Pension Protection Fund

Consultation document

Assumptions to be used for valuations January 2023

2023 Consultation on assumptions to be used for valuations under section 143 and section 179 of the Pensions Act 2004

Contents

1. Introduction and summary

1.1. The Pensions Act 2004 requires valuations under sections 143, 152, 156, 158 and 179 of the Act to be calculated in line with our estimated price of securing PPF levels of compensation with a bulk annuity provider purchased at the best value rate available in the market. We regularly review our estimate to ensure it remains aligned with the market. We are considering, subject to consultation, making some updates to the actuarial assumptions underlying our estimate to bring them into line with current market pricing. The main changes are:

- Increasing the discount rates for certain tranches of benefit,
- A move to the CMI 2021 mortality projections model, and
- Amending the calculation of the expenses.

1.2. In addition, we are proposing adopting a yield curve approach to determining liabilities for the purposes of sections 143, 152 and 158.

1.3. Throughout the document, we will use 'section 143' to refer to the proposed approach to determine liabilities for sections 143, 152 and 158. Similarly, 'section 179' will refer to the proposed approach to determine liabilities for sections 156 and 179.

1.4. This consultation document sets out our proposed changes. The closing date for responses to this consultation is 5pm on Monday 20 February 2023. The proposals are described in detail in sections 3 and 4.

1.5. We propose to introduce these changes for valuations with an effective date on or after 1 April 2023, subject to satisfactory consultation responses. Pension professionals and advisers should be aware that we intend to publish our decision on the assumptions to be used shortly before 1 April 2023.

Consultation Question: Do you agree that we should introduce both section 143 and section 179 assumptions from 1 April 2023? If not, what date(s) would be more appropriate?

2. Review process

2.1. We have adopted ten principles for the setting of assumptions for section 143, section 179 and other similar valuations. These are set out in Appendix 2. Two key ones are as follows:

- The assumptions should deliberately err on the side of understating the liabilities.
- They should be informed by regular meetings with market participants.

2.2. Erring on the side of understating liabilities means that for section 143 valuations we reduce the risk of taking schemes into the PPF that, as at the date of the employer's insolvency, could have bought out better benefits in the market.

2.3. We regularly review market changes and developments to ensure our assumptions remain appropriate. The current assumptions were set following a review of market pricing carried out in Q4 2020, following which the section 143 and section 179 assumptions came into effect on 1 May 2021.

2.4. We recently held discussions with seven market participants and concluded that differences between our current assumptions and insurers' buy-out bases were significant enough that we should consider amending them. The exact impact to an individual scheme will depend on its size and composition. In general insurance company pricing is more competitive than our bases, resulting in lower liabilities. This means that if we do not update our bases then we could in theory take into the PPF schemes that could otherwise secure slightly higher benefits for their members outside the PPF.

2.5. In addition, we carried out analysis over the summer to investigate how liabilities on our simplified single discount rate approach compared with those calculated using a yield curve approach. This analysis was a result of responses to our previous consultations on the assumptions where there has been growing agreement amongst our stakeholders that it is both feasible and desirable to move to a yield curve approach, at least for section 143 valuations. We concluded that it can make a material enough difference to merit such a change in approach. We propose therefore to move the section 143 assumptions to a yield curve basis, while retaining the simplified single discount rate approach for section 179 assumptions.

2.6. The proposed methodology change was discussed with market participants as well as a small number of employee benefit consultancies during the second half of 2022. The changes we propose to make are summarised in the next two sections.

3. Approach to setting the assumptions

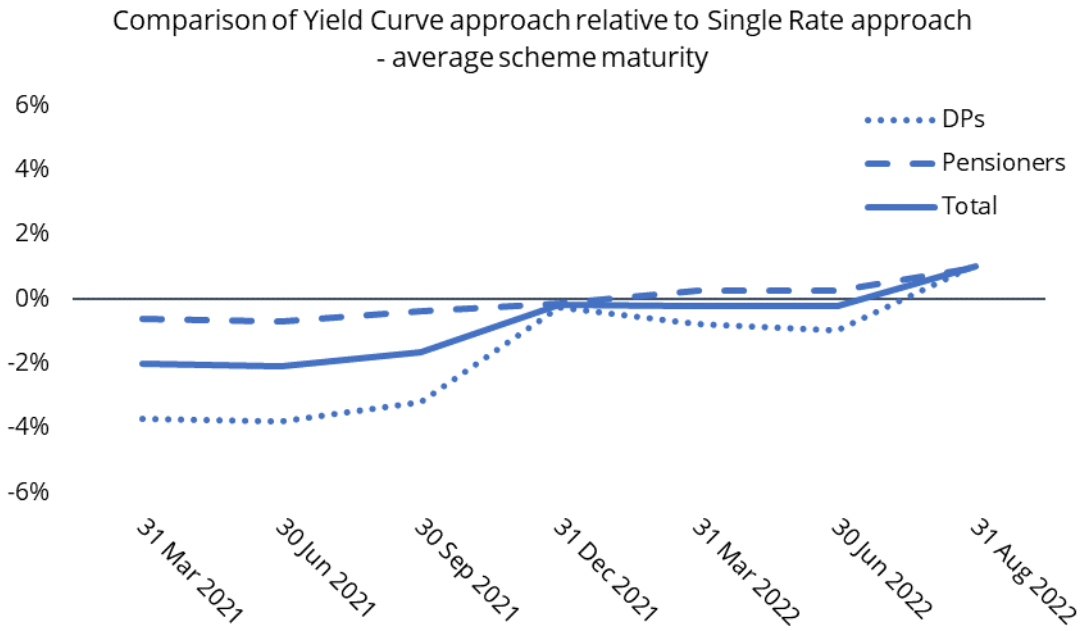
3.1. Historically our approach to setting the discount rate for all valuations has been to use a single rate approach where the discount rate applicable at each future time step is the same. This contrasts with a yield curve approach where the rate may vary for each future time step.

