CURRENT ISSUES IN
RETIREMENT BENEFITS

Mumbai

06-09-2019

Liability Driven Investment in Pension Funds

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Context

- Consider the following findings of the 2018 Corporate Pension Funding Study conducted by Milliman for the 100 largest corporate DB plans in the US :
  - The funding level (defined as value of Assets/Projected Benefit Obligation) dropped from a high of 130% in 1991 to 81% in 2016 and rose upt 86% in 2017 – the funding levels have been volatile over time
  - The overall funding deficit of 100 largest corporate DB plans in US is estimated to be around USD 252 billion as at the end of 2017.

- According to a review of 1400 DB plans in the US done by Investment Metrics, corporate DB plans have aggressively implemented liability driven investigating approach since the beginning gof 2014 thro'2018.

Improving the Funding Level

There are typically four pathways that pension schemes can choose to improve their funding level:

- Receiving enhanced contributions from the sponsor
- Generating additional returns from investments
- Liability Hedging
- Benefiting from solvency improvements arising from a fall in the value of liabilities through market corrections

How to Address Interest Rate Risk

The biggest pension liability risk is interest rate changes.. DB plan interest rate risk can be mitigated with interest rate risk immunization approaches such as the following which are widely used in life insurance companies:

- Duration matching:
- Duration-Convexity Matching
- Key Rate Duration Matching
- Cash Flow Matching – Emerging Opportunity in the Indian context with the development of bond strip market
- Liability Replicating Portfolio

Hedging Longevity Risks

Pension Liabilities are sensitive to mortality rates and future mortality improvement assumptions .The typical choices for reducing longevity risk are :

- Longevity Swaps which entail pension schemes paying fixed premiums and receiving floating payments linked to the actual mortality experience of the pension scheme. If participants live longer than expected , the floating payments are higher to offset the impact of increased pension benefit payments.
- Plan sponsors can sell longevity bonds to mitigate longevity risk as well. The principal is available to bond issuers if the mortality experience is lower than expected.
- Plan sponsors can also transfer DB plan liabilities to a third party such as an insurance company. By buying annuity products for retirees, plan sponsors arrange to have future longevity risk and economic risk borne by the third party. However, this will require liquid assets and extra cost embedded in the annuity price.

Liability Hedge Ratio

- In many cases plan sponsors will not want to hedge all the liability risk when constructing the investment strategy. The target hedging ratio which is the portion of the risk to be hedged usually depends on the plan sponsor's risk appetite and current funding ratio. A lower hedging ratio implies a higher risk but also higher potential of upside gain.

- Traditionally fixed income securities such as government bonds and and high grade corporate bonds are used to construct the hedging portfolio..

- An alternative way of hedging interest rate risk is to use financial derivatives . Interest Rate Swaps are widely used to increase the hedging ratio without physically investing in the bond market.

LDI Philosophy and Problem Formulation

- The philosophy of LDI is somewhat similar to asset-liability management in the banking and insurance industries.
- The goal of LDI is not to maximize the return on the pension fund investment portfolio perse but to maximize the performance of assets relative to liabilities.
- In other words LDI tries to mitigate the liability risks while maintaining a sufficient and sustainable expected long term return. Thereby it takes into account both liability hedging and pension asset growth

LDI Philosophy and Problem Formulation

- Given that LDI is a process of finding the optimal risk return tradeoff for DB pension plans the problem formulation can take one of the following forms “
  - Maximize the funding ratio given a specified risk tolerance
  - Minimize the surplus return volatility given a desired return

- The working party of the Society of Actuaries have developed a Liability Driven Investment Benchmark Model which provides a detailed framework for evaluating alternative LDI strategies and choose the most appropriate liability -driven asset allocation plan considering the return, risk and the sponsor’s risk appetite.

Implementing LDI :Key Considerations

- The balance between the strength of the trustees & sponsor's view on the prevailing levels of interest rates and inflation and their risk appetite will typically determine the timing/extent of the hedge.

- Choice of Hedging Instruments

- Pooled Funds Vs Segregated Mandates

Frequently Asked Questions

What is the real value of the LDI approach ?

The real value of the LDI approach lies in asking the right questions and putting in place a more structured framework for integrating asset management and liability management in the context of pension schemes

The key issues to be thought through in this process are :

- Have the trustees and the sponsor articulated their risk appetite and risk tolerance?
- What should be the liability hedging ratio ?
- How to construct the liability hedging portfolio ?
- What should be the investment strategy for the return generating component of the asset portfolio ?

Frequently Asked Questions

What are the challenges in implementing a LDI Approach for Pension Plans in the Indian Context?

