16th February 2022

To All Members

Dear All,

Subject: - Modification in GN 29 Guidance Note on Valuation of Interest Rate Guarantees on Exempt Provident Funds as per Principles and Procedures for issuance of Guidance Notes (GNs) / Actuarial Practice Standards (APSs) (Version 4.00 / 24 08 2012)

The Council has approved the modifications in Guidance Note 29 on Valuation of Interest Rate Guarantees on Exempt Provident Funds after following the due process as per Principles and Procedures for issuance of Guidance Notes /Actuarial Practice Standards (APSs) (Version 4 / 24 08 2012)

The said GN 29 is a Guidance Note i.e., recommendatory and will be effective for valuations performed on or after 31st March 2022.

Yours Sincerely,

Subhendu Bal
President

Institute of Actuaries of India

GN 29 - Guidance Note on
Valuation of Interest Rate Guarantees on Exempt Provident Funds

A. Classification: **Recommended Practice.**

B. Legislation or Authority:

1. Indian Accounting standard 19 Issued by the Institute of Chartered Accountants of India – referred to herein as IND AS (19) and other relevant Accounting Standards issued in India or Internationally under Generally Accepted Accounting practices (e.g. IFRS, USGAAP)

2. APS 27 issued by the Institute of Actuaries of India.

3. Professional Conduct Standards (PCS) Ver. 3.0 / 01.12.2009) issued by Institute   of Actuaries of India.

4. Employees Provident Funds and Miscellaneous Provisions Act, 1952.

5. Income Tax Act, 1961 and Income Tax Rules, 1962

C. Other Professional Guidance:

Guidance Note 22(GN22): "Reserving for Guarantees in Life Assurance Business" issued by the Institute of Actuaries of India.

D. Author:

Council of the Institute

E. Application:

This Guidance Note applies to any actuary advising on actuarial valuation relating to Interest Rate Guarantee on Exempt Provident Funds prepared

1. As a requirement under accounting standards and / or at the request of a client who may be an employer or a trustee of the Provident Fund.
2. By others who might be relied upon by a client/employer/insurer as a professional actuary giving professional advice.

F. Compliance

Members are reminded that they must always comply with the PCS and this GN imposes additional requirements under specific circumstances.

Status:

Exposure draft issued under due process in accordance with the "Principles and Procedures for issuance of Guidance Notes (GNs)".

Version	Effective From
2.0	31/03/2022

G. Overview:

➢ This Guidance Note ["GN" hereafter] provides guidance to actuaries for
   - (i)   Performing Actuarial Valuation of Interest Rate Guarantee under Exempt Provident Fund ; and
   - (ii)   Preparing Actuarial reports related to measurement, recognition and disclosure of interest rate guarantee embedded as per the requirements of relevant accounting standards (e.g. AS15R and Ind AS19)

➢ This guidance note is divided into the following sections:

   - **Legislative Background**
   - **Accounting Standard Requirements**
   - **General Principles**
   - **Actuarial Principles related to Valuation of EPF Plans**
   - **Valuation Methodologies**
   - **Disclosure Requirements**

➢ Where applicable the actuary is required to refer to 'APS27: Employee Benefits" in addition to this Guidance Note.

H.   Legislative Background

➢ Provident Fund (PF) is a statutory retirement benefit as per "The Employees Provident Fund and Miscellaneous Provisions Act 1952" (EPF & MP Act).

➢ Section 17 of the Employees' Provident Fund and Miscellaneous Provisions Act (EPFMP) Act, 1952 empowers the Government to exempt

any establishment from the provisions of the Employees Provident Fund Scheme 1952 provided the rules of the provident fund set up by the establishment are not less favourable than those specified in section 6 of the EPFMP Act and the employees are also in enjoyment of other provident fund benefits which on the whole are not less favourable to the employees than the benefits provided under the Act. Such exemptions are for a period of 3 years and it can be revoked if the conditions applicable to such an exemption are not complied with.

➤ The rules of the provident funds set up by such establishments (referred to as exempt provident funds) generally provide for the deficiency, if any, in the rate of interest on the contributions based on its return on investment as compared to the rate declared for the Employees' Provident Fund by the Government under paragraph 60 of the Employees'

Provident Fund Scheme, 1952 to be met by the employer. Therefore, such exempt provident funds carry an Embedded Interest Rate Guarantee.

I. **Accounting Standard Requirements specific to India**

➤ Paragraphs 26(b) of AS15R and Paragraph 29(b) of Ind AS19 deal with the defined contribution plans where the enterprise provides a guarantee either indirectly through a plan or directly of a specified return on contributions.

➤ These accounting standards require **such defined contribution plans to be treated as defined benefit plans** from the standpoint of accounting and disclosure.

➤ The above requirement has been specifically addressed by the "ASB Guidance on Implementing AS15 Employee Benefits (revised 2005)".

➤ The accounting and disclosure aspects of exempt provided funds providing an interest rate guarantee, have been examined by the Expert Advisory Committee (EAC) of the Institute of Chartered Accountants of India.

The following excerpts from the opinions expressed by the EAC *1* are relevant in the
context of this GN

- The exempt provident fund plan must be treated as a defined benefit plan under AS15 and INDAS19.
  Note: Under AS15 and INDAS19, defined benefit plans are defined as post-employment benefit plans other than defined contribution plans.

- The plan assets are required to be valued on a Fair value basis and the liability is to be actuarially valued. The difference between the two is to be recognized as net defined benefit liability (asset) in the balance sheet. The resultant surplus/ deficit in the plan should be automatically reflected in the financial statements of the company.

- Disclosures need to be made by the company as per paragraphs 119 to 125 of AS15; and paragraphs 135 to 152 of Ind AS19.

J. General Principles

Given the above legislative background and the accounting standard requirements the following general principles apply to the accounting and disclosure aspects:

- The exempt provident fund plan must be treated as a defined benefit plan under AS15 and INDAS19.

