

# Get Funded, Stay Funded – 2012:

## The Evolution of Pension Risk Management

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White Paper

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## Introduction

Unfunded defined benefit pensions continue to be an important theme for both corporate and public plan sponsors in an environment where changes in bond yields and uncertain investment returns create or aggravate volatility in pension funding status. Even with pension funding relief passed in late 2008, and global equity markets returning approximately 13% annualized in the three years ending December 31, 2011, many plan sponsors continue to face high contribution requirements and stubborn funding ratios, a powerful reminder that misallocated pension assets and declining markets can place staggering cash burdens on sponsoring entities.

Moving into 2012 and looking beyond, there is no question that serious economic challenges remain, some of which can have an extraordinary impact on the funded status of pension plans, particularly in the U.S. where allocations to equities and similarly risky assets remain high. It is never clear exactly when investors' intermediate and long-term concerns — such as the aging population, federal and local deficits, unfunded liabilities and structurally elevated levels of unemployment — will materialize into imminent anxiety in a way that exerts downward pressure on asset prices and funded ratios. Despite three positive return years in risky assets (though 2011 was marginal for most equities), strong Pension Risk Management (PRM), at the policy level and within the portfolio, would seem to be a necessity.

Pension risk management, in one form or another, is the objective of the vast majority of defined benefit (DB) plan sponsors. Yet the prevailing management model relies on many individual asset managers confined to an asset class or management style and directed to outperform their market benchmark rather than their client's liability or actuarial rate of return assumption. Since the passage of ERISA in 1974, pension plan funding has received ever increasing scrutiny by the federal government and the accounting community. Over this period, the pension liability has gone from an unfunded footnote to a true liability of the company with attendant income, capital and rating agency impact. Yet the implementation of pension risk management in a more overt form is lagging far behind the recognition of its need and utility.

## Problems with the Status Quo Approach

The traditional approach to pension risk management threatens to make pensions obsolete largely because it continues to:

- Over-emphasize the search for excess returns vs. market indices
- Over-allocate to equities and other risky assets correlated with the economic cycle
- Under-estimate the impact of non-normal returns and outsized, negative “left tail” events
- Neglect effective plan-level risk management tools and techniques
- Foster an inflexible governance model

### Common plan sponsor reactions to these conditions include:

- Freezing the plan
- Closing the plan to new hires
- Introducing new DC or hybrid plans
- Keeping the status quo and “kicking the can”
- Increasing allocation to alternative investments
- Terminating the plan