3.2. Also, our current basis expresses discount rates net of the revaluation that applies prior to retirement and net of the indexation that applies to post-5 April 1997 compensation after retirement. This way we do not need a separate inflation or pension indexation assumption.

3.3. The approach has been in force since the first assumption guidance was published and was largely adopted for simplicity. Since then, a yield curve approach to valuing liabilities has become much more common and in our last consultation on assumptions there was a consensus among consultation responses that it would be appropriate to move to a yield curve approach for section 143 assumptions. At the time we said "We note the general optimism regarding the feasibility of using yield curves for section 143 valuations, with only one respondent suggesting that such functionality would take time to

introduce. While we do not propose to introduce changes at this stage, we will continue to give consideration in future reviews".

3.4. To help inform our decision, we carried out analysis on how liabilities would compare using a single discount rate and yield curve approach over time. For this purpose we used the assumptions proposed in section 4 and investigated how the two bases would have compared over the last 18 months. The chart below shows that for a scheme of average maturity the numbers have been similar in recent months, but the total liabilities were two per cent out in March 2021 and the liabilities for deferred members were further out, being 4 per cent different.



3.5. When we considered more immature or mature schemes, we found increased variation between the single discount and yield curve approaches across the last 18 months. For example, deferred liabilities on the two bases differed between -6% to +4%.

3.6. Given that we expect that the funding position of future schemes in assessment may be more marginal than has historically been the case, we concluded that the simplification of using a single discount rate for section 143 purposes could affect which side of 100 per cent the funding level fell for some schemes in certain market conditions. We have therefore concluded that now is an appropriate time to switch to a yield curve approach for the purpose of section 143 valuations alongside section 152 and 158 valuations.

3.7. We concluded however that the arguments for changing the methodology for section 179 and 156 were less compelling. The main reason for this is that the additional cost of complying with the guidance would not be proportionate to the more refined assessment of underfunding risk. This is particularly true for section 179 whereby the change is unlikely to result in a materially different levy for many schemes, especially given our PPF levy estimate is now considerably lower than previous years. For similar

reasons, we also propose to maintain a single discount rate approach for funding determinations.

Consultation Question: Do you agree that it is appropriate to move to a yield curve approach for valuations under section 143, 152 and 158 but that a single discount rate should be maintained for all other valuations, including section 179 and 156 valuations? If not, please specify your reasons and the approach you would favour for each valuation type.

Appropriate curves to be used

3.8. When selecting the appropriate curves to be used to set both the discount rate and the inflation assumptions, we looked to find a reliable source that was readily accessible by actuaries undertaking the relevant valuations.

3.9. We considered the relative merits of using a gilts-based curve or a corporate bond-based approach for setting the discount rate. However we concluded that a gilts-based approach was more appropriate since it was difficult to identify a corporate bond curve that met the criteria above.

3.10. Based on this, the discount and inflation curves proposed for curve-based valuations are summarised in the following table.

Element	Specification
Unadjusted curve for deriving discount rate	Bank of England GLC Nominal Rate ("BoE Nominal")
Unadjusted curve for deriving inflation rate	Bank of England GLC Inflation Rate ("BoE Inflation")

If the rates are missing for any maturities, we will specify how to derive appropriate rates as part of our accompanying assumptions guidance.

Consultation Question: Do you foresee any problems in using these curves as a basis for determining the appropriate discount rate and inflation assumption when a curve-based approach is used? Are there any other curves that you believe would be more appropriate?

3.11. When determining the appropriate discount rate we will specify an adjustment to the curve to align our basis with the pricing bases of buyout companies. We propose to assign a different adjustment for pensioners and deferreds. This approach is a simplification of how insurers will price whereby the adjustment can be expected to vary by duration. In our discussions with insurers, they did not suggest that a duration-invariant approach was inappropriate. Also, we propose to make some adjustments to the inflation curve to capture the following features:

- The BoE curve represents gilt-implied inflation, whereas we wish to reflect swap-implied inflation in our assumption, as this more accurately reflects the level of inflation implicit in insurers' pricing bases.

- The BoE curve is derived relative to RPI-linked gilts, whereas PPF compensation is linked to CPI. Therefore, we wish to reduce the curves to reflect an assumed 'wedge' between RPI and CPI.
- It is not possible for insurers to precisely match their liabilities in their investment portfolios, particularly in relation to CPI-linked business, so prices may incorporate a margin to cover this risk.

3.12. The government has stated its intention to harmonise the calculation of RPI and CPIH with effect from 1 March 2030. To reflect this, we propose to split the CPI assumption into two parts. These adjustments will be specified as part of our accompanying assumptions guidance.

