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Determining Discount Rates For Employee Benefit Valuations: Conceptual Considerations and Practical Issues

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Agenda

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  - Determining Risk Adjusted Corporate Bond Yields
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Motivations

- This paper has been motivated by three recent developments :
    - Cross Practice Research Project on Discount Rates Commissioned by the Institute of Actuaries, UK
    - Exposure Draft on "Measurement of Liabilities for Insurance Contracts- Current Estimates and Risk Margins" issued by the International Actuarial Association [IAA]
    - Exposure Draft issued by the International Accounting Standards Board (IASB) advocating an uniform basis for setting discount rates in the context of Employee Benefits Valuations

Requirements Under Accounting Standards

- Accounting Standards
  - AS15R
  - IAS19
  - FAS87

- AS15R AND IAS19 Requirements
  - AS15R: Market Yields at the Balance Sheet Date on Government Bonds
  - IAS19: Market Yields at the Balance Sheet Date on high quality corporate bonds with an alternative to use Market Yields on Governments Bonds
  - IAS19: Impact of Proposed Amendment
  - AS15R & IAS19:
    - Advocates the Use of Weighted Average Discount Rate
    - Suggests extrapolation of Yield Curve for discounting expected payouts after the last available rate

Requirements Under Accounting Standards

- FAS 87 Requirements
  - Rates Implicit in the Current Prices of Annuity Contracts (or)
  - Rates of Return on High Quality Zero Coupon Bonds whose maturity dates and amounts would be the same as the timing and amount of expected benefit payments
  - If coupon bearing bonds are used to determine discount rates, then these discount rates must incorporate expected reinvestment rates.

Conceptual Aspects

- Differing Bases

  Q1: Should the discount rate be delinked from the investment performance of underlying assets ?

  – Views of the Accounting Standards Boards

  – IAA Working Group: Concept of Replicating Portfolio with a Margin for Residual Mismatch

  Q2: What should be the appropriate anchor for the discount rate?

  – Views of the Accounting Standards Boards

Conceptual Aspects

- Zero Coupon Bond Yield Vs YTM
  - Zero Coupon Yield (Spot Rate) provides an unique mapping from maturity to interest rate space
  - YTM does not provide an unique mapping from maturity to interest rate space because it is influenced by the coupon rate
    - ✓ Separate yield curves for Low, Medium and High Coupon Bonds
  - Views of the Accounting Standards Boards
  - Case Study: Using the YTM as opposed to using the entire spot curve under- states PVO.

Conceptual Aspects

- Using the Complete Spot Curve Vs Single Average Discount Rate
  - Single Average Discount Rate must reflect the estimated timing and amount of benefit payments
  - Merits of Using a Single Average Discount Rate
    - Minimizes computational burden
    - Provides an useful benchmark for comparison purposes
  - Views of Accounting Standards Boards
  - Caveats Associated with a Single Discount Rate
    - Limited Influence on Liability Cash Flows
    - Relatively Flat Yield Curve
    - Regular Review: IAA Working Group
  - Case Study: Use of Single Discount Rate vis-à-vis using the complete spot curve marginally understates PVO.

Conceptual Considerations

- Extrapolating the Yield Curve
  - Need for Extrapolation
  - Views of the Accounting Standards Boards
  - Approaches for Extrapolation
    – Use the most similar available yield curve
    – Assume a flat yield curve beyond the last available rate
    – Extrapolate the Yield Curve assuming a constant forward rate (constant slope) - Illustrated in the paper
    – Use a term structure model to extrapolate the yield curve

Issues in the Indian Context

- Estimating Zero Coupon Bond Yields
  - Need for Estimation

  - NSE Approach : Nelson and Siegel (1987) Functional Form

$$r(m) = \beta_0 + (\beta_1 + \beta_2) * \left[\frac{\left(1 - \exp\left(-\frac{m}{\tau}\right)\right)}{\left(\frac{m}{\tau}\right)} \right] - \beta_2 * \exp\left(-\frac{m}{\tau}\right)$$

Where β_0, β_1, β_2 and τ are parameters to be estimated
r is the Zero rate
m is maturity
The parameters are related to the long term and short term interest rates, slope of the Yield curve and the extent of the hump in the curve
The function yields a smooth continuous curve with the hump along the entire tenor spectrum
  - ✓CCIL (Clearing Corporation of India)introduced a Zero Coupon Sovereign Rupee Yield Curve in 2002 based on the Nelson and Siegel Functional Form
  - ✓CCIL has also developed the ZCYC (Zero Coupon Yield Curve) based on the N-S-S (Nelson-Siegel-Svensson) Model which captures the "Spread Dynamics" better than the N-S (Nelson-Siegel) Model

Appendix

- Nelson Siegel Svensson Model

$$r = \beta_0 + (\beta_1 + \beta_2) * \left[\frac{\left(1 - \exp\left(-\frac{m}{\tau_1}\right)\right)}{\left(\frac{m}{\tau}\right)} \right] - \beta_2 * \exp\left(-\frac{m}{\tau_1}\right)$$

$$- \beta_2 * \exp\left(-\frac{m}{\tau_1}\right)$$

$$+ \beta_3 * \frac{\left(1 - \exp\left(-\frac{m}{\tau_2}\right)\right)}{\left(\frac{m}{\tau_2}\right)}$$

$$- \beta_3 * \exp\left(-\frac{m}{\tau_2}\right)$$

Where β_3 and $\tau 2$

are the additional parameters to incorporate an additional slope change and a hump

