



PBSS
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DEFINING AMBITION

DEFINING A POSTERIORI DISTRIBUTION OF AN ACTUARIAL VALUATION FORECASTING: A MIXED APPROACH (COMPANIES UNDER LABOR ACQUIRED RIGHTS ENVIRONMENT)

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BACKGROUND

- During 2001, COMPANY ABC performed a pseudo early retirement window (ERW) program.
- The reason for applying a pseudo early retirement window (ERW) program is that within the labor law which applies to its operation, negative amendments are not allowed.
- Nevertheless, it decided to perform a new one as of 2014.
- Its aim is to use the program as a rightsizing mechanism, applying it on a five year period.
- It has asked its Consulting Actuary to perform a 5-year estimate of the impact over its expected obligations should the program be applied.



CONSTRAINTS

- Given that the demographic and financial assumptions used during the exercise were those used in the actuarial valuation as at December 31/2013, in compliance with IAS 19, the client wishes that results will be in line with such standard.
- Given that the company performed a pseudo early retirement window (ERW) program (which we shall refer as a non-proper early retirement window – NPERW), the way that its impact must be calculated differs from that of an ERW.
- Due to budget and time issues an ALM approach is not feasible, neither is to perform a straight forward non-stochastic actuarial forecasting.

Complying with IAS 19

- IAS 19, states that:
 - “using actuarial techniques to make a reliable estimate of the amount of benefit that employees have earned in return for their service in the current and prior periods. This requires an entity to determine how much benefit is attributable to the current and prior periods (see paragraphs 67–71) and to make estimates (actuarial assumptions) about demographic variables (such as employee turnover and mortality) and financial variables (such as future increases in salaries and medical costs) that will influence the cost of the benefit (see paragraphs 72–91); ” (paragraph 50(a))
 - “An entity shall use the Projected Unit Credit Method to determine the present value of its defined benefit obligations and the related current service cost and, where applicable, past service cost” (paragraph 64)
 - “The Projected Unit Credit Method (sometimes known as the accrued benefit method pro-rated on service or as the benefit/years of service method) sees each period of service as giving rise to an additional unit of benefit entitlement (see paragraphs 67–71) and measures ***each unit separately to build up the final obligation*** (see paragraphs 72–91)” (paragraph 65)

Assessing the differences between an ERW and a NPERW

Under an ERW

- Its impact relates exclusively to the results for those participants eligible to retire under the program.

Under a NPERW

- Its impact relates to the results for all active participants at the starting date of the program, regardless of their status (eligible or non-eligible to retire under the plan conditions).
- The reason for the above is that it will set a date (breakpoint), so that employees hired afterwards shall retire under the conditions of the original plan.

The proposed algorithm

- In order to simplify the explanation we will divide the algorithm in 3 steps, which shall be repeated during each iteration:
 - a. Setting the initial parameters;
 - b. Working with the different types of employee;
 - c. Modifying databases to get on to the next year.



The proposed algorithm (Setting the initial parameters)

- Let N^* be the total amount of participants under the plan
- The above, shall be divided into five groups:
 - $N^1 = N^{1.1} + N^{1.2}$, which comprises active participants with Entry Date Before 09/01/2001;
 - $N^2 = N^{2.1} + N^{2.2}$, which comprises active participants with Entry Date From 09/01/2001;
 - N^3 , which comprises inactive participants.
- Our first parameter to be set will be our target which will be defined as a percentage of the eligible participants under the NPERW ($N^{1.1} + N^{2.1}$). Given the level of the increased benefits and the average number of years of service, our client expects that all of the eligible participants shall be retired by the end of the program.
- Then, we shall define, for each eligible participants per valuation year. the variable: $\beta_x = \ln((\text{attained age}) + (\text{accrued years of service}))$, per sex.

The proposed algorithm

(Setting the initial parameters – cont.)

- Thus, β_x will be distributed as a:
 - $N(\sigma_M, \bar{X}_M)$ if the participant is male;
 - $N(\sigma_F, \bar{X}_F)$ if the participant is female.
- Where:
 - (σ_M, \bar{X}_M) will be the standard deviation and mean of male eligible participants;
 - (σ_F, \bar{X}_F) will be the standard deviation and mean of female eligible participants.

The proposed algorithm

(Working with the different types of employee)

- As stated before, N^* has been divided into three main groups.
- For the purpose of the study N^3 will not be considered as it will not have an impact over the obligations due to the implementation of NPERW plan.
- $N^{*2} = N^{1,2} + N^{2,2}$ will be actuarially projected in a regular fashion, having into account that their obligations will be adjusted to the probability of being part of the group n-years later. In addition, due to the fact that we are dealing with an NPERW, it shall be valued under its original plan and the amendment (in line with IAS 19, paragraph 97).
- $N^{*1} = N^{1,1} + N^{2,1}$; is the group where Monte Carlo shall apply.

