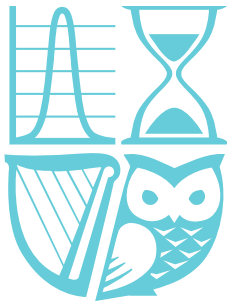

Society of Actuaries in Ireland

Annuity Conversion Rates in Retirement Fund Product Illustrations

Mortality Bases Review

May 2015

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1 Introduction

1.1 This report has been prepared by the Demography Committee of the Society of Actuaries in Ireland ("Society") to review the mortality assumptions used in converting a retirement fund into an annuity as prescribed in the following Actuarial Standards of Practice:

- Actuarial Standard of Practice ASP LA-8 "Life Assurance Product Information"[1] ("ASP LA-8")
- Actuarial Standard of Practice ASP PEN-12 "Statements of Reasonable Projection – Occupational Pension Scheme and Trust RACs"[2] ("ASP PEN-12")
- Actuarial Standard of Practice ASP PRSA-2 "Personal Retirement Savings Accounts Product Information"[3] ("ASP PRSA-2")

1.2 The previous review[4] of mortality assumptions took place in 2009 and its conclusions were reflected in version 1.8 of ASP LA-8, version 1.0 of ASP PEN-12 and version 1.4 of ASP PRSA-2 (effective 1 July 2009).

1.3 The following reports on Irish mortality experience since 2008 indicate that a review of the current mortality assumptions for benefit illustrations is required:

- Report on the 2013 pensioner mortality study of Irish self-administered pension schemes (SAPS)[5];
- Irish Population and Labour Force Projections 2016 to 2046[6];and
- The 2008 to 2012 Annuitant Mortality Aggregated Data Study[7].

[1] https://web.actuaries.ie/standards/asp/asp-la-8

[2]https://web.actuaries.ie/standards/asp/asp-pen-12

[3] https://web.actuaries.ie/standards/asp/asp-prsa-2

[4] "Review of Rates of Mortality Improvement for the purposes of ASPs on Product Information":

https://web.actuaries.ie/sites/default/files/member_story/2009/01/Mortality_Rates_for_Product_Information_Projections/0901%20Mortality%20Rates%20for%20Product%20Information%20projections.pdf

[5]https://web.actuaries.ie/sites/default/files/member_story/2013/12/SAI%20Mortality%20Report%20Final%20Nov%202013.pdf

[6]http://www.cso.ie/en/media/csoie/releasespublications/documents/population/2013/poplabfor2016_2046.pdf

[7] The full report and results of the Society's Annuitant Mortality Aggregated Data Study are to be published in the second half of 2015. Some initial results are shown in Appendix B.

1.4 The 2013 SAPS mortality investigation indicated that mortality rates have continued to improve in recent years, but at rates slower than are assumed currently in ASP LA-8, ASP PEN-12 and ASP PRSA-2. This is consistent with the reduction in population mortality improvement rates recorded by the Central Statistics Office (CSO) in recent years[8], and is also consistent with the CSO's decision to reduce the assumed rates of future mortality improvements in its latest set of labour force projections[9].The Demography Committee therefore concluded that the mortality bases for ASP LA-8, ASP PEN-12 and ASP PRSA-2 should be updated.

1.5 In June 2014 the Society recommended to the Pensions Authority and to the Department of Social Protection a change to the mortality assumptions to be used in calculating retirement benefit scheme transfer values. The mortality basis review and recommended changes are outlined in the report "Retirement Benefit Schemes Transfer Values - Mortality Basis Review"[10]. A similar approach is adopted in the review of mortality assumptions and resulting recommendations outlined in this report.

1.6 The remainder of this report is laid out as follows:

- Section 2 provides the background of the current mortality assumptions in ASP LA-8, ASP PEN-12 and ASP PRSA-2.
- Section 3 describes the methodology used to review the mortality assumptions.
- Section 4 considers future mortality improvements and projection methods.
- Section 5 presents the Demography Committee's proposed new mortality basis for ASP LA-8, ASP PEN-12 and ASP PRSA-2.

