Institute and Faculty of Actuaries

Report of the dynamic discount rates working party

Key considerations for pension scheme funding

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Abstract
This report explores key considerations in relation to adopting a dynamic discount rate funding approach and the impacts of doing so in a range of areas, including funding volatility, investment strategy and end game objectives. It considers the advantages and disadvantages of this approach from the perspective of a range of stakeholders and the challenges that need overcoming in order to fully implement and support the approach, for example data challenges and the new skills required in the industry. The report includes sample modelling to highlight the practical issues that arise when adopting this approach. It describes a step-by-step approach for assessing the risks to be considered when determining an appropriate level of assets to provide funding for a sample set of pension scheme cash flows, as summarised in the table below.

Steps involved in determining the funding buffer and discount rate	
Step 1	Create an asset portfolio based on best-estimate liability cash flows
Step 2	Adjustment for investment costs
Step 3	Buffer: allowance for asset-side risks
Step 4	Buffer: allowance for asset-liability mismatch risk (reinvestment and disinvestment risk)
Step 5	Buffer: allowance for liability-side risks
Step 6	Buffer: consideration of risk diversification when determining the buffer

It also considers how a dynamic discount rate approach fits within the proposed future funding regulations. Finally, the report puts forward recommendations for the IFoA, Scheme Actuaries and TPR.

Consequences of schemes adopting a dynamic discount rate approach could include very different investment strategies with investment in a wider pool of assets, less use of leveraged Liability Driven Investment, fewer schemes targeting buy-out as their end game strategy and an increase in technical work for actuaries in advising on the optimisation of asset and liability cash flows.

Key words
Pensions; Funding; Dynamic; Discount rates; Cash flows

Compliance with Technical Actuarial Standards
The Working Party have determined that because this work is not being presented to any specific user and is not intended to prompt any specific action or be relied upon by the audience to make any decisions, it does not fall within the definition of technical actuarial work and need not comply with TAS 100.

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Chapter 1: Introduction and Executive Summary

Background

1.1 This Working Party was created to follow up on a recommendation by the IFoA's Target End-States for Defined Benefit Pensions Schemes Working Party in its 2021 report.[1] Paragraph 10.4.4 states:

"The actuarial profession should sponsor research into the use of dynamic discount rates for the technical provisions of schemes. This will help remove funding volatility that is artificial in nature and will become increasingly relevant for schemes with a low-dependency [Target End States] that adopt asset strategies that more closely address matching of assets and cash flow liabilities. Gilts+ type discount rates can achieve this, as long as all agree the "+" is variable."

1.2 The report investigates discount rates for funding purposes which is clearly not a new topic for the actuarial profession. For instance, we note that in 2010 the IFoA commissioned a working party to undertake a research project into the use of discount rates for actuarial calculations. This work resulted in a paper being put forward by the profession in the 2012, "A Framework for the use of Discount Rates in Actuarial Work".[2]

1.3 Using the terminology from the above IFoA paper, we should make it clear that in our report we are focusing on discount rates for "budgeting calculations" rather than "matching calculations". This is consistent with the findings of the IFoA paper which concludes that "a budgeting framework may be more suitable for [funding] calculations".

1.4 For those unfamiliar with the earlier paper, we have summarised the meaning of these two expressions below.

1.4.1 Budgeting Calculations – This is the family of calculations where the valuation of the liability is approached from the viewpoint of how the liability is going to be financed and so the discount rate is often based on the expected returns from an agreed investment strategy.

1.4.2 Matching Calculations – This is the family of calculations where the liability is valued by reference to market instruments (or models to simulate market instruments) that seek to match the characteristics of the liability cashflows. Generally, the discount rates used are those implicit in the market prices of the matching market instruments or a reasoned best estimate if there is no deep liquid and transparent market.

Dynamic Discount Rates ("DDRs") – an overview

1.5 First, we need to be clear as to what we mean by the term "dynamic discount rate" approach. We define this approach as one whereby *the discount rate used for funding purposes moves in sympathy with the expected return on the asset portfolio that is backing the liabilities*. It has typically been used in cases where the asset portfolio consists of investments with a high degree of contractual cash flows that are similar in nature and profile to the expected benefit outgo.

1.6 We note that the DDR approach as defined above is not new and there are different types of DDR-type approaches. For example, some schemes such as those that are open and / or immature have used discount rates based on the expected return of the asset portfolio, whether that is expressed relative to gilts, inflation or some other measure, The primary focus of this report is the use of the DDR approach for well hedged and cash flow matched schemes.

[1] https://www.actuaries.org.uk/system/files/field/document/Target end-states for defined benefit pension scheme paper 11 Dec.pdf
[2] https://www.actuaries.org.uk/system/files/documents/pdf/discount-rates-web-document-2.pdf

1.7 Given the focus on such schemes, in this report we will at times comment on the risks associated with investment strategies centred around matching contractual cash flows in addition to commenting solely on the discount rate approach. We believe that this is appropriate because the very fact that DDR may well become more prevalent makes such investment strategies more viable. Also, the use of DDR can involve a certain level of complexity that requires a joined-up funding and investment approach and so the two aspects are not considered in isolation.

1.8 There are several ways in which a discount rate can be expressed, such as “gilts plus”, “swaps plus” or, “bonds minus”. The modelling in this report uses “gilts plus” as we believe that this is the most common way in which discount rates are expressed in UK scheme funding. However, we should make it clear that we use this expression for convenience rather than implying a view about the merits of gilts versus other asset classes. The key focus of this report is not the “gilts” but the “plus”, i.e., the way in which this margin can be derived and how it can vary over time, leading to a more stable funding position, rather than the “plus” being treated as a fixed adjustment that is only subject to review at formal (usually triennial) valuations and can therefore become an anchoring point for the negotiations.

1.9 The high-level benefits of adopting a DDR include the following:

1.9.1 Greater consistency of funding and investment strategies – to the extent that the discount rate better captures changes in the yield on the assets held by the pension scheme, the funding level will exhibit a lower level of volatility over time which has a benefit to the trustees and scheme sponsor as it provides greater stability for budgeting. There is still expected to be some amount of volatility that the trustees will need to monitor and manage; however, the approach benefits trustees as they will have higher quality funding information. They can therefore be more effective in their governance and monitoring by spending their time dealing with the things that matter rather than artificial volatility i.e., the “noise” caused by the model error in the discount rate.

1.9.2 Greater opportunities for investment strategy – if the focus is on finding assets that provide a stable funding level when the discount rate is expressed as a gilts plus a fixed margin then this could lead to considering a smaller pool of potential assets. A DDR approach should make it easier for pension schemes to hold certain assets (e.g., infrastructure) which form part of the larger pool of available assets and therefore result in greater investment choice. There may also be wider societal benefits but these are secondary to the primary trustee objective of providing the benefits for the members of the scheme.

1.9.3 Focusing solely on the actuarial profession, greater opportunities for the actuary to provide valuable input into the funding and investment strategy – working in an integrated fashion with the asset side adviser, the actuary can help optimise the level of cash flow matching and the stability of the funding level.

1.10 There are also drawbacks of adopting this approach including:

1.10.1 Ease of understanding – an argument could be made that adopting a fixed margin for the discount rate is conceptually easier to grasp and not unreasonable in certain situations (e.g., very immature schemes, schemes where the sponsor is much larger, and any inherent volatility is therefore relatively immaterial).

1.10.2 Greater modelling complexity – the need for more detailed and regular flows of asset information and the resulting additional costs that the analysis and modelling entail.

1.10.3 The judgements required are more explicit than in funding approaches involving fixed margins and can be difficult to make quickly in response to changing events. This can be challenging for trustees who, in most schemes, are ultimately responsible for agreeing the discount rate assumptions with the sponsor.

1.11 There are also points that can be considered either as a positive or negative:

1.11.1 More regular collaboration between asset and liability side advisers – if the discount rate is intended to move in a consistent manner with the yield on the assets, then it is important for the two sets of advisers to share information more frequently than is, in our view, typically the case. It will be incumbent on both parties to understand the risks inherent in the assets so that they can explain the position clearly to the trustees so that they can decide on the appropriate level of prudence in the funding assumptions. This increased interaction could result in a framework that is difficult to maintain if the information flows are not well planned.

1.12 Finally, we would note that there are, of course, other factors to consider when setting the discount rate such as risks not covered by the asset cash flows (longevity, for example) and we explore some of these in this report. One aspect not covered in this report is the risk relating to determining assumptions and cash flow matching strategy for pension increases where the benefits are subject to caps and floors. We comment throughout the report on areas where we believe further research would be of value to the actuarial profession; this is one such area. Nevertheless, we believe the DDR concept is still a useful starting point and one which is worthy of further development for wider use in pension scheme funding.

Further context

1.13 We note that the report is being written against a backdrop of UK defined benefit pension schemes continuing to mature due to closure to new members and / or new accrual. In addition, typical asset allocations are gradually moving from growth assets to those that better match the benefit outgo.

1.14 The Purple Book 2022[3], states that "For the first time, there are now more schemes providing no form of accrual of benefits than those that do, with 51 per cent of schemes closed to new members and new benefit accrual."

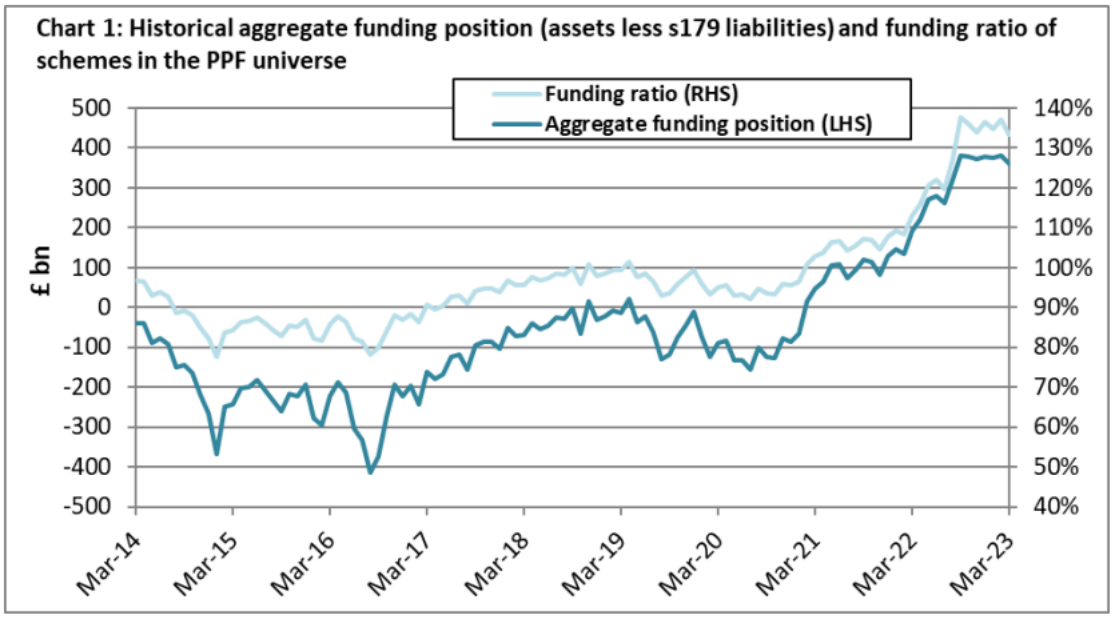
1.15 TPR's March 2020 consultation document[4], "Defined benefit funding code of practice", chapter 16, states that around 15% of DB schemes are already "quite mature" (based on the TPR document, quite mature is defined as a scheme having a mean term of accrued liabilities, weighted by the value of future cash flows discounted at gilts plus 0.5% p.a., of below 16 years). This comment was based on TPR calculations at March 2019 and scheme return data; the percentage will have inevitably increased since then.

1.16 Another factor to note is the general improvement in pension scheme funding that has taken place, especially over 2022/23 which broadly coincides with the period of work carried out in producing this report. For instance, the chart in Figure 1, taken from the monthly analysis carried out by the PPF shows that aggregate funding positions on S179 basis have improved in recent years. Anecdotal evidence based on the experiences of the Working Party members would suggest that the general improvement also applies to other funding measures.

