# Approaches for Valuing Interest Rate Guarantee in Exempt Provident Funds under ICAI Accounting Standard 15 (rev2005)_ver1.00-04/2008

**By**

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The points of view as given in this paper are that of the author and it is appreciated that there could be other valid view points.

***ABSTRACT***

*The Guidance Note issued by the Accounting Standards Board [ASB] of the Institute of Chartered Accountants of India [ICAI] read in conjunction with Para 26 [b] of Accounting Standard 15 [Revised 2005] treats exempted provident funds with an embedded interest rate guarantee as Defined Benefit Plans. Accordingly the relevant provisions of AS15(rev2005) relating to measurement principles and disclosure requirements will apply to such plans. In this paper, the author has presented the typical valuation methodologies for valuing the Interest Rate Guarantee embedded in such exempt provident funds.*

***KEYWORDS***:

*Interest Rate Derivatives; Caps and Floors; Payoff Profiles; Black's Model; Stochastic Interest Rate Model*

# 1. Introduction:

This paper deals with the approaches for valuing the interest rate guarantees offered by Exempt Provident Funds

The backdrop for this paper is Accounting Standard 15 (rev.2005: on Employee Benefits issued by the Institute of Chartered Accountants of India (ICAI). Paragraph 26(b) of this Accounting Standard [referred to as AS15R in this paper] read in conjunction with the Guidance Note issued by the Accounting Standards Board (ASB) of ICAI classifies an Exempt Provident Fund with an embedded interest rate guarantee as a Defined Benefit Plan. Hence the need arises to value and report the interest rate guarantee as part of the Present Value of Obligations (PVO) under AS15R.

This layout of this paper is as follows:
The first part of the paper describes the payoff profile associated with the interest rate guarantees and provides an overview of the two approaches available for valuing such guarantees – the Black's Model and the Stochastic Model.

The second part of the paper discusses the mechanics of the Black's Model and illustrates the application of this model for valuing the interest rate guarantee offered by exempt provident funds.

The third part of the paper presents the application of the stochastic modeling approach for valuing the interest rate guarantee.

The next part of the paper addresses some common questions concerning the valuation of the interest rate guarantee and the inputs required for the valuation.
The final part summarizes the key themes of this paper.

The relevant extract from the Guidance Note issued by the ASB is provided in Appendix I of this paper.

# 2. Payoff Profiles and Valuation Approaches:

### 2.1 Payoff Profile Associated with a Floor:

At a conceptual level, the payoff profile associated with an interest rate guarantee embedded in an exempt provident fund can be considered as identical to the payoff profile associated with an Interest Rate Floor. This is because in both these cases, a positive payoff will arise only if the earned rate of interest is less than the minimum guaranteed rate. Otherwise the payoff will be zero.

The following numerical example can help in clarifying this point:

**Example 1**: Consider a principal amount of Rs.100 million, an annual tenor; a floor rate of 8% pa; and the life of the floor as 5 years. The term "tenor" in this context is defined as the time interval between two interest rate reset dates [can be thought of as the interval between two valuation dates in the context of AS15R]. The floor basically provides insurance against the interest rate falling below 8%. Suppose on a particular interest reset date, the observed interest rate is 7%. The "interest rate floor" will lead to a payoff of 0.01*100,000,000 =Rs. 1,000,000 to be paid one year later. On the other hand if the observed interest rate on the interest reset date is 9%, then the interest rate floor will lead to a zero payoff

The payoff as illustrated above is nothing but the payoff associated with a put option on the interest rate observed at time t with payoff occurring at time (t+1). Therefore if the life the floor is say, 'n' years, then the floor can be viewed as a portfolio of "n" such put options. Each of these put options is commonly referred to as a **floorlet**

## 2.2 Payoff Profile Associated with a Cap:

Some exempt provident funds retain the interest earnings (investment income) in excess of the guaranteed rate of interest. In such instances, it is necessary to value the expected "excess" interest earnings, which is akin to the valuation of an interest rate cap.

An interest rate cap is a type of interest rate derivative which provides a payoff to the holder if the earned rate of interest is higher than the cap rate. Otherwise the payoff to the holder is zero.

The following numerical example illustrates the nature of this payoff:

**Example 2**: Let us consider a principal amount of Rs.100 million, an annual tenor, a cap rate of 8% and the life of the cap as 5 years. Suppose on a particular interest reset date, the observed interest rate is 10%. The "interest rate cap" will lead to a payoff of 0.02*100,000,000 =Rs. 2,000,000 to be paid one year later. On the other hand if the observed interest rate on the interest reset date is 7%, then the interest rate cap will lead to a zero payoff.