[8] Section 4 – paragraphs 4.1 to 4.3

https://web.actuaries.ie/sites/default/files/story/2014/07/140704%20Transfer%20Values%20Mortality%20Bases%20Review.pdf

[9]http://www.cso.ie/en/media/csoie/releasespublications/documents/population/2013/poplabfor2016_2046.pdf

[10] "Retirement Benefit Schemes Transfer Values - Mortality Basis Review"
https://web.actuaries.ie/sites/default/files/story/2014/07/140704%20Transfer%20Values%20Mortality%20Bases%20Review.pdf

2 Background to Current Mortality Basis

2.1 The current mortality assumptions are based on a report prepared by the Society's Demography Committee in 2009 ("Review of Rates of Mortality Improvement for the purposes of ASPs on Product Information"[11]) and its recommendations were adapted in version 1.9 of ASP LA-8, version 1.0 of ASP PEN-12 and version 1.4 of ASP PRSA-2 (effective 1 July 2009).

2.2 The recommended mortality basis was as follows:

- Males: 52% of PNMA00
- Females: 60% of PNFA00

with an increase to the annuity value of:

- 0.44% per annum for men with no spouses pension
- 0.36% per annum for women with no spouses pension and
- 0.27% per annum for men or women with spouses pension

These increases are applied on a compound basis for each year from 2008 until the year in which normal pension date falls.

2.3 It was necessary to establish a simplified basis as a proxy for the actual underlying mortality assumptions, in order to avoid potentially causing logistical difficulties for some users whose IT systems were not able to handle the two-dimensional nature of the underlying assumptions. The simplified proxy basis in paragraph 2.2 above represents an approximation for the following more precise, underlying basis:

91% of PNA00 for both males and females with the mortality improvements assumed by the Central Statistics Office in its 2008 report[12].

2.4 In carrying out the mortality review and making recommendations as outlined above the Demography Committee considered the following reports:

- An investigation into Irish pensioner mortality experience over the period 2003 to 2006[13].
- The 2006 to 2007 Annuitant Mortality Aggregated Data Study[14]

[11]https://web.actuaries.ie/sites/default/files/member_story/2009/01/Mortality_Rates_for_Product_Information_Projections/0901%20Mortality%20Rates%20for%20Product%20Information%20projections.pdf

[12] http://www.cso.ie/en/media/csoie/releasespublications/documents/population/2008/poplabfor_2011-2041.pdf

[13]https://web.actuaries.ie/sites/default/files/member_story/2008/05/May%202008%20Mortality%20Report.pdf

[14]https://web.actuaries.ie/sites/default/files/story/2007/11/November_2007/Newsletter_November_2007.pdf

- CSO Population and Labour Force Projections 2011 to 2041[15] .

2.5 Following the European Court of Justice ruling that Article 5(2) of the Gender Directive 2004/113/EC was in breach of European Union gender discrimination laws, ASP LA-8, ASP PEN-12 and ASP PRSA-2 were all amended to prescribe the use of unisex annuity rates in converting a retirement fund into an annuity for benefit illustrations The unisex annuity rates prescribed the use of female mortality for the retiree (irrespective of the actual gender of the retiree) and male mortality for the retiree's spouse or civil partner.

2.6 In order to remove potential anomalies where, over a long projection period, the price of a female annuity was greater than the price of the corresponding last survivor annuity with a low reversion percentage, the joint life mortality improvement factor was changed from 0.27% to 0.36% (and so was then equal to the female improvement factor).

2.7 The resulting basis reflected in ASP LA-8 v1.10, ASP PEN-12 v1.2 and ASP PRSA-2 v1.6 (effective from 1 March 2012) was therefore as follows:

- female mortality for the retiree (irrespective of the actual gender of the retiree) and male mortality for the retiree's spouse or civil partner; and
- using the following mortality assumptions:

  Female mortality: 60% PNFA00; and

  Male mortality: 52% PNMA00.

- with an increase to the annuity value of 0.36% per annum applied on a compound basis for each year from 2008 until the year in which normal pension date falls (for both single and last survivor annuities).