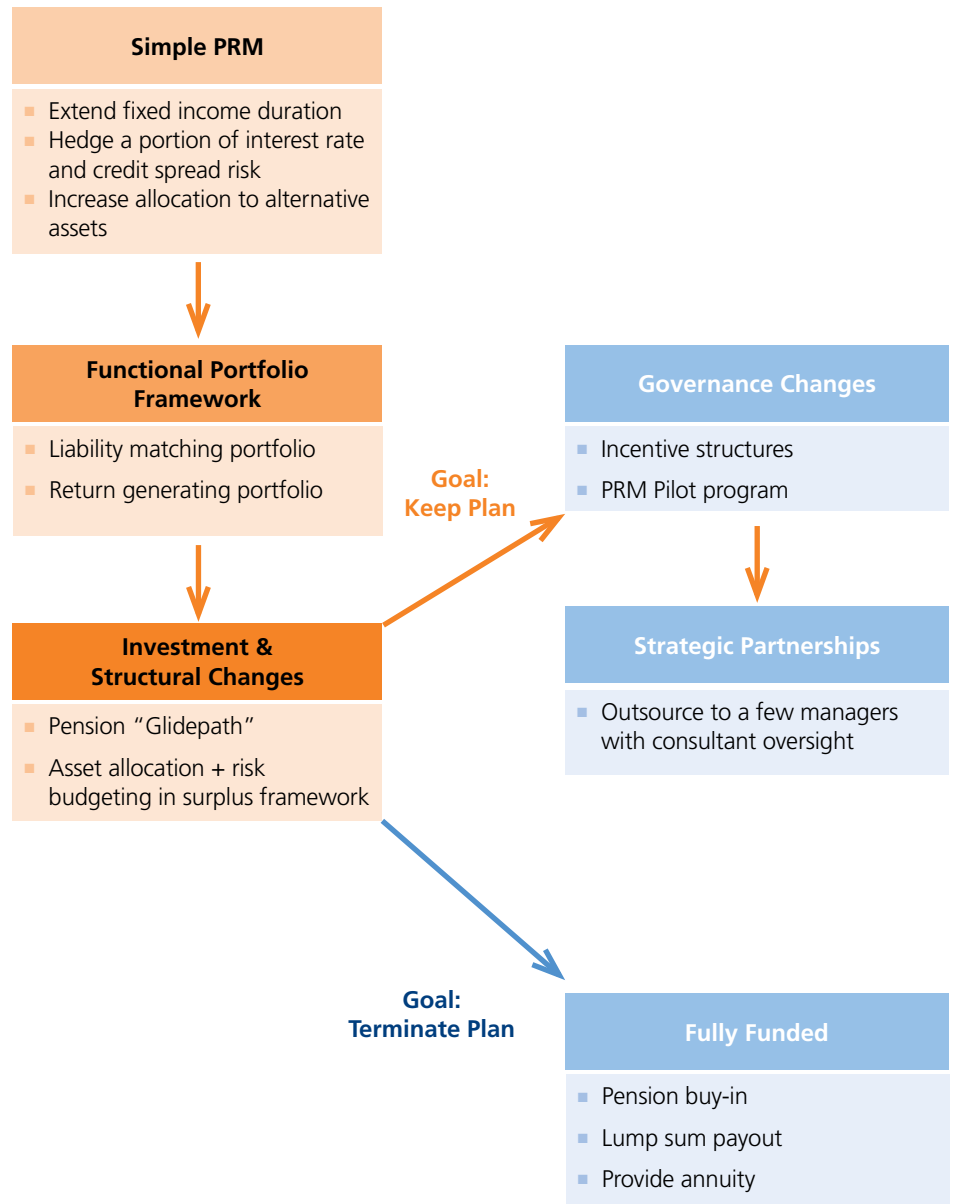
None of the likely outcomes adequately supports the desirable social and economic objective of promoting retirement income security for those at or near retirement age. As a result, after three pension crises in the last ten years, adopting a better pension risk management model has reached a level of critical importance.

Pension risk management is the objective of the vast majority of defined benefit (DB) plan sponsors.

## Towards a Better Pension Funding Process

We believe pension risk management (PRM) is aligned with the mission of defined benefit plan sponsors since it allows them to better position the plan to meet pension benefit obligations while controlling the level, predictability and volatility of pension costs. An evolutionary, multi-step process, PRM can be summarized as follows:

Adopting a more sophisticated pension risk management model has reached a level of critical importance.



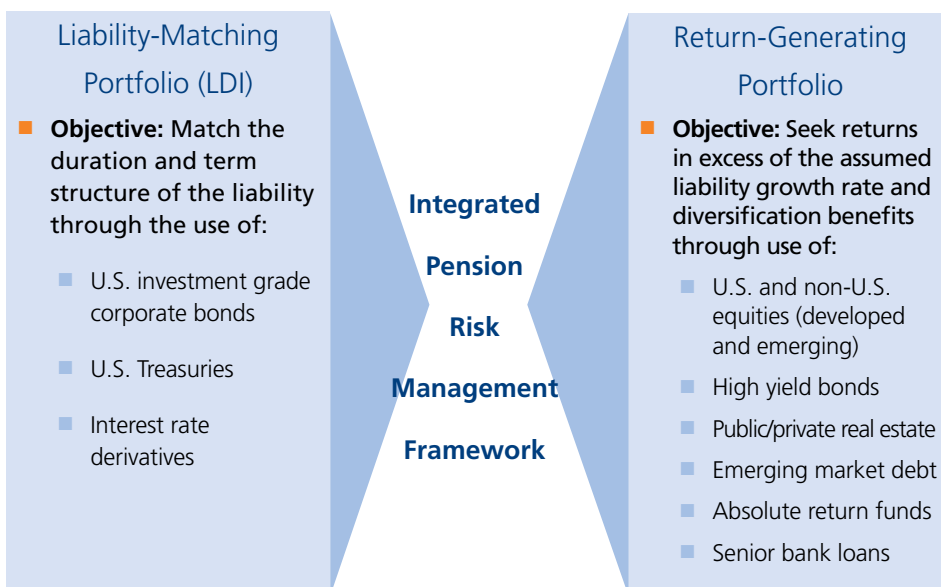
While extending the duration of a plan's fixed income portfolio may be a good start along the pension risk management path, we believe to be truly successful in managing pension risk, one must re-think the portfolio construction process and how allocations across asset classes contribute to risk and return in a liability context.

