

Risk Management Solutions for Pension Funds

Need for Risk Management of Pension Funds

The ongoing capital market crisis has amplified the financial risks for pension funds and the sponsors of corporate pension schemes. Equities crashed, credit spreads widened, interest rates dropped, and many assets have become illiquid. The crisis of 2008 caught several pension funds off guard and caused extreme financial distress. Responsible trustees and managers are now asking themselves “How do we react given this situation?” and “How can we improve our investment and risk management to avoid such situations in the future?”.

Today, we invite you to share our thoughts and solutions for an integrated investment and risk management for pension funds. This series of newsletters will start with the introduction of our Liability Driven Investment (LDI) framework. In short, the LDI approach aims to optimize the investment policy of the funds taking the risk characteristics of the underlying pension liabilities of the scheme explicitly into account.

Beyond the LDI framework, we will systematically highlight key risk factors (such as interest rates, inflation and credit spreads) and their relevance for plan sponsors. In particular, we will show the impact and interactions they can have on both assets and liabilities. Effects on the funding status of the pension funds, for example, the coverage of pension liabilities through financial assets, will be illustrated.

Finally, we will analyze longevity risks and how they can be actively managed. Longevity risks, also called mortality or biometric risks, are less in the headlines these days compared to

other financial risk drivers. However, they play a significant role for future funding stability and influence the total long-term risk exposure of the funds. In short, mortality risks stem from increased life-expectations of pension scheme beneficiaries.

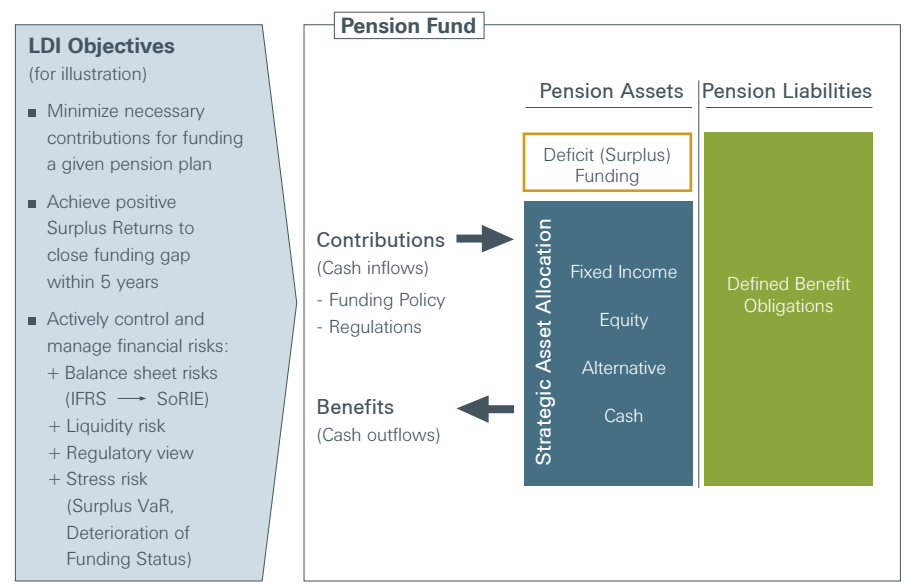
LDI Framework for Pension Funds

The LDI framework sets the outline for the investment and risk management solutions of the pension fund. A systematic analysis will start with a detailed discussion about the individual objectives and constraints of the pension fund and the (risk) preferences of its corporate sponsor. Based on a comprehensive understanding of the pension plan-sponsor’s needs and objectives, a tailor-made LDI solution will be defined in a truly partnership approach.

risklab GmbH, a 100% subsidiary of Allianz Global Investors AG, is a specialist advisor for investment and risk management solutions for pension funds. risklab has developed and successfully implemented a proven and robust Liability Driven Investment Framework (LDI) for big blue chip pension funds in Europe.