- The exempt provident fund plan is a post-employment benefit plan.

- The plan assets should be stated at their fair value and the liability is to be actuarially valued.

For the purpose of accounting valuation under AS 15 R and IND AS19 , only assets, held by an exempt provident fund, that satisfy the requirement/s of the relevant accounting standard should be included. Actuaries may obtain confirmation from the client to that effect.

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1 Opinions finalized by the Expert Advisory Committee of ICAI on 16-07-2013 and 07-07-2016 on "Exempt Provident Fund – Disclosure and Valuation as per AS15 and Ind AS19

- Disclosures need to be made by the company as per paragraphs 119 to 125 of AS15; and paragraphs 135 to 152 of Ind AS19.

K. Actuarial Principles Related to Valuation of Interest Rate Guarantee under EPF Plans

This section contains general principles concerning actuarial valuation of Exempt Employee Provident fund schemes including the following.

i. Data requirements,
ii. Assumptions
iii. Discussion on methodologies and
iv. Reporting

The following section list down certain specific aspects, which must be considered and demonstrated while carrying out valuation for accounting purposes for Exempt Employee Provident fund scheme. It must be noted that these aspects / considerations are not exhaustive and there may be other relevant aspects which should be considered while carrying out a valuation.

Judgment concerning the application of this standard shall be exercised in a reasonable
and justifiable manner. Judgement might be needed on matters like:

a) Setting the relevant assumptions.
b) Selection of the methodology and model.
c) Representation of relevant details in the Actuarial Report as per the Accounting Standard.

K (i) Data Requirements

Exempt Employee Provident fund is a complex scheme to value and Actuaries may need to collect a variety of employee and asset information. The extent of information needed for valuation of Exempt Employee Provident Fund, is a matter of judgement, however, broadly, data required for valuation may include:

a) Employee level information such as date of birth, Date of joining, Retirement age, accumulated account balance with interest etc.
b) Inactive employees' information with account balances outstanding in the scheme such as date of birth, Date of joining, Date of Separation /Retirement, accumulated account balance with interest etc.
c) Plan information such as governing scheme documentation, HR policies or practices of interest credit etc.

d) Asset information including security level details held by Trust. This may also include details of investments held in cash, accrued interest on securities, treatment of reserves, expected contributions from employer on behalf of defaulted securities etc.

e) Detail of transactions within the trust including total employer & employee contributions, voluntary contributions, transfer in & out from trust in lieu of employee movements, Settlements paid to employees from trust., recoverable or unrecoverable loan paid to employees etc.

The valuation report shall include an appropriate summary of statistics of data used in valuation. The summary statistics, at the minimum, shall include the following information:

a) Number of active employees.
b) Number of inactive employees (left but still o\s account balance).
c) Total (& average) account balance for each category of employees.
d) Average age for each category of employees
e) Summary total value of assets etc.

The report should also call out any gap in the information and any assumptions made by the Actuary for addressing such gaps. Additionally, necessary references for any uncertainties (e.g., impact of legislation) included or excluded from calculation should also be included in the report.

K (ii) Assumptions

Assumptions used for valuation of Exempt Employee Provident fund scheme should be appropriate for the purpose of the calculations for which they are used, and the chosen method of valuation. They should be derived from as much relevant information as is sufficient or, if there is insufficient relevant information, as is available.

In case of an accounting valuation, the assumptions should additionally satisfy the requirement/s of the relevant accounting standard.

Broadly, assumptions may constitute of:

a) Discount rate
b) Future levels of interest rate guarantee
c) Mortality/Morbidity/Attrition rates/Retirement age
d) Expected rate of exit of inactive records from scheme
e) Expected yield on asset portfolio etc.

Information that might be relevant to develop assumptions include matters such as:

- Current and Future Financial and Economic outlook.
- Expected Demographic assumptions.
- Recent client experience on matters such as inactive employees exit rates.
- Recent experience of 'fund' related to investment return earnings and expected outlook.
- Employee Provident Fund Organization (EPFO) outlook for future interest guarantee rates etc.

Any opinion in the actuarial report on an assumption or a set of assumptions used shall include a statement about the appropriateness of the assumptions for the purpose for which they will be used. The actuarial report should also mention about any known significant events that have been considered in the selection of appropriate assumptions.

Consistency among different assumptions like long term yield on assets, interest guarantee rate is equally important to be considered. Similarly, consistency of assumptions among various employee benefit schemes of employer is also important. The actuary shall include a comment in the actuarial report about the internal consistency among the assumptions.

Further principles are also set out in APS27.

Following are some examples of applying above principles to valuation of Employee Provident fund scheme:

a) **Interest guarantee rate**

   It is the rate of interest expected to be declared by the EPFO in future and will be the minimum rate to be matched by the organization's Exempt provident fund trust. In deciding this rate of interest, the historical pattern of rates declared by EPFO can be considered. This rate can be taken as a static quantity or as a variable rate for future periods. Issues like relevance of recent data vs. past data in determination of trend, expected stability of rate in future, consideration of the present economic outlook, is a matter of judgement and reasonable & justifiable selection should be made. It should also be borne in mind that one is looking at a long-term rate and present trends of liberalization and globalization of the Indian economy may lead to lower real yields on securities and thereby a possible lower interest guarantee rate.

b) **Rate of exit of inactive employees**

Members of the employee provident fund scheme can exit employment with the organization but can keep their account balances with the Exempt Provident fund Trust. As per present rules, the Trust will be responsible to credit interest rate to such members account balances at par with any active member account balance. Thus, it becomes a relevant assumption to consider about how inactive members are expected to take out their money from the Trust in future.

The past trend from Trust indicating average period of withdrawal of money post exit can be studied. This information, in conjunction with absolute account balance amount of each employee, may have a correlation, as employees with low balances may tend less to withdraw. Similarly, age of employees may be important to consider as young employees may show a different trend when compared to those close to retirement.