The payoff as illustrated above is nothing but the payoff associated with a call option on the interest rate observed at time t with payoff occurring at time (t+1). Therefore if the life of the cap is, say, n years then the "cap" can be viewed as a portfolio of "n" such call options. Each of these call options is commonly referred to as a **caplet.**

### 2.3 PVO of Interest Guarantee:

Based on the above discussion, we can define the PVO (Present Value of Obligation) of an interest rate guarantee in two ways:

- The PVO of the interest rate guarantee will be equal to the value of the interest rate floor if the exempt provident fund does not retain the investment returns earned in excess of the guaranteed rate of interest.
- The PVO of the interest rate guarantee will be equal to the difference between the value of the floor and the value of the cap if the exempt provident fund retains the investment returns earned in excess of the guaranteed rate.

### 2.4 Valuation Approaches: An Overview

To value the floorlets and the caplets with payoff profiles as described above, there are two approaches:

[a] The first approach is the Black's Model –a model suggested by Fischer Black, for valuing interest rate options. We will refer to this approach as the Closed Form Approach or the Black's Model in this paper.

[b] The second approach is the Stochastic Modeling Approach where future interest rates are modeled using a Stochastic Interest Rate Scenario Generator and the PVO of Interest Guarantee [as defined above] is determined under each of the interest rate scenarios. The output of this approach would be a rank- ordered distribution of these PVOs. We need to select an appropriate point in the tail of this distribution and compute the CTE (Conditional Tail Expectation) at this point. The PVO of the interest rate guarantee will be equal to this CTE.

# 3. Black's Model:

## 3.1 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 ($-d_2$)-R (k)* N ($-d_1$)]

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

$d_1$ ={ln [R (k)/R (F)] + $\sigma_k$^2 * t (k)*0.5} divided by $\sigma_k$* t (k)^0.5

$d_2$ = $d_1$ – $\sigma_k$* t (k)^0.5

$\sigma_k$ = 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 3**: Consider a contract with a principal amount of Rs.100mln, 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
- $d_1$ = -0.5677
- $d_2$ = - 0.7677
- N ($-d_1$) = N(0.5677) = 0,7149
- N ($-d_2$) = N(0.7677) = 0.7787

Substituting the above values in equation 1 above, we get

- V (Floor let) = Rs. 1.07 mln

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 ($d_1$) – R(C)$^*$ N ($d_2$)]**
**…. 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 4**: Continuing with the data provided in example 3, let us assume that the cap rate is 8% pa. Suppose we have to value the caplet starting one year from now.

Given $d_1$ =- 0.5677
$d_2$ = -0.7677
N ($d_1$) = N (-0.5677) = 0.2851
N ($d_2$) = N (-0.7677) = 0.2213

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

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

## 3.2 Application of the 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[1]
- 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

[1] The terms valuation date and balance sheet date are used interchangeably in this paper

- The expected working life time of the members of the exempt provident fund as on the valuation date

- 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 life time 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.
- 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.
- 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 life time. 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 mln<br>• Decrement Adjusted Average Working Life Time: 5 years<br>• 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. Mln)** | **1.60** | **2.19** | **2.38** | **2.30** | **2.08** |
| **Present Value of Floor (Rs. Mln)** | **10.55** | | | | |
| **PVO of Interest Guarantee** | **10.55** | | | | |

The Black's Model can be modified to value the interest rate guarantee under different interest rate crediting patterns. For example, the rules of an exempt provident fund may allow the enterprise to retain the interest earnings in excess of the guaranteed rate of interest to be retained by the enterprise. In such cases 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.

The 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 mln
- Decrement Adjusted Average Working Life Time: 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. Mln)** | **1.60** | **2.19** | **2.38** | **2.30** | **2.08** |
| **Present Value of Floor (Rs. Mln)** | **10.55** | | | | |
| **Present Value of Caplets (Rs. Mln)** | **0** | **0.84** | **1.40** | **1.91** | **2.42** |
| **Present Value of Cap (Rs. Mln)** | **6.57** | | | | |
| **PVO of Interest Guarantee (Rs. Mln)** | **3.98** | | | | |

## 4. Stochastic Model

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

- Obtain the (continuously compounded) Zero coupon gilt yield curve on the balance sheet date over the decrement –adjusted expected working life time of the members of the exempt provident fund.
- 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. The short rates need to be adjusted for the yield-spread as defined under the closed-form approach.
- 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. The PVO of Interest Guarantee will be equal to the Present Value of the Shortfalls minus the Present Value of the Surpluses. **As noted in the previous section "surpluses" will be valued only if the enterprise can retain the investment returns in excess of the guaranteed rate**.

- 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. The CTE approach is recommended because it is consistent with the approach recommended in "GN22: Reserving for Guarantees in Life Assurance Business" issued by the Institute of Actuaries of India

## 5. Answers to Frequently Asked Questions

This section presents the responses to the most common questions that can be asked about the valuation of interest rate guarantee. The Black's model has been used to illustrate these responses

**Q**: Should the enterprise value the interest rate guarantee if the current investment return exceeds the guaranteed rate?