From a financial perspective, a typical key objective is to improve the funding status of the pension funds and to reduce future financing costs and cash contributions to the pension scheme. For example, an underfunded pension fund could formulate the target to close the deficit over a given recovery period, for example, over the next five years.

Graph 1: Illustration of LDI Framework



The choice of the plan assets and its strategic and tactical allocation over time play the pivotal role in achieving the defined financial objectives of the pension fund. Risks that are not associated with a systematic risk premium should not be assumed in the strategic asset allocation. And when considered under a tactical view, the return expectations should be challenged very carefully. In this context, risklab has defined a forceful and systematic investment framework for pension funds.

An important ingredient of defining a forward looking investment strategy is a sound assessment about future behavior of capital markets and asset class developments. Without perfect foresight the best one can do is to define a set of reasonable (economically realistic and consistent) scenarios for a broad range of available asset classes, including alternatives. For this purpose, we use the risklab Economic Scenario Generator (ESG). The ESG is a proprietary, state-of-the-art engine which simulates several thousand capital market scenarios. These scenarios are then used as input for the integrated LDI-analysis.

Investment Constraints Impact Portfolio Optimization

Portfolio optimization within the LDI framework also needs to consider a set of individual investment constraints.

For example, a corporate plan-sponsor has to actively manage and control the impact of pension finance activities on the balance sheet and profit and loss statements. Publicly listed companies need to report current and expected future costs of occupational pension schemes to shareholders and analysts. A thorough understanding of the sponsored pension schemes and their

respective financial risks combined with greater transparency will contribute to a better assessment of the financial soundness of a company.

risklab offers LDI solutions that fully integrate the accounting dimension and makes them explicit. Pension related income and expenses impact shareholders' equity not only through the P/L of the plan sponsor, but also potentially through amortization of actuarial gains and losses (AGL) (c.f. SoRIE statements under IFRS).

For example, changes of the applied discount curves are highly relevant for accounting results. Under IFRS this would be the current "yield curve of high-quality corporate bonds," typically measured as the AA corporate yield curve 10+ . Within the US-GAAP principles, the current swap curve would be applied. Since pension liabilities are typically long in interest duration, for example, 15 years, changes in the discount function can significantly impact the reported valuation of pension liabilities. The reported value of DBO (defined benefit obligations) or PBO (projected benefit obligations) can be quite volatile.

We also need to look into liquidity risks for pension funds. Liquidity risks can effect far more the valuation of financial assets. With market liquidity for many asset backed securities, private equity, real estate, and many other alternative investments drying up, unexpected liquidity demands from the pension funds can raise significant solvency challenges for the plan sponsor. In a contracted credit market, cash management and solvency protection experiences a revival. A thorough multi-period cash flow forecast, netting cash inflows from contributions and income from financial assets with cash outflows of the pension scheme, is an essential task.

Finally, the national regulatory requirements and the specific statutory obligations under which a pension fund operates have to be integrated into the LDI framework. Unworkable investment recommendations must be avoided. Of course, a DB plan sponsor may have some flexibility in reacting to an underfunding situation. For example, future benefits may be indexed conditionally. And it will be nearly impossible for a DB plan sponsor to elude financial pressure on the pension scheme.

In the mid-term, the regulatory trend across Europe will likely require the fulfillment of capital adequacy for pension schemes, including stress-tests.

Mismatch Risks to be Managed

Generally speaking, mismatch risks arise from a different value and price behavior of plan assets and liabilities with respect to changes in underlying risk factors.

For example, the interest duration of a pension fund's liabilities is typically long, for example, 15 years, while on the asset side it often is only five years. When interest rates decrease this may lead to a much stronger increase of the DBO compared to increase of fixed income plan-assets. Generally, the interest rate duration gap leads to high surplus volatility with potential large funding level drops (or vice versa, gains).

