

Risk Management in Occupational Pensions Schemes

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Abstract

This paper discusses the 'Risk Management in Occupational Pension's Schemes' and the lessons learnt for Indian Pensions scenario. Section I describes the impact of changing accounting standards on the expected costs of providing the employee benefits and the need for an alternative investment strategy. Section II explores the Liability driven investments concept and maps the asset class with risk categories. Section III proposes a model portfolio to address identified risks. Section IV discusses the challenges for the New Pension Scheme in India. The paper concludes with the implications on pension's scheme fund management.

Keywords

Risk Management, Employee Benefits, Liability Driven Investments, New Pension Scheme, Occupational Pensions Schemes, FRS 17

Section I: Impact of changing Accounting Standards

The pension funds management has changed significantly over the last few years and the growing orientation of international accounting rules on the market values for assets and liabilities and regulatory changes towards the introduction of risk-based solvency capital requirements are underscoring a growing demand for new solutions to overcome the shortcomings of past asset-driven investment strategies.

Most companies are using FRS 17 for pensions accounting and organisations that have adopted International Financial Reporting Standards (IFRS), will be using IAS 19 to account for their employee benefit arrangements. The older standard, SSAP 24 was simply the actuary's recommendation for a pension scheme funding rate that became a P&L expense. Any additional special pension contributions were capitalized and expensed over the remaining average life of the pension scheme to retirement. There was no other P&L or balance sheet impact. The scheme did not feature on the employer company balance sheet. Under IAS 19 the net pension asset / liability is recognized on the employer company balance sheet reflecting the true responsibility of the employer under the pension scheme and P&L charge is arrived at through the combination of various figures.

In a paper discussed in OECD National Accounts experts meeting called "Recent Developments in Occupational Pension Plan Accounting", Juan Yermo, Director for Financial, Fiscal and Enterprise Affairs, OECD, has commented on the Valuing employers' liabilities and assets in defined benefit plans: IAS 19 proposed framework.

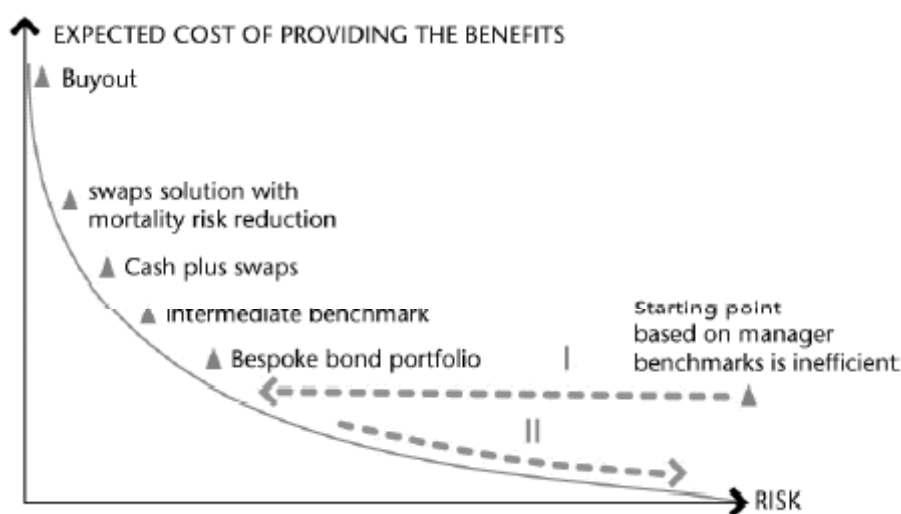
The rule's most noteworthy aspects are the following:

- In general, unfunded pension benefits in defined benefit plans should be recorded as a pension liability in the employer's balance sheet.
- The projected unit credit method should be used for valuing pension liabilities. This method involves the projection of salaries to the estimated time of realisation of the insured event (retirement, disability, death, departure from company, etc)
- The discount rate to value liabilities should be based on high quality corporate bond yields at the balance sheet date.