1.17 Whilst there are, of course, differences between a scheme's PPF liabilities and Technical Provisions, this general improvement may well mean that the tranche of schemes for whom a DDR approach is of interest has changed as there may well be some (but not all) schemes in that tranche whose focus will now be on settling their liabilities with an insurer. At the same time, there may also be schemes whose funding position has improved to such an extent that a DDR approach has more immediate appeal. Overall, we believe that general funding improvements will lead to a greater number of schemes wanting to adopt a low-risk run-off strategy which makes a DDR approach more attractive.

[3] https://www.ppf.co.uk/-/media/PPF-Website/Public/Years/2022-11/PPF_PurpleBook_2022.pdf
[4] https://www.thepensionsregulator.gov.uk/en/document-library/consultations/defined-benefit-funding-code-of-practice-consultation

Figure 1: S179 funding improvements



1.18 At the same time, the Pensions Act 2021 introduces a requirement for trustees and sponsors to agree a long-term objective, with these provisions currently expected to be brought into force alongside new DB funding regulations and a new funding code, no sooner than April 2024. We refer to the long-term objective throughout this report as the 'end game', whether that be low dependency, buy-out or transfer to a consolidator, and a funding and investment strategy to support the chosen objective. We comment on this further in Chapter 8.

1.19 Given all the above developments in the UK pensions landscape, we believe that this report will be helpful for those choosing their end game, but also useful for those wanting to adopt a less volatile funding approach on the journey to any of these end states.

Objectives

1.20 The Working Party has agreed to cover, to a greater or lesser extent, the following points in this report. We note a number of areas where we believe further work could be carried out and these are summarised in the conclusions and next steps Chapter 10.

1.20.1 Define what is meant by the term dynamic discount rate.

1.20.2 Provide an overview of the current practice in pensions for setting discount rates.

1.20.3 Investigate the circumstances in which a DDR approach might be of benefit.

1.20.4 Summarise what can be learnt from the insurance industry.

1.20.5 Demonstrate what such an approach looks like in practice for pension scheme funding.

1.20.6 Consider the implications for other areas, such as:

a. Investment strategy

b. Settlement transactions

c. CETVs and scheme factors

1.20.7 Compare the implications of this approach for compliance with TPR's proposed new funding code and, more generally, the planned changes to the regulatory regime.

1.20.8 Explore the new skills required from actuaries to support a DDR approach.

1.20.9 Provide suggestions for the way forward.

1.20.10 Collate a glossary of terms to help all actuaries have a baseline level of investment knowledge on this topic.

Composition of the Working Party

1.21 The Working Party includes actuaries with expertise in pension scheme funding, consolidation vehicles, pensions investment and insurance, reflecting the importance of both the asset and liability sides in this topic, but also that there is relevant experience to draw on from the regulatory regime for insurance.

Key points to note

1.22 Whilst this report looks at the implications of adopting a particular approach to setting the discount rate and includes the results of modelling for pension scheme funding, it does not give a firm view or recommendation on the level of prudence to be adopted and the amount of assets required for a particular scheme or circumstance. The Working Party believes that this is a matter for agreement between the trustees and the sponsor(s) of each DB scheme, reflecting the scheme's specific circumstances, subject to regulatory oversight by the Pensions Regulator (TPR).

1.23 This report was largely drafted before the Mansion House[5] reforms were published in July 2023. As a result, it does not specifically cover the key themes from the various consultations that might be relevant to a DDR approach.

Overview of methodology for setting the funding buffer and discount rate

1.24 In Chapter 6, we set out a step-by-step approach that we believe can be used for schemes that wish to adopt a DDR approach in conjunction with a cash flow matching investment strategy.

1.25 The six steps are summarised in the table below.

Steps involved in determining the funding buffer and discount rate	
Step 1	Create an asset portfolio based on best-estimate liability cash flows
Step 2	Adjustment for investment costs
Step 3	Buffer: allowance for asset-side risks
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Step 5	Buffer: allowance for liability-side risks
Step 6	Buffer: consideration of risk diversification when determining the buffer

1.26 The funding approach set out in Chapter 6 can be loosely characterised as using a discount rate of gilts plus a variable margin, plus a buffer so that the target to aim for is above 100% funded on this basis. We believe that this approach is preferable for the reasons set out in that chapter, although we note that this approach is not unique to using a DDR.

[5] https://www.gov.uk/government/collections/mansion-house-2023

1.27 We have also considered how the initial discount rate and funding buffer can be updated to reflect changes in future market conditions, The approach we have used, of carrying out sensitivity analysis separately on the credit rating of the assets and the credit spread at time zero in order to derive the discount rate formula, is not something that is typically done in practice; the Working Party believes that this provides a lot of useful information for the scheme. The approach could become more commonplace if more schemes start to adopt a DDR approach.

Chapter 2: Overview of the current practice in pensions for setting a DDR

Introduction

2.1 In this chapter, we have compiled a list of approaches to setting DDRs that the Working Party members have come across during their day-to-day work, whether that be in the course of advising their own clients or based on approaches that they have seen on other pension schemes.

Data sources

2.2 We have relied on personal experiences as we note that, with the exception of any surveys specifically commissioned for this purpose, there is not a lot of data available on the various methods of setting discount rates.

2.3 For instance, the annex to the 2022 scheme funding analysis conducted by TPR contains a wealth of information on discount rates and how they vary by scheme characteristics, but not how they are determined.[6]

2.4 We note that this is not unexpected as one of the main sources of data for the above analysis, the submissions made for TPR's Recovery Plan return, require the discount rate structure to be classified into one of the following four categories:

1. Same rate pre- and post-retirement
2. Different rates pre- and post-retirement
3. Different rates adopted pre- and post- a time "horizon"
4. Other (with a text box included for further information, subject to a maximum of 250 characters)

2.5 The Working Party understands that TPR is currently considering and, in due course, consulting on the information it wishes to receive as part of the information to be submitted as part of the new Statement of Strategy (see Chapter 8 for further information). The Working Party recommends that, if practical, TPR also captures information regarding the way in which the margin above a risk-free rate is determined at the valuation date and future dates.

Overview of the approaches

2.6 In all these approaches documented below, the key theme is that the discount rate is expressed in a way that attempts to capture movements in the expected return on the assets held by the scheme, whether that be by assessing the actual asset portfolio at regular intervals or by using a more approximate representation of the assets held, or expected to be held, by the scheme. We have expressed the dynamic margin as being relative to gilt yields but, as noted earlier, it can be expressed in other ways and relative to other risk-free measures. Indeed, for some asset classes (e.g., illiquid bonds) it might be appropriate to use a single yield (i.e., no reference to risk free rate) based on the contractual future cash flows and current value.

2.7 There are clearly pros and cons of adopting the various approaches for scheme funding, and these are considered in Chapters 3 and 4 of the report.

2.8 The approach adopted will depend on a number of factors, including the underlying asset portfolio. In some cases, for example, depending on the nature of the assets in which the

[6] https://www.thepensionsregulator.gov.uk/en/document-library/research-and-analysis/scheme-funding-analysis-2022/scheme-funding-analysis-2022-annex

scheme invests, a simpler asset portfolio might be assumed for the purposes of deriving the movements in the discount rate between formal assessments.

Approaches adopted

2.9 The following is a list of approaches to expressing the discount rate at formal valuation dates that the Working Party is aware of. In all the examples below, the frequency with which the fixed elements of the basis are reviewed will need to be agreed with the trustees. Whilst it is possible that, for many schemes, the review will take place only at the formal valuation date, for others where there is a greater desire for less funding level volatility the review might take place more frequently.

2.10 Most of these options are variations on an approach that can be described as "gilts plus a proportion of a spread". Under each of these approaches, a decision is required as to the spread or index figures to use.

2.11 We also note that some of the approaches (such as 1. and 2.) could be seen as a proxy for funding for a long-term target linked to annuity pricing whereas others (such as 6. and 7.) are more consistent with funding for a low-risk run-off strategy.

2.12 Whilst the list of approaches below was created by the Working Party during the early phase of its work, we should highlight that the formula derived for the discount rate in the modelling carried out in Chapter 6 in this report is somewhat different in format from any of these. Please refer to Chapter 6 for further details.

1 Gilts plus a fixed proportion of the spread on a AA-rated bond index

- The proportion would be determined based on the actual allocation to bonds within the scheme and a view taken on the deduction to make for default and reinvestment risk.
- The approach assumes that the AA-rated bonds are a broad proxy for the actual or prudently assessed credit quality of the non-gilt assets.
- It also assumes that, to the extent the scheme is not fully funded or perfectly matched, the terms on which future credit assets can be purchased are the same as current terms (unless, of course, a specific deduction is made from the spread for this risk).

2 Gilts plus a fixed proportion of the spread on an index of similar credit quality to the non-gilt assets held by the scheme

- Similar to the first approach but reflecting the actual credit quality of the scheme's assets rather than assuming they approximate to AA-rated, and possibly the latest proportion of these assets held in the scheme's portfolio.

3 Gilts plus a fixed proportion of the spread on the bonds and other "non-growth" assets held by the scheme

- For example, ignoring any growth assets held by the scheme on grounds of prudence and basing the discount rate solely on the other assets.

4 As for approach 3, but some allowance made for additional returns on the growth assets held by the scheme

- Depending on the size of the allocation (which we assume could be small for schemes adopting this approach in conjunction with a cash flow matching strategy), the additional returns could be based on the dividend yield for the FTSE All Share index or some other suitable approach.

5 Gilts plus a margin and a proportion of the credit spread based on the bonds held by the scheme

- The rationale for this approach is that the credit allocation only covers the shorter duration cash flows, so an assumption is needed for the terms on which future credit assets will be purchased. If future credit spreads are not considered to be perfectly

correlated with current spreads, a combination of the current spread and a longer-term 'fixed' margin can be adopted to reflect these future terms.

6 Gilts plus a spread term structure

- This is an extension of the approaches above, but allowing for different spreads (net of an allowance for prudence, defaults and downgrades) at different terms reflecting the availability of investible assets, and / or assets actually held within the portfolio. In the case of a 100% credit portfolio which is well matched to benefit cash flows, it would be analogous to discounting these cash flows using the yield on the credit.
- This also reflects that it is more straightforward to find assets delivering contractual cash flows with a spread for shorter benefit payments, than for very long ones. In that instance, allowing for a larger spread up front reflects the more predictable nature of realising that spread through holding to maturity. Longer term benefit payments may be funded via assets where future reinvestment is needed, or where there is the possibility of prepayments in the underlying asset, and therefore allowing for a lower spread in this instance is consistent with taking a prudent approach in the context of these uncertainties.

7 A blended approach of the above could also be adopted reflecting the diversified investment strategy of the scheme, as shown below. A further extension of this approach could also include, for example if Liability Driven Investment (LDI) is being used, an explicit deduction for the cost of managing/implementing LDI through swaps.

Asset class	Expected return (illustrative)	Prudent haircut (illustrative)	Discount rate	Comments
Equity	Gilts + 4.5% pa	2% pa	Gilts + 2.5% pa	Premium above gilts re-assessed quarterly
Illiquid assets	5.5% pa	1.5% pa	4% pa	Yield on illiquid assets updated at each valuation date (e.g., monthly, quarterly or less frequent)
Traditional credit	Gilts + credit spread	0.5% pa	AA bond yields – 0.5%pa	Prudent haircut might be reassessed, say, quarterly
Gilts / LDI	Gilts	Nil	Gilt yield	

Example wording

2.13 Unlike approaches that use a fixed margin added to a risk-free / low-risk rate to set the discount rate, it can be the case that the DDR is not defined as precisely in schemes' Statement of Funding Principles. For instance, the wording below relates to a case where the discount rate is based on a proportion of the credit spread applicable to the scheme's actual bond holdings.

The yield curve used to discount the projected cash flows is based upon a gilt curve, which is intended to represent the return on a portfolio of low-risk assets. This has been adjusted to allow for the additional returns expected on the Scheme's current asset portfolio above expected returns on gilts. In particular, it reflects the assumed additional return from the Scheme's corporate bond holdings (approximately 70% of the asset portfolio at the valuation date) in excess of government bonds. This additional return has been reduced by 20% as a prudent allowance for the possibility of future defaults and downgrades.

Formal versus informal assessments

2.14 The discount rates to be adopted for the formal valuation and the annual actuarial update are likely to benefit from sufficient time for them to be considered and agreed (or, depending on the specific wording of the scheme's rules, consulted on). However, particularly in cases where the approach is complex, a more pragmatic and simpler methodology may be adopted for regular monitoring of a scheme's funding position in between these formal assessments.