## Functional Portfolio Framework

### Asset allocation in an integrated Pension Risk Management Framework

Given that the ultimate goal of a defined benefit plan is to fund the required payments of the liability while minimizing the cost and income volatility of the sponsor, the risk and reward of any asset class employed in this pursuit should be defined relative to pension liabilities, rather than cash. This suggests that instead of being sorted into the standard equity/fixed income/alternatives buckets, asset classes should be grouped according to their utility within an asset portfolio, namely 1) matching the duration and term structure of the liability, 2) providing expected investment returns in excess of the assumed liability growth rate, or 3) offering diversification benefits to the overall investment portfolio.

Using a segmented portfolio approach that combines both liability-matching and return-generating/diversifying asset classes in an integrated pension risk management framework can help derive more efficient pension portfolios. Toward that end, the two “segments” in our approach are illustrated below:



Asset classes should be grouped according to their utility within an asset portfolio.

### (1) Liability Matching Portfolio

The main role of the liability matching portfolio is to closely match the duration and term structure of the liability. Liability-matching asset classes can include U.S. investment-grade corporate bonds rated BBB and above<sup>1</sup> and U.S. Treasuries. We will discuss the construction of a liability matching portfolio in more detail below.

<sup>1</sup> In short, including select bonds rated BBB in a liability matching portfolio can significantly improve the return, risk and diversification characteristics of a liability-matching portfolio relative to a pension plan's liabilities. For more information, please see "Should BBB- Bonds Be Excluded from Liability-Driven Portfolios?" in the October 25, 2010, issue of ING Investment Weekly.

Implementing an LDI strategy requires a high level of expertise across disciplines.

## (2) Return Generating Portfolio

The return generating portfolio seeks to provide expected investment returns in excess of the assumed liability growth rate as well as diversification benefits which can dampen portfolio volatility. Assets in the return generating portfolio can include U.S. equities, non-U.S. developed market equities and emerging market equities. These have a higher expected return than the liability-matching assets, have very low correlation with the liability but can also be very volatile. High yield bonds, emerging market debt and senior bank loans, while fixed income in nature, can also be considered here because they often have higher expected returns than the liability itself and may provide diversification benefits.

Additional asset classes in a return generating portfolio may include equities of all types, public and private real estate, and absolute return assets or hedge funds. Real estate provides both equity and fixed income characteristics and relatively low correlation to most other asset classes, as well as the liability, while absolute return assets typically have a decent expected return, lower volatility than most asset classes and low correlation with most asset classes and the liability.

Considering asset classes in terms of their possible roles in a portfolio — 1) matching the duration and term structure of the liability and, 2) providing expected investment returns in excess of the assumed liability growth rate and offering diversification benefits — is a vital step toward developing efficient asset mixes in an integrated pension risk management framework. Doing so helps plan sponsors better harness the attributes of each asset class when making strategic asset allocation decisions.

## Creating a Liability Matching Portfolio

### Liability Driven Investment Strategy (LDI)

The primary objective of a liability-driven investment (LDI) strategy is to manage the pension plan liability's sensitivity to changes in both Treasury yields and high-quality corporate bond spreads by allocating across fixed income assets in a strategy engineered to provide the desired degree of liability matching. Matching the liability's sensitivity to changes in interest rates is the easier part of the process and can be done with Treasury coupon bonds, Treasury STRIPS, corporate bonds or derivatives of various maturities. Closely matching the liability's sensitivity to changes in corporate bond spreads, on the other hand, is more of a challenge, as future benefit cash flows are discounted based on high-quality corporate bond yield indices that are effectively un-investable because of liquidity and duration availability. As a result, implementing an LDI strategy requires a high level of expertise across disciplines — practitioners must have expertise in calculating the pension liability, along with a deep understanding of the size, liquidity and duration of the corporate bond markets and experience in constructing well-diversified portfolios of fixed income strategies.

