

STRIKING A BALANCE BETWEEN UPSIDE PARTICIPATION AND DOWNSIDE PROTECTION

Revisiting the investment policy for a defined benefit plan.



Setting the right investment policy for a defined benefit pension plan is a balancing act between improving funded status and reducing surplus risk. On the one hand, sponsors want to improve their funded status by investing in equities and other high-returning assets. On the other hand, they want to reduce surplus risk (the volatility of their funded status) by holding investments that are sensitive to long term interest rates such as long duration bonds. An investment policy that reconciles these divergent goals can better meet the objectives and expectations of the plan.

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Over the past decade defined benefit plans have increasingly moved from a focus on upside participation and an asset-only investment approach, traditionally a 60/40 or 70/30 equity/fixed-income allocation, to an asset/liability orientation. The shift reflects a major drive on the part of plan sponsors to *reduce* surplus risk and *maintain* funded status. A pension plan's future liabilities — the payments it will owe to retirees — are valued at a market rate that changes frequently. Managing the interaction of the plan's assets and liabilities is a critical issue for sponsors because when liabilities grow faster than plan assets, additional cash contributions are required. In the case of a corporate plan, liabilities and funded status are disclosed in the firm's annual report, and investors and analysts use these numbers in evaluating the company's financial health.

Given the growing emphasis on downside protection, liability hedging has emerged as an effective way for pension plans to mitigate funded status volatility (see The Basics of Liability Hedging on page 3). This is a very important step to take, but liability hedging is just part of the solution because, depending on their current state, pension plans need various degrees of growth from their investments to keep up with liabilities. As such, the plan's investment policy needs to strike an appropriate balance between liability hedging and portfolio growth.

MAXIMIZING PORTFOLIO EFFICIENCY

A portfolio is efficient if it delivers the highest expected return for a given level of risk. Plans that adopt an asset/liability orientation need to expand their concept of efficiency. From a traditional asset-only perspective, an efficient portfolio generates the greatest expected return for a given level of *investment* risk. From an asset/liability perspective, an efficient portfolio delivers the greatest expected return for a given level of *surplus* risk. The optimal portfolio for a pension plan should be efficient in both of these senses.

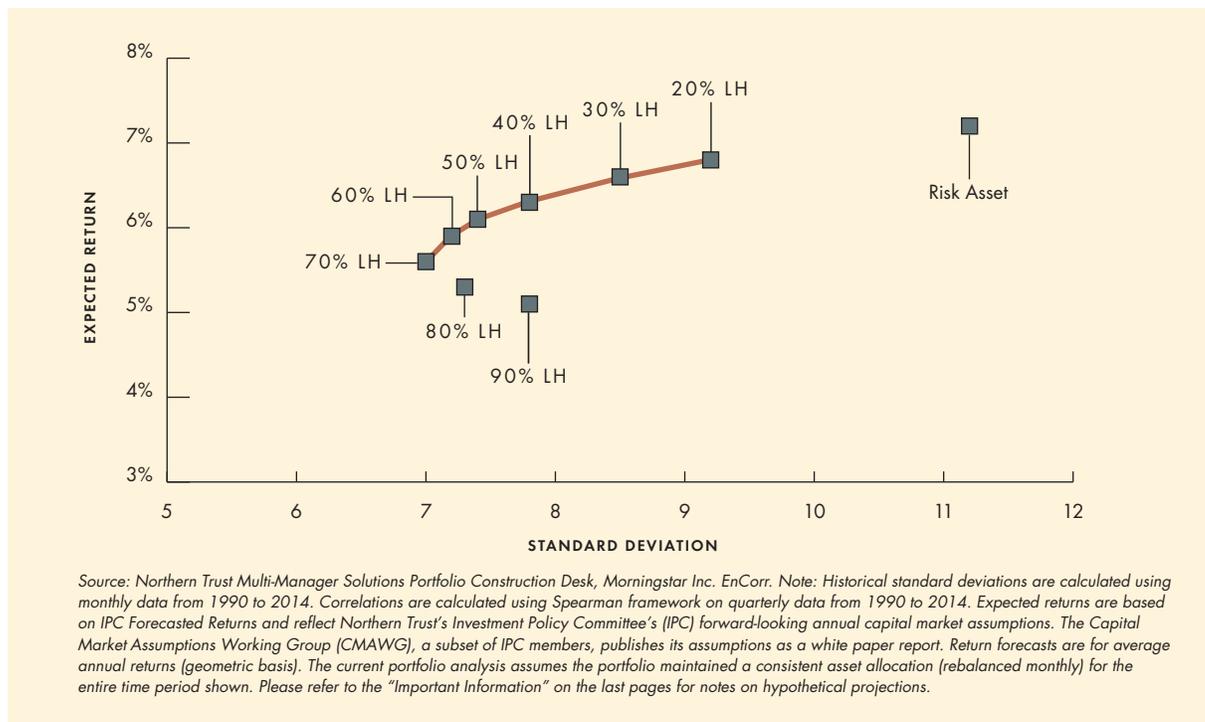
Optimizing model portfolios with both of these goals in mind is a little more complicated than the traditional approach, but the same basic techniques still apply. To discover efficient ways to manage surplus risk, we started by constructing model portfolios with levels of liability hedging (LH) varying from 20% to 90% to proxy a series of risk-driven funded ratio objectives. Then we allocated the remaining assets to growth-oriented investments that would place each portfolio on the efficient frontier. We looked at two kinds of efficient frontiers: the first an asset only focus and the second an asset/liability orientation.



