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Conditions for Pension Liability to Become Zero Under Certain Actuarial Assumptions Imposed On International Accounting Standard 19 Actuarial Model

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Abstract

The international accounting standards employee benefits describe the accounting requirements for employee's short-term, post-retirement, long-term and termination benefits. It further enshrines the principle that the cost of providing employee benefits should be recognized in the period over which benefits are earned by the employee and defines how each cohort of employee benefit is estimated. The objectives of this study are: (i) to estimate the liabilities of each members of the scheme under model (ii) to establish the mathematical condition under which the funding standard liability will be zero. This study applies the funding standard models for the computations of accruing liabilities for the current and past service liability of employees. Data in respect of different categories of employees was collected from a government institution in Jos North local government of Plateau state, Nigeria. The data includes the employee's annual salary and their respective demographic statistics. This was used to obtain the number of years of pensionable service completed and the future years of services to be completed before retirement at the age of years. The study further employs life annuity table to compute the service liability of each member of the scheme. From our results, computational evidence proves that the total service liability of the plan will be vanishingly zero when certain mathematical annuity assumptions are imposed and hence this represents the condition for which the liability of the plan to the members to be zero.

Introduction

Quite a number of liability techniques are associated with pension schemes each with defined objectives where the liabilities describe the actuarial obligations of the scheme on either a scheme termination framework or an ongoing structure. Pension accounting has established various pension liability strategies such that the liability is defined under an appropriate legal framework in obtaining the minimum and maximum tax-deductible contributions. However, since neither of these liabilities may present what authorities actually trust to be the real long-term actuarial obligation of the scheme, the financial liabilities may occasionally be applied to address issues on the scheme's funded conditions. The liabilities estimated in pension accounting are computed at the actuarial interface where the entire subject of pension liability is reviewed. We shall be addressing liability related to retirement for a single age x. However, (Winklevoss, 1993) define the nature of other liabilities associated with termination benefits, disability benefits and death benefits. Pension accounting for defined benefit schemes is difficult because actuarial assumptions and valuation techniques are required to estimate the balance sheet obligation and the income statement expenses. The scheme's liabilities of the defined benefit obligation and the scheme's assets are measured at each balance sheet date. Furthermore, the scheme's assets are measured at a fair value not necessarily the same as either net realizable value or market value. The defined benefit obligation is measured on an actuarial basis and discounted to present value. The difference between the fair value of the scheme's assets and the present value of the defined benefit obligation is a surplus or deficit. A surplus evolves as an asset when the plan sponsor gains an economic benefit from it but a deficit evolves as a liability to the level that the plan sponsor has a constructive obligation to make it good. It is the accrued net cost to date at the balance sheet date above the plan sponsor's normal contribution rate of the promise implicit in a defined benefits scheme that the sponsor will make good any shortfall in the plan funding. A surplus or deficit must be recognized as necessary as an asset or liability on the employer's balance sheet subject to certain conditions. In (McNally & O'Connor, 2013), the IAS 19, therefore, ensures the amount recognized in the sponsor's balance sheet as a defined benefit liability (deficit) or asset (surplus) to be the net total of the following amounts: (i) The present value of the defined benefit obligation at the balance sheet date plus (ii) any actuarial gains less any actuarial losses not yet recognized as income or an expense because of the smoothing afforded by the corridor approach less (iii) any past service cost not yet recognized and (iv) the fair value at the balance sheet date of plan assets out of which the defined benefit obligation is to be settled directly.