3.13. We propose that the calculated CPI assumptions should then be fed into the normal version of the Black 76 option pricing formulae (which is equivalent to the Bachelier model), along with two volatility curves (one curve for the floor and one for the cap), to reach the pension indexation assumption applicable to post-5 April 1997 compensation. Although we understand that other models will more typically be used by insurance companies for pricing purposes, we have chosen the normal version of the Black 76 model as it is relatively simple and commonly used within the pensions industry. We will publish the formulae in our assumptions guidance, and we will publish the volatility curves on our website periodically. The underlying rationale is to calculate the pension increase as inflation plus the value of a put option with a strike price of 0 per cent less the value of a call option with a strike price of 2.5 per cent.

Consultation Question: Do you foresee any potential issues incorporating the proposed approach into existing processes for section 143, 152 and 158 valuations? If so, are there any structural changes you would propose that would materially reduce the implementation burden?

4. Strength of basis and specific assumptions

4.1. Our discussions with the seven insurance companies led us to conclude that market pricing had materially changed since the last detailed review to such a degree that a weakening of the bases was merited. In this section we discuss the assumptions under three headings – financial, mortality and expenses.

4.2. The revised section 143 and 179 assumptions are set out in full in Appendices 3 and 4 respectively.

Financial

4.3. We believe that the discount rates should be increased by 20 basis points for deferred pensioners and 10 basis points for pensioners, reflecting more competitive pricing. These adjustments have been made directly to the section 179 interest rates (other than for the index-linked elements, discussed later). For the section 143 basis we will adjust the BoE Nominal curve for pensioners by 40 basis points and will apply no adjustment for deferred pensioners.

4.4. When we were comparing the relative strength of the yield curve and single discount rate approaches, we found that slightly amending the duration of the fixed interest gilt indices that underlie the section 179 basis resulted in a better alignment with the section 143 basis for schemes of an average maturity. We have therefore changed the reference index for pensioners to a duration of 15 rather than 10 years. Also, for the pre-retirement discount rate for post-09 compensation, we have moved from a duration of 15 years to 10 years.

4.5. For inflation curves we propose to adjust the BoE Inflation curve by -20 basis points for pre-1 March 2030 and by -10 basis points thereafter. This reflects the net impact of the three adjustments described in paragraph 3.11.[1] We have adjusted the offsets to the inflation-linked elements of the section 179 discount rates to be broadly consistent with the offsets to the section 143 basis.

4.6. We therefore propose to update the section 179 offsets to discount rates in line with the following table. This leads to the following section 179 discount rates (red text indicates a change):

Discount rates	Current A10	Proposed A11
Pensioner pre-97	10 yr FI yield + 0.3%	15 yr FI yield + 0.4%
Pensioner post-97	Max {10 yr FI yield – 1.9%, 5-15 yrs IL yield + 1.2%}	Max {15 yr FI yield – 1.8%, 5-15 yrs IL yield + 0.6%}
Non-pensioners post-retirement pre-97	20 yr FI yield – 0.2%	20 yr FI yield without adjustment
Non-pensioners post-retirement post-97	Max {20 yr FI yield – 2.5%, Over 5 yrs IL yield + 0.7%}	Max {20 yr FI yield – 2.3%, Over 5 yrs IL yield + 0.1%}
Non-pensioners pre-retirement pre-09	5-15 yrs IL yield + 0.2%	5-15 yrs IL yield + 0.2%
Non-pensioners pre-retirement post-09	Max {15 yr FI yield – 2.5%, 5-15 yrs IL yield + 0.2%}	Max {10 yr FI yield – 2.5%, 5-15 yrs IL yield + 0.2%}
Non-pensioners pre-retirement non-increasing	10 yr FI yield – 0.2%	10 yr FI yield without adjustment

"FI" has been used as shorthand for the annualised yield on the relevant FTSE Actuaries' Government Fixed Interest Index. Similarly, IL refers to the average of the relevant FTSE Actuaries' Government Securities Index-Linked annualised Real Yields (i) assuming 5 per cent inflation and (ii) assuming nil inflation.

Mortality

4.7. There is also evidence that longevity pricing has become slightly more competitive over the last couple of years, which is likely to be because insurance companies and reinsurance companies are making some allowance for the impacts of COVID19 on life

[1] Stakeholders might think that the two adjustments are closer than they expect, given that actuaries' assumptions for the RPI-CPI wedge prior to 2030 tend to be much higher than for the post-2030 wedge. However, the pre-2030 swap/gilt-implied inflation adjustment which mitigates the wedge impact is quite high, being 40 basis points.

expectancy. We propose to take this opportunity to move to the latest CMI tables as well as to align our bases with the latest market practice.

4.8. We propose to retain the Self-Administered Pension Scheme (SAPS) "S3" mortality series. Discussions with insurers indicated that the adoption of the latest S3 tables was reasonable. In light of recent feedback and developments, we again considered making an adjustment to reflect the fact that the S3 tables are based on public sector and private sector schemes whereas generally only private sector schemes are eligible for PPF protection. However, on the grounds of materiality and simplicity we propose to continue to use the tables unadjusted. Marginally funded schemes completing a section 143 valuation can always use bespoke mortality tables if we believe there is evidence to justify doing so.

4.9. The section 179 and section 143 bases have slightly different mortality assumptions, with the section 179 using the all member S3 tables but the section 143 tables being more granular and allocating tables on the basis of the size of members' compensation. We considered updating the thresholds for allocating these tables but on the grounds of materiality and simplicity we believe it is appropriate to retain them.