Matching the duration of the liabilities is crucial. If the duration of the corporate bond portfolio is shorter than the liability's duration, some assets will need to be invested in longer-duration Treasuries, interest rate swaps or futures to extend the portfolio's duration. While this will help with the duration matching, it will also introduce a mismatch between the credit spread exposure of the assets and the liabilities.

Since corporate bond yields are effectively equal to Treasury yields plus a spread for default risk, it is vital to understand the sensitivity of a pension plan's liability to changes in both interest rates and spreads. In the table below, we show the decomposition of a representative plan's liability growth rate due to changes in Treasury yields and Aa bond spreads. Looking closely at the volatility of the annualized liability returns, we can see that 74.5% was specifically due to movements in Treasury yields while 25.5% was the result of changes in corporate bond spreads — an almost 3-to-1 ratio. Also, the correlation between the total liability returns and the returns due to changes in Treasury yields (0.79) was almost twice as high as the correlation between the total liability returns and the returns due to changes in Aa rated corporate bond spreads (0.41).

**Period: January 1997 Through December 2011**

	Decomposition of Liability Returns			Duration
	Duration-Equivalent Treasury Returns	Returns Due to Changes in Spreads	Total	Total
Average (Annualized for Returns)	8.61%	0.42%	9.03%	10.28
Standard Deviation (Annualized)	9.06%	6.03%	9.66%	0.45
Contribution to Variance	74.5%	25.5%	100.0%	
Correlations				
Duration-Equivalent Treasury Returns	1.00	(0.23)	0.79	
Returns Due to Changes in Spreads		1.00	0.41	
Total			1.00	

Given these outcomes, managing the liability's sensitivity to changes in Treasury yields is clearly the first and most important step toward effectively managing the liability's sensitivity to changes in the discount rate. That said, the funded status of the plan will not be fully protected unless the liability's sensitivity to changes in corporate bond spreads is also well-managed.

It is vital to understand the sensitivity of a pension plan's liability to changes in both interest rates and spreads.

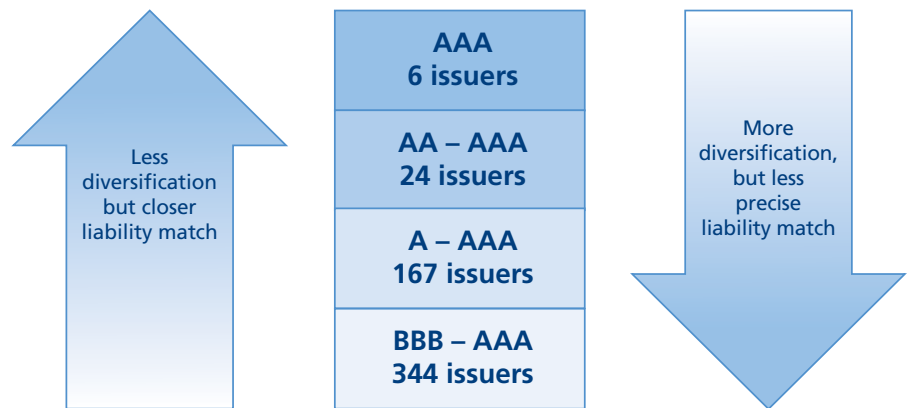
All corporate pension plan liability cash flows are discounted at Aa corporate bond yields for accounting purposes and at A-Aaa yields for funding purposes, regardless of the liability duration. While very high in average credit quality, these corporate bond benchmarks are overly concentrated in a limited number of issuers and are effectively un-investable, especially at the long end of the curve (i.e., with a maturity in excess of ten years). While ratings are an extremely important guidepost for investors, we believe that a careful and rational approach to the construction of a well-diversified fixed income portfolio will necessarily entail selective active investment in bonds with ratings below those included in the corporate bond benchmarks used to discount the liabilities.

We believe that expanding the investment universe outweighs the risk of a lower average credit rating for the portfolio because:

- Diversification is improved; concentration risk is reduced.
- Yield is increased.
- Credit selection expertise can be more efficiently exercised.