The Actuary must examine these rates and any other information available to him\her and use best possible judgement to cater to long term nature of the assumption.

c) **Expected return on asset portfolio.**

Depending on the methodology used (explained in next section) , Expected return on asset portfolio will be a relevant assumption in Exempt Provident fund valuation. The long-term rate of return expected to be earned on asset portfolio of Trust is an important assumption in determining likely shortfall and the quantum of interest rate guarantee. E.g., if assets are expected to earn significantly higher or lower return than the assumed interest rate guarantee, this will lead to a lower or higher interest rate guarantee obligation for the organization.

A security wise analysis of investments held by the Trust, new and re-investment strategy, current economic and financial outlook, statutory guidance on investments by EPFO may need to be considered in setting this assumption. Consistency of this assumption with present prevailing investment return on different asset categories would also be a relevant factor to consider. Volatility in certain assets classes such as equities and the expected churn in portfolio may also impact Trust asset portfolio return in future.

K (iii) Guidance on Methodologies

a) The methodologies recommended for measuring the value of the interest rate guarantee are.
    i. Deterministic Modelling Approach (including cash flow modelling approach)
    ii. Option Pricing Approach
    iii. Stochastic Modelling Approach

b) The choice of the methodology will depend upon what the actuary thinks is most appropriate under the given circumstances, and on the materiality of the value of the interest rate guarantee in the overall context.

c) A brief description of the above methodologies/models is provided as part of the "Application Guidance" accompanying this Note.

a) **Deterministic Modelling Approach**

- At a basic level, deterministic modelling involves deciding upon a single assumption for each variable in the model. The single assumption can be influenced by the data history for that variable, for example, the average of the guaranteed rates of interest declared by the EPFO over the last three years.
- In a deterministic model prudence can be reflected through margins in the assumptions used or through changing the assumptions. A first step is to consider changing each assumption in turn; and evaluating the effect. This is known as sensitivity testing. An extension of sensitivity testing is to evaluate the effect under selected scenarios using different sets of pre-determined internally consistent assumptions.
- In the context of valuing the interest rate guarantee, a deterministic approach involving scenario analysis will be to consider three interest rate scenarios: Base Case Scenario, Rising Interest Rate Scenario and Falling Interest Rate Scenario. The present value of the interest rate guarantee is set equal to the average of the present values determined under these scenarios. More details on this approach are provided in the section on "Application Guidance".
- Alternatively, a deterministic cashflow modelling approach can be used where the model projects both the EPF liability and/or asset cashflows over the projection period using pre-determined values for the model variables. This cashflow model can be used for (i) valuing the interest rate guarantee; and (ii) projecting the values of the EPF plan liabilities and/or assets at different points of time over the projection period. This cashflow modelling approach can be supplemented with sensitivity analysis and scenario testing to get an understanding of a range of values under, say, different interest rate environments. The salient features of a liability cashflow model used by some practitioners are presented in the section on "Application Guidance".

b) **Option Pricing Approach**

- This approach uses the modified version of the Black Scholes Option Pricing Model for determining PVO of the interest rate guarantee. This approach assumes that the rate of return on the asset portfolio is a random variable which follows a log-normal probability distribution.

- Under this approach, the PVO of the Interest Rate Guarantee is set equal to the Value of the Interest Rate Floor, which is computed using the Option Pricing Model used for pricing interest rate derivatives. The underlying rationale is that the interest rate guarantee obligation of the enterprise is like the obligation of the seller of an interest rate floor who has to compensate the buyer when the actual rate of interest [on an interest reset date] turns out to be less than the guaranteed rate.

- If the PF trust retains the surplus interest earnings for funding future interest shortfalls, then the enterprise indirectly benefits from the surplus interest earnings which will arise if the future interest rates are higher than the guaranteed rate. In this case the PVO of the interest rate guarantee will be equal to the Value of Interest Rate Floor less the Value of the Interest Rate Cap.

- The application of the Option Pricing Model for valuing the interest rate guarantee is illustrated with the help of a numerical example as part of the "Application Guidance" which accompanies this Guidance Note.

c) **Stochastic Modelling Approach**

- The stochastic modelling approach treats one or more of the assumptions as random variables. Typically, this model is run several times by randomly drawing the values for these variables from their respective probability distributions. The key benefit is that this approach provides a probability distribution for the model outputs.

- The application of this approach for valuation of interest rate guarantee is discussed in greater detail as part of the section on "Application Guidance".

K (IV) Disclosure Requirements

a) The disclosures for the EPF plan need to be consistent with the disclosures provided for other defined benefit plans like the gratuity plan. This would imply, for example, that the INDAS19 disclosure report for such plans need to include both the Profit and Loss Account and OCI related disclosures.

b) The guidance related to the preparation of disclosures for EPF plans is covered in greater detail as part of the section on "Application Guidance".

Application Guidance Related to Modelling Approach

➢ The purpose of this section is to illustrate and clarify the application of GN29 in the following areas:

- Guidance on Selected Measurement Methodologies
- Disclosures related to EPF plans with reference to INDAS19 requirements. including a numerical illustration

➢ It is important to note that the approaches described in this section for measuring the value of interest rate guarantee; and the guidance provided in this section for preparing the disclosures represents just one set of professional views in these areas.

➢ It is recognized that there can be other valid viewpoints on the approaches /guidance detailed in this section.

Application Guidance Related to Measurement Methodologies

DETERMINSITIC APPROACH

➢ **Sensitivity Testing/Scenario Analysis Approach [part of Deterministic Approach]**

This approach computes the present value of the interest rate guarantee under three interest rate scenarios:

  i.   Base Case Scenario,
 ii.   Rising Interest Rate Scenario
iii.   Falling Interest Rate Scenario.

The present value obligation [PVO] of the interest rate guarantee is set equal to the average of the present values determined under these scenarios.