4.10. We propose to adopt the CMI_2021 model for mortality improvements. The model has a number of parameters and we propose to adopt the standard parameters with the exception of choosing an initial addition of 0.25% and placing only a 10% weight on the 2020 and 2021 data to reflect the unusual experience during the pandemic. We believe that this is within the range of assumptions currently being made by insurance and reinsurance companies and is at the optimistic end of that range. In this context 'optimistic' means lower mortality improvements and hence a lower buy-out price.

4.11. The model requires the long-term rate of mortality improvements to be specified. We believe our existing assumptions remain appropriate, these being 1.5 per cent per annum for males and 1.25 per cent per annum for females.

Expenses

4.12. We propose to amend the formula for calculating our benefit installation and payment expenses because this is expressed as the capitalised value of future payment expenses, and since current annuity rates are lower than in recent years (principally owing to a rise in gilt yields) the capitalised value of future payment expenses should reduce.

4.13. We also propose to update the wind-up expenses. These have been designed to reflect the fact that the cost of winding up a scheme will depend to some extent on the size of the scheme but will not be a linear function of the number of members. The method we use is to calculate the wind-up expenses as a tapered percentage of the liabilities which captures the relationship between scheme size and wind-up expenses that we have seen from schemes that have gone through an assessment period. Since liabilities have fallen materially since the formulae were last updated, we have recalibrated our taper rates and thresholds to target the same amount of winding-up expenses as before.

4.14. The following table shows the current expense loadings and those proposed. The red text indicates changes.

Expenses	Current B9	Proposed B10
Wind-up	4% of liabilities up to £5m; 1% of liabilities between £5m and £25m; and 0.5% of liabilities between £25m and £545m* *As a result, expenses are capped at a maximum value of £3m.	5% of liabilities up to £4m; 1.5% of liabilities between £4m and £20m; and 0.8% of liabilities between £20m and £340m* *As a result, expenses are capped at a maximum value of £3m.
Non-pensioner benefit installation / payment	£950 per member	£750 per member
Pensioner benefit installation / payment	Age related allowance <60, £800 per member 60-70, £650 per member 70-80, £550 per member >80, £450 per member	Age related allowance <60, £650 per member 60-70, £550 per member 70-80, £500 per member >80, £400 per member

Consultation Question: Do you believe that the proposed assumptions are appropriate? If not, which assumptions do you believe should be changed, and why?

5. Impact

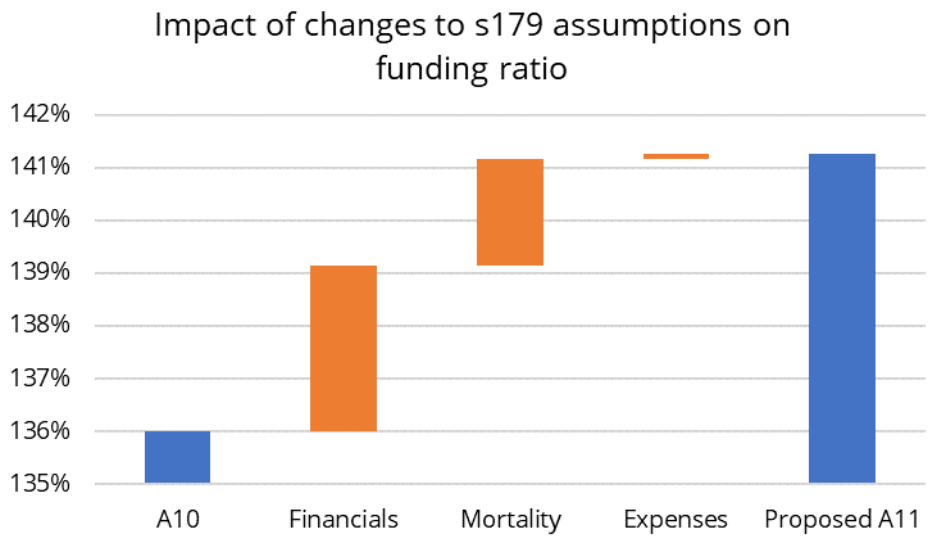
5.1. Taken together, the assumption changes described in section 4 will typically reduce the value of section 143 liabilities. Based on calculations as at 31 August 2022 for an average scheme, we calculate that the approximate impact will be as follows:

	Pre-97	Post-97	Post-09	Total
Pensioner liabilities	-3.5%	-5.0%	n/a	-4.0%
Non-pensioner liabilities	-1.8%	-4.2%	1.2%	-3.1%

5.2. The actual impact for an individual scheme will differ depending on the scheme's duration and membership profile. As can be seen from the above table, at this particular date, the impact was higher on pensioners than deferred members. However, the opposite could be true at different dates depending on the shape of the yield curves and how they compare with the various gilt indices used under section 179.

5.3. The PPF 7800 index tracks the aggregate section 179 funding position of schemes eligible for PPF protection. As at 31 October 2022, there were 5,131 schemes in the PPF 7800 index, of which 709 were in deficit. The changes to the section 179 assumptions would, we estimate, improve the aggregate funding ratio, from 136.0 per cent to 141.3 per cent,

and move 143 schemes from deficit to surplus. The deficit of schemes in deficit would reduce from £5 billion to £3 billion. The following waterfall chart explains the change in the funding ratio between the current section 179 basis ("A10") and the proposed A11 basis.