Issues in the Indian Context

- Extrapolating the Yield Curve
  - ZCYC (NSE) is available only for terms upto 20 years
  - Hence there is a need to extrapolate ZCYC beyond 20 years
  - We can consider extrapolating the yield curve assuming a constant slope (illustrated in the paper)

Issues in the Indian Context

- Determining Risk Adjusted Corporate Bond Yields

  - Need: Proposed IASB Amendment to IAS19

  - Defining "High Quality" Corporate Bonds

  - Are the corporate bond spreads adequate to compensate for the expected default loss plus uncertainty associated actual defaults being different from expected?
    - Need for Comprehensive Empirical Studies

  - Annualized Zero Coupon Corporate Bond Spreads 31 December, 2009 (Basis Points)

Issues in the Indian Context

Annualized Zero Coupon Corporate Bond Spreads at Selected Durations as on 31 December, 2009 (basis points)

Year	1	5	10	15
AAA	175	100	120	80
AA+	180	141	164	160
AA	210	201	201	183
AA -	215	205	247	251
A+	240	231	275	281
BBB -	440	435	481	482

Decomposition of Yield Spread: A rated bonds and US Treasuries

D   7%

                                     36%

C

                                     39%

B

A   18%
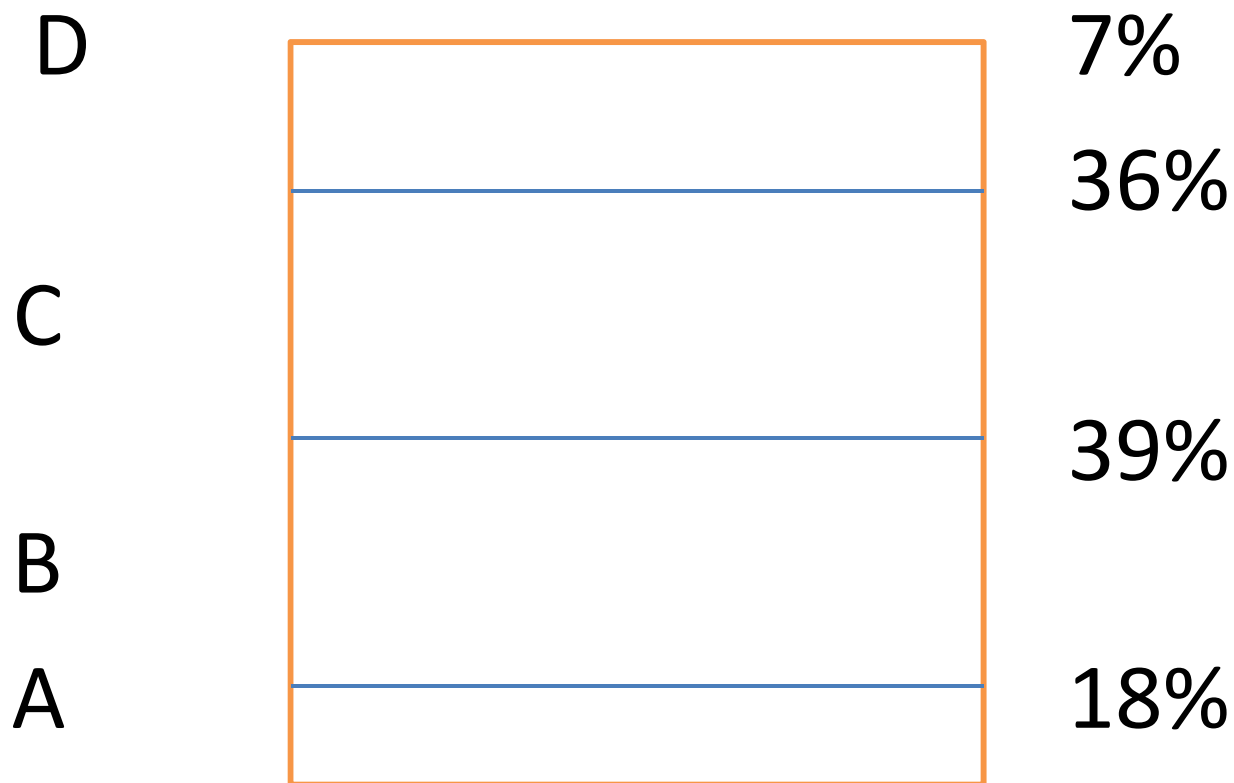
A – Expected Default Loss

B – Credit Risk Premium

C – Taxes

D- Unexplained

Source: Measurement of Liabilities for Insurance Contract :Current Estimate and Risk Margins prepared by Ad hoc Risk Margin

Working Group (IAA)- March 2008

Next Steps

- **Need for Guidance Note**
  - Principles Based Approach
  - Spot Rate Vs YTM
  - Source(s) for Spot Rates: Available Benchmarks
  - Using the Entire Spot Curve Vs Single Average Discount Rate
  - Extrapolating the Yield Curve Beyond the last Available Market Rate
- **Fostering Research and Debate**
  - Evaluating Adequacy of Alternative Approaches for Estimating ZCYC
    - Jointly with NSE, CCIL and FIMMDA(?)
  - Assessing Adequacy of Yield Spreads on Corporate Bonds
    - Jointly with FIMMDA(?)
- **Building a Communication Bridge with Related Professions**

Thank You