[15] http://www.cso.ie/en/media/csoie/releasespublications/documents/population/2008/poplabfor_2011-2041.pdf

3 Methodology for Updating Mortality Basis

Mortality Study of Self-Administered Pension Schemes

3.1 In 2012, the Society initiated an updated study into the pensioner mortality experience of Irish self-administered pension schemes (SAPS), following the previous May 2008 study[16]. The final report was issued in December 2013[17]. The objective of the study was to carry out research that would assist actuaries when setting mortality assumptions, provide a basis for updating mortality assumptions in relevant ASPs, and help to quantify changes in Irish pensioner mortality experience since the previous study.

3.2 Details of the SAPS study data, methodology and results are documented in both the study report and in paragraphs 3.3 to 3.10 of the "Retirement Benefit Schemes Transfer Values – Mortality Basis Review".

Choice of Lives or Amounts Basis

3.3 The current mortality basis used in converting a retirement fund into an annuity to be illustrated as prescribed in ASP LA-8, ASP PEN-12 and ASP PRSA-2 is an amounts basis and an amounts basis will be retained for the proposed new basis. An amounts basis weights the mortality experience by the size of each member's pension and will generally result in lower mortality rates than a lives basis for the same population.

Overview of Approach

3.4 The Demography Committee analysed the SAPS experience data to ascertain if new mortality assumptions were required for ASP LA-8, ASP PEN-12 and ASP PRSA-2. The approach adopted was similar to that employed and documented in the "Retirement Benefit Schemes Transfer Values – Mortality Basis Review". This report is referred to as the"Transfer Value Review" in the paragraphs below.

[16] Report of the Working Party on Pensioner Mortality Experience under Self-Administered Pension Schemes dated May 2008:

[16] https://web.actuaries.ie/sites/default/files/member_story/2008/05/May%202008%20Mortality%20Report.pdf

[17] Report on the 2013 pensioner mortality study of Irish SAPS: https://web.actuaries.ie/sites/default/files/member_story/2013/12/Society%20Mortality%20Report%20Final%20Nov%202013.pdf

3.5 Four sets of standard tables were considered as possible bases for an updated mortality assumption:

Mortality Table	Central Exposure Year	Types of Lives
S1	2003	UK SAPS Pensioners (excluding dependants)
S2	2007	UK SAPS Pensioners (excluding dependants)
ILT15	2006	Irish Population
PN00	2000 approx.	UK Life Office Pensioners (Normal Retirements only)

3.6 The following profile was assumed to be the profile of a 'typical' " individual in receipt of a retirement benefit illustration containing the conversion of a projected accumulated retirement fund to an annuity in accordance with ASP LA-8, ASP PEN-12 or ASP PRSA-2:

Current age	45[18]
Retirement age	65
Net discount rate	1%[19]

Using the above assumptions, the Committee performed two separate analyses to determine how best to match the actual experience data from the SAPS study to the standard tables.

3.7 First, the Committee determined the adjustments required to the standard tables so that an annuity value for the 'typical' individual above, calculated using each standard table would match the annuity value calculated using the observed mortality rates from the SAPS study. This resulted in the following adjustments to the standard tables[20]:

	Lives Basis		Amounts basis	
	Males	**Females**	**Males**	**Females**
S1	91.1%	100.0%	93.7%	102.5%
S2	107.4%	113.3%	107.2%	110.4%
ILT15	89.1%	97.8%	78.6%	92.3%
PN00	100.7%	104.6%	100.3%	108.2%

[18] The current age of 45 was determined by considering the average age profile of new and existing insured lives pensioners for two large insurance companies in Ireland in November 2014.

[19] The interest rate was set at 1% based on the specification in ASPs LA-8, PEN-12 and PRSA-2, as at 01/03/2015, of an interest rate of 3% and an escalation rate of 2% per annum when converting a retirement fund into an annuity for benefit illustrations.