6. Consultation questions

6.1. The Board would be grateful to receive responses to the following questions:

Q1. Do you agree that we should introduce both section 143 and section 179 assumptions from 1 April 2023? If not, what date would be more appropriate?

Q2. Do you agree that it is appropriate to move to a yield curve approach for valuations under sections 143, 152 and 158 but that a single discount rate should be maintained for all other valuations, including section 179 and section 156 valuations? If not, please specify your reasons and the approach you would favour for each valuation type.

Q3. Do you foresee any problems in using these curves as a basis for determining the appropriate discount rate and inflation assumption when a curve-based approach is used? Are there any other curves that you believe would be more appropriate?

Q4. Do you foresee any potential issues incorporating the proposed approach into existing processes for section 143, 152 and 158 valuations? If so, are there any structural changes you would propose that would materially reduce the implementation burden?

Q5. Do you believe that the proposed assumptions are appropriate? If not, which assumptions do you believe should be changed, and why?

Q6. Do you have comments on any other matter in this consultation document which is not included in responses to the questions above?

7. Process for responding

7.1. The consultation will end at 5pm on 20 February 2023. Please ensure that your response reaches us by that date. If you would like further copies of this document, it can be found at the Valuation Guidance section of the Pension Protection Fund website at https://www.ppf.co.uk/

7.2. Please respond to the consultation by emailing responses to AssumptionsConsultation@ppf.co.uk or by writing to the contacts below.

7.3. Please state whether you are responding as an individual or representing the views of an organisation. If you are responding on behalf of an organisation please make it clear who the organisation represents and, where applicable, how the views of members were assembled.

7.4. The Board will publish a summary of responses on the PPF website at https://www.ppf.co.uk/ before 1 April 2023. At the same time it will also publish its decision about future assumptions for section 143 and section 179 valuations.

7.5. In the event of any queries, please contact:

Lisa McCrory
Chief Finance Officer & Chief Actuary
Pension Protection Fund
Renaissance
12 Dingwall Road
Croydon, Surrey
CR0 2NA
Email: Lisa.McCrory@ppf.co.uk

7.6. The Board would welcome feedback on the consultation process. If you have any comments, please contact:

Georgina Watson
Stakeholder Manager
Pension Protection Fund
Renaissance
12 Dingwall Road
Croydon, Surrey
CR0 2NA
Email: Georgina.Watson@ppf.co.uk

7.7. The requirements of the Freedom of Information Act 2000 state that all information contained in the response, including personal information, may be subject to publication

or disclosure. By providing personal information for the purpose of the public consultation exercise, it is understood that a respondent consents to its disclosure and publication. If this is not the case, the respondent should limit any personal information which is provided or remove it completely. If a respondent requests that the information given in response to the consultation be kept confidential, this will only be possible if it is consistent with the Freedom of Information Act 2000 obligations and general law on this issue. Further information about the Freedom of Information Act 2000 can be found on the website of the Ministry of Justice.

7.8. You can also find our Privacy notice on our website.

Appendix 1: Valuations covered

i. A section 143 valuation is carried out during a PPF assessment period. The assets and liabilities for the section 143 valuation are established in accordance with section 143, the Pension Protection Fund (Valuation) Regulations 2005 (SI 2005 / 672), as amended, and guidance issued by the Board of the Pension Protection Fund. The valuation is carried out by an actuary appointed by the Board and the valuation is approved by the Board.

ii. A section 152 valuation is carried out following an application for reconsideration under section 151 of the Pensions Act 2004.

iii. Section 156 valuations must be carried out on a regular basis by a scheme that has been granted authorisation by the Board to run as a closed scheme having demonstrated that it was over 100 per cent funded at a section 143 valuation.

iv. A section 158 valuation is carried out by a scheme that has been running as a closed scheme, following an application to commence a further assessment period under section 157.

v. Valuations carried out under section 152, 156 and 158 are required to be conducted on similar principles to a section 143 valuation. Legislation requires that protected liabilities are calculated as the estimated cost of securing scheme benefits calculated in accordance with Schedule 7 of the Pensions Act 2004 (PPF pension compensation provisions) to the member by means of an annuity purchased at the market rate.

vi. The key purpose of these valuations is to assess whether a scheme has sufficient funds to buy out levels of benefit at least equal to PPF compensation in the market. For a large number of schemes this position will be relatively clear cut. This is a key consideration for keeping the assumptions used as simple as possible. Certain assumptions may be varied, upon request to the PPF, to take account of a scheme's specific circumstances. This is a further reason for maintaining simplicity in the standard assumptions.

vii. Section 179 valuations are carried out on a regular basis by all schemes eligible for PPF protection and the results are used in the calculation of PPF levies.

viii. A section 179 valuation is in principle very similar to a section 143 valuation but contains simplifications – consistency and simplicity matter more than a high level of precision. The PPF levy calculation requires each section 179 valuation to be rolled forward from its effective date to a later date. More complex valuation assumptions would tend to lead to more complex roll-forward calculations, and hence higher costs associated with performing such calculations.