The step-by-step procedure underlying this approach is as follows:

A. Liability Duration - As on the valuation date, compute the appropriate term equal to the weighted average duration of the PF obligation or such period as the Actuary may consider to be appropriate [referred to as "appropriate term" hereafter].

B. Liability Interest Rate - Find the current Government of India (GoI) Bond Yield for the appropriate term determined in Step A

C. Portfolio Yield - Determine the average historic yield on the Asset portfolio on a Fair Value Basis (Market Value) backing the PF obligations.

D. Determine the remaining term to maturity of the asset (investment) portfolio backing the PF obligations.

E. Determine the current GoI Bond Yield for a term equal to the remaining term to maturity of the above investment portfolio.

F. Yield Spread (C – E) - Compute the difference between the average historic yield and the GoI Bond Yield. This difference represents the yield spread on the Asset portfolio on a Fair Value Basis (Market Value) backing the PF obligations.

G. Expected Investment Return - Add the yield spread to the GoI Bond Yield determined in step B to determine the expected investment return

Calculation of Interest Rate Guarantee

1. Compare this expected investment return with the guaranteed rate of interest and compute the present value of the interest rate guarantee using the formula:

   (Expected Investment Return –Guaranteed PF Rate of Interest) * Accumulated PF Account Balances * Present Value Annuity Factor for a term equal to the weighted average duration of the obligation
   If the expected investment return exceeds the guaranteed rate of interest the Present Value of the Interest Rate Guarantee will be set equal to zero.

2. Consider, for example, a 100 Basis Points (BP) increase in the expected portfolio return and compute the present value of the interest rate guarantee using the formula:

(Expected Investment Return + 100 BP – Guaranteed Rate of Interest) *Accumulated PF Account Balances * Present Value Annuity Factor for a term equal to the weighted average duration of the obligation
If the expected investment return +100 BP exceeds the guaranteed rate of interest, the present value of the interest rate guarantee will be set equal to zero.

3. Consider a 100 BP decrease in the expected portfolio return and compute the present value of the interest rate guarantee using the formula:

    (Expected Investment Return – 100 BP – Guaranteed Rate of Interest) * Accumulated PF Account Balances* Present Value Annuity Factor for a term equal to the weighted average duration of the obligation
    If the expected investment return minus 100 BP exceeds the guaranteed rate of interest, the present value of interest rate guarantee will be set equal to zero.

Present Value of the Obligation, Interest Rate and Surplus

a) The discount rate used for the determining the present value in steps above for calculating the Interest Rate Guarantee will be determined in accordance with paragraph 78 of AS15R or paragraph 83 of the IND AS 19

When PF trust retains the surplus interest earning for funding future interest rate shortfalls

b) The Present Value Obligation of the interest rate guarantee will be equal to the average of the present values determined in steps 1, 2 and 3 above provided the PF trust retains the surplus interest earning for funding future interest rate shortfalls.

c) The Total Present Value of the Obligation will be the Accumulated PF Account Balances plus PVO of the Interest Rate Guarantee calculated in (b) above.

d) In case the fair value of the EPF asset portfolio is higher than the Total Present Value of the Obligation calculated in(c) above, the net liability is nil subject to the asset ceiling restrictions under the relevant accounting standard.

e) In case the fair value of the EPF asset portfolio is lower than the Total Present Value of the Obligation calculated in (c) above, the net liability is positive.

When PF trust does not retain the surplus interest earning for funding future interest rate Shortfalls

f) The Present Value Obligation   of the interest rate guarantee will be equal to the average of the present values determined in steps 1 and 3 above provided the PF trust does not retain the surplus interest earning for funding future interest rate shortfalls.

g) The Total Present Value of the Obligation will be the Accumulated PF Account Balances plus PVO of the Interest Rate Guarantee calculated in (f) above.

h) In case the fair value of the EPF asset portfolio is higher than the Total Present Value of the Obligation calculated in(g) above, the net liability is nil subject to the asset ceiling restrictions under the relevant accounting standard.

➢ **Cashflow Modelling Approach [part of Deterministic   Approach]**

a) The account balances of the employees on the valuation date shall be projected in the future to the various ages at which, the employees are expected to exit the organization and withdraw the fund.

b) For active employees, the Projections are required to consider withdrawal, mortality retirement and any other relevant assumptions. For inactive employees still with the fund, a reasonable assumption about likely period of fund withdrawal shall be taken.

c) The Cashflows are projected using the contribution rate, an interest crediting rate assumption (expected long-term EPFO rate), and a salary increase assumption.

d) To determine the PVO, the future projected benefits will then be prorated and discounted back to the valuation date (using the valuation discount rate), reflecting any decrement adjustments.

e) There may be differences in the way the proration / attribution of projected benefits is performed, e.g. either on service, on contribution, or on weighted service on contribution rate.

f) The PVO calculated above is then compared to the value of assets to determine the net liability.

This cashflow approach is an internationally recognized approach for plans called "cash balance" schemes.

OPTION PRICING APPROACH

Conceptual Framework:

The Black's model, which provides a closed form solution for the value of a floor, assumes that the interest rate R (k) follows a lognormal distribution with a specified volatility parameter. Based on this assumption, the value of the floorlet is given by the following equation:

V [Floorlet] = L*[t (k+1)-t (k)] *P [0, t (k+1)] *[R (F)* N (-d2)-R (k)* N (-d1)]

Equ (1)

Where

L = notional principal

amount t(k+1) = time k+1

t(k) = time k

t (0) = valuation (balance Sheet) date

R(F) = guaranteed rate of interest

R(k) =spread adjusted forward rate at time k

d1 = {ln [R (k)/R (F)] + σk ^2 * t (k)*0.5} divided by σk* t

(k)^0.5 d2 = d1 – σk* t

(k)^0.5

σk = volatility parameter

P [0, t (k+1)] = present value factor

N (*) = cumulative normal probability values

The following numerical example illustrates the application of this equation:

Example 1: Consider a contract with a principal amount of Rs.100m, a tenor of one year, a floor rate of 8% pa and a life of 5 years. Let us assume

that the continuously compounded Zero coupon yield curve is flat at 7% pa and the annualized volatility of the interest rates underlying the floor let is 20% pa. Suppose we have to value the floor let starting one year from now.