Indeed, for illiquid assets there might be step changes at calibration and assessment dates reflecting, say, updated valuations of the illiquid asset.

2.15 Where a more pragmatic and simpler methodology is adopted care will be needed as the users of the information will need to understand the potential differences between the more accurate approach used for the formal assessments and that used for monitoring between these dates. As well as highlighting any approximations in the tracking of the discount rate, users should also be made aware of approximations in the tracking of the assets between recalibration points.

2.16 For illustration purposes, for the scheme for which the Statement of Funding Principles (SFP) wording is shown above, the discount rate is recalibrated on a quarterly basis. Between quarters, the movements are approximated by changes in a bond index and variations of 5 basis points are not uncommon at each recalibration which equates to less than 1% of the Technical Provisions in current market conditions. Other things remaining the same, the impact of variances in the discount rate would be much less significant for mature schemes compared to immature schemes.

Chapter 3: The DDR approach and stakeholder considerations

Introduction

3.1 As noted in Chapter 1, there are a number of pros and cons of using a DDR approach relative to other approaches that are in common practice. When debating the merits of one approach over another, the Working Party came up with the following list of criteria.

3.1.1 How well the approach captures actual economic changes in funding and minimises volatility caused by the valuation methodology adopted.

3.1.2 Complexity and governance implications (both the time and cost).

3.1.3 Ease of explanation (and to whom).

3.1.4 Operational issues (e.g., how does it cope with certain asset classes).

3.1.5 Consistency of application across schemes.

3.1.6 Incentives created (e.g., does it introduce behaviours by various stakeholders that are at odds with what might be otherwise expected).

3.2 We then considered the main stakeholders involved with a pension scheme and what such an approach would mean for them, along with other interested parties. The following sub-sections address the considerations from the perspective of these stakeholders.

3.3 One key point to consider is how a DDR approach might impact a pension scheme's long-term objective. Such an approach may increase trustees' (and sponsors') appetite to 'run on' a pension schemes for longer, perhaps with a view to targeting surplus generation (perhaps by accepting some degree of asset and liability cash flow mismatch and therefore taking more risk than theoretically necessary) which could be used to increase members' benefits and/or shared with the sponsor depending on the circumstances.

3.4 In the analysis below, we have attempted to highlight whether the points being considered are a function of a DDR approach, or whether it is instead caused by using a cash flow matched approach irrespective of whether a DDR approach is also used.

Members

3.5 Ultimately, a member's view of the pension scheme will be determined by whether it pays the benefits as promised, rather than the discount rate methodology adopted to fund the scheme. Putting this to one side, if the scheme buys investments that are intended to broadly match the payments that need to be made, the members may find alignment between the investment strategy and the DDR approach more intuitive and therefore easier to understand.

3.6 A more stable funding level should help provide members with more confidence that their scheme is being properly run. In situations where schemes have experience large funding falls, this can result in members raising concerns about their benefit security.

3.7 One potential downside of a cash flow matched approach (irrespective of whether a DDR approach is used for the discount rate) could be due to the investment strategy. If the focus is on funding assets that deliver cash flows that broadly match the scheme's benefit outgo, then there could be less chance of surpluses emerging. Other things being equal, this would mean less chance of discretionary increases in benefits being provided. This comment assumes that the liability cash flows on which the investment strategy is based do not include an allowance for discretionary increases to benefits of some form. The flip side of this comment is that the investment strategy underlying this funding approach should help the benefits be paid with more certainty.

3.8 The cash flow matched approach, when used in conjunction with a DDR approach, does not necessarily imply a more secure funding approach for members in the scenario of employer insolvency. It is plausible to envisage a scenario whereby members in a scheme that has adopted such a strategy are adversely affected, either due to credit spreads blowing out at that time (by more than the allowance made by insurers in annuity prices) or due to having to sell illiquid assets unexpectedly in order to secure the benefits with an insurer.

3.9 The members' views on the options they are offered should also be considered, e.g., early retirement and transfer value terms. The DDR approach may result in a more variable discount rate when compared with, say, a gilts plus fixed margin approach. As a consequence, the terms underlying the various options could change more frequently, especially if the scheme is not in surplus and there is a desire by the trustees to avoid funding strains. More variable option terms might make it more difficult for members to make decisions and plan for the future.

Sponsors

3.10 From the perspective of the sponsor, the DDR approach might have positives and negatives. The reduction in funding volatility that the DDR approach brings should appeal to sponsors. However, the DDR approach when used in conjunction with a cash flow matching strategy involves an investment strategy that could be considered to be lower risk than one that is more heavily invested in growth assets. At the same time, the approach might provide scope for investment in a wider range of matching-type assets than the gilts and high-quality corporate bonds that have been traditionally used to match liability cash flows. Depending on the sponsor's risk appetite, keeping the funding objective the same, the DDR approach might involve less risk but potentially more cost than other riskier investment strategies.

3.11 Another point to consider is that if DDR increases the likelihood of schemes adopting low-risk run-off targets then costs to the sponsor may be lower than those under a buyout strategy, but there will be a greater reliance on covenant and over a longer period as a consequence.

3.12 One further point to consider is the impact of the methodology on scheme design. A method that poses less volatility to a sponsor could make future defined benefit pension provision more attractive than it would otherwise be.

Trustees

3.13 As noted in Chapter 8, under the Pensions Act 2021 trustees will need to agree a long-term objective with the sponsor, and an associated funding and investment strategy. For those schemes that wish to target some form of low-risk run-off strategy, the DDR approach would be a good fit, especially if the scheme is mature with cash flows that are easier to match.

3.14 The approach benefits from being relatively straightforward to understand at a high level and therefore to explain to other parties. That said, the approach does lead to an increase in governance complexity for the trustees when the approach is first implemented but with longer term governance benefits as decision making and monitoring should be more straightforward for them. It is also worth noting that the use of a DDR is expected to make the funding level less volatile, even if the markets themselves are. Continuing with the theme of governance, should a scheme choose to analyse member factors more regularly there will be additional work needed to review and possibly update them.

3.15 A DDR approach that is used in conjunction with a high level of asset and liability cash flow matching should give trustees a high level of confidence that the scheme's benefits will be met in full, even if the scheme is less than 100% funded on a solvency basis (especially if there is longevity hedging in place), assuming no employer insolvency.

3.16 Finally, the DDR approach is one where it can be said that the investment strategy drives the discount rate, rather than the funding strategy driving investment choices. A consequence of moving to this funding approach is that it encourages pension schemes to invest more in cash flow generating assets and on a longer-term basis.

Alternative providers of pension scheme benefits

3.17 The term “alternative providers” is intended to cover the traditional bulk annuity providers, the new superfunds and capital backed funding arrangements. Adoption of a DDR approach by pension schemes might have positives and negatives for alternative providers. This will likely depend on a pension scheme’s specific objectives when implementing a DDR approach.

3.18 The Working Party anticipates that a DDR approach will require a high degree of matching between the asset cash flows and expected benefit outgo. Consequently, a pension scheme implementing a DDR approach is likely to hold a significant allocation to credit assets. Since bulk annuity insurers typically invest in credit and credit-like assets to back pension liabilities[7], in this scenario a DDR approach might result in a funding basis which better tracks insurer pricing versus a traditional ‘Gilts+’ type approach because both are sensitive to credit spreads (the Working Party understands this is also the case for superfunds and other alternative providers). Where a pension scheme is targeting a transfer to an alternative provider as its endgame objective, a DDR approach might therefore provide greater certainty around when a scheme will be sufficiently funded to transact, provide more meaningful monitoring on the journey, and potentially reduce the risk (and cost) of failed transactions. In this context, a DDR approach might therefore have benefits for both pension schemes and alternative providers.

3.19 However, a potential downside for alternative providers is that pension schemes implementing a DDR approach in conjunction with a cash flow matching strategy might be seeking similar cash flow ‘matching’ assets typically held by these providers. Increased competition for the same ‘matching’ assets might suppress the spread on these assets relative to risk free rates and make sourcing these assets more difficult.

3.20 As noted above, there may be an increase in trustees’ (and sponsors’) appetite to ‘run on’ pension schemes for longer, in conjunction with a DDR approach. For alternative providers, this might delay the point at which schemes look to transfer or, in some cases, schemes may no longer target a transfer to an alternative provider as their endgame objective.

The Pensions Regulator (TPR)

3.21 In its December 2022 draft DB Code of Practice[8] TPR specifically mentions a DDR approach as a possible way forward for setting the low dependency discount rate, where a scheme has purchased cashflow matching assets. TPR is therefore open to schemes using DDR approaches when is appropriate for the scheme’s circumstances.

3.22 One of TPR’s objectives is ensure the security of members’ benefits, so many of our comments in relation to members are also important to TPR. At the same time, TPR has a statutory requirement to consider the sustainable growth of employers, so there is a balance to be struck between improved member security and not making employer contributions too high. TPR could be concerned if, for instance, by adopting a DDR approach, employer costs were increased to the extent that monies were paid into the scheme that could otherwise be used for sustainable growth. This is possible, if a DDR approach were to be accompanied with de-risking that would otherwise have not taken place. However, to the extent that the employer has to agree the assumptions and resultant funding plan, which is the case for most schemes, employers should be able to manage that risk.

3.23 DDR approaches that are based on a wider range of investments, and higher discount rates than typically used for mature schemes, could require a greater degree of scrutiny by TPR.

3.24 Another practical implication of the DDR approach that is relevant for TPR is the potential difficulty in providing adequate oversight. It may be more difficult for TPR to understand in sufficient detail the suitability of a DDR approach if there is an increase in the number of schemes following more complex funding frameworks. However, heterogeneity is probably

[7] https://www.lgimblog.com/categories/investment-strategy/the-endgame-is-nigh-time-to-pay-more-attention-to-credit/
[8] https://www.thepensionsregulator.gov.uk/en/document-library/consultations/draft-defined-benefit-funding-code-of-practice-and-regulatory-approach-consultation/draft-db-funding-code-of-practice

helpful in terms of mitigating systemic risk such as that which was witnessed in the LDI market in 2022.

3.25 Further details on how a DDR approach fits within TPR's draft funding code are provided in Chapter 8 and Appendix 5.

3.26 Finally, although we have not separately considered the viewpoint of the Pension Protection Fund (PPF), one of TPR's objectives is to minimise calls on the PPF so there will be some alignment of interests for these two statutory bodies.

Society

3.27 Within the UK, the aggregate size of DB pension schemes means the way they invest has broad ramifications for the domestic economy as a whole. In that light, there have been some calls for more directive action to encourage pension schemes to invest in UK risk capital[9] (venture capital, corporate debt, infrastructure etc.), to reverse the structural migration toward gilts observed over the past two decades.

3.28 The primary focus in this report is on the direct impact of taking a DDR approach in conjunction with a cash flow matching strategy on members and sponsors respectively. Given that we anticipate a DDR approach may be coupled with a change in investment strategy (as discussed in Chapter 7) it would be myopic to ignore the possibility of broader impacts on the UK economy if there is widescale take-up. As an example, it may facilitate a stronger channel for financing green infrastructure with long-term capital from pension schemes, which would be a tailwind for a broader, UK-wide, green transition. There is also the potential for lower investment in gilts which might have negative impacts for the Government.

[9] https://www.institute.global/insights/economic-prosperity/investing-in-the-future-boosting-savings-and-prosperity-for-the-uk

Chapter 4: In what circumstances might a DDR approach be beneficial?

Introduction

4.1 To summarise the key points made earlier, for a scheme that invests in credit and other assets that are expected to provide regular contractual cash flows the primary drawback of a discount rate based on a gilts curve plus a fixed margin is the funding level volatility arising from fluctuations in credit spreads, which is particularly severe when schemes hold a significant proportion of credit assets.

4.2 If the discount rate is for budgeting purposes (i.e., it is a funding basis), this funding variability may well be a false signal, if the underlying cash flows from the credit portfolio are still expected to be sufficient in meeting benefit payments as they fall due.

4.3 To help illustrate this point, and the potential size of false signals, we created a model to 'back-test' how the volatility in funding level might have looked over the last 30 years using different approaches to determine the discount rate.

4.4 There are of course caveats about such a back-test, not least the feedback loop of having recourse to a sponsor for additional contributions when considered necessary. In fact, we would suggest the results are fairly intuitive.