[20] This exercise made allowance in the annuity value calculation for future mortality improvements in line with those adopted by the CSO in its April 2013 Population and Labour Force Projections (http://www.cso.ie/en/media/csoie/releasespublications/documents/population/2013/poplabfor2016_2046.pdf).

3.8 Second, the Committee used a least-squares analysis to determine the percentage adjustment that should be applied to each standard table to produce mortality rates that closely fitted the actual experience recorded from the SAPS study, as weighted by the exposures in the SAPS study. This resulted in the following percentage adjustments:

	Lives Basis		Amounts basis	
	Males	**Females**	**Males**	**Females**
S1	88.2%	96.8%	88.4%	96.9%
S2	106.1%	108.5%	104.4%	103.5%
ILT15	86.4%	91.9%	71.7%	84.9%
PN00	95.6%	99.7%	93.8%	100.8%

3.9 The results of the least-squares analysis referred to in paragraph 3.8 were deemed to provide a reasonable independent justification for the percentage adjustments derived directly from the data, particularly for males.

3.10 As expected the percentage adjustments in 3.8 using the least squares analysis are lower than the adjustments previously calculated (paragraph3.7) based on a "typical" individual. This is due to the fact that the calculation of annuity values for the "typical" individual discounts future time periods while the "least squares" method does not.

3.11 Based on the above analysis, the Demography Committee's initial view would therefore be to use the S2 tables as the basis for the revised mortality assumptions, as the S2 tables are the most recently published of the available mortality tables and, according to the analyses performed by the Committee, provide the closest fit to the experience data.

3.12 We note that ILT15 is now somewhat out-of-date, with a central exposure year of 2006. Ideally, ILT16 would have been available for use in this analysis, to provide a more recent Irish-based set of rates that could be assessed, but its publication has been deferred by the CSO until later in 2015.

Gender

3.13 The low volume of data for Irish female SAPS pensioners means that it is not statistically credible to calculate separate adjustments for females. In addition, the data that is available for females is dominated by experience for one specific occupation type (teachers, which account for 2,768 of the total 4,598 deaths). The Committee concluded that the data for females was not suitable for use as a generic basis due to credibility and volatility concerns.

3.14 The Committee instead recommends using only the male adjustment factors (from paragraph 3.7) as the basis for the mortality assumption for both males and females. This results in the following assumption for females:

107.2% of "S2PFA" +
2013 CSO labour force projections mortality improvements from 2010

3.15 The Committee carried out calculations to determine the percentage adjustment factors to be applied to the other standard tables considered that would lead to results equivalent to those obtained using the recommended percentage adjustment factors in paragraph 3.14. It can be seen from the table below that the male adjustment factors are the same as those shown in paragraph 3.7 above while the difference in the female adjustment factors compared to paragraph 3.7 represents the impact of moving to using the "S2" male adjustment as the "anchor point":

	Lives Basis		Amounts basis	
	Males	**Females**	**Males**	**Females**
S1	91.1%	95.0%	93.7%	99.6%
S2	107.4%	107.4%	107.2%	107.2%
ILT15	89.1%	92.8%	78.6%	89.7%
PN00	100.7%	99.4%	100.3%	105.2%

Recommended Standard Table

3.16 As described above, the S2 tables are the Committee's preferred choice for use as the standard table. However, the Committee notes that the S2 Tables are among those more recent publications from the CMI to which general access has been limited[21] to organisations that either supply data for CMI investigations or are willing to pay a licence fee.

3.17 In order to avoid potential practical limitations for actuaries in terms of access to the required tables, the Committee instead recommends the use of the ILT15 table as the basis for the annuity conversion calculation as specified in ASP LA-8, ASP PEN-12 and ASP PRSA-2.

3.18 This table is readily available to all life and pensions actuaries and, although it is not as up to date as the S2 tables, it has the advantage of being based on Irish mortality experience and provides a reasonable fit to the experience from the SAPS investigation. The least-squares analysis carried out by the Committee (referred to in paragraph 3.8) showed that the residuals under ILT15 were lower than for the S2 tables for male lives (0.37% compared to 0.59%) but were higher than for male amounts (-1.2% compared to -0.22%). The use of ILT15 is also consistent with the basis recommended in the "Transfer Value Report".