Appendix 2: Policy principles around setting assumptions

The Board has adopted the following ten principles to underlie the setting of assumptions for section 143, section 179 and similar valuations:

a) Compliance with the regulations (see Appendix 1). In particular, the assumptions are required to reflect insurance company buy-out pricing terms for PPF compensation.
b) Seeking evidence from confidential dialogue with market participants.
c) Seeking anecdotal evidence from consultants of the state of the market; a significant shift would indicate the need for a review of assumptions.
d) If the need for a review under principle (c) has not been invoked, nonetheless reviewing the market by speaking to market participants every year to eighteen months.
e) Proportionality (balancing the degree of precision with the cost, taking into account the purpose of the valuation).
f) Adoption of new tables and techniques as appropriate, having regard to the principle of proportionality.
g) Reasonable stability in the assumptions over time; i.e. frequent changes are undesirable.
h) Deliberately erring on the side of understating liabilities; i.e. assessing section 143 liabilities at a level that is believed for most schemes to be somewhat below the best market price.
i) Consulting with the pensions industry to check proposals.
j) Providing sufficient notification of changes.

These principles are not binding but the Board has made a commitment to follow them as far as possible.

Appendix 3: Proposed new assumptions for section 143

Changes from the existing assumptions are highlighted. With the exception of the effective date, we do not propose to make any changes to Parts 1 and 2 and so these sections are not shown below.

Part 3 – Financial basis for use when undertaking valuations

3.1 Calculation of yields as at the effective date of valuation

Yields should be measured as at the close of business on the effective date of the valuation. For any dates where yields are not available the yields for the nearest preceding date should be used. Yields should be calculated to the nearest 0.01%. Expressions of the form (Yield Z - k%) should be calculated as an arithmetic difference and not a geometric difference.

3.2 Discount rates

Separate yields are used for pensioners and for non-pensioners. The liability must be obtained by reference to the following (adjusted) yields.

Non-pensioners: Adjusted yield = BoE Nominal Yield
Pensioner: Adjusted yield = BoE Nominal Yield + 0.4%

The BoE Nominal Yield is the GLC Nominal daily forward rate provided at https://www.bankofengland.co.uk/statistics/yield-curves/. The yields are shown at six-monthly intervals up to 40 years. Only those shown for integer maturities should be used. For periods beyond 40 years, the 40-year forward rate should be adopted.

3.2 Revaluation rates

Where compensation increases in deferment, the liability must be obtained by inflating compensation for the period of deferment in line with the adjusted inflation rate shown below, with the relevant cumulative caps on PPF revaluation being applied where appropriate[2]:

Pre-1 March 2030: Adjusted inflation rate = BoE Inflation Rate – 0.2%
Post-28 February 2030: Adjusted inflation rate = BoE Inflation Rate – 0.1%

The BoE Inflation Rate is the GLC Inflation daily forward rate provided at https://www.bankofengland.co.uk/statistics/yield-curves/. The yields are shown at six-monthly maturities up to 40 years. Only those shown for integer maturities should be used. For periods beyond 40 years, the 40-year forward rate should be adopted.

[2] i.e. 5 per cent per annum compound for pre-6 April 2009 compensation, and 2.5 per cent per annum compound for post-5 April 2009 compensation.

If the rates are missing for any maturities, then the missing rates should be inferred from the rates that are available. For instance, at the moment there are no forward or spot rates for years 1 and 2. In this case, for years 1 and 2, the forward rate should be derived as follows:

$$\sqrt{\frac{(1+s_3)^3}{1+f_3}} - 1$$

Where:

- s_3 = the GLC Inflation daily spot rate in year 3
- f_3 = the GLC Inflation daily forward rate in year 3

3.3 Pension indexation rates

Pre-6 April 1997 compensation should receive no increases in payment.

Post-5 April 1997 compensation receives increases in payment in line with CPI subject to an annual cap of 2.5 per cent and a collar of zero. We refer to this as LCPI(0,2.5). This assumption should be calculated for each future year (or "tenor") using the following formulae, which have been derived from the normal version of the Black 76 option pricing model (also known as the Bachelier model):

$$d_1 = \frac{S-K}{v\sqrt{T}}$$

$$C(K) = (S-K) \times N(d_1) + \frac{v\sqrt{T}}{\sqrt{2\pi}} e^{-{d_1}^2/2}$$

$$P(K) = (K-S) \times N(-d_1) + \frac{v\sqrt{T}}{\sqrt{2\pi}} e^{-{d_1}^2/2}$$

$$LCPI(0,2.5) = S + P(0\%) - C(2.5\%)$$

Where:

- T is the tenor,
- S is the inflation rate for year T, to be expressed as a 1-year forward rate and derived from the adjusted inflation rates described in section 3.2,
- v is the volatility of S, which we will publish on our website periodically at this location: https://www.ppf.co.uk/trustees-advisers/valuation-guidance, and
- $N(.)$ is the cumulative distribution function of a standard normal distribution.

Part 4 – Mortality for use when undertaking valuations

The mortality baseline in respect of an active, deferred or pensioner member, pre and post retirement, shall be:

Gender of first life	**First life**	**Contingent life**
Men	S3PMA	S3DFA
Women	S3PFA	S3DMA

The mortality baseline in respect of a current dependant shall be S3DMA (men) and S3DFA (women).

Future changes to mortality in line with CMI_2021_M [1.50%; A=0.25%; w2020=10%; w2021=10%] and CMI_2021_F [1.25%; A=0.25%; w2020=10%; w2021=10%] for men and women respectively (from 2013).

These mortality tables are published by the Continuous Mortality Investigation. For each individual, the set of mortality rates used shall be those applicable to that individual's year of birth.