Exhibit 1 shows expected return versus standard deviation and is the traditional picture that relates expected returns to volatility. Asset allocations that lie on this efficient frontier deliver the best expected return for every level of investment risk. The portfolio with 20% liability hedging has an expected return of 6.8%, a standard deviation of 9.2 and a Sharpe ratio of 0.6¹. The portfolio with 80% liability hedging has an expected return of 5.3%, a standard deviation of 7.3 and a Sharpe ratio of 0.6. However, because the 80% hedged portfolio has a much larger allocation to bonds it is both less rewarding and less volatile.

The point on this graph labeled “Risk Asset” represents an allocation that has no liability hedging at all. It has the greatest expected return and the greatest volatility. Exhibit 1 also shows that while returns continue to decline for portfolios with liability hedging of 70%, 80% and 90%, volatility increases in this portion of the curve. This is because these portfolios are so heavily invested in longer duration bonds that their other allocations are too small to diversify the associated credit and interest-rate risks.

EXHIBIT 1: EFFICIENT FRONTIER – ASSET ONLY VIEW

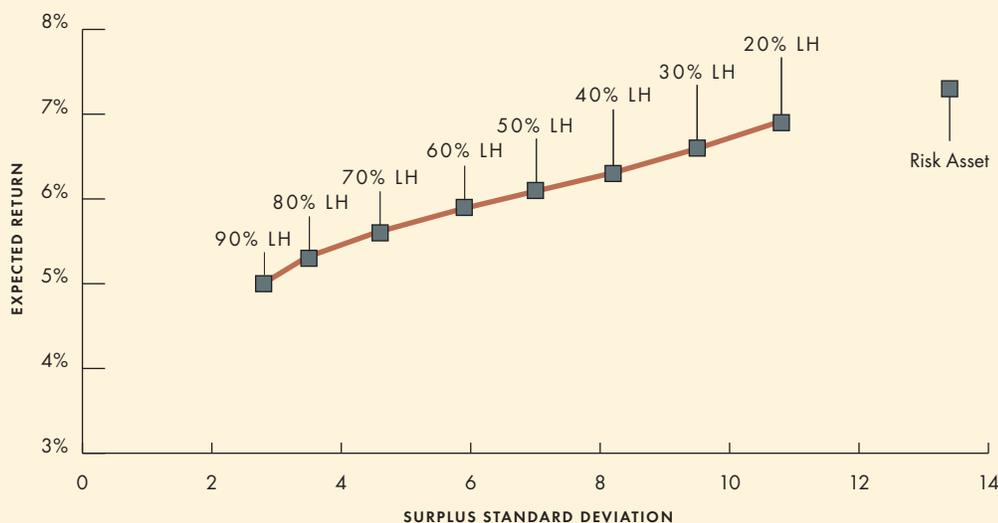


As Exhibit 2 shows, an asset/liability perspective can be quite different from an asset-only view. Here, an efficient portfolio is defined as one that delivers the best expected return for every level of *surplus* risk. The 20% LH portfolio is relatively volatile, with a surplus standard deviation of 10.8 and a surplus Sharpe ratio of 0.5. At this point on the efficient frontier, the pension plan has a higher allocation to return seeking assets at the expense of liability hedging, hence there is little relationship between portfolio return and liabilities.

The effects of hedging are much more apparent when the plan moves to an 80% LH portfolio. Here the surplus standard deviation has been reduced to just 3.5 and the surplus Sharpe ratio has climbed to 1.2. In this case the portfolio is more defensive and there is a much greater relationship between assets and liabilities. This efficient frontier offers a valuable perspective to plan sponsors hoping to balance portfolio growth against surplus stability.

¹ The Sharpe ratio is the mean return earned in excess of the risk-free rate per unit of risk. A higher Sharpe ratio indicates that the investor earns more return for a given level of risk.

