3. Correlation between sponsor’s business and investment returns</th>
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<td>• In a downturn, revenues of a cyclical business may fall sharply, possibly at the same time as equities post losses and bond yields fall. The sponsor may have to make a contribution when it can least afford to.</td>
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<td>• Conversely, a plan sponsor whose business is not cyclical can afford to hold more risk through downturns, and may prefer to <strong>de-risk</strong> more slowly.</td>
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Correlation Matters
History suggests sponsors with cyclical businesses should be particularly careful

Free Cash Flow and U.S. Stock Market Returns (12/31/93 – 6/30/14)

Sources: FactSet, Capital Group.

S&P 500 Returns (Right Scale)
• Industrials (Left Scale)
• Consumer Staples (Left Scale)
• S&P 500 Returns (Right Scale)
How is the “Optimal” Glide Path Determined?
Developing a framework to map a plan sponsor’s risk tolerance to an LDI glide path

Plan sponsors have various risk tolerances:

- Risk-averse sponsors reduce risk sooner
- Risk-tolerant sponsors may want to de-risk later, retaining their implicit optionality (accept funded status volatility now, hope status improves in time, bear cost in the future if approach doesn’t work out)

Finding the “optimal” glide path for a given risk tolerance is akin to the static portfolio allocation problem, solved with mean-variance efficient portfolios.

A similar approach could yield a solution for glide paths, but the problem is harder to define, and harder to solve.
Monte Carlo Simulation: A Monte Carlo simulation was used to calculate the probable range of outcomes and probabilities. Monte Carlo simulation is a statistical technique that, through a large number of random scenarios, calculates a range of outcomes that are based on the assumptions included in this report. This simulation is provided for informational purposes only and is not intended to provide any assurance of actual results. The simulation will not capture low-probability, high-impact outcomes. While we believe the calculations to be reliable, we cannot guarantee their accuracy.

For a single path of simulated monthly asset and liability returns, the path-specific risk is defined to be the realized volatility of the funding ratio over the full simulation period (assuming no additional contributions by the plan sponsor), and the path-specific return is defined to be the average funding ratio over the full period. In the full Monte Carlo analysis, we define risk and return by averaging the above path-specific risk and return measures over all simulated paths. So, on Slides 11 and 12, Risk Measure refers to the average, over all simulation paths, of the tracking error of asset returns versus liability, measured over the 10-year simulation horizon. Likewise, Funded Status Measure refers to the average, over all simulation paths, of the plan’s funded status averaged over the 10-year simulation horizon.
From a “Standard Edition” Efficient Frontier …
A quick refresher on Markowitz

Expected return

7%

6%

5%

Volatility

Asset Mix:
- U.S. Equity
- Global High Yield
- Long Government
- Long Credit
- Long Corporate

For illustrative purposes only. This example is hypothetical and does not reflect the results of any particular investment.

Source: Capital Group.
… to an LDI efficient frontier

Optimal glide paths at different risk levels to liabilities

Efficient frontier: starting funded status – 78%, rebalance every 0.1%

Asset Mix:
- U.S. Equity
- Non-U.S. Equity
- Long Government
- Long Credit

For illustrative purposes only. This example is hypothetical and does not reflect the results of any particular investment. Analysis performed using Monte Carlo simulation of assets and liabilities (see page 9).

Source: Capital Group.
Efficient Glide Path is Sensitive to Rebalancing Strategy

Adjusting the rebalancing step size has a measurable, but modest impact

For illustrative purposes only. This example is hypothetical and does not reflect the results of any particular investment. Analysis performed using Monte Carlo simulation of assets and liabilities (see page 9).

Source: Capital Group.
Hypothetical Glide Path Examples
Four glide paths, different tracking errors

LDI efficient glide path designs for a plan at 95% funded status

Asset Mix:
- U.S. Equity
- Non-U.S. Equity
- Long Government
- Long Credit

For illustrative purposes only. This example is hypothetical and does not reflect the results of any particular investment. Analysis performed using Monte Carlo simulation of assets and liabilities (see page 9).
Source: Capital Group.
Hypothetical Example: Four Risk Scenarios

Efficient glide paths showing average time to funded status vs. drawdown risk

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Source: Capital Group.
Hypothetical Example: Optimal Glide Path

On average, how long does it take to reach fully funded status?

For illustrative purposes only. This example is hypothetical and does not reflect the results of any particular investment. Analysis performed using Monte Carlo simulation of assets and liabilities (see page 9).

Source: Capital Group.
Back to the LDI Efficient Frontier

Considerations when picking a point on the curve

Efficient frontier: starting funded status – 78%, rebalance every 0.1%

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Source: Capital Group.
Key Takeaways for Plan Sponsors

Quantitative rigor can be a powerful complement to qualitative judgments

• Plans need a glide path, and the choice of glide path matters
• Different plan sponsors will choose different glide paths
• Choice is determined by objective factors, as well as judgment
• Think of objective factors as determining the risk tolerance
• Map risk tolerance onto the glide path via the “efficient frontier”
• Ultimately, the choice still involves some informed judgment

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