The IAS 19 actuarial valuation represents an appraisal of a firm's current and future liabilities caused by scheme members' benefits promises. A collection of financial and demographic assumptions and data are usually set in motion so as to perform the actuarial valuation mathematically. Such data entails the full employee and benefits reconciliation while the set assumptions impact on the materiality of the demographic and financial variables so as to obtain comprehensive results according to IAS 19 approach. The computed results are subsequently presented for disclosure in the year-end financials in a defined framework. These assumptions are usually supported by previous data and depend on the actuary's good sense of numerical estimates. A skillful computational experience is required for IAS 19 actuarial valuation to satisfy the strongly strict reporting standards when carrying out this numerical work. Firms should necessarily know with certainty the end of service gratuity liabilities and should also ascertain if they have under-accrued or over-accrued their employee's benefit obligations. Nonetheless, these liabilities may have some pervasive impact on the firm's future cash flow system. Consequently, any firm that elects to satisfy IFRS disclosure conditions should adopt IAS 19 as one of the underlying conditions. In (Swinkel, 2011), firms usually comply with IFRS on the following grounds. (i) The government or the firm authorities may enforce it (ii) The commitment to global financial reporting standards (iii) The opportunity in accessing world markets (iv) The requirements to be fulfilled on the stock exchange. A firm's choice of IAS 19 guarantees its financial statements are uniformly comparable to international standards. An actuarial forecast of future cash flow is needed on employees' estimated period of retirement or death concerning long-term employee benefit liabilities. This actuarial forecast is usually carried out under several frameworks of financial conditions so as to know the associated uncertainties. In such actuarial projections the valuation results are rolled forward and such that a mathematical projection of the computed benefits visa-vis actuarial present value of future cash flows over the remaining life span of the benefits scheme is made available to the firm's management for further application in the budgeting process. IAS 19 actuarial valuation assists in identifying all implicit uncertainties so that we can ascertain the necessary courses of action which can be implemented to mitigate against such uncertainties. Consequently, by adopting an IAS 19 actuarial valuation standard, firms would be exposed to fully know with certainty their employees' benefit obligations. After performing actuarial valuation on a firm's employee benefit liabilities, priorities would then be given to funding at least a percentage of these obligations in order to explicitly match liabilities with assets and mitigate against the cash-flow risk of failing to satisfy termination payment obligations to ex-employees from strained working capital. Consequently, the cost of gaining investment returns on the matching assets progressively declines. The funding strategy enforces cost certainty and improves the stability of the income statement so that the firm's credit rating status by external rating agencies is enhanced. Irrespective of whatever kind of pension scheme is designed by companies in favour of their staff, it is necessary for such companies to recognize the contributions of members to the pension plan in the income statement as pension costs and again companies should recognise provisions in the balance sheet for the pension plan liabilities. In accordance with IAS 19 requirements companies should identify the company's pension plans either as a defined benefit scheme or a defined contribution scheme.

In actuarial pensions literature, many previous papers have concentrated on the financial impact of pension accounting and the rationale behind adopting one type of pension plan or another. Nonetheless, the pervasive effect of compulsory accounting standards in terms of mathematical models has not yet been comprehensively explored. In (Swinkels, 2006; Severinson, 2010; Demaria, Dufour, Louisy-Louis, Luu, 2012; Hartwell, 2012; Sandu, 2012; Glaum, Keller, Street, 2018; Klein & Fulbier, 2019), the trends of swapping pension plans were studied and consequently it is observed that firms prefer having consistent income distribution profiles and hence supports having a fixed form of pension contribution. From the author's perspective, this may mean that defined contribution schemes may have replaced the various defined benefit pension schemes, especially in the U.S. The financial statements of companies the author cross-examined especially in the Netherlands provides prima facie evidence of the introduction of IFRS to be the motivating rationale why swap pension scheme from defined benefits schemes to defined contribution schemes. According to the author, many firms in the Netherlands still provide defined benefits schemes to their employees while only a few firms provide defined contribution schemes. This has orchestrated the reasons why the pervasive consequences of post-retirement benefit standards in IAS 19 are mathematically appraised and to establish the effect of different variables on the consequences of the introduction of this standard. It is believed that the introduction of the post-retirement benefit standard in IAS 19 is responsible for swapping pension plans. This work contributes to the argument in respect of the financial implications of accounting standards by assessing the effect of IAS 19 mathematical models to establish conditions for pension liability to become zero under the defined international accounting standard 19 architecture. In line with few previous works (De Jong et al., 2006, Gopalakrishnan and Sugrue, 1992, Collins et al., 1981, Ali and Kumar, 1994), the results of these papers did not show any evidence that the effect of IAS 19 introduction affected the managed pension schemes. A company's choice on swapping pension schemes cannot be ascertained through the size effect of the consequences of IAS 19 on managed pension schemes. Nonetheless, what could be observed is that the ageing demographic variables and the possible consequences of corridor methodology termination could affect a company's drastic decision to swap pension schemes. This falls in line with (Klumpers & Whittington, 2003) who noted that long-term funding, investment and operating frameworks actually influence an employer-sponsored pension fund decision.