- ✓ Mandated investment patterns reduces control of investment decisions relating to liability hedging. Mandatory requirement to invest in corporate bonds can accentuate the asset liability duration mismatch and possibly introduce an unintended and unrewarded credit risk in the investment strategy.
- ✓ Most LDI approaches use derivatives vanilla interest rate swaps. While globally the swap market is a vibrant one , the market for swaps is in the Indian context restricted
- ✓ While life insurance companies do a more systematic and through analysis of their asset liability management practices,it is not clear whether the large DB pension plan sponsors and trustees (e.g.: public sector banks) have undertaken an ALM approach (LDI Approach) to pension plan investment strategy – despite the requirement under Ind AS19 to describe asset liability matching strategies.
- ✓ DB pension plans with substantial exposure to insurer managed assets are likely to have a low level of control with respect to liability hedging decisions

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Frequently Asked Questions

1. Should an Enterprise Risk Management (ERM) approach be considered while designing a LDI strategy for the PSU Banks' pension plans?
   - ✓ It is important to consider any natural hedges that may be available from a sponsor's core business activities which can partly offset some of the liability risks embedded in their pension plans
   - ✓ For example, a low interest rate environment can lead to a higher surplus from the banking and investment books of a commercial bank which can offset the impact of a higher deficit arising from the bank's exposure to its pension plan. Therefore what needs to be hedged through the LDI strategy is the net exposure to interest rate risk.

DURATION - INTEREST RATE MATRIX

In the following table D(A) represents Duration of Assets and D(L) represents Duration of Liabilities. V(A) represents Value of Assets and V(L) represents Value of Liabilities.

A typical situation will be one where Duration of Assets is less than the Duration of Liabilities and is therefore exposed to downside Interest rate risk when interest rates are expected to decline.

Relative Durations	i ↑	i ↓
D(A)>D(L)	% ↓ in V(A) >% ↓ in V(L)	% ↑ in V(A) > % ↑ in V(L)
D(A) < D(L)	% ↓ in V(A) < % ↓ in V(L)	% ↑ in V(A) < % ↑ in V(L)

Formulating Risk Appetite Statements

The trustees aim to maximize investment returns subject to the funding level of the pension scheme calculated on a specified basis not falling below X% over a Y year period in Z% of the scenarios considered.

The trustees aim to maximize investment returns subject to ensuring that the contributions the employer is expected to pay calculated on a specified basis does not exceed Rs.X million per annum over the next Y years in Z% of the scenarios considered.

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Thank You

Appendix 3A – More on Hedging Interest Rate Risk

Duration and convexity matching: Duration matching is valid only for small parallel changes. To incorporate the second order impact of yield curve changes on asset or liability value, we can calculate and match convexity as well.

Key rate duration matching: Even with duration and convexity matching, nonparallel yield curve change can cause different changes between assets and liabilities. Key rate duration measures the sensitivity to the interest rate at a specified maturity. A series of key rate durations can capture the key terms on the yield curve. The target asset key rate durations can be calculated the same way as target duration except replacing duration with a series of key rate durations.

Appendix 3B: More on Hedging Interest Rate Risk

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For pension liability, a shift of the yield curve changes not only the discount rates, but also the expected benefit payments in the future through wage inflation and inflation adjustment to pension benefits. Theoretically, an interest rate cut would increase aggregate demand in the economic system and usually increase nominal wage rate and inflation rate. For pension assets, embedded options in callable bonds and puttable bonds may be exercised with the yield changes and need to be considered in duration calculation as well.

Appendix 3C – More on Hedging Interest Rate Risk

Cash flow matching: Duration, convexity and key rate duration matching try to match the value changes. When a benefit payment is due, some assets may have to be sold to meet the liquidity requirement. A more conservative approach is to match the target liability cash flow and asset cash flows. Both the interest rate risk are addressed in this approach. However, given the long time horizon of pension benefits, uncertainty about mortality experience, and the relatively high cost of cash flow matching, usually only short term cash flow matching is used together with interest rate sensitivity matching strategies to mitigate interest rate risk.

Appendix 3D – More on Hedging Interest Rate Risk

Liability replicating portfolio: Except for cash flow matching, which is immune to material interest rate changes, the previous matching approaches work only for small changes. However, fixed income securities may not always be available for matching long dated pension benefits. A liability replicating portfolio intends to capture both small and big changes in interest rate level and yield curve shape. The replicating portfolio is composed of asset instruments selected so the portfolio mimics the value and sensitivity to the interest rate curve as much as possible.