EXHIBIT 2: EFFICIENT FRONTIER – ASSET/LIABILITY PERSPECTIVE



Source: Northern Trust Multi-Manager Solutions Portfolio Construction Desk, Morningstar Inc. EnCorr. Note: Historical standard deviations are calculated using monthly data from 1990 to 2014. Correlations are calculated using Spearman framework on quarterly data from 1990 to 2014. Expected returns are based on IPC Forecasted Returns and reflect Northern Trust's Investment Policy Committee's (IPC) forward-looking annual capital market assumptions. The Capital Market Assumptions Working Group (CMAWG), a subset of IPC members, publishes its assumptions as a white paper report. Return forecasts are for average annual returns (geometric basis). The current portfolio analysis assumes the portfolio maintained a consistent asset allocation (rebalanced monthly) for the entire time period shown. Please refer to the "Important Information" on the last pages for notes on hypothetical projections.

THE BASICS OF LIABILITY HEDGING

When a pension plan's assets exceed its liabilities, it has a surplus, and when its liabilities exceed its assets, it has a deficit.

$$\text{Surplus} = \text{Assets} - \text{Liabilities}$$

Funded ratio is another key way to measure the relationship between plan assets and liabilities.

$$\text{Funded ratio} = \text{Assets}/\text{Liabilities}$$

A fund with \$600 million in assets and \$500 million in liabilities has a surplus of \$100 million (\$600 - \$500) and a funded ratio of 120% (600/500).

Surplus risk is the danger that a plan's surplus will shrink or its deficit will grow due to volatility in its assets, liabilities or both. To minimize volatility of pension plan contributions, plan sponsors prefer to keep surplus risk low. Liability hedging is a key way to reduce surplus risk and minimize volatility in the funded ratio.

A common way for plans to hedge funded ratio volatility is to hold long duration high-grade bonds against some or all of its liabilities. As much as possible, the duration profile of the bonds is matched to the duration profile of the liabilities. When falling interest rates cause plan liabilities to increase in value, the bonds appreciate in step with them.

In our Capital Market Assumptions, the expected returns from high-grade bonds are currently modest compared to equities. Thus, liability hedging has the cost of reducing overall expected investment returns. Plan sponsors want high returns and low surplus risk, but this tradeoff must be carefully managed.

