Ryan ALM
Asset/Liability Management

Pension Solution:
Best Way to Hedge Interest Rate Risk

Pension funds are faced with numerous risk factors. Perhaps, the greatest risk factor is Interest rate risk. If affects assets but especially liabilities. How pensions cope with Interest rate risk could determine the funded status and solvency of the plan.

The funded ratio of a pension is assets / liabilities based on either market value or actuarial valuations. The funded status is assets - liabilities with the same valuations. This funded ratio/status determines the contribution costs of a plan, amortizations, actuarial gains/losses and perhaps, affects credit ratings. The funded ratio and status are both based on present value calculations and valuations. As a result, how the present value of pension assets are calculated plays a major role In the funded ratio/status situation.

Assets

There are numerous assets that are interest rate sensitive such as: ABS, bank loans, bonds, cash equivalents, CLOs, CMBS, CMOs, derivatives, futures, mortgage-backed securities, municipal bonds, Private Debt, REITs, etc. . Since Interest rates are never static, their volatility affects the funded ratio/status of the pension plan. This could be good or bad but most pensions do not want volatility on these critical calculations. As a result, many pensions, especially corporate plans, invest in hedging strategies to reduce or Immunize this volatility. These strategies can be quite sophisticated but all come at an extra cost and new risk factors.

Derivatives such as interest rate swaps and futures are contracts which have no cash flow certainty or exact funds available to make the liability cash flow payments. They are hedges vs. the liability growth rate. In fact, these strategies introduce more

risk: counter party risk, interest rate risk, non-matching risk of assets purchased (usually equities) vs. liabilities and leverage. In addition, interest rate swaps and futures have all of the problems associated with a liability proxy data gathering… as with duration matching. For example, where do you get the average duration of liabilities? Most, if not all, actuarial reports do not provide this calculation. Moreover, they do not provide the projected liability benefit payment schedule which you would need to calculate duration. In addition, actuarial reports are annual reports usually months delinquent so there would be serious delayed information. The duration calculation is at a precise moment in time… like a balance sheet. As time and interest rates change… so will duration. Only A ***Custom Liability Index (CLI)*** priced at market rates and based on each pension's unique liability benefit payment schedule could provide an accurate and current duration profile. Any difference in yield creates a difference in the calculation of duration and liability growth rates.

A common proxy for the average duration of liabilities is to use a generic bond market index… usually the Bloomberg Barclay's long corporate index. Such a proxy creates several erroneous data issues. This index has no bonds shorter than 10 years and no durations longer than 17 years. This certainly does not represent any pension liability schedule even if the average durations were similar.

Accounting standards and actuarial practices price liabilities as a portfolio of zero-coupon bonds with a *single average discount rate* based on the present value of this zero-coupon liability portfolio. Note… **there are no generic bond indexes that use zero-coupon bonds as their portfolio**. Moreover, there are no generic bond indexes that use any of the required pension accounting discount rates… **they use market rates**! Every pension plan's liabilities are different and unique to that plan due to different labor force, salaries, mortality, and plan amendments. There is no way any generic bond market index could represent any pension plan liability term structure.

Liabilities

Liabilities are bond like valuations since their present value is calculated the same way you calculate the present value of bonds. Indeed, FASB and GASB accounting rules require that you price liabilities as if they were zero-coupon bonds. This makes liabilities extremely interest rate sensitive. The longer the average life or duration of liabilities the greater the interest rate risk and present value volatility. Since the duration of liabilities changes with interest rates (discount rates) this calculation needs to be refreshed and updated on a frequent and accurate basis. According to ASC 715 accounting rules (formerly FAS 158) liabilities are to be priced as a high-quality zero-coupon bond yield curve. FASB accepts AA corporates as the interest rates in compliance. Since corporate zeroes do not exist in the market-place, such discount rates are *hypothetical* interest rates. Ryan ALM is one of few vendors who supply the ASC 715 discount rates. Price Waterhouse Coopers (PWC) has been our major client since FAS 158 became effective in 2008 (now ASC 715). Our discount rates are consistently higher than most vendors providing clients with a lower present value of their pension liabilities thereby enhancing the balance sheet.

GASB accounting rules allow for liabilities to be priced at a single discount rate equal to the assumed ROA. Such divergence in discount rates between FASB and GASB creates much confusion and conflicts but don't disagree as to the fact that liabilities are assumed to be priced as and behave as zero-coupon bonds.

Liabilities are a term structure of projected benefits. This becomes a tough job for actuaries to calculate annually so it takes some time. Usually, actuarial reports come out months after the end of the fiscal year (around six months for Public plans). Asset managers need fresh and continuous data to do their job. For asset/liability management (ALM) monthly or even daily updates are critical. Since duration and interest rates change daily, liabilities are certainly dynamic structures requiring constant attention. Without a Custom Liability Index (CLI) it would be hard, if not

impossible, for a plan sponsor, its asset managers and consultant to understand the risk/reward behavior and interest rate sensitivity of their liabilities.

Solution: Cash Flow Match Benefits

The funded ratio/status and performance measurement of assets vs. liabilities are all based on present value measurements. This has led to a tower of babel on what is the proper discount rate, funded status, index benchmark, duration calculation, etc. The solution lies in cash flow matching projected benefits… ***future value projections***. The goal of a pension is to secure benefits in a cost-effective manner. Benefits are future value numbers. They have little, if any, interest rate sensitivity. A $100 million benefit payment in 2030 is $100 million whether interest rates go up or down. It is a static non-interest rate sensitive calculation. So it follows… that the best way to hedge interest rate risk is to hedge future values by cash flow matching projected benefits with bonds. Bonds have been used historically to match benefits (i.e. defeasance, dedication, immunization) since they may be the only asset class with ***certainty of cash flows or future values***.

Since benefit payments are future values (FV) suggests that the future value of assets vs. the future value of liabilities is the most critical evaluation. But most asset classes are difficult to ascertain their future value. Only bonds (and insurance annuities) have a known future value and have historically been used to cash flow match liabilities (i.e. defeasance, dedication, buy-out annuities). To prove my point as to the potential misinformation with using a PV calculation, let's use a simple example below. Two pensions both at $1.0 billion market value would have the same funded ratio in PV$. But pension B is 100% invested in corporate bonds that out-yield pension A (100% invested in Treasuries) by 150 bps per year. Certainly, plan B has a much greater future value (@ 24% higher) and funded status if we used future values. This suggests that the funded ratio and funded status are not that accurate or even good indicators of the true economic solvency:

Pension	Composition	YTM	PV	FV
A	100% Treasuries	2.00%	$1.0 billion	$1.35 billion
B	100% Corporates	3.50%	$1.0 billion	$1.68 billion

The point of all this is… that we need to focus more on the FV of assets vs. liabilities. If we value liabilities at market rates, they would have discount rates of AA corporates (FASB method) or even better U.S. Treasury STRIPS (defeasance method). A corporate bond portfolio matched to liabilities that is skewed to A/BBB securities would out-yield liabilities and would enhance the funded status on a future value basis thereby reducing funding costs and also mitigate interest rate risk. This is why **"cash flow matching"** of liability future values is the most prudent risk and lowest cost methodology to de-risking a pension through asset liability management (ALM). It secures the benefits in a cost-efficient manner while neutralizing interest rate risk.