We have
- t (k) = 1
- t (k+1) =2
- R (F) = 0.08
- Forward Rate one year from now = 0.07
- P [0, t (k+1)]= exp (-2x0.07) = Exp (-0.14) = 0.86936
- volatility   = 0.2
- d1   = -0.5677
- d2   = - 0.7677
- N (-d1)   = N (0.5677) = 0.7149
- N (-d2)   = N (0.7677) = 0.7787

Substituting the above values in equation 1 above, we get
- V (Floor let) = Rs. 1.07 m

Each floor let of a floor must be valued separately using equ (1) and summed up to determine the value of the floor

Likewise, the Black's model for valuing a caplet is given by the following equation

V (Caplet) = L* [t (k+1)-t (k)] * P (0, t (k+1)) * [R (k)* N (d1) – R(C)* N (d2)]

.... Equ (2)

Where R(C) denotes the cap rate which will be equal to the guaranteed rate of interest and all other symbols in this equation have been defined under Equ (1).

The following example illustrates the application of this formula:

Example 2: Continuing with the data provided in example 1, let us assume that the cap rate is 8% pa. Suppose we have to value the caplet starting one year from now.

Given   d1 =- 0.5677
        d2 = -0.7677
            N (d1) = N (-0.5677) = 0.2851
            N (d2) = N (-0.7677) = 0.2213

Substituting these values and the other values in equ (2) we get the V [Caplet] = Rs. 0.20 m.

This example drives home the fact that even though the current yield curve is flat at 7%, and the cap rate is 8%, the caplet has still got some value primarily because of the volatility parameter.

Application of the Option Pricing Framework:

The inputs and the process involved in applying the Black's Model for valuing the interest rate guarantee are as follows:

Inputs

The inputs required for using the Black's model are as follows:

- The Gilt Yield Curve [the zero-coupon yield curve applicable to Government of India Bonds] as on the valuation date

- The investment return earned on the assets backing the PF Accumulation for five to ten years immediately preceding the valuation date

- The current guaranteed rate of return, which is typically equal to the rate of return declared by the Employees Provident Fund Organization [EPFO]

- The PF accumulation as on the Valuation Date

- The expected working lifetime of the members of the exempt provident fund as on the valuation date or such shorter period as the Actuary may consider to be appropriate.

- The demographic assumptions related to decrements such as future attrition rates and mortality rates.

- The discount rate which is equal to the market yield on Government bonds [on the balance sheet date]. The term of the Government bonds must be equal to the decrement adjusted expected working lifetime of the employees.

Process

The following steps are involved in applying the Black's Model for valuing the interest rate guarantee embedded in an exempt provident fund:

- Obtain the continuously compounded Zero Coupon gilt yield curve [as on the balance sheet date] over the "decrement adjusted" expected working lifetime of the members of the exempt provident fund or such shorter period as the Actuary may consider to be appropriate.

- Derive the one-year forward rates from the Zero-coupon yield curve obtained in the previous step.

- Adjust the one-year forward rates for the yield spread between the portfolio rate of return and the yield on the gilts of an appropriate term. The portfolio rate of return refers to the rate of return on the asset portfolio backing the PF accumulation.

- Determine an appropriate volatility parameter for the spread adjusted one- year forward rates. This parameter can be estimated as the standard deviation of the historical rates of return on the asset portfolio backing the PF accumulation.

- A more robust approach for estimating the volatility parameter is the "implied volatility". This approach presumes availability of traded options on equity and bond indices which reasonably represents the PF investment portfolio. If such traded options are available, then the volatility implicit in the market prices of these options can be estimated and fed into the Blacks Model.

- Project the guaranteed rates of return based on the recent rate declared by the EPFO

- Use the Black's Model for estimating the value of the floorlet for each   year of the decrement adjusted remaining working lifetime. The value of the floor will be equal to the sum of the values of the floorlets.

- The PVO [Present Value Obligation] of the Interest Guarantee is equal to the value of the floor.

- The following table illustrates the application of this framework.

Table 1: PVO of Interest Guarantee Using Black's Model (Floor Only)

• Accumulated PF Balance: Rs. 500 m • Decrement Adjusted Average Working Lifetime: 5 years • Yield Spread: 0%					
Year	1	2	3	4	5
Zero Coupon Gilt Yields	8.15%	8.17%	8.19%	8.24%	8.32%
Spread Adjusted Forward Rates	8.15%	8.19%	8.25%	8.39%	8.60%
Volatility Parameter [% pa]	10%	10%	10%	10%	10%
Guaranteed Rate of Return	8.5%	8.5%	8.5%	8.5%	8.5%
Present Value of Floor lets (Rs. M)	1.60	2.19	2.38	2.30	2.08
Present Value of Floor (Rs. M)	10.55				
PVO of Interest Guarantee	10.55				

If the PF Trust can retain the surplus interest earnings for funding future interest rate shortfalls, the Black's model needs to be modified to value the expected "excess interest earnings" which was earlier referred to as the value of the cap. In this case PVO of the interest rate guarantee will be equal to the difference between the value of the floor and the value of the cap.

he following table illustrates valuation of both floor and cap. This table assumes that the investment earnings in excess of the guaranteed rate are retained by the enterprise.