OPTIMAL ASSET ALLOCATIONS

The model portfolios shown in Exhibits 1 and 2 reside on two efficient frontiers. To design them, we began with certain assumptions:

- Each asset class allocation has to represent at least 3% of the total portfolio, because below this level, allocations are too small to make a significant difference.
- Diversification matters.
- Average liability duration is 12 years.
- Liability hedges consist of strategic allocations to long corporate bonds and government bonds.
- Expected returns are based on Northern Trust's Capital Market Assumptions, which are designed to be both forward-looking and historically aware.
- Correlations between asset classes are constant over time. This is a simplifying assumption that allows us to model static, rather than dynamic, asset allocations.
- We take minimum liability hedge ratios and return hurdle rates into account.

We considered the following asset classes:

- Global equity (the MSCI All Countries World Index)
- Diversified credit (U.S. high yield and emerging-market debt)
- Real assets (private real estate, global REITs and global listed infrastructure)
- Alternatives (hedge funds)
- Fixed income/liability hedging (long credit and government)
- We did not model commodities or inflation-linked bonds because of the benign medium term inflation outlook in our Capital Market Assumptions.
- We did not model private equity for the reasons in the note below.

We imposed the following constraints:

- Allocations to return-seeking assets range from a low of 3% to a high of 15%.
- Fixed-income allocations range from 15% for plans less than 80% funded and to 90% for frozen plans that are fully funded.

A NOTE ON PRIVATE EQUITY

We would not recommend an allocation to private equity investments for closed plans that exclude new employees but continue to accrue benefits for existing employees and for frozen plans that are in the final stage before termination. This is because private equity funds typically lock up capital for 10 years or more, which tends to be well beyond the time horizon of these plans. However, private equity funds may be suitable for large open plans.

RECOMMENDED ALLOCATIONS

Exhibit 3 shows the asset mixes that appear along the efficient frontiers shown in Exhibits 1 and 2. Note that hedging is accomplished through allocations to long U.S. government and corporate bonds. The sum of these two allocations equals the liability hedging percentage in each column.

Sponsors of plans with high funding ratios are above all concerned about maintaining their surplus. They tend to prefer mixes on the right side of the chart that have lower allocations to growth assets. Expected returns are generally lower at this end of the spectrum, but so, too, is surplus volatility. Plans with low funding ratios typically seek greater portfolio growth and prefer allocations on the left side of the chart.

EXHIBIT 3: ASSET MIX RECOMMENDATIONS

Asset Class	Risk Asset	20% LH	30% LH	40% LH	50% LH	60% LH	70% LH	80% LH	90% LH
Global Equity	55.5%	44.0%	39.0%	33.5%	28.0%	22.0%	16.0%	10.0%	10.0%
Diversified Credit	18.5%	15.0%	13.0%	11.0%	9.0%	7.0%	6.0%	4.0%	—
Real Assets	18.5%	15.0%	13.0%	11.0%	9.0%	8.0%	5.0%	3.0%	—
Alternatives	7.5%	6.0%	5.0%	4.5%	4.0%	3.0%	3.0%	3.0%	—
Fixed Income/Liability Hedging	—	20.0%	30.0%	40.0%	50.0%	60.0%	70.0%	80.0%	90.0%
Total	100%								
Expected Return	7.2%	6.8%	6.6%	6.3%	6.1%	5.9%	5.6%	5.3%	5.1%
Standard Deviation	11.2	9.2	8.5	7.8	7.4	7.2	7.0	7.3	7.8
Sharpe Ratio	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.6	0.5
Surplus Standard Deviation	13.4	10.8	9.5	8.2	7.0	5.9	4.6	3.5	2.8
Surplus Sharpe Ratio	0.5	0.5	0.6	0.7	0.7	0.8	1.0	1.2	1.5

Source: Northern Trust Multi-Manager Solutions Portfolio Construction Desk.

STRESS-TESTING THE PORTFOLIOS

One of the key elements of our risk management policy is to stress-test the performance of model portfolios through a series of actual events such as the dot-com crash of 2000–2002, the Lehman Brothers’ default in 2008 or hypothetical events such as a 100 basis points rise in interest rates. We compared results for the model portfolios to those of a traditional 60/40 indexed global equities/long government and credit bonds portfolio.