3.19 From paragraph 3.15 the adjustments needed to ILT15 are therefore as follows for males and females:

78.60% ILTM15 / 89.70% ILTF15 +
2013 CSO labour force projections mortality improvements from 2010

[21] http://www.actuaries.org.uk/research-and-resources/pages/how-access-cmi-outputs

Sensitivity to Age of "typical Individual"

3.20 The sensitivity of the above assumptions to the age of the "typical" individual was investigated by re-calculating the mortality assumptions assuming the "typical" individual was aged 40 and 50 respectively. The interest rate and mortality improvement assumptions remained unchanged. The results, on an amounts basis, are presented in the table below. On the basis of these results the mortality assumptions are not overly sensitive to the age assumed for the "typical" individual.

Age of "typical" individual	**40**		**50**	
	Male	**Female**	**Male**	**Female**
S2PM/FA	107.4%	107.4%	106.9%	106.9%
ILTM/F15	79.1%	90.1%	78.0%	89.3%

Insured Lives

3.21 The mortality assumptions for ASP LA-8, ASP PEN-12 or ASP PRSA-2 apply to insured lives. An adjustment is needed to allow for the move from the SAPS pensioner mortality experience to the insured lives mortality experience. The Demography Committee based this adjustment on a comparison of the 2013 Irish SAPS Study and the experience of 2008 to 2012 Annuitant Mortality Aggregated Data Study.

3.22 The 2008 to 2012 Annuitant Mortality Aggregated Data Study collated the mortality experience of four insurers in Ireland for Compulsory Purchase Annuities in payment over the period 2008 to 2012. The SAPS experience was compared with the experience of the Compulsory Purchase annuitants of the aggregated life office investigation. On the basis of this comparison there is a difference of approximately 80% and 93% between the pensioner and insured lives for males and females respectively. As in paragraph 3.14 it is prudent to assume the male adjustment factor of 80% applies both to males and females due to concerns about the volatility and credibility of the female data. Appendix B summarises the method used to determine this adjustment.

3.23 Applying the 80% adjustment to allow for the move from pensioners to insured lives results in a proposed mortality basis of:

62.88% ILTM15 / 71.76% ILTF15 +
2013 CSO labour force projections mortality improvements from 2010

calculated as 78.6x0.8 and 89.7x0.8 respectively.

4 Projected future mortality improvements

Recent experience

4.1 The CSO has recorded the following population mortality improvement rates as having occurred in recent years:

	Males (p.a.)	Females (p.a.)
2000 to 2005[22]	5.0%	3.5%
2006 to 2010[23]	3.0%	2.5%

4.2 The 2013 SAPS mortality investigation examined the implied mortality improvement rates for SAPS data over the period 2005 to 2010. These rates are derived by comparing the Actual / Expected experience (measured against PNL00 tables) from both the 2013 and 2008 studies. Based on the period between exposure midpoints for both studies (November 2004 to March 2010), the implied improvement rates over the period were:

	Males (p.a.)	Females (p.a.)
All ages	2.2%	2.0%

4.3 It is clear that mortality rates for Irish SAPS pensioners continue to improve, although at rates that are lower than previously expected. The above results imply that mortality improvement rates between 2005 and 2010 within the SAPS population have been slightly lower than those recorded by the CSO for similar periods, and also lower than those anticipated by the most recent CSO population projections (the CSO's 2016-2046 labour force projections published in 2013 anticipated mortality improvements to be slightly lower than the rates recorded between 2006 and 2010 shown in paragraph 4.1, reflecting an assumed gradual decline from that experience to a long-term rate of 1.5% by 2036).

Projection options

4.4 The Committee considered the following two projection options for modelling the mortality improvements implied by the 2013 SAPS study as part of the Transfer Value Review:

- CSO population and labour force projections; and
- CMI annuitant projection model.