**A:** The answer is "Yes". This is so because the enterprise bears the risk of the future investment returns can falling below the guaranteed rate. Therefore the enterprise needs to provide for this contingency as on the valuation date. This is particularly important if the enterprise follows the practice of not retaining the investment returns in excess of the guaranteed rate.

The following table illustrates this point where we have taken the current investment returns (spread adjusted forward rates) to be higher than the guaranteed rate.

**Table 3**
**Calculating the PVO of Interest Guarantee Using Black's Model (Floor Only)**
**Scenario: Current Investment Return > Guaranteed Rate**

- Accumulated PF Balance: Rs. 500 mln
- Decrement Adjusted Average Working Life Time: 5 years
- Yield Spread : 0.5%

| Year | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Zero Coupon Gilt Yield** | **8.15%** | **8.17%** | **8.19%** | **8.24%** | **8.32%** |
| **Spread Adjusted Forward Rate** | **8.65%** | **8.67%** | **8.69%** | **8.74%** | **8.82%** |
| **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. Mln)** | **-** | **1.10** | **1.45** | **1.53** | **1.45** |
| **Present Value of Floor (Rs. Mln)** | **5.53** | | | | |
| **PVO of Interest Guarantee (Rs. Mln)** | **5.53** | | | | |

Comparing Tables 1 and 3, we find that the PVO of Interest Guarantee has declined from Rs. 10.55 mln to Rs. 5.53 mln. As expected, the PVO of Interest Guarantee has declined but the point to be noted is that the PVO of Interest Guarantee continues to exist reflecting the future downside investment risk.

**Q:** It is very likely that the future guarantee rate need not be equal to the current guaranteed rate. Can Black's Model accommodate the changes in the guaranteed rate?

**A:** Again the answer is "Yes". The guaranteed rate is an input into the model and can be varied year wise by the user. The following table illustrates this point wherein the future guaranteed rates are shown to be declining at the rate 0.1% pa

## Table 4
## Calculating the PVO of Interest Guarantee Using Black's Model (Floor Only)
### Scenario: Declining Trend in Guaranteed Rates

- Accumulated PF Balance: Rs. 500 mln
- Decrement Adjusted Remaining Life Time: 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%** | **8.4%** | **8.3%** | **8.2%** | **8.1%** |
| **Present Value of Floor lets (Rs. Mln)** | **1.60** | **1.91** | **1.93** | **1.73** | **1.46** |
| **Present Value of Floor (Rs. Mln)** | **8.63** | | | | |
| **PVO of Interest Guarantee (Rs. Mln)** | **8.63** | | | | |

Comparing Tables 1 and 4 we find that the PVO of Interest Guarantee has declined from Rs. 10.55 mln to Rs. 8.63 mln which is line in with what we would expect under a scenario of declining guaranteed rates. On the other hand, the PVO of Interest Guarantee would have increased from Rs. 10.55 mln to Rs. 12.73 mln had we assumed a scenario where guaranteed interest rates were to increase at the rate of 0.1% pa (the corresponding table is not shown here)
While it is debatable whether the guaranteed rates will increase or decrease in the future, it is probably a good idea to test the sensitivity of the PVO of Interest Guarantee to changes in guaranteed rate in either direction – upwards and downwards – and disclose the results of this sensitivity analysis. This disclosure is **similar** to the disclosure required under Para 120(m) of AS15 (R) which requires disclosure of the financial impact of a one percent (1%) increase and decrease in the assumed medical cost trend rates.

Also, it needs to be noted that the guaranteed rate of interest is predicated upon the rate of interest declared by the EPFO [Employees Provident Fund Organisation]. Since the rate of interest declared by the EPFO is an 'administered interest rate' it is difficult to model the future behavior of this interest rate.

One way to address this issue is to assume that the current rate of interest declared by the EPFO will continue to prevail in the future and value the interest rate guarantee on that basis. This assumption can be 'unlocked' on the next valuation date and the interest rate guarantee on that valuation date can be valued using the then rate of interest declared by the EPFO. This process of unlocking (referred to as Prospective Unlocking in FAS 97) needs to be done on every valuation date in the future. The actuarial gain or loss arising on account of such "unlocking" will pass through the income statement(s) of the enterprise for the corresponding period(s).