### Liability Matching vs. Diversification

BarCap Long Corporate Universe



**Higher credit rating reduces risk relative to liability but increases the impact of a downgrade/default.**

The number represents the number of issuers in the Barclays Long Corporate Universe as of December 31, 2011

Source: Barclays Capital

Therefore, when constructing an LDI investment portfolio, it is vital to look beyond ratings and to focus on industry and issuer diversification. We believe the diversification benefit derived from increasing the investable universe through limited active management — as opposed to a passive approach (a buy-and hold strategy or investment in an unmanaged bond index that does not match the duration and term structure of the liability) — outweighs the risk inherent in decreasing the overall credit quality of the portfolio. Further, it is important to keep in mind that for an LDI mandate, avoiding adverse outcomes vs. the liability is more important than generating excess returns. It should also be noted that downgraded or defaulted credits are not included in the liability benchmarks and, as a result, can have an adverse impact vs. the liability for portfolios that hold them. Consequently, the best approach to use when including issuers rated below A- is to select issuers only from industries with relatively stable earnings and cash flows such as regulated industries and those that produce necessities and to avoid issuers from industries that have sub-optimal capital structures and greater price volatility as noted below.

When constructing an LDI portfolio, it's vital to look beyond ratings.

**“BBB” industries to consider:**

- Industries with stable credit quality characteristics
- Regulated industries
  - Government involvement allows companies to run with higher debt loads, i.e.:
    - Electric and gas utilities
    - Natural gas pipelines
    - Railroads
- Industries that create “necessities”
  - More stable revenue and cash flow
    - Consumer non-cyclical
    - Food, energy, communications

**“BBB” industries to exclude:**

- **Financials**  
Sub-optimal capital structure given the need to access capital markets for funding
- **Basic industries, capital goods, consumer cyclical, technology and other industries**  
Greater economic sensitivity creates price volatility in excess of strategy objectives
- **“BBB-” Bonds are “too close to the edge”**  
Potential price volatility in excess of strategy objectives

Using this approach, we can expand the investable universe to more effectively create a well diversified portfolio of long duration corporate bonds that adequately reflects the duration and credit quality of the pension liabilities while remaining sensitive to potentially adverse outcomes.

Traditional asset class and manager diversification can fail when we need it most.

## Constructing the Return Generating Portfolio

The return generating portfolio seeks expected returns in excess of the assumed liability growth rate —plus possible diversification benefits. Generating these excess returns requires acceptance of a certain amount of risk. This risk is typically mitigated through a traditional asset allocation process using mean-variance optimization across multiple asset classes such as domestic and foreign equity, alternatives and fixed income as noted earlier. The outcome is a set of diversified portfolios designed to maximize expected return for a given level of risk. Most investors begin and end the risk management process at that stage of diversification; however, as we learned in past crises, not just in 2008, traditional asset class diversification can fail when we need it most.

To measure and monitor risk in ways that adequately capture the true behavior of assets over time, investors can take into account several more robust metrics. Our first consideration is Modified Value-at-Risk, or Cornish Fisher VaR, for individual assets or complete portfolios. Unlike traditional VaR, which is calculated using an estimate of mean and standard deviation parameters assuming a normal return distribution, Modified VaR includes skewness and kurtosis in its calculations, providing an estimate of maximum loss potential at a given confidence level, recognizing the non-normality of the asset's probability distribution. Modified VaR can also be utilized in the optimization process in lieu of standard deviation or traditional VaR. By measuring each manager's or asset class's marginal contribution to the Modified VaR of a total portfolio, it's possible to limit a strategy's marginal contribution to Modified VaR in the asset allocation process.

Another helpful tool is Conditional VaR, the average of the worst 5% (or 1%) of historical return observations or return paths based on a stochastic simulation. This metric quantifies the size of potential losses in negative, left-tail events.

In addition, we strongly advocate looking at the maximum drawdown of an asset class or a strategy. If an asset has enough history, why not look at the worst peak-to-trough performance over its life? That number will be a lot worse than VaR, Modified VaR or even Conditional VaR. Examining the maximum historical drawdown of an entire portfolio based on the current or proposed asset allocation will help clarify whether such a drawdown can be endured without risking insolvency or other consequences.