- Indexation and other benefit increases should be taken into account to the extent that they are part of the formal or constructive terms of the plan.
- Pension plan assets should be valued at fair value. Discount cash flows should not be used if market values exist.
- Actuarial gains and losses (including investment) within a range of 10% of plan assets or obligations may not be reflected at all on the balance sheet. Actuarial gains and losses above/below this level can be amortised over the working life of employees.
- A pension plan surplus may be deemed as an asset of the sponsoring employer if the surplus might be refunded to the company or used to reduce future contributions

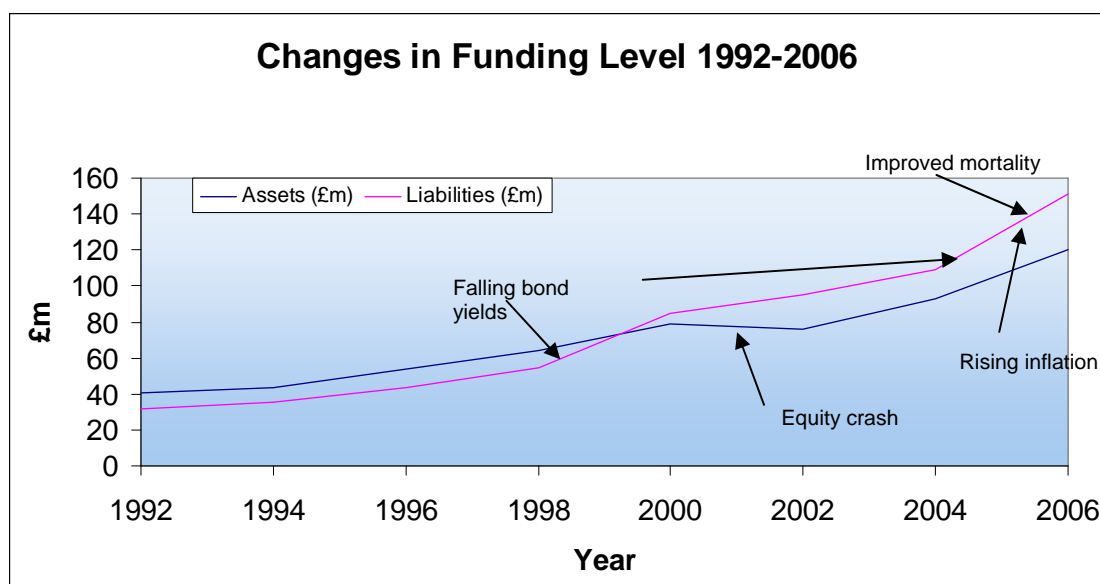
Also, in the recent past, pension schemes were in deficit in the UK and the cost of providing the benefits was surmounting from the employer's point of view. In many cases, additional contributions from sponsoring employers were unlikely to close the gap without significant help from investment returns. The asset liability modeling techniques can be used to assess the amount of risk that can be taken against the liabilities. But surprisingly a large part of the risk relates to the different sensitivity of the assets and liabilities to changes in interest rates, inflation and mortality. The biggest challenge is to design a performance benchmark for the fund managers that will behave in the same way as the liabilities when interest rates and inflation expectations change helps remove unrewarded risk and reduce the expected cost of the scheme.

The following graph illustrates the risk-reward process in an occupational pension scheme. The curved line indicates the best portfolio at each level of risk: portfolios above this line target the same level of risk at lower return; portfolios below the line do not exist. The arrow illustrates how the expected return is maintained while the level of risk is reduced.



Graph 1: Expected Cost of providing benefits, Aon Investment Consulting Practices

In a presentation at the IOA, UK, "In a Practical Approach to LDI", June 2007, Aon Consulting UK LDI Proposition leader: Andrew McKinnell articulates the need for Liability driven investments (LDI), through falling bond yields, equity crash, improved mortality and rising inflation against changing funding level in the following graph.