Table 2
Calculating the PVO using Black's Model (with both Floor and Cap)

• Accumulated Balance: Rs. 500 m • Decrement Adjusted Average Working Lifetime: 5 years • Yield Spread: 0%					
Year	1	2	3	4	5
Zero Coupon Gilt Yield	8.15%	8.17%	8.19%	8.24%	8.32%
Spread Adjusted Forward Rate	8.15%	8.19%	8.25%	8.39%	8.60%
Volatility Parameter [% pa]	10%	10%	10%	10%	10%
Guaranteed Rate of Return	8.5%	8.5%	8.5%	8.5%	8.5%

Present Value of Floor lets (Rs. M)	1.60	2.19	2.38	2.30	2.08
Present Value of Floor (Rs. M)	10.55				
Present Value of Caplets (Rs. M)	0	0.84	1.40	1.91	2.42
Present Value of Cap (Rs. M)	6.57				
PVO of Interest Guarantee (Rs. M)	3.98				

STOCHASTIC MODELLING APPROACH

The steps involved in applying this approach for valuing the interest rate guarantee are as follows:

a. Obtain the (continuously compounded) Zero coupon gilt yield curve on the balance sheet date over the decrement –adjusted expected working lifetime of the members of the Exempt Provident Fund or such shorter period as the Actuary may consider to be appropriate.

b. Using the Zero-coupon yield curve in conjunction with any appropriate stochastic interest rate projection model, project the short-rates [one-year forward rates] over the decrement adjusted working lifetime or such shorter period as may be appropriate. The short rates need to be adjusted for the yield-spread -the difference between the yield on the EPF asset portfolio and the GoI bond for a term equal to the average remaining term to maturity of the EPF asset portfolio.

c. Under each of the interest rate paths, determine the present values of the shortfalls and the present value of the surpluses. A shortfall will arise in the year(s) in which the projected interest rate falls below the guaranteed interest rate and "surplus" will arise in the year(s) in which the projected interest rate is above the guaranteed interest rate.

d. The PVO of Interest Rate Guarantee will be equal to the Present Value of the Shortfalls less the Present Value of the Surpluses if the PF trust can retain the surplus interest earnings for funding future interest shortfalls. On the other hand, the PVO of the interest rate guarantee will be equal to the present value of the shortfalls if the PF trust cannot retain the surplus interest earnings for funding future interest shortfalls

e. Rank order the "PVOs of Interest Guarantee" values obtained for the various interest rate paths starting with the "largest" PVO and ending with the "smallest" PVO. Select an appropriate point in the tail of this rank-ordered distribution and compute the CTE [Conditional Tail Expectation] at that point. The "PVO of Interest Guarantee" will be equal to this CTE.

The CTE (p) is defined as the arithmetic mean of the largest 100(1-p) % PVOs from the rank-ordered PVO distribution. For example, a

95% CTE will be the arithmetic mean of the largest 5% of the PVOs.

Application Guidance Related to Disclosures

1. Introduction

This section of the Application Guidance addresses the disclosure aspects of the exempt EPF (Exempt Provident Fund) plan as per Ind AS19 requirements. With some modifications, the principles discussed in this section can be applied to the exempt EPF disclosure reports prepared as per the AS15 requirements.

This section is structured as follows.

- ➢ Section 2 covers the **key building blocks** for preparing the disclosure report.
- ➢ Section 3 provides the formulae for calculating selected line items of the EPF disclosure report such as current service cost, interest cost and interest income on plan assets.
- ➢ Section 4 examines the additional disclosures related to the amount, timing, and uncertainty of future cashflows in the context of exempt EPF plan. This section describes the additional disclosures that can be relevant for the exempt EPF plan
- ➢ Section 5 is on the application guidance. This section shows how the disclosures can be prepared and/or presented using a numerical example.

2. Key Building Blocks

This section discusses the key building blocks that underlie the preparation of the disclosure report.

- ➢ The **first building block** is the recognition of the premise that the exempt EPF plan is a post-employment defined benefit plan[2] as defined in the Ind AS19. Hence the disclosures for the exempt EPF plan need to be consistent with the disclosures provided for the other defined benefit plans like the gratuity plan. This also means that the disclosure report will include both the P&L (Profit and Loss) and the OCI (Other Comprehensive Income) related disclosures.

However, we also need to be cognizant of the fact that the core PF liability is of a defined contribution plan and the interest rate guarantee embedded in the exempt provident fund plan is the defined

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[2] Ind AS19 states that defined benefit (DB) plans are post-employment benefit plans other than defined contribution plans

benefit element of the exempt EPF plan.

Hence the actuary can bifurcate the disclosures into two components: line items relating to the Defined contribution component of the exempt EPF; and the line items relating to the Defined Benefit component of the exempt EPF plan. The actuary can then aggregate the two components to present the aggregate position.

The numerical illustration presented in this section reflects the aggregated disclosures.

➤ The **second building block** relates to the approach to be followed for valuing the plan assets. This approach will be a "Fair Value" approach[3].

  Where a fair value in terms of a "market price" is not available for an asset, any of the other valuation approaches as recommended in an earlier section of this report can be adopted.

  Paragraph 100 of AS15 Revised provides the following guidance for estimating fair value when no market price is available: *"When no market price is available, the fair value of plan assets is estimated; for example, by discounting expected future cash flows using a discount rate that reflects both the risk associated with the plan assets and the maturity or expected disposal date of those assets (or, if they have no maturity, the expected period until the settlement of the related obligation)"*

➤ The **third building block** relates to the recognition of the realised interest shortfalls and the realised (default- related) losses on the investments.

  Given the persisting low interest rate environment , it is not unusual for an exempt EPF plan to find that the investment earnings on its asset portfolio are not adequate to meet the guaranteed interest commitments on the PF contributions.

  This results in a shortfall which must be met from the retained earnings (reserves and surplus) of the exempt PF Trust. In the event of the shortfall exceeding the retained earnings of the exempt PF Trust, the employer is called upon to make an additional contribution to bridge the shortfall.
  The magnitude of the shortfall (as described above) is further exacerbated by the fact that some of the bond investments in the asset portfolio of the exempt EPF plan are impaired by the inability of the issuers of those bonds to service their debt obligations.