[22] http://www.cso.ie/en/media/csoie/releasespublications/documents/population/2008/poplabfor_2011-2041.pdf

[23] http://www.cso.ie/en/media/csoie/releasespublications/documents/population/2013/poplabfor2016_2046.pdf

4.5 The considerations are outlined in paragraphs 4.4 to 4.16 of the Transfer Value Review. Having considered the projection options available and the results of the 2013 SAPS study the Committee recommended that mortality improvements be included in the transfer value basis (set out in the Statutory Guidance) in line with the method used by the CSO in its 2013 population and labour force projections.

4.6 The Committee now consider that the same conclusions are valid for ASP LA-8, ASP PEN-12 and ASP PRSA-2. That is, the Committee recommends that the mortality improvements to be used when converting a retirement fund into an annuity for product illustration purposes are in line with the method used by the CSO in its 2013 population and labour force projections

5 Proposed Basis

5.1 On the basis of the work described in the previous sections of this report, and recognising the need to avoid potential practical limitations for actuaries in terms of access to the required tables for transfer value calculations, the Committee recommends that the following base tables provide the most appropriate set of mortality assumptions for ASP LA-8, ASP PEN-12 and ASP PRSA:

- 62.88% ILT15 (Males)
- 71.76% ILT15 (Females)

The rate of future mortality improvements is assumed to be in line with that adopted by the CSO (referred to in paragraphs 4.5 and 4.6).

5.2 The tables below show a comparison of projected life expectancies and annuity values[24] at age 65, using the proposed basis in paragraph 5.1 above and the mortality assumptions underlying the current mortality basis of ASP LA-8, ASP PEN-12 and ASP PRSA (see summary of assumptions in Table A.1 Appendix A). It should be noted that:

- The proposed basis results in lower life expectancies and annuity values relative to the current basis for both males and females; and
- The interest rate underlying the annuity calculations is not consistent with market rates and the annuity values quoted are considerably lower than current market values as at May 2015. In accordance with ASPs LA-8, PEN-12 and PRSA-2, illustrations must take into account differences in the proposed basis and market rates where appropriate.

Life Expectancies					
	Males			**Females**	
	Current Basis	**Proposed Basis**		**Current Basis**	**Proposed Basis**
2014	25.02	23.67		26.03	25.26
2026	26.38	25.21		27.23	26.56
2034	27.13	26.06		27.92	27.31
2054	28.80	27.96		29.47	29.00

Annuity Values					
	Males			**Females**	
	Current Basis	**Proposed Basis**		**Current Basis**	**Proposed Basis**
2014	21.29	20.19		22.09	21.48
2026	22.37	21.41		23.04	22.51
2034	22.95	22.08		23.58	23.09
2054	24.25	23.57		24.78	24.40

[24] Annuity values were calculated assuming a net interest rate of 1%.

Proxy for Recommended Mortality Basis

5.3 The Committee understands that IT systems limitations faced by some users of ASP LA-8, ASP PEN-12 and ASP PRSA-2 continue to complicate significantly the conversion of a retirement fund into an annuity to be illustrated for calculations requiring a two-dimensional table of future mortality improvement rates.

5.4 As such, the Committee has instead developed a set of one-dimensional factors to allow for future rates of mortality improvement. These one-dimensional factors have been derived with the aim of providing a proxy method that produces results which are a reasonable fit to the recommended basis in paragraph 5.1. The use of one-dimensional improvement factors is consistent with the format of the assumptions currently contained in ASP LA-8, ASP PEN-12 and ASP PRSA-2.

5.5 Based on our analysis the Demography committee proposes a proxy mortality basis as follows:

- Females: 50% ILT15 (Females)
- Males 42% ILT15 (Males)

With a compound annual increase to the annuity value of

- 0.33% - retiree with no spouse's pension
- 0.33% - retiree with spouse's pension

5.6 In order to remove potential anomalies where, over a long projection period, the price of a female annuity is greater than the price of the corresponding last survivor annuity with a low reversion percentage, the joint life mortality improvement factor is set equal to the single life mortality improvement factor (see paragraph 2.6). The suggested proxy basis provides a close match to the underlying basis and we consider that it is a sufficiently reasonable fit on the basis of the comparison tables outlined in Appendix C.