4.5 The model was based on the same liability cash flows as described in Chapter 6. For modelling simplicity, this benefit profile is held at constant maturity over the back-test. The asset strategy consists of:

4.5.1 A set of corporate bonds where the initial cashflows are more similar to a standard index and materially shorter than the liabilities.

4.5.2 A hedging overlay, targeting an interest rate hedge ratio of 85% of liabilities valued on a gilts flat basis (which is more prudent than the valuation approaches described below).

4.6 The different valuation approaches were as follows:

4.6.1 A fixed premium over the gilt yield curve (taken as +1.5% p.a. constant throughout the period).

4.6.2 A fixed proportion over the gilt yield curve of the credit spread (50%) with a maximum set as a proxy for periods when spreads become extreme and may signal a period of potentially higher defaults. The maximum credit spread is set at 3% (corresponding to an allowance in the discount rate of 1.5% p.a.).

4.7 The charts in Figures 2 and 3 show the funding level and credit spread on the asset portfolio over the 30-year time period from 1993.

4.8 As expected, there is significant correlation between the credit spread, and the funding level, under the fixed premium valuation approach, as shown in Figure 2.

4.9 Under the DDR approach in Figure 3, a significant proportion of this volatility is removed with the exception of a funding level deterioration in 2008 (the global financial crisis) reflecting the exceptionally high prevailing credit spreads. This exceeds the maximum allowable credit spread within the liability basis, and therefore this sends a signal of higher possible future corporate bond defaults (although it is worth noting that actual defaults from that period were lower than implied by the increase in spreads that took place).

Figure 2 – Fixed premium valuation methodology

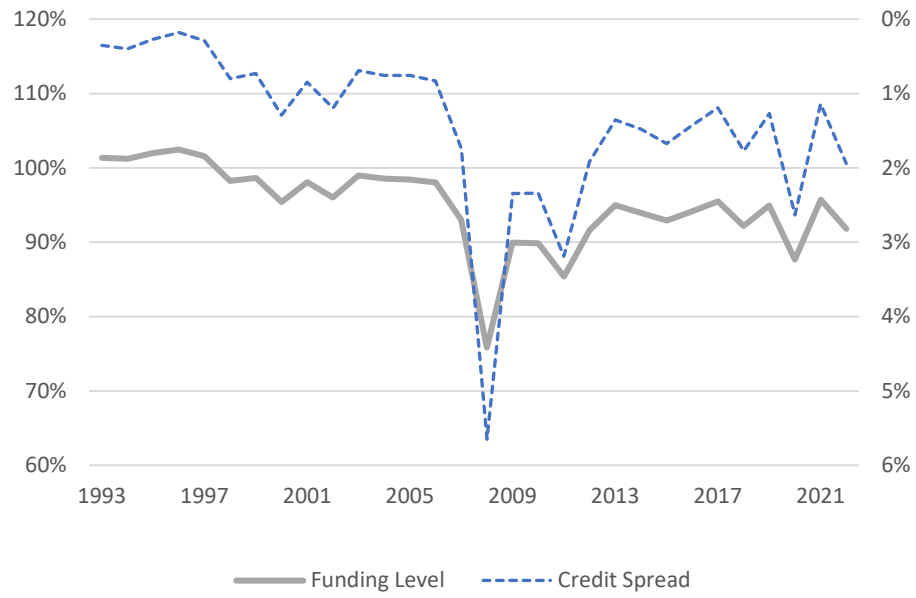
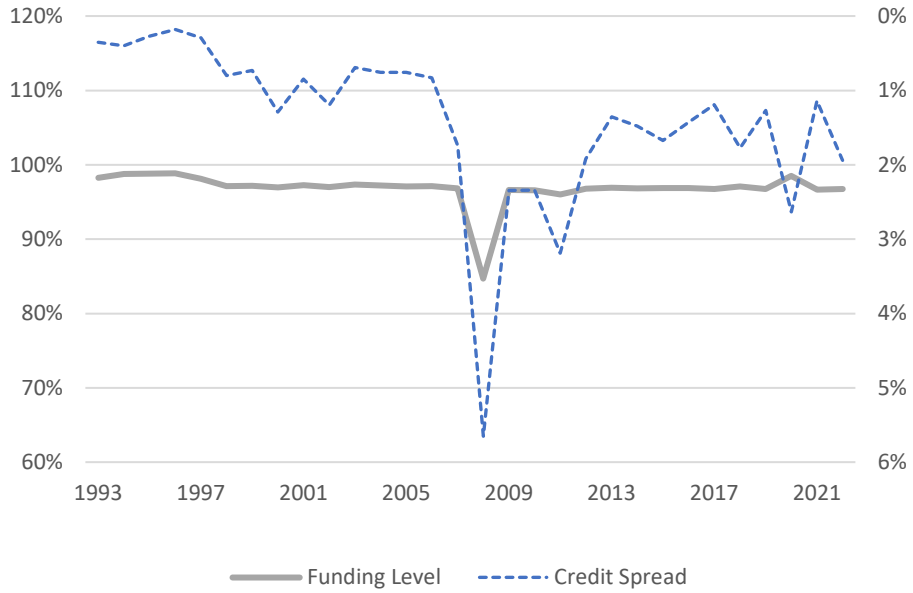


Figure 2 – Fixed and capped proportion of spread valuation methodology



4.10 The above analysis helps to frame the primary benefit of a DDR, and when it might be most beneficial. It allows schemes that hold significant credit allocations to reduce funding level volatility that is due to credit spread fluctuations, so that if a deficit subsequently does arise (as a result of longevity experience, a default or another reason) it is a truer signal that there is a budgeting shortfall.

4.11 In the following circumstances we believe that the benefit from a DDR approach is sufficiently compelling for trustees to seriously consider its adoption:

4.11.1 Schemes with well-matched assets and liabilities: The majority of assets deliver predictable cash flows that resemble a corresponding set of expected liability cash flows.

4.11.2 Schemes using investment strategies practising a “buy and maintain” approach. Expectation that these assets will be held through to receipt of those cashflows and the credit rating of the asset portfolio is stable.

4.11.3 Schemes large enough to provide governance bandwidth: Sufficient governance bandwidth to effectively establish a DDR approach.

4.11.4 Schemes with a focus on end game alignment (see Chapter 9 for further details): Significant stakeholder interest in, and focus on, the budgeting discount rate

4.12 More generally, and as implied by the various way in which discount rates were expressed in Chapter 2, we believe that a DDR methodology can be readily applied to more straightforward situations where the scheme holds credit assets. The discount rate approaches in Chapter 2 could still be considered to be an improvement on a strict gilts plus fixed margin approach in many circumstances.

Portfolios with well-matched assets and liabilities

4.13 What does a portfolio need to look like in order for this approach to be suitable, and beneficial?

4.14 Cash flow predictability is the key, desirable characteristic for an asset to be included in such a portfolio. Therefore, investment grade credit will likely form the bedrock of such portfolios, but similarly illiquid private debt assets and other asset classes that provide contractual cash flows may also be attractive within such a portfolio (and may offer larger spreads). Nevertheless, the appropriateness of these, and other similar, assets will fall on a spectrum; suitability isn’t binary.

4.15 The eligibility criteria for the matching adjustment under Solvency II regulations will be informed by the same factors. Pension schemes will not need to be as rigidly constrained from a regulatory perspective; nonetheless, underlying effectiveness at matching liability cash flows should remain the primary consideration for trustees.

4.16 Finally, the liability profile of the scheme will impact the suitability of a portfolio, and therefore the appropriateness of a DDR approach more broadly. For example, it will likely be harder to match the changing liability profile of open schemes, and therefore this approach may be less compelling for open, or very immature, schemes.

Investment strategies practising a “buy and hold” approach

4.17 A portfolio with well-matched assets and liabilities will have the properties of:

4.17.1 Contractual asset cash flows, held to maturity.

4.17.2 Asset cash flows which are well aligned with the nature of the expected benefit payments, e.g., level of inflation linkage.

4.18 It is possible for schemes to relax the condition of tight matching to expected benefit payments, while still investing in assets delivering contractual cash flows.

4.19 It is also possible to design investment mandates where there is scope for active management, by transferring between individual credit instruments to maintain credit quality while maintaining duration at portfolio level.

4.20 Therefore, portfolios with well-matched assets and liabilities can be viewed as a specific subset within a broader group of possible ‘buy-and-hold’ strategies.

4.21 A DDR approach may remain appropriate within these broader set of strategies, although implementation considerations may be more complex to account for mismatches between asset and liability duration.

4.22 Re-investment assumptions will likely be more material if there is a reliance on reinvesting short-term excess cash flows.

Schemes large enough to provide governance bandwidth

4.23 The philosophy behind a DDR approach in combination with a cash flow matching strategy is that the long-term nature of pension scheme liabilities allows pension schemes to warehouse illiquidity risk, and to look through fluctuations in credit spreads to the extent they overstate the 'real world' probability of subsequent default risk. However, this necessitates the assessing and monitoring of default risk through other means, so that haircuts can be applied to effectively reserve for these expected losses.

4.24 As such, implementing and maintaining a DDR framework over time may require more oversight, from a governance perspective, than a more traditional approach. For example, the DDR approach requires trustees to understand and take views on default risk explicitly rather than implicitly (as is the case for gilts plus fixed margin approaches). That said, an argument can be made that in the longer term a well-designed approach that avoids false signals may save governance time in other ways, for instance by there not being a need to understand and explain changes in funding caused by mismatches between the assets and the liability valuation methodology.

4.25 The question of whether a DDR approach in conjunction with a cash flow matching strategy is only appropriate for large schemes naturally follows from considerations of governance bandwidth. Two further reasons this approach may be less effective for smaller schemes are:

4.25.1 the types of assets they can effectively access; and

4.25.2 the fact that cash flows for a smaller scheme are less certain due to the small sample size.

4.26 We do not consider that there is a minimum size of scheme for this approach; it is more a question of applying it in a proportionate manner – for example, by investing in investment grade bonds and accepting that broad cash flow matching is an acceptable position.

Focus on long-term objective alignment

4.27 To restate, the primary benefit of a DDR is to more accurately reflect the ongoing funding or budgeting cost of a scheme, where the mode of funding the scheme is primarily through holding cash flow matching assets, including credit of various forms to maturity.

4.28 Therefore, in the first instance, we might expect this approach to be most naturally suited to schemes planning to run off over the medium to long run. Nonetheless, given the parallels in the funding approach to the type of investment approach seen in insurers' annuity books, it can be argued that this approach may remain appropriate even if a scheme's end game is to insure liabilities. In this instance, although the true budgeting cost will converge to the solvency basis as the point of buy-out approaches (because the mode of funding the scheme is through insurance), an argument could be made that a DDR approach and solvency basis would move in a similar manner to the extent that they are both exposed to the same risks, such as credit.

4.29 Trustees will need to monitor the risks inherent in their scheme as it moves towards its chosen long-term objective. For schemes that have chosen solvency as the objective, one point to bear in mind when assessing the level of risk using a Value at Risk (VaR) model is that the solvency measure is typically calculated as gilts plus a fixed margin within the model. Other things remaining the same, this could lead to schemes targeting higher allocations to gilts than may be necessary. Note – this modelling issue of using fixed margins for liability measures is not specific to solvency liabilities.

Dynamic discount rates – what does this mean for leveraged LDI?

4.30 September 2022 highlighted the importance of collateral management in supporting leveraged LDI mandates across the UK pension industry. Do we anticipate the industry would have fared better, or worse, if DDR approaches were more prevalent? We have compiled some thoughts on this topic below.

4.31 On the one hand, a physical matching portfolio could, in theory, meet cash flows as they fall due, and sidestep the need for leverage (much like a Matching Asset eligible portfolio backing bulk annuities in an insurance context – see Chapter 5).

4.32 On the other hand, to the extent that the physical assets don't produce the right nature and shape of cashflows (e.g., because it is not possible to get sufficiently long duration assets, or because there is still a need to generate some additional return) then some LDI is necessary.

4.33 If, for example, there are higher allocations to illiquid assets (providing contractual cash flows) within the strategic asset allocation, and this is coupled with an LDI overlay (to hedge long dated interest rate exposure, or inflation exposure, where there's a dearth of available matching assets), then this could lead to a more fragile collateral position in the round.

4.34 The level of leverage required may be more related to how well funded the scheme is, rather than whether a DDR, or fixed margin, approach is taken.

4.35 That said, for the last decade there has been a predominance of 'gilts-plus' approaches to determining discount rates which led to a desire to hedge that valuation risk using gilt or near gilt hedging instruments.