  From a disclosure standpoint, the additional employer contributions [as described above] can be treated as a benefit payment related to the interest rate guarantee element of the exempt EPF plan which is matched by a corresponding contribution from the employer.

  The above treatment is consistent with the prevailing practice

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[3] The opinions finalized by the Expert Advisory Committee of ICAI as on 16-07-2013; and 07-07-2016 reiterate that an EPF plan is a DB plan and the plan assets held by the Trust should be valued at fair value as per the principles of AS15 and INDAS19.

where the core PF liability is funded whereas the liability related to interest rate guarantee is usually unfunded.

The **fourth building block** relates to the treatment of the unrealized losses/gains on the investment[4] portfolio of the EPF plan. These unrelated losses/gains arise from the risks faced by an EPF plan which include.

- Interest Rate Risk
- Equity Risk
- Default Risk
- Credit Spread Risk

Interest rate risk arises from the exposure of the investment portfolio to changes in
market interest rates.

Equity risk arises from the exposure of the investment portfolio to the volatility in the equity   market.

Default risk is the risk of loss due to contractual obligations not being met whether due to the inability or decision by the counterparty. Assessing default risk of an investment involves assessing two components -probability of default and loss given default.

Credit spread risk refers to the risk of changes in the value of an asset (e.g.: corporate bond) due to an actual or perceived change in the credit worthiness of the issuer (e.g.: a rating downgrade)

Typically interest rate risk and equity risk are considered as components of "Market Risk"; and Default risk and Credit -spread risk are considered as components of "Credit Risk".[5]

In our context, the discussion on Market Risk and Credit Risk merits importance for three reasons:

- The fair market value of the investment portfolio is impacted by the unrealized gains/losses of the constituent investments.

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[4] The terms "investment portfolio" and "asset portfolio" are used interchangeably in this section of the report.

[5] However, some practitioners of risk management consider "credit spread risk" as a component of "market risk".

[Source: Sweeting, Paul, "Financial Enterprise Risk management (Second Edition)", published by Cambridge University Press]

- The size of the unrealized gains/losses is influenced by the market risks and credit risks inherent in the investment portfolio.
- In the present-day context, a typical EPF plan has exposures to three main asset classes- Central and State Government Bonds, Corporate Bonds and Equities (often through Equity oriented Mutual Fund Schemes).

The declining interest rates in the recent past has resulted in a significant unrealized capital gains on the government bond exposures of the investment portfolio.

On the other hand, the corporate bond exposures have experienced a depreciation in price/value primarily due to the deteriorating credit worthiness of some of the high-profile issuers of debt in the corporate bond market.

This has led to some of the EPF plans (and their sponsoring employers) setting up explicit provisions for the potential loss of principal that can arise from such impaired investments.

The exposures to equities have accentuated the volatile movement of the unrealized losses/gains of the investment portfolio overtime.

Given this backdrop, the relevant question from the disclosure standpoint is: How should we treat the unrealized gains/losses? There appears to be two schools of thought on the appropriate approach:

- The first school of thought advocates that the market risk related losses/gains arising from interest rate risks and equity risks should be routed through OCI [Other Comprehensive Income]. On the other hand, credit risk related unrealized losses arising from default risk and credit – spread risk should pass through the P&L (Profit &Loss) for the current reporting period.

- The second school of thought is of the view that all unrealized losses/gains arising from market risks and unrealized losses arising from credit risks shall be recognised in OCI for the current reporting period.

- It is recommended that all unrealized gains/losses shall be included in the Other Comprehensive Income for the current period. This approach will be consistent with the Ind AS19 requirement to

recognise remeasurements of the net defined benefit liability (asset) in other comprehensive income [refer paragraphs 122 and 125 of Ind AS19]. It thereafter follows that the unrealized asset losses once realized cannot be recycled. It will continue to be part of the OCI.

3. Computing Selected Line items

This section describes the formulae used for computing selected line items in the EPF INDAS19 disclosure report like current service cost, interest cost and interest income on plan assets.

Line Item	Description of the formula
Opening Present Value of Obligations (PVO)	= Accumulated PF Balance (BoP)+Value of the interest rate guarantee on the Accumulated PF Balance (BoP)
Service Cost*	= Employer's Contribution to EPF during the reporting period [estimated as at BoP] +Value of the Interest Rate Guarantee on Employer and Employee contributions (including voluntary contributions) [estimated as at BoP]
Interest Cost	= Discount Rate (BoP) * [Opening PVO +0.5*Employer Contributions to PF during the reporting period +0.5*Employee Contributions (including voluntary contributions) during the reporting period +0.5*" Transfer-In during the reporting period – 0.5*Benefits Paid during the reporting period]
Closing Present Value of Obligation (PVO)	= Accumulated PF Balance (EoP)+Value of Interest Rate Guarantee on the Accumulated PF Balance (EoP)
Interest Income on Plan Assets	=Discount Rate (BoP) * [Opening FVPA+0.5*Employer's Contribution to PF during the reporting period +0.5*Employees' contributions including voluntary contributions during the reporting period +0.5*Transfer-In during the reporting period – 0.5*Benefits paid during the period]

where BoP stands for the Beginning of the Reporting Period
where EoP stands for the End of the Reporting Period
where FVPA denotes Fair Value of Plan Assets

*In instances where employees' voluntary contributions and/or transfers-in during the year have been a significant portion, a member should liaise with the client and calculate the service cost using actual contribution data

Additional Disclosures

➢ This section covers the additional disclosures [under paragraph 145 ofIndAS19] related to the amount, timing, and uncertainty of future cash flows to the extent they are relevant for the exempt EPF plan

➢ Paragraph 145 of IndAS19 requires an entity to disclose:

  • A sensitivity analysis for each significant actuarial assumption at the end of the reporting period showing how the DBO would have been affected by changes in the relevant actuarial assumption that were reasonably possible at that date

  • Information about any asset-liability matching strategies used by the plan or the entity

  • Description of any funding arrangements and funding policy that affect future contributions

  • Expected contributions to the plan during the next annual reporting period

  • Information about the maturity profile of the defined benefit obligation (DBO) such as weighted average duration of DBO and information about the distribution of the timing of benefit payments, such as a maturity analysis of the benefit payments.