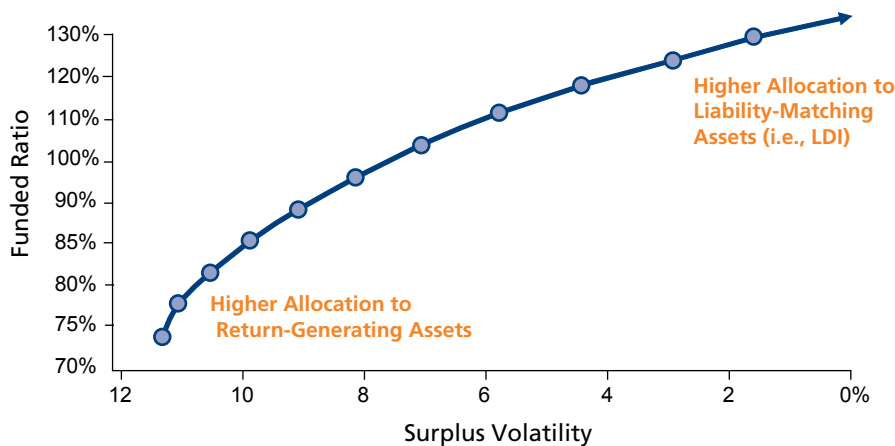
Finally, using multi-factor risk analysis and style analysis can help investors understand the risk exposures hidden in their underlying managers' portfolios, as well as at an aggregate portfolio level. These tools help provide a firmer grasp on the true sources of a manager's returns — and whether they are attributable to skill, style or other inherent biases — and further aid the portfolio construction process.

Considering asset classes in terms of their possible roles in a portfolio is a vital step toward developing efficient asset mixes in an integrated pension risk management framework. Doing so helps plan sponsors better harness the attributes of each asset class when making strategic asset allocation decisions.

## The Pension Glidepath<sup>SM</sup>

The use of a Pension Glidepath<sup>SM</sup> approach can help sponsors better manage risk dynamically by allowing them to adjust asset allocation and total risk budgets more effectively in accordance with changes in the plan's funded status. Much in the way a target date fund's glidepath governs the systematic adjustment of the retirement fund's asset allocation with the passage of time, a Pension Glidepath<sup>SM</sup> would govern how a plan sponsor changes the plan's asset allocation according to well-defined parameters. The difference is that asset allocation, total risk budget and the composition of risk would be adjusted in response to changes in the plan's funded status over time. With a Pension Glidepath<sup>SM</sup>, the total risk taken by the plan (defined in asset/liability context) would be gradually reduced as the plan approached and then exceeded fully funded status.

A Pension Glidepath<sup>SM</sup> is nothing more than an actionable plan for pension risk management.



### Factors Governing the Glidepath Construction

- Expected liability growth rate
- Current funded status of the plan
- Level of contributions sponsor can afford
- Impact on sponsor's financials should actual risk be higher than initially expected

A Pension Glidepath<sup>SM</sup> is really nothing more than an actionable plan for pension risk management. It dictates clearly what a sponsor will do as funded status changes. While all plans have well-crafted investment policy statements covering diversification, delegation of duties and the like, most seem to lack the hard triggers that govern how and when meaningful changes in the investment program will be made.

[Note: The cash contributions a sponsor can afford on a year-by-year basis would also govern the total risk taken, but we make the simplifying assumption that the contribution is fixed at a given level and the investment returns required in excess of contributions determine the total risk budget.]

Many plans still face funding shortfalls and need future contributions.

## Putting it All Together

### Hiring the Right Managers

Implementing a successful pension risk management strategy requires finding managers that go beyond the requisite skill required to run traditional long-only equity or fixed income portfolios or even suitable alternatives strategies. Successful pension managers also need a high level of expertise across multiple disciplines. For instance, as noted above, managers must have an in-depth understanding of how pension liabilities are calculated and their relationship to interest rates, as well as knowledge of the size, liquidity and duration of the corporate bond markets in order to construct a well-diversified LDI solution. Ideally, return generating portfolios should be constructed, not by a multitude of managers focused on beating market benchmarks unrelated to the plan's true goal of funding the liability, but rather by managers that use the liability as their "bogey" and seek to outperform it by constructing diversified, multi-asset class portfolios using the advanced optimization and risk management tools available today. In that ideal scenario, it should be self evident that managers of broadly diversified portfolios need the skills to identify and access dependable alpha sources across the various asset classes. Toward that end, pension managers should look deeper into the risks embedded in their portfolios to ensure that plan assets are not only diversified at the asset class level but also across risk factors to protect against significant draw-downs in the event of turbulent markets. Finally, if managers accept the plan liabilities as their benchmarks, they need the ability to calculate (or have ready access to) plan liability and surplus data in order to dynamically manage risk across both liability matching and return generating portfolios.