4.36 The low level of yields and size of deficits meant that leverage was required to simultaneously hedge liability valuation risk and deliver a return that could be supported by the trustees/ sponsor. To the extent that a DDR approach would encourage a more integrated asset liability methodology to determining the discount rate it is possible that some schemes would have felt less need to employ leverage within the assets (particularly on top of illiquid assets) and perhaps focussed more on cash flow matching.

Chapter 5: What can we learn from the insurance industry?

Introduction

5.1 In this chapter, we consider how the discount rate is constructed for long-term obligations in the insurance industry and attempt to draw features from this that might be desirable under a 'DDR' approach for pensions. We begin with the broad principles underpinning the insurance and pension regimes before exploring the concept of the Matching Adjustment ("MA") – the regulatory mechanism that allows insurers to adjust liability discount rates to take credit for a proportion of the spread on well-matched backing asset.

Pensions and insurance regimes

5.2 It should first be noted that the pensions and insurance regimes are very different. Unlike pensions, the insurance regulatory regime requires that a Solvency Capital Requirement ("SCR") is held against the risk of failure. This required capital considers all categories of risk across the balance sheet (assets and liabilities) and is set to a level such that the provider can withstand a significant stress event (quantified as 99.5th percentile VaR) over one-year. Insurers will either use a standard approach to determining the SCR, which uses a set of stresses to key assumptions (alongside factor-based and scenario-based approaches, where necessary), or a more bespoke Internal Model. Therefore, the insurer holds an explicit amount on its balance sheet to protect its customers from future uncertainty.

5.3 In contrast, the pensions regime, as set out in the Pensions Act 2004 and subsequent legislation, allows for a scheme-specific approach for funding to be determined, having regard to prudent principles and an assessment of the strength of covenant provided by the sponsoring employer. We do not wish to extend this report by giving a detailed overview of the UK funding regime that many readers will be familiar with, but would simply note that the pensions regime provides far more flexibility over the assumptions to be adopted, the period over which any shortfalls are remedied and the assets that can be used to provide for the scheme's liabilities.

5.4 The insurance regime also takes a prescribed approach to determine what amount should be held by an insurer to cover its liabilities under normal circumstances. This amount is referred to as the Technical Provisions ("TPs"). The TPs comprise of Risk Margin ("RM") and Best Estimate Liabilities ("BEL"). The RM represents the amount to be added to BEL to align TPs with the amount another insurer would require to take on the business in an arm's length transaction. The BEL is the present value of expected future cash flows, discounted using a "risk-free" yield curve. However, an insurer may be able to discount at rates higher than risk-free, such as when an MA is approved for use.

5.5 In summary, there are many differences between the insurance and pensions regime. Looking at this specifically from the perspective of a pensions actuary, the pension approach has:

5.5.1 More flexibility over the levels of prudence to include in the Technical Provisions

5.5.2 Greater freedoms over

a. how to determine the discount rate;
b. whether certain assets can be considered suitable for a DDR approach; and
c. the extent to which asset and liability cash flows need to be matched.

The MA

5.6 The UK's current insurance regulatory regime ("Solvency II", or more accurately "onshored Solvency II", reflecting that the rules are inherited from the EU which the UK is no longer part of) makes available an MA on certain products. These products must meet criteria with

respect to underwriting risks and persistency and the backing assets must have cash flows that are fixed and bond-like in nature and very closely match the liability cash flows. Most annuities fit these criteria, where the policyholder optionality and the type of risk exposure is limited.

5.7 When permission to use a MA is obtained from the regulatory authority, the discount rate for liabilities is the basic risk-free rate plus the MA. The MA is applied as level basis point uplift across the term structure of the basic risk-free yield curve.

5.8 The MA is used extensively in the insurance industry by UK annuity providers and performs an increasingly important role given the growth in Bulk Purchase Annuity ("BPA") market activity in recent years. Across Europe the MA is not as widely used given the differing nature of liabilities, with Spain being presently the only EU Member State having approved MA applications.

Determining the MA

5.9 The spread of an asset return over the risk-free rate can be considered to comprise of:

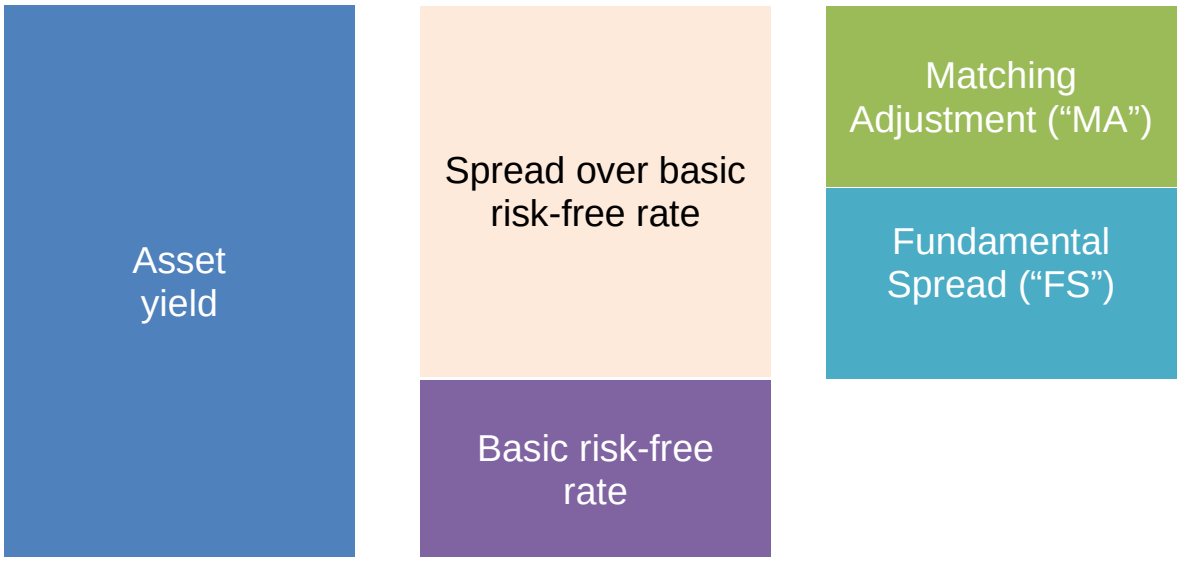
5.9.1 Allowance for non-credit related risks, which would include the reward an investor receives for being unable to divest ("illiquidity") or the specialised skills required to source or manage the asset; and

5.9.2 Allowance for credit related risk, which would include expected credit default losses and some allowance for uncertainty in credit losses (to capture the cost of downgrade).

5.10 It is difficult in practice to attribute these parts of the spread.

5.11 Under the Solvency II regime, the credit related risk element is called the Fundamental Spread ("FS") and the non-credit related risk element is the MA. An illustration of this decomposition under Solvency II is shown below.

Figure 4: Asset yield decomposition under Solvency II



5.12 Based on this decomposition, the MA is calculated from the spread over the basic risk-free rate and the applicable FS. The applicable FS is based on a calculation that depends on the nature of the assets held (based on the credit-rating, term and sector of the assets), however there is an underlying floor of 35% of "long-term average spreads" (a 30-year average) that bites in most cases.

5.13 As the FS is based on a proportion of long-term average spreads, it is a relatively static amount (i.e., it will not materially change over time provided the profile of the asset portfolio is unchanged). Consequently, the MA is dynamic over time, so varies in line with changes in spreads. This means that the discount rate used for calculating BEL is dynamic and the BEL moves consistently with the value of backing assets.

5.14 The chart below from the Bank of England demonstrates how an indicative MA moved over the pandemic period, when credit spreads were elevated. As spreads widened in mid-March 2020, the MA from this portfolio tracked it closely, absorbing much of the impact on insurers' balance sheets. The analysis assumes that the underlying assets have not been downgraded; if downgrades were to increase, the MA would reduce.

Figure 5: Corporate spreads and the MA (indicative)

Determining the FS

5.15 The premise of the MA is that as long-term cash flow matched investors, insurers are exposed to the retained risks of default and downgrade. This is reflected through the probability of default ("PD") and cost of downgrade ("CoD") components of the FS, subject to a long-term average spread ("LTAS") floor and an assumption that 30% of the asset value will be recovered in the case of default.

5.16 PD and CoD are published monthly split by credit quality rating (Credit Quality Steps or "CQS"), term and sector (Financial or Non-Financial). PD and CoD are derived by the regulatory authority and apply at a cash flow level. The LTAS floor is based on 35% of 30 years of historical spread data. Under the current spread environment, the LTAS floor bites in most credit rating and term combinations for Financial and Non-Financial corporate bonds.

5.17 The MA (expressed as the adjustment applied to the discount rate) under Solvency II is calculated as follows:

$$Credit\ Spread - \ MAX(PD + CoD, 35\%\ LTAS)$$

5.18 This spread adjustment allows MA-eligible liabilities to be valued in a similar way as the assets in the MA portfolio. The spread haircut (the FS) is relatively stable and the MA is dynamic.

Cash flow matching

5.19 It is important to note that there is no middle ground to the application of the MA; the MA either applies or it does not. In order for firms to have approval to apply the MA, they must comply with the MA criteria (as described above, and which can be found in more detail in Provision 42 of "The Solvency 2 Regulations 2015") and meet the three cash flow matching tests (see Appendix).

5.20 The cash flow matching tests are used to assess the suitability of the matching of asset cash flows to liability cash flows. They provide clear criteria on what would be counted as a "pass" in the eyes of the regulator.

Earlier approaches

Solvency I

5.21 Solvency I existed prior to the implementation of Solvency II on 1 January 2016. There are significant differences between the current Solvency II approach and the previous Solvency I Pillar 2 approach. Solvency I Pillar 2 allowed for firms' own internal ways of measuring the required deduction for default risk.

5.22 Under Solvency II, asset eligibility rules are strict (e.g., "fixed and bond-like") whereas under the Solvency I Pillar 2 there existed instead formal and quantifiable investment limits for particular assets. There were also differences in the liability eligibility: Solvency II is effectively restricted to annuities, whereas Solvency I Pillar 2 allowed for firms' discretion. Solvency II is also more prescriptive than the previous regime when it comes to credit default deductions (through the prescribed FS in Solvency II, but more principles-based in Solvency I) and portfolio management (where Solvency II mandates strict cash flows matching and management for MA approval).

QIS5

5.23 The fifth and final quantitative impact study before Solvency II was agreed was known as "QIS5". QIS5 calculated a theoretical illiquidity premium (applied in a similar way to the MA) using the formula:

$$50\% \ (Credit\ Spread - \ 40\ basis\ points)$$

5.24 This was applied fully or partially to the discount rate, depending on the class of business. To determine the extent that this applied to certain lines of business, a bucketing approach was proposed where products were classified into 50%, 75% and 100% groups. The 100% application was granted to business where the risks are only longevity and expense risk, there is no surrender of any form and the premiums have already been paid. For business where 100% did not apply, a 75% illiquidity premium applied to life contracts with profit participation and 50% to everything else.

5.25 The 100% application rate was most commonly used for different types of annuities (including non-life annuities), but also to retirement business in run-off, unit-linked insurance, health and non-life insurance.

Potential reform

5.26 The UK insurance regime is undergoing changes to the prudential requirements and the MA design and calibration is within the scope of the reforms. On 17 November 2022, the UK Government announced a package of reform and dubbed the regime "Solvency UK". The main changes affecting the MA are that the FS calculation will move to using "notched" allowances for credit risk within CQS categories (for example, different allowances for assets rated AA+ or AA- compared with AA) and the MA eligibility criteria is to be broadened to include assets with 'highly predictable' cash flows (subject to increased FS) and liabilities that are subject to morbidity risk.

5.27 The package introduces additional regulatory powers for the PRA that could lead to higher levels of FS for some firms and/or asset classes. The ultimate impact of these new powers, its effect on the MA and, consequently, the UK BPA market, is uncertain.

Chapter 6: What might a DDR approach look like in practice for pension scheme funding?

Introduction

6.1 The Working Party carried out some modelling, in order to help with our own thinking as to what such an approach might look like in practice. The modelling also helped to identify various points of interest that have been captured in this report.

6.2 Key features of the modelling are summarised below:

6.2.1 The Working Party took a deterministic rather than stochastic approach to the modelling. This was primarily because a simpler approach was thought desirable as a stochastic approach might make findings more difficult to interpret. This is not to say that a stochastic approach should not be used, and we suggest the actuarial profession look to carry out research on the development of a stochastic version of the framework set out in paragraph 6.3.