Looking first at asset-only volatility at the top of Exhibit 4, we found that the model portfolio exhibits less volatility and greater downside protection than the traditional 60/40 mix. *(Note that for a \$500 million plan, mitigating losses by 1% preserves approximately \$5 million of assets.)*

EXHIBIT 4: STRESS TESTING THE MODEL PORTFOLIO



Then we looked at funded-ratio volatility. As the bottom half of Exhibit 4 shows, under most circumstances the less-volatile model portfolio better preserves funded status than the traditional 60/40 allocation while continuing to participate in a major share of the upside. This combination of surplus protection and upside participation meets the needs of most plan sponsors.

As the exhibit indicates, there are some scenarios where asset/liability volatility and asset-only volatility move in opposite directions. Why should a 100 basis point decline in interest rates have a positive impact on asset growth and a negative impact on the funded ratio?

Recall that the funded ratio is defined as assets divided by liabilities. When interest rates decline, bond values rise and plan assets grow. However, the decline in interest rates drives plan liabilities higher because they are discounted at a lower rate. Total assets and total liabilities do not change to the same degree, as bonds are just one component of the numerator and liabilities form the entire denominator. When rates decline, total assets grow, but liabilities grow even more. Hence the negative impact on the funded ratio. On the other hand, when rates go up, asset values fall and the funded ratio climbs.

MATCHING THE POLICY TO THE PLAN

No two pension plans are alike. Some have a funding surplus and others a deficit. Some are open, while others are closed or frozen. Some have the capacity to assume substantial investment risk while others do not. Contribution policies across pension plans can differ and vary over time. Plan status, funded ratio and the chosen return/risk target all affect the design of a plan's strategic asset allocation.

Open plans can generally take more risk because they will have time to recover if they encounter a market downturn. They also have growing liabilities they need to keep up with. Closed plans and frozen plans have shorter time horizons and generally less tolerance for risk.

Plans with a surplus want to preserve it because they have a lesser need for portfolio growth and relatively little appetite for risk. Plans with a funded status well below 100% have a greater need for growth, but their risk appetite will likely depend on the economy and financial health of the plan sponsor. If the sponsor is in very good shape financially, it may not worry much about the DB plan being underfunded. However, if the sponsor company is in an out-of-favor sector, it may be torn between taking more risk to cure its deficit and fearing a market downturn that could cause its funded status to deteriorate.

After revisiting a plan's investment policy and resetting it in an asset/liability framework, further customization to the portfolio can occur during implementation. For example, some sponsors are open to investing in derivatives, which can be an efficient way to hedge their liabilities, but others will not consider derivatives. Plans may use actively managed strategies, passive strategies or some combination of the two. Sponsors also may have environmental, social and governance (ESG) guidelines for their portfolios and these can be accommodated as their investment policy is implemented.

NEXT STEPS

Plan sponsors moving from a traditional asset-only investment approach to an asset/liability orientation will want to consider a number of questions: Does your existing policy emphasize both investment returns and surplus stability? Does it strike the right balance between these divergent goals? Do your results seem to overemphasize one over the other? Should you be taking less risk? More risk?

If you determine that your investment policy and implementation strategy are in need of review, our team of investment strategists and actuaries stands ready to evaluate your current policy and help you transition to one that will better align your portfolio with your objectives.

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Important Information Hypothetical Returns - Where hypothetical portfolio data is presented, the portfolio analysis assumes the hypothetical portfolio maintained a consistent asset allocation (rebalanced monthly) for the entire time period shown. Hypothetical portfolio data is based on publicly available index information. All information is assumed to be accurate and complete but is not guaranteed.

Hypothetical portfolio data contained herein does not represent the results of an actual investment portfolio but reflects the historical index performance of the strategy described which were selected with the benefit of hindsight. Components of the hypothetical portfolio were selected primarily utilizing actual historic market risk and return data. If the hypothetical portfolio would have been actively managed, it would have been subject to market conditions that could have materially impacted performance and possibly resulted in a significant decline in portfolio value.

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