Methods and Materials

IAS 19 model: The accounting for defined benefit plans in the financial statements of the plan sponsor is usually complicated because employers do not recognise the expense of the retirement benefits which should be accounted for and also managed at the end of each accounting period. Since these benefits could be payable in future and their cost dependent on a number of variables such as mortality and return on investments that are usually complex to establish ahead, the computation of expense that ought to be recognized in an accounting period is complex. As the plan sponsor would bear the investment risk of the shortfall evolving from a defined benefit scheme, especially where the sum contributed by both the plan sponsor and the scheme members in addition to the net investment return on total contributions are inadequate to settle the scheme pension benefits when they fall due. Consequently, such a shortfall could result in a short-term to long-term liability of the plan sponsor above its annual funding budgetary allocation and hence needs to be recognized in the employer's financial statements. The converse is also applicable where any excess of assets in the pension scheme that could reduce the employer's payments obligations in the future could be needed to be recognized as an asset in its financial statements. In (McNally & O'Connor, 2013), the International Accounting Standard No. 19 (IAS 19) requires internationally recognized guidance on accounting for and disclosure in financial statements of defined benefit pension obligations. The first stated objective of IAS 19 is to ensure that the sponsor's balance sheet shows a net pension liability or asset concerning employee's benefits to be settled in the future and such defines the balance sheet approach. The second objective of IAS 19 is to ascertain that the sponsor's income statement recognizes an expense where the company consumes a financial benefit evolving from the services rendered by the employee in exchange for the employee's benefits. In spite of the stated objectives, the IAS enshrines provisions to enhance a more smoothed result in the published financial statements under the corridor approach.

The IAS 19 Model Descriptions

Model 1

$$L_{IAS}=\left(\frac{S_C}{k}\right)\times\left(\frac{k}{60}\right)\times\left(SAL\times(1+SAL_G)^x\right)\times\left(\frac{1}{(1+BR)^x}\right)\times\left(\frac{\left(1-\left(\frac{1}{(1+AF)}\right)\right)^N}{AF}\right)$$

Model 2

$$AF=\left(1-\left(\frac{1}{1+AR}\right)\right)^{\frac{N}{AR}}$$

Model 3

$$AR=\left(\frac{(1+d)}{(1+P_g)}\right)-1$$

where;

L_{IAS} is the total service liability

k is the number of pensionable years ($Current\ age-entry\ age$)

S_C is the number of years of pensionable service completed to date ($Current\ age-entry\ age$)

x is the number of years to retirement $retirement\ age-current\ age$

$d=4.5\%$ is the discount rate

$P_g=10\%$ is the pension increase

$EI=17.9\%$ is the expected rate of inflation

$SAL=current\ salary$

SAL 5% is the salary growth rate

$BR=$üüü is the corporate bond rate

$AF=annuity\ factor$

$AR=annuity\ rate$

$N=10\ years$ is the expected life span post retirement

The salary data and demographic statistics of 25 employees were collected from the management office of a government institution in Jos North, Plateau state Nigeria. Analysis was performed using the international accounting standard IAS 19 model based on (McNally & O'Connor, 2013). The data was properly cleaned and free of possible errors to carry out full computation of the actuarial liability. The data include the current age, past service years, future service year(s) and the salary of each employee.

Results

Table 1: The Table of Liability L_{IAS}

PCN	A	B	C	D	E	F
001	0.836735	0.816667	2976281	0.37886	0.079202	61026.71
002	0.761905	0.7	3864292	0.297234	0.075036	45965.85
003	0.657143	0.583333	2342968	0.233195	0.071367	14947.26
004	0.545455	0.55	2611741	0.16205	0.066653	8462.95
005	0.46875	0.533333	2445483	0.127136	0.063959	4971.359
006	0.351351	0.616667	3171048	0.05438	0.056699	2118.4
007	0.351351	0.616667	3171048	0.05438	0.056699	2118.4
008	0.405405	0.616667	29203581	0.069314	0.05848	29593.61
009	0.384615	0.65	3011727	0.05438	0.056699	2321.5
010	0.15	0.333333	2253605	0.127136	0.064375	922.2164
011	0.090909	0.55	2833759	0.02626	0.052441	195.1202
012	0.075	0.666667	3133408	0.011232	0.049	86.22894
013	0.069767	0.716667	3627312	0.007805	0.0479	67.80832
014	0.083333	0.6	2577863	0.018248	0.050798	119.4811
015	0.088235	0.566667	1633694	0.02326	0.051862	98.53619
016	0.075	0.666667	2189306	0.011232	0.049	60.248
017	0.075	0.666667	2189306	0.011232	0.049	60.248
018	0.069767	0.716667	2534396	0.007805	0.0479	47.37755
019	0.081081	0.616667	1891205	0.016164	0.050309	76.89438
020	0.083333	0.6	1801148	0.018248	0.050798	83.48121
021	0.076923	0.65	2085054	0.012681	0.049412	65.32452
022	0.073171		2298772	0.009949	0.048612	55.58874
023	0.090909	0.55	1555899	0.02626	0.052441	107.1324
024	0.1	0.5	1344044	0.037789	0.054389	138.1223
025	0.088235	0.566667	1633694	0.02326	0.051862	98.53619
Total	6.133373	15.333336	88380636.39	1.81949	1.404893	173808.38