Graph 2: Changes in funding level, Aon Consulting UK

He argues: "The bond portfolios are typically shorter duration than liabilities, but longer bonds yield less. So, extending duration using swap will help in matching Assets to liabilities". He further argues: "an agreement to receive fixed amounts at given time in exchange for floating interest payments by using swaps would enable longer durations to be better matched and provide yield pick-up over gilts"

So, the LDI covers any strategy that seeks to manage investment risks relative to a scheme's liabilities.

Section II: Liability Driven Investments (LDI)

The Liability driven investments (LDI) is a form of investing which aims at generating sufficient assets to meet all liabilities, both current and future. A liability driven approach to investment requires pivoting from an asset only to an asset-liability focus. From a liability driven perspective, what matters most is the asset's investment performance relative to changes in liability values. A sudden interest in the LDI is primarily due to the new accounting regulations that require assets and liabilities of a pension scheme to be based on their market value and the new regulatory changes towards risk based solvency capital requirements. The advanced asset-liability modelling techniques are used to convert the risk concerns into mandates for investment managers.

Essentially, LDI can be broken down into the following stages:

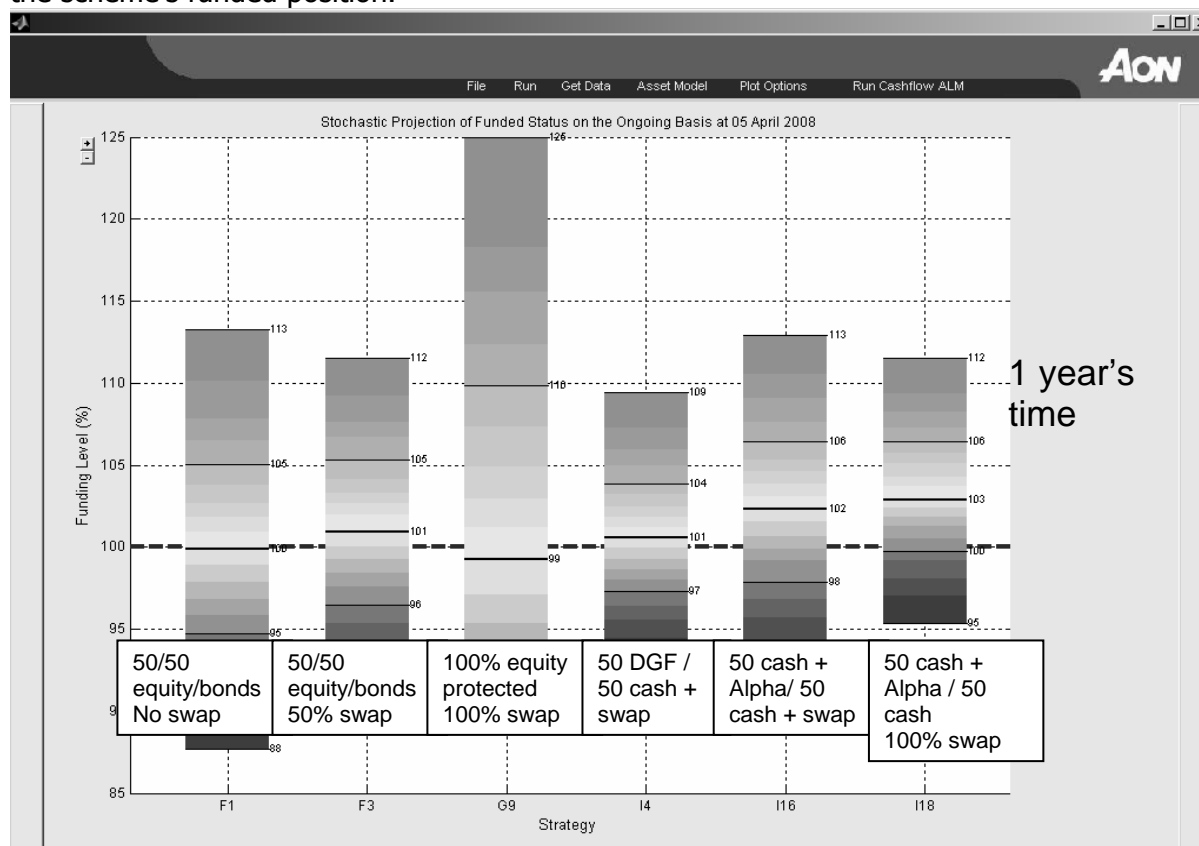
1. Understanding the liabilities and creating a suitable benchmark
2. Setting the risk tolerance against this benchmark
3. Creating a portfolio of return-seeking assets using swaps and other financial instruments to remove any unwanted risks