The proposed algorithm

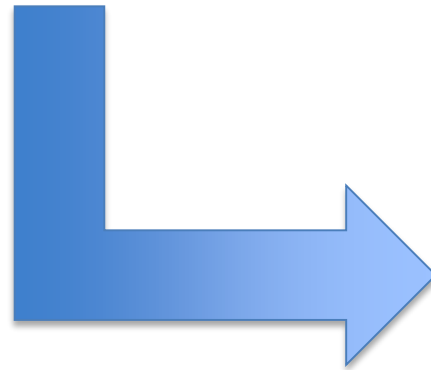
(Modifying databases to get on to the next year)

- As from the second year, databases are modified in according to the following criteria:
 - Salaries and pensions are increased in terms of the plan's conditions and the actuarial assumptions being used;
 - The above items are also adjusted in terms of the probability of survivorship (if retiree) or remaining in the group (if active);
 - Attained ages, accrued years of service, future years of service are adjusted in terms of the accrual of an extra year of service.



Changes in Plan Definition

CONCEPT	Entry Date Before 09/2001	Entry Date From 09/2001
Normal Retirement Age	Male: 50 ; Female: 45	Male: 60 ; Female: 55
Minimum Retirement Age	Male: 45 ; Female: 40	Male: 55 ; Female: 50
Minimum Years of Service	15	20
Early Retirement	35 years of service regardless of age	



CONCEPT	Entry Date Before 09/2001	From 09/2001 Until 08/2014	Entry Date From 09/2014
Normal Retirement Age	Male: 50 ; Female: 45	Male: 60 ; Female: 55	Male: 60 ; Female: 55
Minimum Retirement Age	Male: 45 ; Female: 40	Male: 55 ; Female: 50	Male: 55 ; Female: 50
Minimum Years of Service	15	20	20
Especial Condition	Employees with more than 10 years of service can retire if it requires less than 5 years to attain their retirement age		N/A
Early Retirement	35 years of service regardless of age		

Changes in Plan Definition

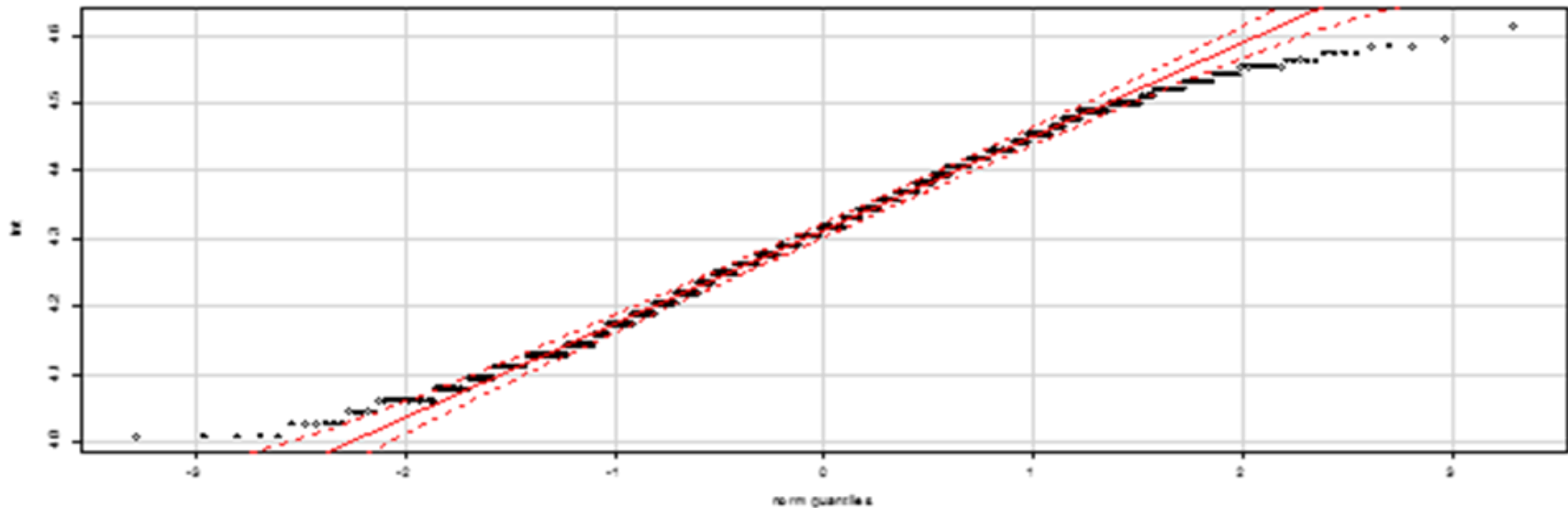
Entry Date Before 09/2001			Entry Date From 09/2001		
YOS	DBO (%)	NC (%)	YOS	DBO (%)	NC (%)
10	60,00%	2,00%	10	55,00%	1,00%
15	70,00%	2,00%	15	60,00%	1,00%
20	80,00%	2,00%	20	65,00%	2,00%
25	90,00%	2,00%	25	75,00%	2,00%
30	100,00%	0,00%	30	85,00%	3,00%
35	100,00%	0,00%	35	100,00%	0,00%