In table 1, column A defines the numbers of pensionable service completed to date that is (current age – entry age) divided by the number of pensionable years that is (retirement age – entry age). Column B indicates the number of pensionable years that is (retirement age – entry age) divided by 60. Column C indicates the current salary that is (month salary × 12) multiplied by 1 plus the salary growth of 5% to the power of the numbers of years to retirement that is (retirement age – current age). Column D indicates 1 divided by 1 plus the bond rate 2.899% raised to power of the numbers of years to retirement (x). Column E indicates 1 minus annuity factor raised to power of the expected life span post retirement that is N = 10 years. Lastly column F indicates the total service liability of the entire participants on the scheme that is the products of columns A × B × C × D × E which will give us the total service liability of 173,808.38.

where $A=\left(\frac{S_c}{k}\right)$; $B=\left(\frac{k}{60}\right)$; $C=SAL\times(1+SAL_G)^x$; $D=\frac{1}{(1+BR)^X}$;

$$E=\left[\frac{\left(1-\left(\frac{1}{(1+AF)}\right)^N\right)}{AF}\right]$$

$$F=\left(\frac{S_c}{k}\right)\times\left(\frac{k}{60}\right)\times\left(SAL\times\left(1+(SAL_G)^X\right)\right)\times\left[\frac{\left(1-\left(\frac{1}{(1+AF)}\right)^N\right)}{AF}\right]=L_{IAS}$$

Table 2: Table of Service Years Completed

PCN	G	H	X	J
001	2014464	41	57	8
002	2372340	32	55	10
003	1304652	23	53	12
004	1256292	18	50	15
005	1066956	15	48	17
006	983240.3	13	41	24
007	983240.3	13	41	24
008	9983240	15	43	22
009	933840	15	41	24
010	983240.3	3	48	17
011	655668	3	35	30
012	515244	3	28	37
013	515244	3	25	40
014	515244	3	32	33
015	360000	3	34	31
016	360000	3	28	37
017	360000	3	28	37
018	360000	3	25	40
019	360000	3	31	34
020	360000	3	32	33
021	360000	3	29	36
022	360000	3	27	38
023	360000	3	35	30
024	360000	3	38	27
025	360000	3	34	31
Total	28042904.9			

Table 2 is the table of service years completed, in column G we have the annual salary that is monthly salary × 12, column H indicates the current age minus entry age, column X is the column for age and lastly column J is the retirement age minus the current age of each participants of the scheme. The total salary resulted to 28,042,904.90.
PCN is the employee's Permanent code number
G is the annual salary that is monthly salary × 12
H = current age – entry age
X = age = (current year – entry age)
J = Retirement age – current age

Table 3: Sensitivity Analysis for Ordinary Annuity Table

PCN	K	L	M
001	0.01	0.034653	0
002	0.011	0.03363	0
003	0.012	0.032609	0
004	0.013	0.031589	0
005	0.014	0.030572	0
006	0.015	0.029557	0
007	0.016	0.028543	0
008	0.017	0.027532	0
009	0.018	0.026523	0
010	0.019	0.025515	0
011	0.02	0.02451	0
012	0.021	0.023506	0
013	0.022	0.022505	0
014	0.023	0.021505	0
015	0.024	0.020508	0
016	0.025	0.019512	0
017	0.026	0.018519	0
018	0.027	0.017527	0
019	0.027	0.017527	0
020	0.028	0.016537	0
021	0.029	0.015549	0
022	0.03	0.014563	0
023	0.031	0.013579	0
024	0.032	0.012597	0
025	0.033	0.011617	0
Total	0.543	0.570784	0