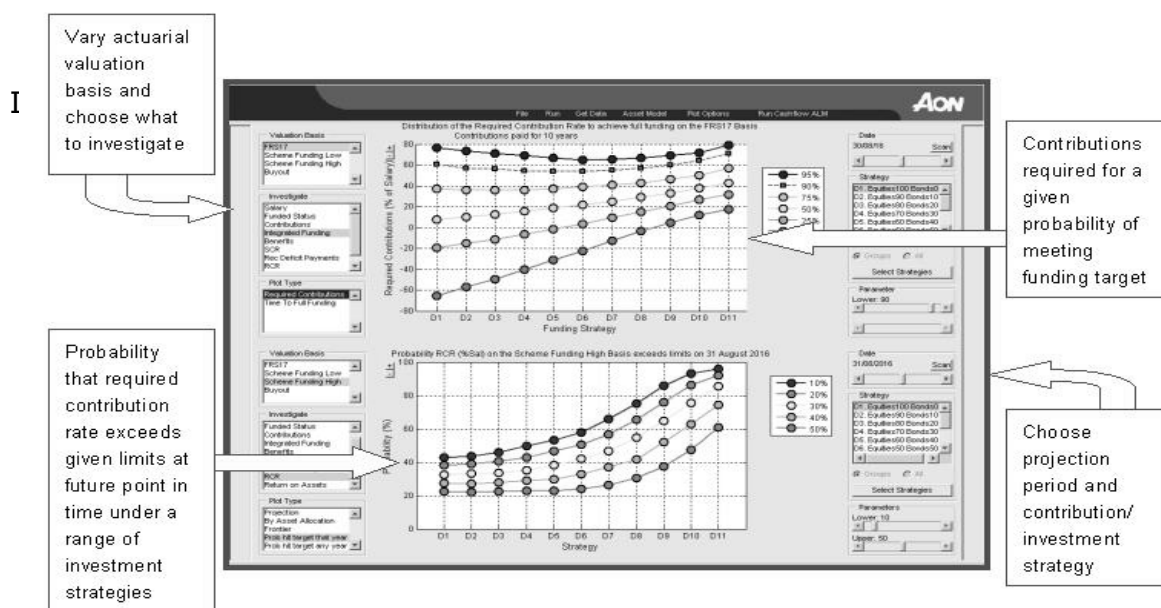
The following investment class could be used to hedge the identified risk category:

	Interest Rate Risk	Yield Curve Risk	Country Risk	Currency Risk	Credit Risk	Sovereign Risk
Domestic Government Bonds	√	√				
Domestic Corporate Bonds	√	√			√	
Mortgage Backed Securities	√	√				
Overseas Government Bonds	√	√	√	√		
Overseas Corporate Bonds	√	√	√	√	√	
High Yield			√	√	√	
Emerging Market Debt	√					√

Table 2: Asset Class-Risk Category, Aon Investment Consulting Practices

As pension liabilities exhibit bond-like characteristics and are well defined, future cash flow obligations of the plan sponsor extend over a very long period of time, typically over 40 years. Thus, the metrics that are applicable to the measurement of a bond portfolio can also be applied to determine the structure and profile of liability of a defined benefit pension scheme. Comparing the structure & profile of the liability of a defined benefit pension scheme with the structure and profile of the pension fund (i.e. asset of a defined benefit pension scheme) exposes the sources of risk of the scheme's funded position.