Summary of proposed changes

5.7 The table below sets out the proposed mortality basis for use in converting a retirement fund to an annuity value for the purpose of benefit illustrations for ASPs LA-8, PEN-12 and PRSA-2, along with those currently in use:

	Proposed	**Current**
Female mortality rate	50% ILT15 (Females)	60% PNFA00
Male mortality rate	42% ILT15 (Males)	52% PNMA00
Annual adjustment factor to be applied to single life cases	0.33%	0.36%
Annual adjustment factor to be applied to joint-life cases (assumes female is primary beneficiary with a male spouse)	0.33%	0.36%

5.8 Appendix A to this paper provides a comparison of the details of the underlying proposed and existing bases, prior to the application of the proxy adjustments.

5.9 The Demography Committee wishes to reiterate that the proposed assumptions summarised in paragraph 5.7 reflect the following adjustments:

- The adjustments to the standard tables underlying these assumptions were derived from the male mortality rates of the 2013 SAPS study and adjusted by the 2008 to 2012 Aggregated Data Study; and
- Due to the lack of statistically credible data for females the same adjustments were assumed for females (see paragraphs 3.13 to 3.15).

The Committee believes that this approach is reasonable but that further research on the mortality of Irish female insured and pensioner lives is required to accurately model their mortality. This approach is also consistent with the approach adopted in the 2009 report "Review of Rates of Mortality Improvement for the purposes of ASPs on Product Information"[25]

5.10 In addition, it is also worth noting that the assumptions in paragraph 5.7 reflect the following approximations:

- The ILT15 tables were used instead of the S2 tables (see paragraphs 3.16 to 3.19); and
- One-dimensional factors for future mortality improvements were used as a proxy to the CSO's projected rates of mortality improvement (see paragraphs 5.3 to 5.6).

The Committee recommends that the assumptions should be reviewed again when ILT16 is published and that at this time the proxy adjustments should be eliminated and a two-dimensional mortality basis should be adopted going forward.

Sensitivity Testing

5.11 The proposed set of assumptions is sensitive to the mortality improvement assumption chosen. For instance, if the long-term rate of mortality improvement is increased by 0.5% to 2.0% pa, annuity values would be expected to increase as set out below.

2014	Male aged 65	Female aged 65	Male aged 45 (NRA 65)	Female aged 45 (NRA 65)
% increase in annuity	1.2%	1.2%	3.2%	2.8%

[25] https://web.actuaries.ie/sites/default/files/member_story/2009/01/Mortality_Rates_for_Product_Information_Projections/0901%20Mortality%20Rates%20for%20Product%20Information%20projections.pdf

5.12 If, in addition to a 0.5% increase in the long-term rate of improvement, the current rate of mortality improvement is also increased by 0.5% for each gender, annuity values are expected to increase as set out below.

2014	Male aged 65	Female aged 65	Male aged 45 (NRA 65)	Female aged 45 (NRA 65)
% increase in annuity	2.8%	2.5%	4.6%	4.0%

Appendix A: Summary of Proposed and Current Mortality Basis

The table below compares the mortality assumptions underlying the proposed and current bases for ASPs LA-8, PEN-12 and PRSA-2 prior to the application of the simplifying proxy adjustments.

Table A.1: Comparison of underlying mortality assumptions for proposed and current basis

	Proposed	Current
Male mortality rate	62.88% ILT15 (Males)	91% PNMA00
Female mortality rate	71.76% ILT15 (Females)	91% PNFA00
Future mortality improvements	2013 CSO Labour Force Projections	2008 CSO Labour Force Projections
Initial rate of annual mortality improvement assumed by CSO for males	3.0%	5.0%
Initial rate of annual mortality improvement assumed by CSO for females	2.5%	3.5%
Long-term rate of annual mortality improvement assumed by the CSO (males and females)	1.5%	1.5%
CSO assumption for the convergence period from initial rates of mortality improvement to long-term rate	25 years	25 years