Table 3 indicates sensitivity analysis for ordinary annuity. Column K indicates P_g (i.e. pension increase of 10%). Column L indicates discount rate 4.5% minus P_g (pension increase) divided by 1 plus pension increase. Column M is defined below which will result to zero no matter how pension increase (P_g) varies.

where; $K = P_g$; $L = \dfrac{d - P_g}{1 + P_g}$; $M = \left[1 - \left(\dfrac{1 + P_g}{1 + d}\right)\right]^{\frac{N}{AR}}$

Table 4: Table of Life Annuity

PCN	X	P	Q
001	57	13.626	12.626
002	55	14.327	13.327
003	53	15.012	14.012
004	50	16.003	15.003
005	48	16.635	15.635
006	41	18.637	17.637
007	41	18.637	17.637
008	43	18.1	17.1
009	41	18.637	17.637
010	48	16.534	15.534
011	35	20.069	19.069
012	28	21.408	20.408
013	25	21.877	20.877
014	32	20.686	19.686
015	34	20.282	19.282
016	28	21.408	20.408
017	28	21.408	20.408
018	25	21.877	20.877
019	31	20.877	19.877
020	32	20.686	19.686
021	29	21.238	20.238
022	27	21.571	20.571
023	35	20.069	19.069
024	38	19.386	18.386
025	34	20.282	19.282

Source: Neil (1979)

Table 4 is the table of life annuity (annuity due and annuity immediate). Column X indicates the age of each participant's on the scheme while Column P indicates life annuity due a_x and column Q is the column of life annuity immediate (a_x). where; X = age; P = a_x (annuity due) and Q = a_x (annuity immediate)

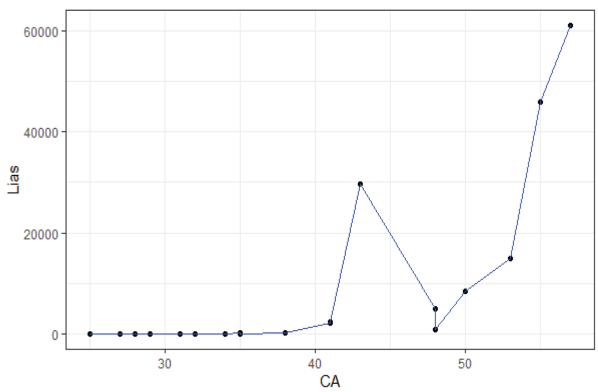

Figure 1: Graph L_{IAS} against Age

Figure 1 is the graph of service liability against their respective ages of participants in the scheme. The figure indicates that the service liability between 40 and 50 years, there are two local minima and progressively rises until it approaches 60 while between 40 and 45 years, two maxima are visible. The liabilities curve dropped while approaching 50 but thereafter sharply increases. The left tail is an asymptotes to the real axis.

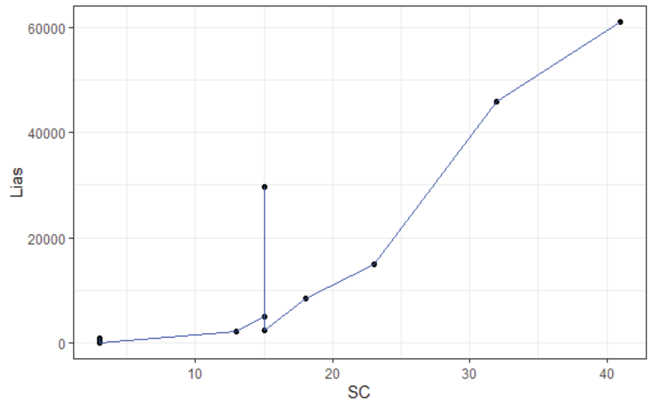

Figure 2: Graph of L_{IAS} against S_C

Figure 2 is the graph of service liability (L_{IAS}) against numbers of pensionable service years completed to date (S_C). Here the number of pensionable service years at 15 years is at a local minimum while above 30 years and 40 years are local maxima.