Graph 3: PRiSM screen outputs, Aon Consulting

The above graphs are outputs from Aon Consulting’s market-leading pension risk modelling software, PRiSM, which has deterministic and stochastic outputs. It can compare the behaviour of alternative contribution, vary actuarial valuation basis, projection periods and investment strategies.

Section III: Risks and model portfolio

We will now discuss some sources of risk that a pension scheme is exposed to and work out a portfolio to implement the LDI approach:

A. Interest rate risk: The risk that an investment's value will change due to a change in the absolute level of interest rates. Pension liabilities are long term in nature. The new regulations require pension funds to bring their interest-rate risk more in line with the interest-rate risk of their liabilities.

Consider a hypothetical pension portfolio consisting only of bonds:

	DB Pension scheme liability	XYZ Bond index
Duration	15.0 yrs	5.85 yrs

Duration is a measure of interest rate sensitivity and is the weighted average maturity of a bond's cash flows or of any series of linked cash flows. It measures the average remaining life of a stream of cash flows. The sensitivity to changes in interest rates can be minimized by matching the duration of pension fund liabilities with that of the pension fund’s assets.

Now the problem with pension plans is that they cannot execute a true interest rate immunization strategy. The reason for this is that creating a fixed income portfolio with 15-20 year duration is not easy. The bond portfolios for most DB pension schemes are accustomed to have duration of around 5 –10 years. This mismatch of duration will expose the pension scheme to interest rate risk.

Consider a hypothetical ABC DB pension scheme where liabilities are combination of fixed and floating but assets are invested only in a fixed income portfolio.

Assets (DB Pension Scheme)	Value (Rs.)	Duration
Cash	400,000	0
Bonds @ 4.5%	200,000,000	4.4
Bonds @ 5.75%	160,000,000	8

The total value of the assets = Rs. 400,000 + Rs. 200,000,000 + Rs. 160,000,000
= Rs. 360,400,000

The duration of the total assets will be the weighted average of the individual asset components.

Duration of total assets = $(400,000/360,400,000) * 0 + (200,000,000/360,400,000) * 4.4 + (160,000,000/360,400,000) * 8 = 6$ (approx)

This means that the total value of the assets will go DOWN by 6% if interest rates go up by 1%.

Liabilities (DB Pension scheme)	Value (Rs.)	Duration
Fixed	150,000,000	15
Floating (Consumer Price Index)	250,000,000	12

Duration of the total liabilities is again the weighted average of individual liability components.

Duration of total liabilities = $(150,000,000/400,000,000) * 15 + (250,000,000/400,000,000) * 12 = 13.1$ (approx)

This means that the total value of the liabilities will go DOWN by 13.1 % if interest rates go UP by 1%.

Hence in the above example, the pension fund may not be exposed to a loss in case interest rates go up, because if that happens, value of liabilities may decrease more than the value of assets. But, it will be exposed to a loss in case interest rates go down.

The above problem can be solved by using the liability driven investment approach to create an asset portfolio which will not only match the duration but also the nature of liabilities. In the below mentioned example, assets are invested as per the nature and duration of liabilities.

Consider the assets:

The total value is Rs. 360,400,000.

Cash: Rs. 400,000

Bonds @ 4.5%: Rs. 150,000,000

Bonds @ 5.75%: Rs. 250,000,000

Lets say that a zero coupon bond is available in the market with duration of 14.25.

If pension scheme swaps the Bond @ 4.5% with zero coupon bond, the duration is increased from 4.4 to 14.00.

Similarly, if bonds @ 5.75% are replaced by bonds @ CPI using interest rate SWAP, the duration increases from 8 to 12.50

Assets (DB Pension scheme)	Value	Duration
Cash	400,000	0
Zero Coupon Bonds @ (Fixed)	155,000,000	14.00
Bonds @ CPI	205,000,000	12.50

Duration of total assets = $(400,000/360,400,000) * 0 + (155,000,000/360,400,000) * 14.00 + (205,000,000/360,400,000) * 12.50 = 13.13$ (approx)

The net effect on the portfolio is the duration of the assets portfolio is now equal to the weighted average duration of the liabilities portfolio, thus immunizing the pension scheme from changes in the interest rates.