As it was reported in IPE.com, big Dutch pension funds seem to have suffered a strong decline in their funding ratios largely due to the steep drop in interest rates at the end of 2008. For example, it was reported that for one pension fund the funding ratio dropped from 148% to 92% in 2008. Approximately 29% of this decrease is attributable to the net impact of the

return, increased pension liabilities and the hedging position of the interest-rate risk. [Source: "Funds blame bulk of decline on interest rates," IPE.com, 29 January 2009]

Lately, credit spreads have widened and spread development has impacted the pension funds' surplus stronger than previously experienced. Should credit spreads revert to lower levels, for example, in the context of an economic recovery, the DBO may increase much stronger than plan assets resulting in potential funding level deteriorations.

From a risk management perspective, the objective must be to create transparency, and to control and fine tune or – in extreme cases – completely match these financial risks.

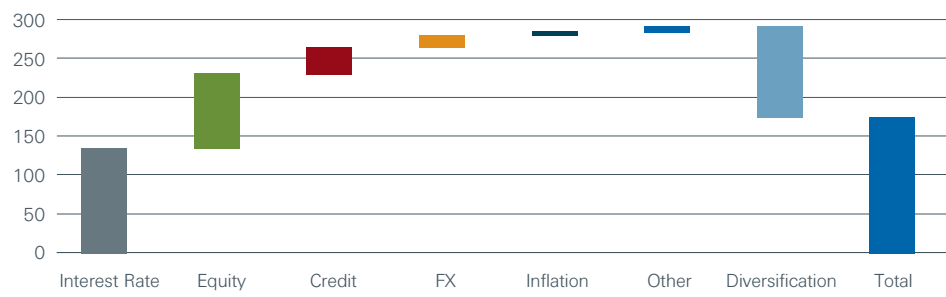
Surplus Risk Orientation Reflects the Net-effects of Assets and Liabilities

Often, plan sponsors focus on asset strategies only and neglect their interactions with liabilities. From an LDI perspective this approach falls short. We strongly believe it requires a simultaneous integration and risk analysis of liabilities and assets. Such a view can be achieved by looking at the funds' surplus measured as the difference between plan assets and liabilities. Through a systematic assessment of the risk exposure of the pension fund, we can identify the net risk contributions of the various risk factors to the overall surplus risk exposure. The following graph illustrates a surplus at risk breakdown and reveals those risk factors that are most critical. On this basis, we have a clear indication where risk hedging activities should be employed and where they would be most effective.

From a reporting perspective, we typically summarize the risk contribution of single risk factors and estimate the total risk exposure of a pension fund in an aggregated Surplus Value at Risk (SVaR) figure. This risk metric estimates the maximum negative change of the surplus, for example, over one year, within a certain probability level, for example, 95% of all cases. For example, a funding status with a deficit of EUR 250mn and a Surplus Value at Risk of EUR 175mn, would then indicate an expected increase of the funding deficit in the worst case to minus EUR 425mn. Additionally, the report can include risk estimates for certain loss probabilities and magnitudes of funding level drops quantifying directly the sponsor's risk preferences.

Graph 2: Illustration of Risk Exposure Decomposition and Reporting Example for Pension Funds

- Ongoing controlling and assessment of Surplus Risk Exposure
- Detailed analysis of Risk Factor Exposure
- Surplus at Risk Analysis
- Quantification of Loss Potential (e.g. Funding Level Drop)



Surplus at Risk	31.12.2007 (Mio. EUR)	30.12.2008 (Mio. EUR)
VaR 95% / 1yr.	-165,0	-175,0
in % of DBO	-11,1	-13,0
Probability Funding Level Drop (FL Drop)	FYF 2008	
Probability in %	2,0	0,0
FL Drop in %	-5,0	-15,0
Surplus Drop (in Mio.)	-68,0	-203,0

Dynamic Surplus Return Management extends the Strategic Risk Management

Surplus Value at Risk not only monitors and serves as an important reporting figure, it can also be the target variable for the active risk/return management of an ongoing pension investment process.