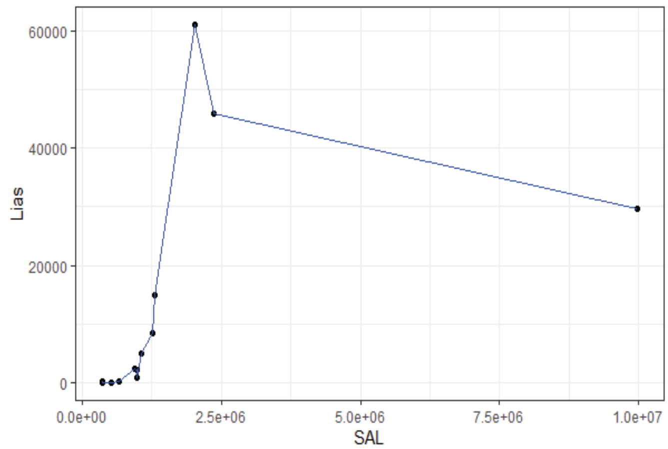

Figure 3: Graph of L_{IAS} against Salary

Figure 3 is the graph of total service liability (L_{IAS}) against their respective salary (SAL) for each member of the scheme. The salary clusters around 0 to 18,000 on the horizontal axis while the liability assumes a local maximum of 60,000.

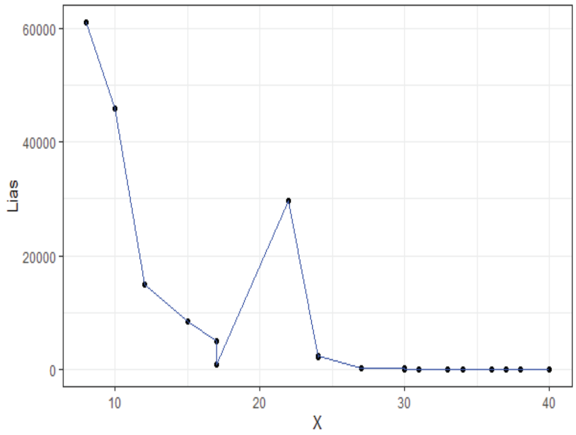

Figure 4: Graph of L_{IAS} against Future Service

Figure 4 is a graph of service liability against the future service years. The right tail of the curve is almost asymptotes to the horizontal axis, also we have a local maximum between 20 and 30 years which eventually dropped, then we finally have a local minimum between 15 and 20 years.

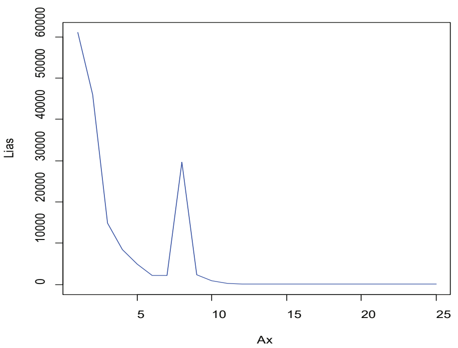

Figure 5: Graph of L_{IAS} against Life Annuity

Figure 5 is the graph of service liability (L_{IAS}) against life annuity and the right tail of the curve is also an asymptote to the horizontal axis, a local minimum between 5 and 7 years while a local maximum in form of a spike exists between 7 and 10 years.

Discussion

The discussions below is based on our results in table 3 column M. From the description of the parameters, we let N be the expectation of life at retirement.
Using model 3 under the conditions that

Using equation (3), $AR = \frac{d - P_g}{1 + P_g}$ and

$$AF = \left(1 - \left(\frac{1+P_g}{1+d}\right)\right)^{\frac{N}{AR}}$$

then $L_{IAS} \to 0$

Note that $\lim_{n\to\infty} a^n = 0$ for $|a| < 1$. We observe that $\left|\frac{1+P_g}{1+d}\right| < 1$. Again since $N \in \mathbf{Z}^+$ and $AR \in \mathbf{R}^+$. Specifically since $AR < 0$ so that $(1+AR) < \varepsilon$ for $\varepsilon > 0$ a small number greater than zero, then $\frac{N}{AR} \to -\infty$

consequently $\left(1 - \frac{1+P_g}{1+d}\right) < 1$ and $\left(1 - \frac{1+P_g}{1+d}\right)^{\frac{N}{AR}} \to 0$

hence $L_{IAS} = 0$

Let $\frac{1}{\alpha} = \beta$ and observe that if $0 < \alpha < 1$, then β is relatively bigger than α, that is $\beta > \alpha$