➢ In the context of the exempt EPF plan, the DBO [Defined Benefit Obligation] is the value of the interest rate guarantee embedded in the exempt EPF plan.

➢ Hence the sensitivity analyses described above are relevant for the value of the interest rate guarantee embedded in the exempt EPF plan

➢ The significant actuarial assumptions used for estimating the value of the interest rate guarantee include:

  • Discount Rate (determined as per paragraph 83 of Ind AS19)

  • Expected Return on Plan Assets

  • Guaranteed Rate of Interest

  • Volatility Parameter (which will be relevant if the Option Pricing Approach or the Stochastic Modelling Approach is used for estimating the value of the interest rate guarantee)

  • Withdrawal Rate (which will impact the estimated remaining term of obligations)

 The variation margin around each of the above assumptions is specified by the enterprise [e.g., plus and minus 100 basis points]. The deterministic approach for calculating the value of the interest rate guarantee has a built - in sensitivity testing for expected rate of return on plan assets. We recommend that, regardless of the approach used for calculating the value of the interest rate guarantee, the results of the sensitivity tests for the different input parameters to be disclosed separately.

- The description of the asset liability matching strategies used by the plan can include information about the strategies used by the enterprise for managing interest rate risk (e.g.: duration matching strategy); and credit risk inherent in the investment portfolio of the EPF plan
- The description of the funding arrangements can include a discussion on how the enterprise plans to meet (i) future interest shortfalls; and (ii) unrealized credit risk related losses in the asset portfolio of the EPF plan.

- The information about the maturity profile of the DBO [in terms of reporting the weighted average duration of the DBO and the maturity analysis of the benefit payments] may not be available when the value of the interest rate guarantee is assessed using the Deterministic Approach- particularly when the sensitivity testing /scenario analysis approach is used.

   However, such information is available when the option pricing approach and/or the stochastic modelling approach are used for calculating the value of the interest rate guarantee.

4. Numerical Illustration

The following numerical illustration presents the PVO movement and asset movement tables related a EPF plan as per INDAS19 requirements.

Liability Movement Table

Table 2: Changes in the Present Value of Obligations: Reconciliation of the Opening and Closing Balances	
Details	Aggregate Position
A. PF balance at the beginning of the reporting period	16024
B. Value of Interest Rate Guarantee on the opening PF balance	39
C.PVO as at the beginning of the reporting period =A+B	16063
D. Interest Cost [Refer to Notes 1) below this table]	1,201
E. Employer's Contribution to PF during the reporting period [Refer to note 2 below this table]	525

F. Value of Interest Rate Guarantee on the contributions made during the reporting period. The contributions will include the employer contributions, employee contributions Voluntary PF Contributions and transfer-ins	5
G. Service Cost =E+F	530
H. Employee Contributions, Voluntary PF Contributions and Transfer In during the reporting period [Refer to Note 2 below this table]	1,648
I. Benefits paid during the reporting period [refer to note 3 at the end of this table]	(2,695)
J. Actuarial loss/(gain) on obligation [refer to note 4 at the end of this table]	644
K. PF balance at the end of the reporting period	17,005
L. Value of Interest Rate Guarantee on the closing PF balance	386
M.PVO as at the end of the reporting period =K+L	17391

Note 1: Interest Cost is calculated as follows: Opening Discount Rate*(C+0.5*E+0.5*F+0.5*H+0.5*I)
Note 2*: Note 2: There are two approaches for determining the contributions made during the reporting period. . The first and the most appropriate approach is to estimate the contributions at the beginning of the reporting period. However if there are practical constraints involved in estimating the contributions during the reporting period then the actuary can use the actual contributions made during the reporting period in the place of the estimated contributions.
Note 3 The benefits paid are the actual benefit payments with regard to the DC section [PF related]; and the pay-out related to the interest shortfall during the reporting period with regard to the DB section (Interest Rate Guarantee related)
Note 4: Actuarial Loss / (Gains) on Obligations is calculated as follows: M-(C+D+G+H+I)

Asset Movement Table

Changes in the Fair Value of Plan Assets: Reconciliation of the Opening and Closing Balances	
Details	Aggregate Position
A. Fair value of plan assets as at the beginning of the period	16,290
B. Interest Income on plan assets [refer to note 2 below this table]	1,227
C. Actual Employer's Contribution to PF during the reporting period [Refer to Note 1(a) and Note 1(b)]	746
D. Employees' Contribution to PF including voluntary employee contributions and transfer-in during the reporting period	1,648
E. Benefits paid during the reporting period	(2,695)
Actuarial gain/(loss) on plan assets [refer to note 3 below this table]	(1,031)
G. Fair value of plan assets as at the end of the period	16,185

Note 1(a): The employer's contribution shown here is the actual employer's contribution during the reporting period, whereas the employer's contribution shown in the PVO movement table is the estimated contribution at the beginning of the reporting period.
Note 1(b): Typically, the interest rate guarantee tends to be unfunded. Hence the only flows considered here are the additional employer's contribution to meet any actual interest shortfall during the reporting period and the matching benefit outgo
Note 2: Interest Income on Plan Assets is calculated as follows: Opening Discount Rate *(A+0.5*C+0.5*D+0.5*E)
Note 3: The actuarial gain /(loss) on plan assets is calculated as follows: G-(A+B+C+D+E)