6.2.2 The modelling is based on January 2023 market conditions. The Working Party has used liability cash flows for a sample pension scheme with the following key characteristics: closed to future benefit accrual; 50% pensioner liabilities; modified duration of 13.4 years; no allowance for expenses within the liabilities. Pension cash flows are projected using a monthly projection model. These are aggregated to annual time-steps for consistency with the projected asset cash flows.

6.2.3 For the purpose of the modelling, the Working Party considered the universe of corporate bonds from the ICE BofA Sterling Corporate and Collateralised Index (an all stocks Sterling Investment Grade Corporate Bond Index). The pool of assets available to pension schemes is of course greater than this subset of the universe; however, the purpose of the modelling is to demonstrate a concept that can be extended to include other assets, particularly those that will provide a series of cash flows. Appendix 1 provides a glossary of investments typically used in cash flow-driven strategies.

6.2.4 The view of the Working Party was that inflation should be assumed to be hedged so it can be ignored in the modelling as the primary focus is on discount rates. However, note that whilst this assumption has been made for the purpose of this report, inflation is a risk that needs careful management (as demonstrated by the rapid rise in inflation over 2022).

6.2.5 More generally, we note that this is a significant simplification since exact pension increase provisions (as opposed to general inflation) are very seldom able to be precisely matched for pension schemes. As noted in paragraph 1.12, we suggest that this is a separate area for further research (from both an investment and funding perspective) for schemes who choose to run off rather than buy-out.

6.2.6 The Working Party also noted that the pool of assets that are typically used to cash flow match are more weighted towards fixed than inflation-linked so it is more likely than not that some amount of inflation hedging will be needed in these cash flow driven strategies.

Headline findings

6.3 The Working Party developed a step-by-step approach that we believe forms a suitable starting point for advising trustees on the derivation of the discount rate to adopt for funding purposes.

6.4 A general observation is that such a funding approach could be loosely characterised as using a discount rate of gilts plus a variable margin plus a buffer so that the target to aim for is

above 100% funded on this basis. The legislation is such that there might be a need to express this as 100% funded on a gilts plus (smaller) variable margin so as to allow TPR to compare more easily the strength of bases for different pension schemes but the lower discount rate is straightforward to derive. The Working Party prefers the buffer approach for the reasons set out in paragraph 6.7. The approach can be summarised by the following steps and is described in detail below.

Steps involved in the derivation of the buffer and discount rate	
Step 1	Create an asset portfolio based on best-estimate liability cash flows
Step 2	Adjustment for investment costs
Step 3	Buffer: allowance for asset-side risks
Step 4	Buffer: allowance for asset-liability mismatch risk (reinvestment and disinvestment risk)
Step 5	Buffer: allowance for liability-side risks
Step 6	Buffer: consideration of risk diversification when determining the buffer

6.5 The approach to setting discount rates requires the actuary and investment consultant to work together to optimise the outcome i.e., the level of matching and the resulting funding level. We believe the constructive integration of the funding and investment advice required for this approach to be a positive development.

6.6 The concepts for setting the discount rate outlined above are illustrated in the following example derivation. Please note that the buffer derived in this example is intended to include margins for prudence; the actual level of prudence to be adopted in practice will be a matter for the trustees, taking advice from the Scheme Actuary.

Example derivation of setting the discount rate and buffer at t=0		Derivation of discount rate & buffer	Commentary
Discount rate			
Step 1	Unadjusted discount rate[10]	Gilts + 1.4% p.a.	Based on market value of (best-estimate) liability cash flow 'matching' asset portfolio
Step 2	Adjustment for investment costs	Gilts + 1.2% p.a.	Based on assumed fees/expenses of underlying asset portfolio (20bps deduction to unadjusted discount rate)
Buffer (above liabilities discounted at Gilts + 1.2% p.a.)			
Step 3	Allowance for asset-side risks	9.3%	In this example, the total allowance for credit default and downgrade
Step 4	Allowance for asset-liability mismatch risk	9.4% (+0.1%)	Very small in this example due to the high degree of matching
Step 5	Allowance for liability-side risks	11.2% (+1.8%)	In this example, increase in reserves due to strengthening longevity and commutation assumptions
Step 6	Loading to liabilities for risk-based buffer	9.5% (-1.7%)	i.e., after allowance for diversification of risks in the buffer, the funding basis is 109.5% of liabilities calculated on a Gilts + 1.2% p.a. discount rate.

6.7 The approach of expressing a funding basis as a percentage (in excess of 100) of the present value of assets over the present value of liabilities based on a discount rate of gilts plus a (larger) variable margin could be considered as an improvement for a number of reasons:

6.7.1 The margins for prudence are considered more explicitly; and

6.7.2 The funding starts with consideration of an investment strategy which should encourage schemes to invest in a less constrained manner (as opposed to starting

[10] We use the term "unadjusted" as we note the rate will be greater than the expected yield on the assets as no allowance is made in the discount rate for asset impairments such as default or downgrade.

with a discount rate of gilts plus a small margin which then might encourage investment in assets that are expected to achieve slightly more than this low yield)

6.8 We also note that the advantages of this "buffer margin" approach to funding are not unique to the DDR approach.

Data used

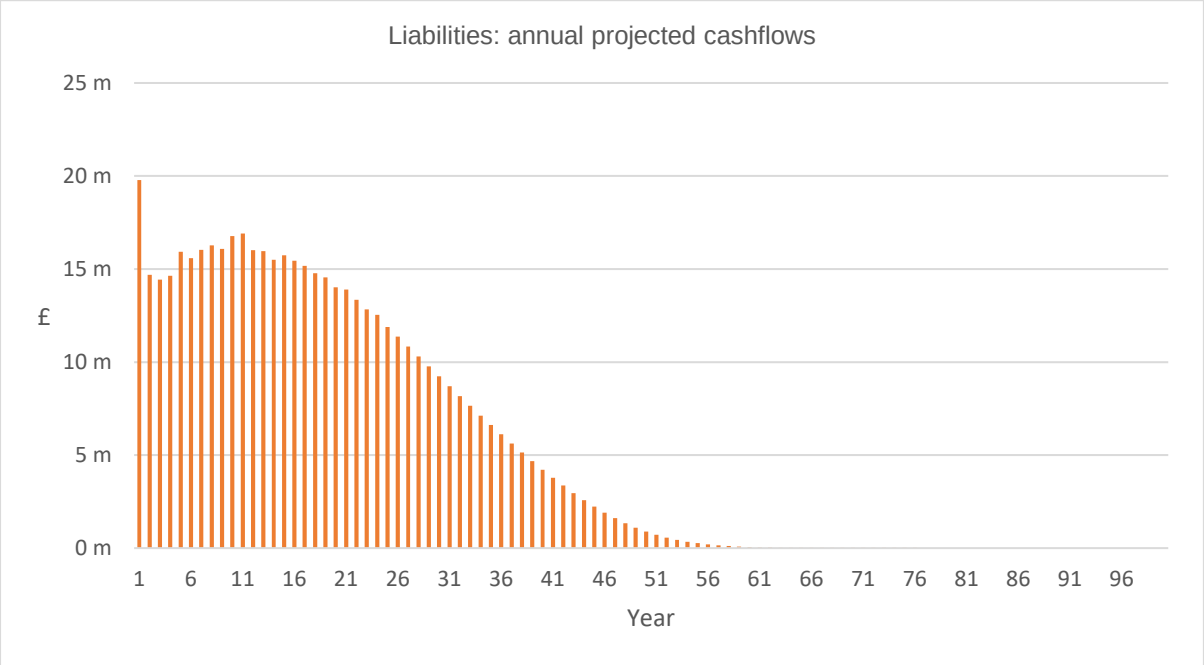
6.9 Liability cash flows: these are based on an anonymised sample pension scheme. The liability characteristics are summarised below. The liabilities are based on expected benefit payments only i.e., no allowance is made for expenses.

Membership category	Liability weighted average age (years)	PV of liabilities discounted at Gilts (£m)	Male % of liability (%)	Modified duration (years)
Deferred members	57	148.0	79	16.1
Pensioner members	72	148.1	86	10.7
Total	65	296.1	82	13.4

6.10 For completeness, the financial and demographic assumptions used to derive the cash flows are summarised in Appendix 3.

6.11 The chart in Figure 6 shows the projected liability cash flows. As can be seen, the shape is typical of many pension schemes. The Year 1 cash flow is higher than subsequent years due to the pension commencement lump sum in respect of members over normal retirement age – in the software used to calculate the cash flows, these members are assumed to retire immediately. In practice, a degree of smoothing might take place to adjust for this, but due to time constraints this has not been done in the analysis for this report.

Figure 6: Liabilities: annual projected cash flows



6.12 Asset cash flows: these are derived based on the constituents of the ICE BofA Sterling Corporate and Collateralised Index at January 2023. The starting asset portfolio – which comprises a specified unit of corporate bonds selected from this universe – was selected through a simple cash flow matching 'optimisation' process. The objective of this process was to select a portfolio of bonds such that the difference between the projected asset and liability

cash flows in each annual time-step was minimised. As shown by the charts in Figures 7 and 8, apart from the period between years 41 and 56 when specific bonds reach maturity, the specified asset portfolio results in a close 'match' between the projected asset and liability cash flows.