The optimal plan risk exposure is individual and depends on the pension fund and its sponsor's risk bearing capabilities and preferences.

Specifically designed derivative LDI-Risk Overlay Strategies aim to manage the Surplus Value at Risk of a pension fund. The overall risk position can be either widely reduced – except for

some basis risks – or extended to try to earn further expected risk premium.

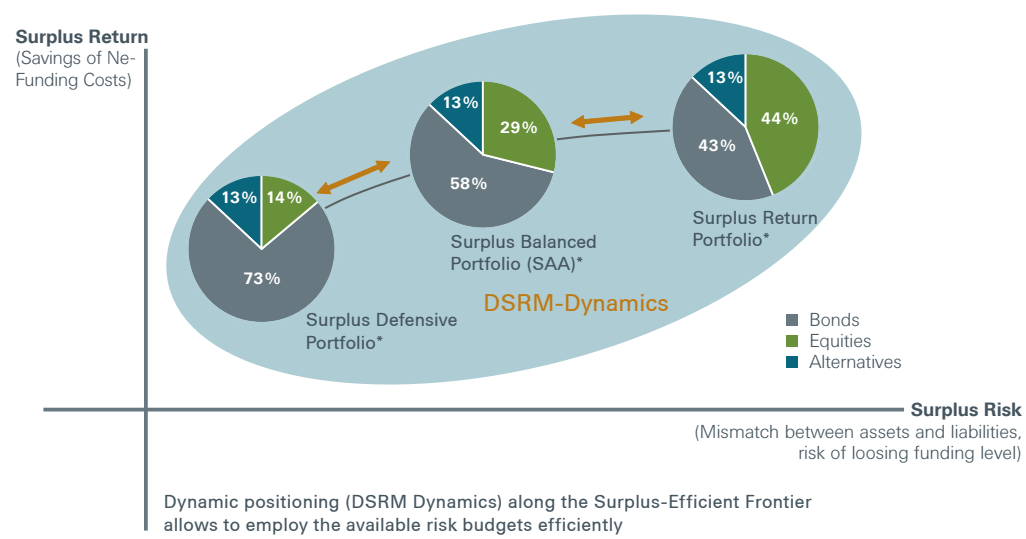
LDI Overlay strategies are efficient tactical instruments to adjust risk exposures. In our experience, this approach proves to be quite eloquent and robust compared to a pure rebalancing of the plan-asset portfolio. With the risklab Dynamic Surplus Return Management™ strategy, we can offer a transparent and proven risk overlay solution for pension funds that can be tailored to individual risk preferences.

Outlook

In times of severe economic and capital market crisis, CFOs, treasurers, pension trustees, and other investment professionals do not want to be taken off guard by the specific financial risks inherent to sponsored pension schemes. A thorough risk analysis to assess the exposure and an ongoing risk management solution is key. We strongly argue the case for an integrated LDI risk management approach.

In the coming newsletters, we will focus on solutions for selected key risk factors for pension funds in Europe. Should you be interested in parts or all of the LDI risk-management framework introduced today, we are happy to discuss them with you in person.

Graph 3: risklab Dynamic Surplus Return Management™
Illustration: Liability Driven Investment Concept with Dynamics



* Risk sensitivities (like interest rate duration, inflation duration, ...) are essentially the same (+/- 0.5 years) for all LDI portfolios along the efficient investment frontier

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A backtest represents a model based on selection criteria applied backwards in time. The results are not indicative of how the proposed fund may perform in the future, and the model results have limitations as a representation of past performance.

The proposed risklab investment strategies may involve risk factors not characteristic of the risks of traditional investments in stocks and bonds, including the volatile and speculative qualities of commodities, emerging markets, currencies and variance swaps, the possible illiquidity of derivatives, the magnified loss potential of investments involving leverage, and the possible mispricing or improper valuation of derivatives. The proposed investment strategy may also involve short sales, in which the „covering“ of borrowed securities could lead to losses for the fund under certain market conditions.

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