B. Inflation Linked Bond: is an instrument where the producer or consumer price index used as the basis for a swap or other index rate payment. Investors concerned about the impact of inflation are more interested than ever in inflation-linked bonds (ILBs) as an investment that may preserve their future purchasing power.

Future wage obligations are linked directly or indirectly to inflation. Inflationary expectations are embedded in benefit projections as they drive assumed wage and salary increases over time.

The investors saving for their retirement are interested in sacrificing current spending for future consumption, only if the real worth of their money is guaranteed. The uncertainty of future inflation and its effect in the reduction of acquiring power has led to increased used of securities with a payout linked to an inflation index.

All ILBs are tied to inflation although the precise provisions vary. In general, the interest payments and principal on an inflation-linked bond rise along with any widespread increases in consumer prices so that the bond's cash flows increase with a corresponding rise in inflation.

For example: Consider a hypothetical pension scheme with liabilities linked with the consumer price index. Say, the pension fund buys a bond which pays coupon according to the inflation index that is consumer price index.

Price of the bond (Floating, CPI): Rs.1,000,000
 Term: 10-year
 Coupon rate : 2.0% annual real coupon purchased in 2005
 Inflation (say) :3% annual inflation
 Interest paid: 2.0% of R1,000,000 or Rs. 20,000

The principal on the bond adjusts upward on a daily basis to match the inflation rate, reaching Rs 1,343,916 (approx) at the end of 10 years.

Although the coupon rate on the bond remains fixed at 2.0%, the actual interest payments rise as the value of the principal increases and in 2015

The annualized interest payment would be 2.0% of the inflation-adjusted principal, or 2.0% of Rs1,343,916 which is Rs 26,878 (approx)

The note would then be redeemed at maturity for Rs.1,343,916

Thus, the pension scheme has matched its liabilities with by purchasing a bond linked to an inflation index, in this case the consumer price index.

Investment strategies can be designed to hedge against the risk of deflation also. This can be done by using inflation options. For example, put options on a zero coupon swap pays the difference with respect to a strike in case inflation turns out to be lower than this pre-specified strike. If a DB pension scheme combines this put option with receiving inflation on a zero coupon inflation swap, it will receive the maximum of inflation and the strike, thereby flooring the inflation payout at the strike.

C. Longevity Risk: Longevity risk is the potential for plan members living longer than expected. This means:

- A longer period over which pensions must be paid
- A higher valuation of pension liabilities and a larger deficit

The Pensions schemes can hedge interest rate and inflation risk, simultaneously. However, by ignoring longevity risk, the effectiveness of this strategy greatly decreases. The following approaches can be used to manage longevity risk:

- Retain longevity exposure: Exposes the scheme to a potentially large, unavoided risk.
- Pension buyout: Eliminates the risk entirely, but also eliminates the ongoing scheme.
- Longevity hedging: Transfer longevity risk out of the scheme, but maintain the scheme at the same time. This can be done by the use of financial instruments like longevity Swaps. It involves an exchange of payment streams between the scheme and the counter-party.

Working: The counter-party will agree to make payments for the scheme's pensioners until death (known as the floating leg). In return, the scheme will pay the counter-party an agreed stream of payments (known as the fixed leg). The fixed leg will be an estimate of the future pension payments by the counter-party based on an assumed future level of improvement in longevity. The scheme has therefore transformed its liability from paying pensions to its pensioners for an unknown period to counter-party for a fixed period. The fixed leg will usually be an estimate of the future pension payments by the counter-party, based on an assumed future level of improvement in longevity. The scheme has therefore its liability from paying payments to pensioners for an unknown period to paying known payments to counter-party for a fixed period.

Longevity Swaps can also be designed which will be based on longevity index. This index will rise in line with the improvements in mortality allowing the scheme to hedge risks in connection with general longevity improvements.

The market for longevity derivatives is still at its nascent stage. The EIP/BNP introduced mortality index / longevity bonds that were designed to hedge the mortality / longevity risk faced by pension funds.