The mortality table used for an active, deferred or pensioner member should be based on an individual's pension size (before application of the compensation cap and 90% reduction) as follows:

Pension size[3]	**First life**	**Contingent life**
Males:		
< 5,500	S3PMA_H	S3DFA
>= 5,500 and < 22,500	S3PMA_M	S3DFA
>= 22,500	S3PMA_L	S3DFA
Females:		
< 1,000	S3PFA_H	S3DMA
>= 1,000 and < 9,000	S3PFA_M	S3DMA
>= 9,000	S3PFA_L	S3DMA

[3] For non-pensioners include revaluation to the relevant time only, where appropriate, and include the pension equivalent of any lump sum entitlement using the commutation factors available on the PPF website.

Part 5 – Other assumptions for use when undertaking valuations

5.1 Assumptions for contingent benefits

a) Proportions married

Where the scheme provides for survivor pensions:

For pensioners

Where the scheme makes provision (including discretionary provision) for survivor pensions for "relevant partners" an assumption consistent with 85% (males) or 75% (females) at normal pension age.

Where the scheme only makes provision for survivor pensions for a legal spouse or civil partner, an assumption consistent with 75% (males) or 65% (females) at normal pension age.

Using a proportion married assumption consistent with 85% / 75% (males) or 75% / 65% (females) at normal pension age may require mortality rates for calendar years before 2013 for a "strictly correct" calculation of the proportion married assumption to apply for older pensioners. In such circumstances prudent assumptions should be used.

For non-pensioners

Where the scheme makes provision (including discretionary provision) for survivor pensions for "relevant partners" the assumption must be, at the assumed date of retirement or earlier death, 85% (males) or 75% (females).

Where the scheme only makes provision for survivor pensions for a legal spouse or civil partner, the assumption must be, at the assumed date of retirement or earlier death, 75% (males) or 65% (females).

A **"relevant partner"** is as defined in SI 2005/670, being a person of either sex who was not married to, or in a civil partnership with, the member and who was living with the member as if that person and the member were husband and wife or, in the case of two adults of the same sex, as if they were civil partners. For the purpose of the above, two adults of the same sex are to be regarded as living together as civil partners if they would be regarded as living together as husband and wife were they instead two adults of opposite sex. Schemes that were formerly contracted-out on a protected rights basis may be required to pay a survivor's pension to a wider category than just the legal spouse.

b) Age difference between member and dependant

Females are assumed to be 3 years younger than males.

c) Children's pensions

No specific additional allowance is to be included for prospective children's pensions. Children's pensions already in payment should be assumed to cease at age 18, or age 23 if currently aged over 17.

5.2 Expenses

This calculation of expenses is intended to give an estimate of the cost of securing a full buyout with an insurance company. The expenses must be applied whatever the investment strategy of the scheme and, in particular, even if all scheme benefits are secured by immediate and deferred annuity policies.

a) Estimated wind-up expenses

5% of liabilities (excluding benefit installation / payment expenses) up to £4 million

plus

1.5% of liabilities (excluding benefit installation / payment expenses) between £4 million and £20 million

plus

0.8% of liabilities (excluding benefit installation / payment expenses) between £20 million and £340 million.

The estimated wind-up expenses will be no more than £3 million for all schemes.

b) Benefit installation / payment expenses

Non-pensioners
An allowance of £750 per member should be made.

Pensioners
An age-related allowance per member should be made, according to the table below:

Age	**Expense allowance per member**
	£
< 60	650
60 – 70	550
70 – 80	500
80 +	400

If a member has two or more records, e.g. a pension and a deferred pension, then only one expense allowance (the highest) should be calculated.

Appendix 4: Proposed new assumptions for section 179

Changes from the existing assumptions are highlighted. With the exception of the effective date we do not propose to make any changes to Parts 1 and 2, and so these sections are not shown below.

Part 3 – Financial basis for use when undertaking valuations

3.1 Calculation of yields as at the effective date of valuation

Yields should be measured as at the close of business on the effective date of the valuation. For any dates where yields are not available the yields for the nearest preceding date should be used. Yields should be calculated to the nearest 0.01%. Expressions of the form (Yield Z - k%) should be calculated as an arithmetic difference and not a geometric difference.

3.2 Yields in deferment

Compensation increasing in deferment and accrued prior to 6 April 2009

For each non-pensioner, where compensation which accrued prior to 6 April 2009 increases in deferment, the liability for the period of deferment must be obtained by discounting the benefit at normal pension age at the adjusted net index-linked gilt yield shown below. As this yield implicitly allows for increases to normal pension age no allowance should be made for increases to benefits between the relevant date and normal pension age.

Adjusted net index-linked gilt yield = Yield A (**i**) + 0.2%

(**i**) Yield A should be determined daily as 50% of the sum of the FTSE Actuaries' Government Securities Index-Linked annualised Real Yields 5 to 15 years assuming:

a 5% inflation; and

b 0% inflation.

Compensation increasing in deferment and accrued after 5 April 2009

For each non-pensioner, where compensation which accrued after 5 April 2009 increases in deferment, the liability for the period of deferment must be obtained by discounting the benefit at normal pension age at the adjusted yield shown below. As this yield implicitly allows for increases to normal pension age no allowance should be made for increases to benefits between the relevant date and normal pension age.

Adjusted yield = higher of (Yield A (**i**) + 0.2%

and (Yield B (**ii**) – 2.5%)

(**ii**) Yield B should be determined daily as the annualised yield on the FTSE Actuaries' Government 10 year Fixed Interest Index.