Figure 7: Assets (unadjusted) and Liabilities: annual projected cash flows

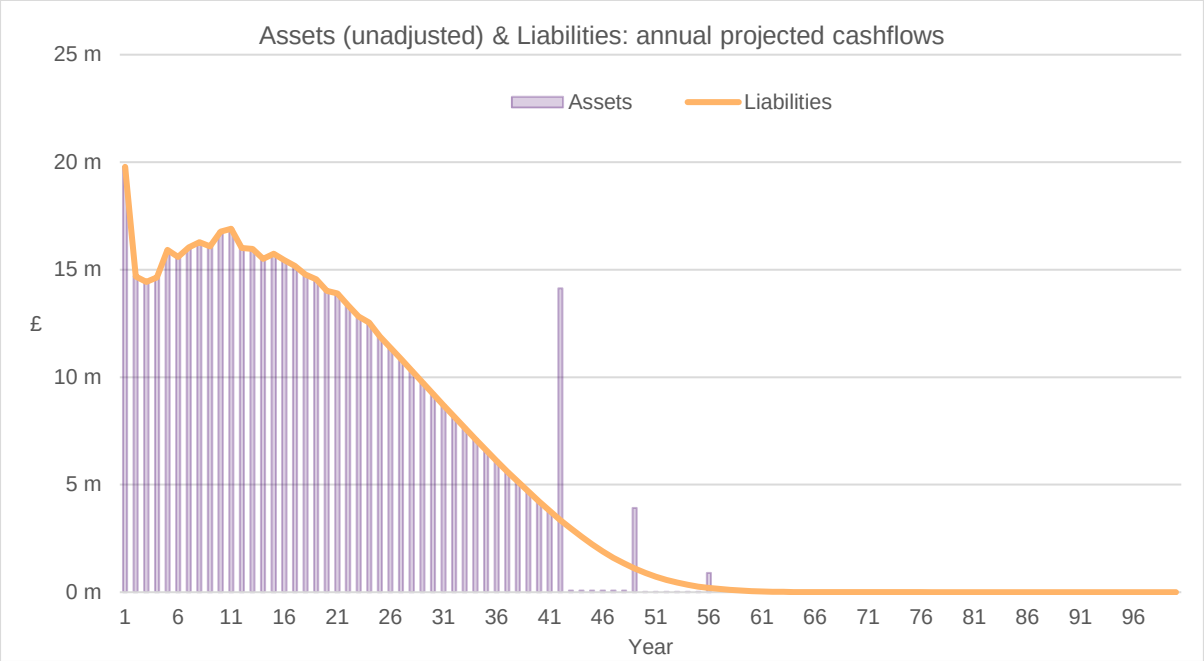
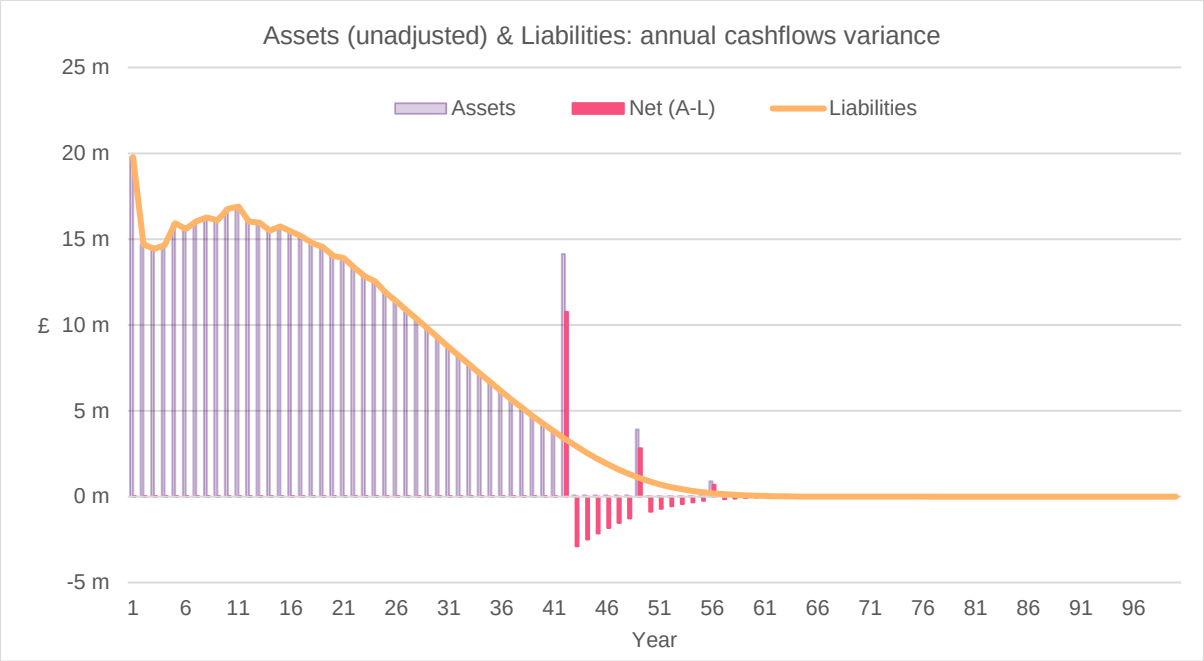
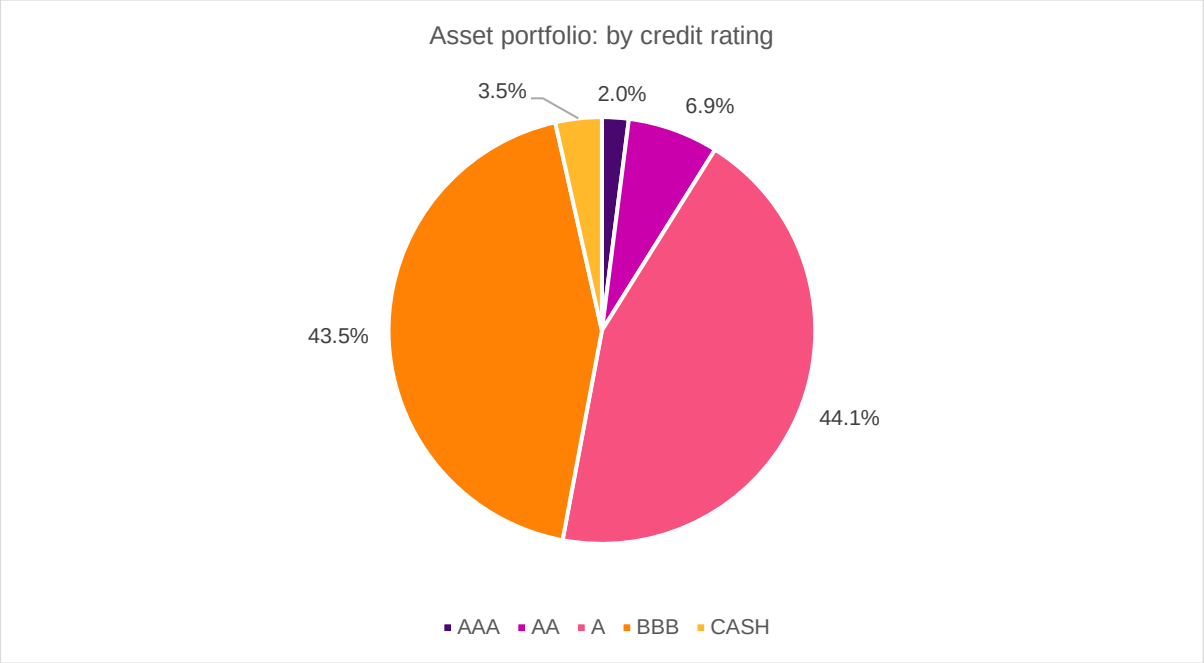


Figure 8: Assets (unadjusted) and Liabilities: focus on annual cash flow variance



6.13 The breakdown of the starting asset portfolio by credit rating is shown in Figure 9 for reference.

Figure 9: Asset portfolio: by credit rating



6.14 The Working Party acknowledges the level of cash flow matching seen in the example above will rarely be seen in practice. Indeed, an investment strategy consisting entirely of corporate bonds, as is the case in this example, is unlikely to be appropriate for many pension schemes.

6.15 When compared with the liability cash flows, the asset portfolio that is eventually adopted may well exhibit a material level of reinvestment and disinvestment risk. It is also the case that variations in the levels of future benefit outgo will have a knock-on effect on the level of matching and therefore the level of reinvestment and disinvestment risk. Furthermore, there will be risks specific to the asset cash flows, such as in this example default risk and possibly cost of (credit rating) downgrade risk.

6.16 A method is therefore needed to assess and quantify these risks so that the agreed level of assets held is deemed to provide a prudent level of coverage for the benefit outgo.

Derivation of the overall funding buffer and the discount rate

6.17 As noted above, it became apparent to the Working Party that a step-by-step approach would help when considering how to set the funding basis, by which we mean some combination of a discount rate that is derived from the yield available on the assets and a buffer (i.e., excess of assets over the liabilities) to allow for expected investment costs and risks.

6.18 The approach underlying the analysis is described in the following six steps.

Step One: determine the asset portfolio based on best-estimate liability cash flows

6.19 The Scheme Actuary works with the trustees to derive assumptions for the best estimate of the scheme's cash flows.

6.20 The cash flows are shared with the asset side adviser to derive a starting portfolio.

6.21 Key statistics for the example scheme and defined asset portfolio are set out below.

	Liabilities	Assets
PV cash flows at risk free rate (using a gilt curve)	£296.1m	£296.1m
Market value	n/a	£248.6m
Modified duration (discounted at risk free rate)	13.4 years	13.4 years
Unadjusted implied discount rate (assumes liability value = market value of assets)	Gilts + 1.4% pa	n/a

6.22 The starting asset portfolio is derived, as detailed earlier in paragraph 6.12. We have implicitly assumed in this example that the scheme has enough assets to create the starting asset portfolio. We comment on the position if there were a deficit later in this chapter.

Step Two: determine allowance for investment costs

6.23 In the example model, the asset cash flows are projected gross of investment costs.

6.24 The Working Party applied an assumed deduction of 0.2% pa to allow for investment costs, which was deemed reasonable for this portfolio. This reduces the unadjusted discount rate by the same amount.

6.25 In practice, the Scheme Actuary will need to work with the asset side adviser and trustees to determine an appropriate allowance based on the underlying assets.

6.26 Although not relevant to the example model, to the extent that the scheme hedges using LDI then the costs associated with it could also be included in this step.

Step Three: determine allowance for asset-side risks

6.27 As the asset cash flows are projected on an unadjusted basis, an allowance also needs to be made for asset side risks, for example in this case where the asset portfolio is based on credit, default risk and the cost of downgrade risk.

6.28 For ease, the Working Party applied the Solvency II calibration for probability of default and cost of downgrade to the selected asset portfolio, as described in Chapter 5. In this case, the impact on the discount rate was around 0.6% pa, after allowance was made for risk diversification. Keeping the discount rate unchanged, this is equivalent to a buffer of 9.3% before diversification, as shown in the table in 6.6.

6.29 The Working Party recognises this calibration may not be appropriate for pension scheme funding purposes. We note that the Solvency II assumptions are intended to be prudent; they are more prudent than the assumptions derived using the alternative approaches that are considered in paragraph 6.77. This is an area where further analysis by the actuarial profession would be beneficial.

Step Four: determine allowance for asset-liability mismatch risk (reinvestment and disinvestment risk)

6.30 The asset cash flows are not expected to provide a perfect match to the liability cash flows which will mean that there is reinvestment and disinvestment risk to consider.

6.31 Based on the example scheme and the duration of the asset and liability cash flows, reinvestment risk is more of an issue than disinvestment.

6.32 The approach used in the modelling and the rationale underlying it is best described by way of example, as set out in table below. This is just one approach to setting a prudent buffer in respect of reinvestment and disinvestment risks.

Year	1	…	42	…	47	48
Risk free spot rate (% pa)	3.43		3.36		3.25	3.26
Risk free 1-year forward rate (% pa)	3.43		2.36		2.36	2.36
Assets cash flow (£)	19,790,045		14,132,700		79,502	79,502
Liability cash flow (£)	19,784,059		3,361,709		1,604,850	1,337,964
Net (Asset -Liability) in the year (£)	5,986		10,770,991		(1,525,348)	(1,258,462)
Cumulative net (Asset – Liability) (£)	5,986		11,016,408		135,004	(1,123,458)
Reinvestment risk buffer for that year (£)	86		158,690		1,945	n/a
Disinvestment risk buffer for that year (£)	n/a		n/a		n/a	26,523

6.33 For the example scheme shown in the above table, the asset and liability cash flow profiles are such that there are excess asset cash flows in year 1 and in all years up to and including year 42. There is then a shortfall of asset cash flows in certain later years (e.g., year 48) as the selected portfolio matures before the liabilities fully run-off. Considering the cumulative differences, there remains an asset surplus until year 47. In this example, there is therefore a good but not perfect level of matching so consideration needs to be given to creating a prudent margin due to the disinvestment and reinvestment risk.

6.34 Year 1: the scheme has excess asset cash flows versus the benefit outgo for this year. This implies a reinvestment risk. The assumption made in this scenario is that the scheme will invest the excess assets, the key issue to consider is the yield on which this investment will be made. The model assumes that the excess assets can only be invested in the risk free rate (which is recognised as being a prudent assumption). The buffer in year 1 is derived by calculating the average unadjusted yield over the risk free (1.44% for the chosen asset portfolio) and multiplying it by the cumulative excess assets.

6.35 The buffer for year 1 is £86 (that is, 1.44% x £5,986).

6.36 Year 42: in the example model, the same situation applies up to and including year 42, with the reinvestment risk buffer determined based on the cumulative position (i.e., aggregate of excess asset cash flows over projected benefit outgo in up to and including each year).

6.37 The buffer for year 42 is therefore £158,690 (that is, 1.44% x £11,016,408).

6.38 Year 47: the scheme has a shortfall of asset cash flows versus the benefit outgo for this year. In isolation, the excess assets would imply a disinvestment risk. However, when the prior years are taken into account, the cumulative position is that there remains an excess of asset cash flows. The assumption regarding the reinvestment risk faced by the scheme is therefore the same as in the previous years.

6.39 The buffer for year 47 is £1,945 (that is, 1.44% x £135,004).

6.40 Year 48: the cumulative position is now such that there is a shortfall of asset cash flows and so there is now a disinvestment rather than reinvestment risk. The assumption made is that the scheme would not necessarily want to disinvest to meet this shortfall as this would have implications for the level of matching for future cash flows. Instead, it would seek to borrow money to cover the shortfall (i.e. accept a loan from the sponsor), and for this borrowing to be made good from future excess asset cash flows. (The Working Party recognises that it is not common for pension schemes to receive a loan from the sponsor, for example. However, an assumption needs to be derived for assessing the impact of the reinvestment risk.)

6.41 Assuming the scheme can borrow at the risk free rate, the buffer i.e., the cost of borrowing in year 48 would be £26,523 (that is, 2.36% x £1,123,458).

6.42 The method can be applied in all projection years, with the total buffer derived by taking the present value of each year's buffer discounted at the risk free rate. In this example, the initial buffer is calculated to be £0.31m which compares with a liability value (assuming a risk free discount rate) of £296.1m.