EIP (European Investment bank) / BNP Longevity Bond:

- Was announced in November, 2004.in UK and issued by the EIB
- Issue: £540 million, 25 year
- Mortality Index: 65 year-old males from England & Wales (ONS)
- Payments were linked to a survivor index $S(t)$ where $S(t)$ is the proportion of cohort 65 at time 0 surviving to time t .
- Bond pays floating coupons: £50m * $S(t)$ at time t .

Issues with EIP / BNP Bond

- It required upfront payment by hedgers and cost to hedge was 20 basis points
- Credit risk: EIB (AAA) rating, BNP (AA) rating, Partner Re (AA) rating
- Cross currency swap involved (euro / Sterling)
- 25 year maturity may be too short.

As a result, the bond was withdrawn from the market.

Section IV: New Pension Scheme (NPS), India

The last 5 years have witnessed sweeping changes in the Pensions environment in India, which are throwing-in new challenges and opportunities. The NPS would be available for the central government employees appointed on or after 1st January 2004 on a mandatory basis and to those in the unorganized sector on voluntary basis. All participants will have individual pension account which would be portable.

Also, the non-government employees are governed by the Employees' Provident Funds and Miscellaneous Provisions Act of 1952, operated by the Employees Provident Fund Organisation (EPFO). As the EPFO is a government body constituted under the EPF Act and managed by a board of trustees appointed by the central government with representatives from the central and state governments, employer associations and employee unions, the pension funds are essentially managed by government bodies.

The Pension Fund Regulatory and Development Authority (PFRDA) Chairman D Swarup has informed in a press conference on 27 Nov, 2007 that the three government firms (State Bank of India-SBI, Life Insurance Corp-LIC and UTI Asset Management Co-TI AMC) will start managing the government's new pension fund of more than Rs 20 billion (\$503 million) from the end of June, 2008. The corpus will be mandated to invest in two types of schemes: The first option will invest the full amount in bonds, while the other allows investment up to 5 per cent in equities, 10 per cent in equity oriented mutual fund schemes and the remainder in bonds. Currently, only state-run firms to manage the new pension fund for government employees. Legislation is pending in parliament for approval that will allow foreign firms to own a maximum 26 per cent in the pension fund management company.

The Risk Management in the NPS world should be scrutinized under following points:

- Under the proposed system, as the individual employee can select the fund manager, the risk of insufficient education can affect the retirement income.
- There are no explicit/implicit guarantees or underpin as the investment risk is entirely borne by the employee
- The existing infrastructure of the banks, depositories will be used or collection, accounting record keeping etc. How efficient and cost-effective is the existing network?

- Is the benefit structure is optimal? Should it be means-tested?
- The current notification specifies that 3 types of schemes of various risk-return combinations shall be offered through investments in differing combinations of government securities, corporate bonds and equity shares. What is the level of due diligence in the investment strategies.
- How to ascertain the performance benchmark for the fund managers and what is the fund management fee structure

Conclusion:

The new accounting disclosures and regulations have a profound impact on the way assets and liabilities are calculated and reported in the books of the accounts. The move towards market based valuation actuarial assumptions and adherence to guidance notes have changed the way the portfolios are managed. The pension fund management should focus on the sensitivity of the liabilities and measure asset allocation strategies as a function of marginal risk / return to the surplus to manage the volatility of the surplus in complying with the new regulatory standards going forward.

The model portfolio discussed in the section III can be adapted to meet the Indian pensions scenario with customisation and the basic principles of understanding of the liabilities, creating a suitable benchmark, setting the risk tolerance against this benchmark and then creating a portfolio of return-seeking assets can be largely same.

The Indian Pensions reforms process has started. The easing of investment guidelines for pension funds and insurance companies could bring in new approach to risk/return based investment strategies. The changes in the assets under management for institutional investors invariably have far reaching implication on the financial markets e.g., in certain Latin America countries, the pension's reform saw a massive growth in the bond market.

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