Consequently, $(\alpha)^{-\frac{N}{AR}} = \frac{1}{(\alpha)^{\frac{N}{AR}}} = \left[\frac{1}{\alpha}\right]^{\frac{N}{AR}}$ (4a)

$$(\alpha)^{-\frac{N}{AR}} = \frac{1}{(\alpha)^{\frac{N}{AR}}} = \frac{1}{\alpha^{\infty}} = \frac{1}{\infty} = 0 \quad \text{(4b)}$$

$L_{IAS} = f(\alpha, AF)$

$$f(\alpha, AF) = \begin{cases} g(\alpha) \neq 0 & for \quad \alpha = a_x \\ g(AF) \to 0 & for \quad \alpha = AF \end{cases} \quad (5)$$

where $\alpha = a_x \; \& \; \ddot{a}_{n+1} = \ddot{a}_x$

$$AR = \left(\frac{(1+d)}{(1+P_g)}\right) - 1 \quad (6)$$

$$AR = \frac{1+d}{1+P_g} - \frac{1}{1} \quad (7)$$

$$AR = \frac{(1+d) - (1+P_g)}{1+P_g} \quad (8)$$

$$AR = \frac{(1+d)-(1+P_g)}{1+P_g} \qquad (9)$$

$$AR = \frac{d-P_g}{1+P_g}$$

$$\frac{1+d}{1+P_g} \aleph\aleph\aleph 1 \quad d \quad 1 \quad P_g \quad d \quad P_g \qquad (9a)$$

$$AF = \left(1-\left(\frac{1}{1+AR}\right)\right)^{\frac{N}{AR}} \qquad (10)$$

Consider the denominator $1+AR = 1+\left(\frac{d-P_g}{1+P_g}\right)$ (11)

$$1+AR = \frac{1}{1}+\left(\frac{d-P_g}{1+P_g}\right) \qquad (12)$$

$$1+AR = \frac{1+d}{1+P_g} \qquad (13)$$

$$(1+AR)(1+P_g) = 1+d \qquad (14)$$

$$d = (1+AR)(1+P_g)-1 \qquad (15)$$

Then $\frac{1}{1+AR} = \left(\frac{1+P_g}{1+d}\right) < \varepsilon$ (16)

where ε is a small number and

$$AF = \left(1-\left(\frac{1+P_g}{1+d}\right)\right)^{\frac{N}{AR}} = \left[\frac{1}{1}-\left(\frac{1+P_g}{1+d}\right)\right]^{\frac{N}{AR}} = \left(\frac{d-P_g}{1+d}\right)^{\frac{N}{AR}} \qquad (17)$$

Based on the arguments in (4a) and (4b),

$$\left(\frac{d-p_g}{1+d}\right)^{\frac{N}{AR}} \to 0$$

But from the statistics given, we computed $\frac{N}{AR} = 5122$

Also observe that, $\left[\frac{1+P_g}{1+d}\right]^{5122} = 0$ since 5122 is comparatively very large.

Following (McNally & O'Connor, 2013), the liability becomes zero, this is due to the value of annuity factor defined as $AF = \left(1-\left(\frac{1}{1+AR}\right)\right)^{\frac{N}{AR}} \to 0$

$$\text{üüüü}_{IAS} = \left(\frac{S_c}{k}\right)\times\left(\frac{k}{60}\right)\times\left(\quad \times\left(1+\left(\quad _G\right)^X\right)\right)\times\left[\frac{\left(1-\left(\frac{1}{(1+AF)}\right)^N\right)}{AF}\right] \qquad (19)$$

Since AF is infinitesimally very small, $AF \to 0^+$ and the term $\frac{1}{(1+AF)}$ is vanishingly zero and hence $L_{IAS} = 0$ which confirms our result in the computed column M, table 3. Consequently, this represents a phantom of zero liability.

Conclusion

The $IAS\ 19$ model for pension liability computation has been presented in this study. The process of analysis utilized the model in (McNally & O'Connor, 2013). Although the application of $IAS\ 19$ possess far-reaching advantages for a firm and its employees, computational evidence from our results proves that the total service liability under the conditions of the current model is vanishingly zero. This presents a phantom effect detected in (McNally & O'Connor, 2013). However, our findings show that when the annuity factor is replaced by a life table annuity, the service liability does not vanish. Consequently, the phantom effect in total service liability obtained as zero, therefore, initiates inquiry as to whether this current valuation framework causes potential uncertainties for the pension trustees who are responsibly saddled with both administrative and core decision-making responsibilities of the system.

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