Compensation not increasing in deferment

For each non-pensioner, where compensation does not increase in deferment, the liability for the period of deferment must be obtained by discounting the benefit at normal pension age at the adjusted gilt yield shown below.[4]

Adjusted gilt yield = Yield B (**ii**) + no adjustments

3.3 Yields in payment

Separate yields are used for pensioners and for non-pensioners post retirement. For the period from which payments are assumed to commence, the liability must be obtained by reference to the following (adjusted) yields.

Non-pensioners: compensation with no increases in payment

Adjusted yield = Yield D (**iv**) + no adjustments

(**iv**) Yield D should be determined daily as the annualised yield on the FTSE Actuaries' Government 20 year Fixed Interest Index.

Non-pensioners: compensation increasing in payment

Adjusted yield = higher of (Yield E (**v**) + 0.1%) and
(Yield D (**iv**) – 2.3%)

(**v**) Yield E should be determined daily as 50% of the sum of the FTSE Actuaries' Government Securities Index-Linked annualised Real Yields over five years assuming:

a 5% inflation; and

b 0% inflation.

Pensioners: compensation with no increases in payment

Adjusted yield = Yield C (**iii**) + 0.4%

(**iii**) Yield C should be determined daily as the annualised yield on the FTSE Actuaries' Government 15 year Fixed Interest Index.

Pensioners: compensation increasing in payment

Adjusted yield = higher of (Yield A (**i**) + 0.6%) and
(Yield C (**iii**) – 1.8%)

[4] This assumption only applies to schemes that do not provide for any revaluation of benefits for, or in respect of, any member. If one or more members receive revaluation on any part of their pension then this assumption does not apply to that scheme.

Part 4 – Mortality for use when undertaking valuations

The mortality baseline in respect of an active, deferred or pensioner member, pre and post retirement, shall be:

Gender of first life	First life	Contingent life
Men	S3PMA	S3DFA
Women	S3PFA	S3DMA

The mortality baseline in respect of a current dependant shall be S3DMA (men) and S3DFA (women).

Future changes to mortality in line with CMI_2021_M [1.50%; A=0.25%; w2020=10%; w2021=10%] and CMI_2021_F [1.25%; A=0.25%; w2020=10%; w2021=10%] for men and women respectively (from 2013).

These mortality tables are published by the Continuous Mortality Investigation. For each individual, the set of mortality rates used shall be those applicable to that individual's year of birth.

Part 5 – Other assumptions for use when undertaking valuations

5.1 Assumptions for contingent benefits

a) Proportions married

Where the scheme provides for survivor pensions:

For pensioners

Where the scheme makes provision (including discretionary provision) for survivor pensions for "relevant partners" an assumption consistent with 85% (males) or 75% (females) at normal pension age.

Where the scheme only makes provision for survivor pensions for a legal spouse or civil partner, an assumption consistent with 75% (males) or 65% (females) at normal pension age.

Using a proportion married assumption consistent with 85% / 75% (males) or 75% / 65% (females) at normal pension age may require mortality rates for calendar years before 2013 for a "strictly correct" calculation of the proportion married assumption to apply for older pensioners. In such circumstances prudent assumptions should be used.

For non-pensioners

Where the scheme makes provision (including discretionary provision) for survivor pensions for "relevant partners" the assumption must be, at the assumed date of retirement or earlier death, 85% (males) or 75% (females).

Where the scheme only makes provision for survivor pensions for a legal spouse or civil partner, the assumption must be, at the assumed date of retirement or earlier death, 75% (males) or 65% (females).

A **"relevant partner"** is as defined in SI 2005/670, being a person of either sex who was not married to, or in a civil partnership with, the member and who was living with the member as if that person and the member were husband and wife or, in the case of two adults of the same sex, as if they were civil partners. For the purpose of the above, two adults of the same sex are to be regarded as living together as civil partners if they would be regarded as living together as husband and wife were they instead two adults of opposite sex. Schemes that were formerly contracted-out on a protected rights basis may be required to pay a survivor's pension to a wider category than just the legal spouse.

b) Age difference between member and dependant

Females are assumed to be 3 years younger than males.

c) Children's pensions

No specific additional allowance is to be included for prospective children's pensions. Children's pensions already in payment should be assumed to cease at age 18, or age 23 if currently aged over 17.

5.2 Expenses

This calculation of expenses is intended to give an estimate of the cost of securing a full buyout with an insurance company. The expenses specified in this section must be applied whatever the investment strategy of the scheme and, in particular, even if all scheme benefits are secured by immediate and deferred annuity policies.

a) Estimated wind-up expenses

5% of liabilities (excluding benefit installation / payment expenses) up to £4 million

plus

1.5% of liabilities (excluding benefit installation / payment expenses) between £4 million and £20 million

plus

0.8% of liabilities (excluding benefit installation / payment expenses) between £20 million and £340 million.

The estimated wind-up expenses will be no more than £3 million for all schemes.

b) Benefit installation / payment expenses

Non-pensioners
An allowance of £750 per member should be made.

Pensioners
An age-related allowance per member should be made, according to the table below:

Age	**Expense allowance per member**
	£
< 60	650
60 – 70	550
70 – 80	500
80 +	400

If a member has two or more records, e.g. a pension and a deferred pension, then only one expense allowance (the highest) should be calculated.