Entry Date Before 09/2001			From 09/2001 Until 08/2014			Entry Date From 09/2014		
YOS	DBO (%)	NC (%)	YOS	DBO (%)	NC (%)	YOS	DBO (%)	NC (%)
10	70,00%	2,00%	10	60,00%	1,00%	10	55,00%	1,00%
15	80,00%	2,00%	15	65,00%	2,00%	15	60,00%	1,00%
20	90,00%	2,00%	20	75,00%	2,00%	20	65,00%	2,00%
25	100,00%	0,00%	25	85,00%	3,00%	25	75,00%	2,00%
30	100,00%	0,00%	30	100,00%	0,00%	30	85,00%	3,00%
35	100,00%	0,00%	35	100,00%	0,00%	35	100,00%	0,00%

Checking the Assumption on the Distribution of β_{x_i}

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
4.007	4.220	4.317	4.312	4.407	4.615



Valuation Results: Non-vested employees (In Millions)

- Over this group Monte Carlo simulations were not going to be applied, a sole figure relates per valuation year (given that 0 relates to the starting point, it is as from year 1 that a difference exits).

CONCEPT	0	1	2	3	4	5
After NPERW	75.045,70	83.340,98	92.376,81	102.553,48	113.754,87	126.255,09
Before NPERW	75.045,70	83.337,37	92.367,98	102.522,34	113.679,39	126.086,34
Diference	0,00	3,61	8,83	31,13	75,48	168,74

- It is important to point out that the different at year 1, will constitute a Prior Service Cost.

Valuation Results: Vested employees (In Millions)

- Based on 1,500 iterations, the following DBOs were obtained:

YEAR	PERCENTILES						
	Min	10	25	50	75	90	Max
0	23.705,80						
1	25.972,55	26.042,71	26.069,62	26.105,25	26.147,69	26.182,31	26.266,07
2	30.770,00	30.889,06	30.941,25	30.988,86	31.053,05	31.111,18	31.251,65
3	36.814,17	37.009,47	37.077,76	37.144,03	37.223,11	37.285,38	37.536,77
4	44.148,28	44.438,99	44.500,22	44.566,44	44.642,83	44.707,14	44.891,14
5	53.165,87	53.370,89	53.449,57	53.548,31	53.634,31	53.702,60	53.898,69

- Now, in order to determine the differences, we had to calculate a baseline equal to the results as if the NPERW was not in place. This gave the following results:

CONCEPT	0	1	2	3	4	5
Without NPERW	23.705,80	25.933,94	30.744,96	36.797,47	44.137,42	53.155,59



Valuation Results: Active employees (In Millions)

- The following table shows the consolidated impact over the DBO, due to the implementation of the NPERW program:

YEAR	PERCENTILES						
	Min	10	25	50	75	90	Max
0				0,00			
1	42,22	112,38	139,29	174,92	217,36	251,98	335,74
2	33,86	152,93	205,12	252,73	316,92	375,05	515,52
3	47,83	243,13	311,42	377,68	456,77	519,04	770,43
4	86,32	377,04	438,28	504,50	580,89	645,20	829,20
5	179,02	384,04	462,72	561,45	647,46	715,75	1.011,84

CONCLUSIONS

- If a company is within a country where its labor law requires that companies must comply with the acquired rights definition (i.e., negative amendments to employ benefits are not allowed for active employees and should they wished to be put in force, these shall only apply to employees hired after its implementation date).
- Under such environment, a normal early retirement window (ERW) cannot be implemented. Instead, a non-proper early retirement window (NPERW) should be applied.
- The major difference between an ERW and a NPERW is that while the impact of an ERW is just over eligible (vested) participants, in a NPERW the impact is over all active participants (eligible and non-eligible) as of its implementation date.

CONCLUSIONS (cont.)

- Another difference between an ERW and a NPERW is that while the impact of an ERW does not affect the original plan conditions at the window's closing date, NPERW does affect it.



THANK YOU FOR YOUR ATTENTION!

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