### Getting Started

The hardest part of any journey is likely to be the first step. Many plan sponsors understand the importance of managing their pension risk more effectively but may be hesitant to change from their traditional practices for many reasons (e.g., rates are too low, need the return expected for a traditional portfolio, lack of comfort with non-traditional approach). Certainly change is difficult, but we believe there are ways to begin to adopt a Pension Risk Management approach, whether by hiring a manager to lengthen duration of the fixed income portfolio or beginning to fully integrate the segmented portfolio approach described above, without initially disrupting an entire portfolio.

Many plan sponsors are concerned about moving to an LDI solution during the low interest rate environment we find ourselves in today. Since many plans still face funding shortfalls, most will be required to make significant contributions in the near term. Lengthening the duration of their entire fixed income allocation now may only prolong their underfunding as these asset values would fall with a

presumed rise in interest rates. One approach to consider, however, would be to lock in a portion of their liabilities and begin the journey along the PRM Glidepath by initially funding an LDI portfolio with their new contributions only. This interim step would allow sponsors and their consultants to monitor the LDI manager to ensure the liabilities are adequately matched before committing significant additional capital to the strategy. As the funded status begins to improve, they can allocate additional assets to the LDI strategy and, as the total allocation grows, consider hiring additional LDI managers to mitigate single manager risk.

While lengthening duration with LDI is a good start, transitioning to a fully integrated PRM approach may be more appealing to some sponsors. A good way to begin this transformation would be to “carve out” a portion of plan assets and liabilities, which would then be managed using the funded status as a performance benchmark. For example, if a \$1 billion plan were 80% funded, a 10% carve out to a PRM manager would entail assigning \$80 million in assets to manage against \$100 million of liabilities, representing a funding deficit of \$20 million. The appointed manager would create both liability matching and return generating portfolios and manage the glidepath transition between the two as the carved out asset/liability funding gap narrowed. By initially limiting the capital dedicated to such a strategy, plan sponsors and their consultants could assess results based on the volatility and direction of the funded status. More capital (and perhaps additional managers) could be deployed in this manner as the funded status improves, confidence grows and capable managers are identified. Ultimately, the logical goal of an integrated PRM strategy would be to have a few — rather than many — managers focused on what is most important: funded status and the ability to cover pension liabilities.

## Plan Governance and Oversight

While this paper has focused mainly on the functional and structural approaches to pension risk management, plan governance and oversight issues should not be overlooked. Today, most important decisions are made by the plan sponsor, the Board of Trustees or investment committee who meet periodically to discuss, among other things, the performance of their many managers vs. their market benchmarks. Investment consultants typically provide valuable input and advice to the stakeholders, but they are normally asked only every few years for an exhaustive asset-liability-management analysis which is the basis for the most momentous decisions with the biggest financial impact. An un-responsive governance framework may cause painful short-term effects in volatile times. Adopting a PRM-focused structure allows for more dynamic governance by aligning manager goals and incentives with the most critical issue facing plan sponsors, ensuring that assets are available to meet plan liabilities.

The logical goal would be to have few — rather than many — managers focused on what is most important.

## Conclusion

In the final analysis, plan sponsors can continue to throw money at their funding problem and hope for the best, or they can resolve to leave little or nothing to chance and attempt to seize control of their financial future through pension risk management (PRM). An evolutionary, multi-step process, PRM assists plan sponsors in accomplishing their mission to meet pension benefit obligations while controlling the level, predictability and volatility of pension costs. It does not necessarily lead to pre-defined conclusions since the right answer is company-specific and dependent on many variables. Beginning the PRM process can be as simple as extending duration in a fixed income portfolio or it can take the form of a fully integrated functional portfolio solution that dynamically adjusts risk exposures based on evolving plan metrics. Without any doubt, managing pension risks more effectively will require plan sponsors to change meaningful aspects of their approach and its governing body of assumptions. Asset managers and investment consultants should facilitate and support sponsors in this transition, so that it can occur quickly and with little or no disruption or adverse financial consequences.

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