**Q:** What are the other input variables that can be varied?

**A:** In general any or all of the following user- defined input variables can be varied to test the sensitivity of the PVO of Interest Guarantee to changes in these variables

- Attrition Rate – this will impact the decrement adjusted remaining working life time
- Yield Spread
- Volatility Parameter – can be varied for every year of the remaining term under the Black's model
- Future Guaranteed Rates of Return can be varied for every year of the decrement adjusted working life time

Other things being equal (ceteris paribus) we can expect to see the following relationships between the PVO of Interest Guarantee and changes in the above input variables

- A higher (lower) attrition rate will reduce (increase) the remaining term and hence reduce (increase) the PVO of Interest Guarantee
- A higher (lower) yield spread will reduce (increase) the PVO of Interest Guarantee
- An increase (decrease) in the volatility parameter will increase (decrease) the PVO of Interest Guarantee
- An increase (decrease) in future guaranteed rates will increase (decrease) the PVO of Interest Guarantee.

**Q:** What are the inputs which the enterprise must provide to value the interest rate guarantee?

**A:** Regardless of the valuation approach used, the enterprise must provide the following inputs:

- ➢ Rules of the Exempt Provident Fund
- ➢ Date of birth
- ➢ Date of joining
- ➢ PF Accumulation for each employee as on the valuation date

- Aggregate PF Accumulation as on the valuation date
- Yield on the Fund – for the Most Recent Period and Preceding Five to Ten Periods
- Attrition Rate
- Fair value of Plan Assets as on the Valuation Date
- Maturity Profile of the Plan Assets

## 7. Summary

The salient conclusions resulting from the paper are as follows:

- The interest rate guarantee embedded in an exempt provident fund resembles an "interest rate derivative" in terms of the payoff profile.
- Hence the PVO of Interest Guarantee associated with an interest rate guarantee embedded in an exempt provident fund can be determined as the difference between the values of the two types of interest rate derivatives: Floor and Cap. In other words the PVO of Interest Guarantee associated with the interest rate guarantee = Value of Floor – Value of Cap
- The value of the cap will be equal to zero if the enterprise does not retain the investment earnings in excess of the guaranteed rate. In such cases the PVO of Interest Guarantee associated with the interest rate guarantee will be equal to the value of the floor
- There are two methodologies available for valuing interest rate guarantees: (a) Black's Model for valuing interest rate derivatives
  (b) Stochastic Modeling Approach

- All the input parameters for either the Black's Model or the Stochastic Model are user defined. Hence these input parameters can be varied to examine the sensitivity of the PVO of Interest Guarantee to changes in these parameters.
- One of the input parameters for either of these valuation models is the guaranteed rate of interest, which is typically set equal to the rate of interest declared by the EPFO from time to time. Since the rate of interest declared by the EPFO is an administered rate it is difficult to model the future behavior of this interest rate. This problem can be circumvented through "Prospective Unlocking" whereby the assumption about the guaranteed rate of interest can be unlocked on each valuation date. The actuarial gain or loss arising from such "unlocking" can be recognized in the income statement for the corresponding period

## References:


1. John C. Hull, "Options, Futures and Other derivatives," (Fifth edition) Pearson Education
2. Accounting Standard (AS) 15 (revised 2005) – Employee Benefits
3. ASB Guidance on Implementing AS 15, Employee Benefits (Revised 2005)
4. Black, F. and P. Karasinski, "Bond and Option Pricing When Short Rates Are Lognormal"., Financial Analysts Journal, July/August 1991, 52-59
5. Herzog, Thomas N. and Lord, Graham, "Applications of Monte Carlo Methods to Finance and Insurance", (ACTEXS Publications, Inc)
6. Sriram,K., Rajpal,Vivek and Pavese, Marc, "Choice of Interest Rate Models For Estimating Economic Capital of Life Insurance Companies – Paper present at the 9th Global Conference of Actuaries

# Appendix 1

## ASB Guidance on Implementing AS15 (rev.2005): Employee Benefits Extract

**Question:** Whether a provident fund, which guarantees a specified rate of return, is a defined benefit plan or a defined contribution plan?

**Response:** Section 17 of the Employees Provident Funds Act (EPF) 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 favorable than those specified in section 6 of the EPF Act and the employees are also in enjoyment of other provident fund benefits which on the whole are not less favorable to the employees than the benefits provided under the Act.

The rules of the provident funds set up by such establishments (referred to as exempt provident funds) generally provide for the deficiency in the rate of interest on the contributions based on its return on investment as compared to the rate declared for Employees' Provident Fund by the Government under paragraph 60 of the Employees' Provident Fund Scheme, 1952 to be met by the employer. Such provision in the rules of the provident fund will tantamount to the guarantee of a specified rate of return.

As per AS15R, where in terms of any plan the enterprise's obligation is to provide the agreed benefits to current and former employees and the actuarial risk (that benefits will cost more than expected) and the investment risk fall, in substance, on the enterprise, the plan will be a defined benefit plan.

Accordingly, provident funds set by employers which require interest shortfall to be met by the employer would be in effect defined benefit plans in accordance with the requirements of paragraph 26(b) of AS15R.