The table below compares the proposed and current proxy mortality basis recommended for use in converting a retirement fund to an annuity value for the purpose of benefit illustrations for ASPs LA-8, PEN-12 and PRSA-2:

Table A.2: Comparison of proposed and current recommended proxy mortality basis

	Proposed	Current
Female mortality rate	50% ILT15 (Females)	60% PNFA00
Male mortality rate	42% ILT15 (Males)	52% PNMA00
Annual adjustment factor to be applied to single life cases	0.33%	0.36%
Annual adjustment factor to be applied to joint-life cases (assumes female is primary beneficiary with a male spouse)	0.33%	0.36%

Appendix B: Comparison of 2013 SAPS Study and 2008 to 2012 Aggregated Data Study

The 2013 SAPS investigation was based on the mortality experience of Irish SAPS pensioners centred on the year 2010 and included both private and public sector pension schemes. The Annuitant Mortality Aggregated Data Study covered the period 2008 to 2012. Four insurance companies in Ireland provided their mortality experience on an Actual/Expected (A/E) basis using tables PNM/FA00 for a range of common life insurance products.

The SAPS mortality experience was compared with the compulsory purchase annuitant experience of the Aggregated Data Study. The comparison was based on data grouped into five year age bands between the ages of 60 and 90. To compare the SAPS and Aggregated Data Study A/E values were calculated for the SAPS data using the PNM/FA00 tables and compared with the corresponding A/E values for the Aggregated Data Study. On average there was an approximate 20% difference between the A/E values for males and a smaller difference for females of approximately 7%. The results are summarised in Tables A and B below for males and females respectively. To allow for IBNR deaths in the final year of the Aggregated Data Study the calculations were repeated based on the Aggregated Data Study experience over the period 2008 to 2011. However the resulting adjustment of 20% for males was unchanged.

Table B.1: Comparison of Irish SAPS 2013 and 2008 to 2012 Aggregated Data Study for males.

Males	A/E		
	Aggregated Life Office Data (A)	SAPS Data (B)	A/B
60-64	57.7%	104.6%	55%
65-69	64.9%	83.7%	78%
70-74	71.5%	81.2%	88%
75-79	78.7%	81.4%	97%
80-84	80.3%	97.0%	83%
85-89	88.9%	112.6%	79%
Average			**80%**

Table B.2: Comparison of Irish SAPS 2013 and 2008 to 2012 Aggregated Data Study for females.

Females	A/E		
	Aggregated Life Office Data (A)	SAPS Data (B)	A/B
60-64	88.0%	116.3%	76%
65-69	88.8%	89.7%	99%
70-74	84.1%	74.6%	113%
75-79	75.3%	77.7%	97%
80-84	82.4%	89.2%	92%
85-89	78.2%	98.6%	79%
Average			**93%**

Appendix C: Proxy Basis Fit

As mentioned in paragraph 5.6 the Demography Committee performed a series of comparisons to quantify how well the proxy basis outlined in paragraph 5.5 matches the basis specified in paragraph 5.1.

Female Single Life

	Annuity Values			
Female aged 65 in…	**2014**	**2026**	**2034**	**2054**
71.76% ILT15 (Females) with CSO Improvements	21.48	22.51	23.09	24.40
Proxy – 50% ILT15(Females) with an increase to the annuity value of 0.33% p.a. compound for each year between 2014 and the year in which normal pension date falls.	21.49	22.35	22.95	24.51
Difference	0.0%	-0.7%	-0.6%	0.5%

Female Joint Life (50% reversion; Age Difference +3)

	Annuity Values			
Female aged 65 in…	**2014**	**2026**	**2034**	**2054**
71.76% ILT15 (Females) with CSO Improvements	22.89	23.85	24.40	25.57
Proxy – 50% ILT15(Females) with an increase to the annuity value of 0.33% p.a. compound for each year between 2014 and the year in which normal pension date falls.	22.81	23.73	24.36	26.02
Difference	-0.4%	-0.5%	-0.1%	1.8%

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