6.43 Under the method adopted by the Working Party (as outlined above) this implies a buffer of around 0.1% of the assets is needed. The Working Party notes this is much smaller than might be intuitively expected – this is due to the close 'match' between the projected asset and liability cash flows. For illustration purposes, if the liabilities were updated such that the non-pensioners are now assumed not to commute pension on retirement, and there are no changes in the asset allocation, the buffer would increase to 5.6% of the assets before diversification (which equates to the overall buffer increasing from 9.5% to 14.7% after allowing for diversification effects).

Step Five: determine allowance for liability risks

6.44 The liability cash flows under this approach are intended to be best estimate but they are also uncertain. The Scheme Actuary should work with the trustees to consider the demographic risks inherent in these cash flows – for example, how longevity risk might affect the cash flows (to the extent it is not hedged), the impact of other demographic risks and member option terms. The Scheme Actuary should illustrate how these cash flows might be affected by changes in key assumptions, e.g., what would happen if:

6.44.1 The long-term rate of mortality improvement changes from 1.5% to 2% p.a.

6.44.2 Members commute, say, 10% of pension rather than 20%, as assumed in the starting cash flows.

6.45 Based on this analysis, the trustees can decide whether the level of buffer should be increased. In this example, we have assumed that the trustees want to reserve for both of these liability assumption changes which serve to increase the buffer by 1.8% before diversification.

Step Six: consideration of risk diversification when determining the buffer

6.46 The final step is to determine the overall buffer allowing for expected costs and risks described in steps two through five above, depending on the trustees' views on each of these.

6.47 As noted earlier, the Working Party has used a deterministic model for this report. As a consequence, a further issue to consider is how to combine the various buffers. As a starting point, it would seem overly prudent to add on the full increase in the buffer for each asset and liability risk that has been assessed, not least because in the above example there is some degree of prudence assumed in steps 3, 4 and 5. The exception to this is step 2, the adjustment required to cover expected investment costs. For the purpose of this report and our modelling, we have assumed that:

6.47.1 Asset risks are perfectly correlated;

6.47.2 Liability risks are uncorrelated; and

6.47.3 Asset and liability risks are uncorrelated.

6.48 Using the above assumptions regarding correlation, we combine the asset and liability risks using the following general formula, where A(n) is the buffer needed for the n^{th} asset risk out of a total of N, and L(m) is the buffer needed for the m^{th} liability risk out of a total of M:

$$\sqrt{\left(\sum_1^N A(n)\right)^2 + \sum_1^M L(m)^2}$$

6.49 For the example scheme modelled by the Working Party, the composition of the buffer is set out below.

Total buffer assets	**£29.9m**
Investment costs (no allowance for diversification)	£5.8m
Total risk-based buffer assets (diversified)	**£24.1m**
Default risk	£8.6m
Cost of downgrade risk	£15.0m
Reinvestment / disinvestment risk	£0.3m
Longevity risk	£2.8m
Commutation risk	£1.7m
Calculated risk diversification (see formula below)	(£4.3m)

$$£29.9m = £5.8m + \sqrt{(£8.6m + £15.0m + £0.3m)^2 + £2.8m^2 + £1.7m^2}$$

6.50 The correlation between asset and liability risks is an area where further research by the actuarial profession would be beneficial.

6.51 The example method adopted by the Working Party is summarised in the table below.

	Required assets	Total assets required (cumulative)	Funding target expressed based on adjusted discount rate	Implied discount rate based on 100% target (set PV liabilities = Total assets required)
Matching assets (market value)	£248.6m	£248.6m	n/a	Gilts +1.4% pa
Buffer assets: investment costs	£5.8m	£254.4m	100% based on Gilts + 1.2% pa	Gilts + 1.2% pa
Buffer assets: risk-based buffer	£24.1m	£278.5m	109.5% based on Gilts + 1.2% pa	Gilts + 0.5% pa

6.52 Please note that the Excel spreadsheet used for the modelling is available (on an own risk basis) on request.

Interaction of the funding buffer and the discount rate

6.53 In determining the overall strength of funding basis, it is possible to derive combinations of discount rate and funding buffer that give the same level of assets to be held for a given set of liability cash flows. There are also occasions when it is helpful to convert a buffer plus discount rate into a basis where there is no buffer and, as a consequence, a lower discount rate – for example, when TPR is carrying out a review of valuation bases for all schemes at or around the same effective date.

6.54 However, the Working Party's preference is for these two assumptions to be kept separate in order to retain clarity in the approach being adopted.

6.55 Consider, for example, two schemes with identical benefit cash flows. The first scheme adopts an investment strategy that is relatively lower risk and provides a reasonably good match between assets and liabilities. The yield on the portfolio is gilts plus 1% pa. As a result of the level of matching, the trustees decide that a buffer of 5% is required.

6.56 The second scheme chooses a portfolio that produces a yield, gilts plus 2% pa, but the portfolio has a poorer level of matching. The trustees therefore decide that a larger buffer is required to reflect the increase in the reinvestment and disinvestment risks.

6.57 If we were to convert the buffers for these identical schemes into an adjustment to the discount rate then information would be lost. Other things being equal, the second set of assumptions tells us that the trustees are adopting a higher return investment strategy but accepting a less well-matched position.

6.58 Another reason for the Working Party advocating the buffer plus discount rate approach is that it can be the case with traditional funding approaches for the discount rate to reflect prudent margins for non-investment related risks. For instance, a set of trustees may have previously agreed to adopt a discount rate of gilts plus 0.5% pa for when the liabilities are mature, but they also want to build in a margin for adverse changes in future longevity. They therefore express their assumption as gilts plus 0.3% pa. Unless the rationale for the derivation of this assumption is retained, the asset side adviser may mistakenly believe that, in the longer term, the investment portfolio needs to achieve return of gilts plus 0.3% pa and therefore targets a lower risk portfolio than is actually required.

6.59 The Working Party notes that other views have been expressed previously on the subject of funding and margins for prudence. The 1992 paper "A realistic approach to pension funding" by P.N. Thornton and A.S. Wilson included in its conclusions a view that "…typical funding bases…often contain hidden and undesirable margins" which we agree is unhelpful if that is still the case, but that "where margins are taken deliberately this should be in the investment return". We disagree with this view, but we do accept that the paper was written for a different purpose and in a time when the UK pensions landscape was very different from the one we face today.

Impact of changes in market conditions on the starting discount rate

6.60 To assess the impact of changes in market conditions on the modelled starting discount rate, the Working Party considered two scenarios:

6.60.1 Credit rating: each bond in the asset portfolio is assessed to be rated one notch higher (versus the base position) on the Solvency II Credit Quality Steps ("CQS"). For simplicity, the Working Party assumed no change in the market value of the bonds – the Working Party recognises this is unlikely to be the case in practice.

6.60.2 Credit spreads: the spread on each bond is assumed to be 10bps higher, with a commensurate fall in the bond's market value (with no change in credit rating).

6.61 The results for the example scheme are summarised in the table below. The italicised text highlights changes versus the base modelling results.

	Credit rating: one notch higher on Solvency II CQS		**Credit spreads: 10bps increase**	
	Funding target expressed based on adjusted discount rate	Implied discount rate based on 100% target (set PV liabilities = Total assets required)	Funding target expressed based on adjusted discount rate	Implied discount rate based on 100% target (set PV liabilities = Total assets required)
Matching assets (market value)	n/a	Gilts + 1.4% pa	n/a	*Gilts +1.5% pa*
Buffer assets: investment costs	100% based on Gilts + 1.2% pa	Gilts + 1.2% pa	*100% based on Gilts + 1.3% pa*	*Gilts + 1.3% pa*
Buffer assets: risk-based buffer	*106.3% based on Gilts + 1.2% pa*	*Gilts + 0.7% pa*	*109.6% based on Gilts + 1.3% pa*	*Gilts + 0.6% pa*

6.62 Assuming a higher credit rating for the bonds reduces the risk-based buffer requirement from 9.5% (base results) to 6.3% of the funding target (expressed based on the adjusted discount rate), all else equal. There is no impact on the other discount rates shown in the table since the sensitivity assumes the market value of the bond portfolio is unchanged.

6.63 Assuming a 10bps increase in credit spread reduces the market value of the asset portfolio by around 1.2%. This increases the implied discount rate by 0.1% as the same matching asset portfolio, with lower market value but unchanged cash flows, is assumed to remain appropriate for the liabilities. The risk-based buffer is unchanged in £ terms (£24.1m) since the sensitivity assumes no change in credit rating (i.e., modelled credit risk) and there are no changes to the asset and liability cash flows. The buffer increases slightly in % terms – from 9.5% to 9.6% – as it is expressed relative to a lower liability figure, driven by the 0.1% higher discount rate.

Derivation of a DDR for this sample pension scheme

6.64 The sensitivity analysis in 6.62 and 6.63 could be used to create a formula that captures the impact on the funding basis of future changes in credit ratings and credit spreads.

6.65 For example, for small changes in credit spread or credit rating, the formula could be expressed as:.

6.65.1 For a one notch improvement in the average credit rating of the asset portfolio, the buffer should reduce by 3.2%; and

6.65.2 The discount rate should change by the full movement in the average credit spread but with a proportionate adjustment to the buffer to reflect the change in value of the liabilities i.e., the 0.1% referred to in paragraph 6.43 (note this assumes the £ buffer remains unchanged)

6.66 The Working Party makes a number of observations about the above approach.

6.66.1 We note that the formula is somewhat different in format from the approaches set out in Chapter 2, in that the variations in future market conditions are assumed to affect both the discount rate and the funding buffer (the latter item not being a feature of the approaches set out in Chapter 2). We see this as an improvement, for the reasons expressed earlier in this Chapter.

6.66.2 We have not carried out analysis as to whether the above formula is robust for large changes in market conditions. In any event, if there were material changes in, say, the credit rating of the underlying asset portfolio then it would be sensible to carry out a fundamental review of the derivation of the discount rate and funding buffer before relying on the results of any funding update using a pre-defined formula.

6.66.3 The approach uses the Solvency II calibration for probability of default and cost of downgrade which was not designed for pension scheme funding. Alternative approaches, such as the one set out in paragraph 6.78 might produce a different algorithm.

6.66.4 The above approach of carrying out sensitivity analysis at time zero in order to derive the discount rate formula is not something that is typically done in practice; the Working Party believes that this provides a lot of useful information for the scheme. The approach could become more commonplace if more schemes start to adopt a dynamic discount rate approach.

Practical issues and other considerations

6.67 There are a number of other points to take into account that will affect the starting discount rate and which are not considered in the modelling carried out by the Working Party. Consideration will also need to be given as to how changes in funding position are explained to trustees. These points are addressed below.

Treatment of deficit contributions

6.68 The above example made the implicit assumption that the scheme had sufficient assets to generate the starting asset portfolio. Therefore no allowance for further payments from the sponsor was considered. To the extent that deficit contributions are agreed, these could be included in the analysis as a series of fixed payments, akin to a short-dated bond. In theory, the payments should give rise to an adjustment under step 2 as there will be an element of default risk attaching to them. In theory, to the extent that the deficit contributions are payable over a relatively short timeframe this increases the potential for reinvestment risk (see step 4 in the above approach). In practice, if the proportion of cash flows in respect of deficit contributions relative to the other asset cash flows is small then from a pragmatic perspective this adjustment might not be needed.

Schemes open to further accrual

6.69 In broad terms, these schemes can be subdivided into two categories.

6.70 Schemes where the value of future accrual is small relative to the existing liabilities (typically these schemes are closed to new entrants and mature). In these cases, the value of the additional accrual can be considered in a similar manner as deficit contributions.

6.71 Schemes where the value of future accrual is significant relative to the existing liabilities. Such schemes are typically open to new entrants and immature, with cash flows that are low relative to the size of scheme or cash flow positive, i.e. contributions received are greater than benefits paid out. The DDR approach in conjunction with a cash flow matching investment strategy does not fit well with such schemes due to the long, possibly indefinite, time period over which benefits will be provided, not yet holding the assets in respect of some of those benefits, and the difficulties in finding assets to match the longer dated liability cash flows. We have therefore not considered these schemes further.

Allowance to be made for credit default and downgrades

6.72 In the earlier modelling, the Solvency II approach was adopted to make allowance for default and downgrade risk. However, its use should not be taken to imply a preference by the Working Party for the Solvency II over alternative formulae. Below, we first explore the components used in the Solvency II framework and then look at alternative approaches.

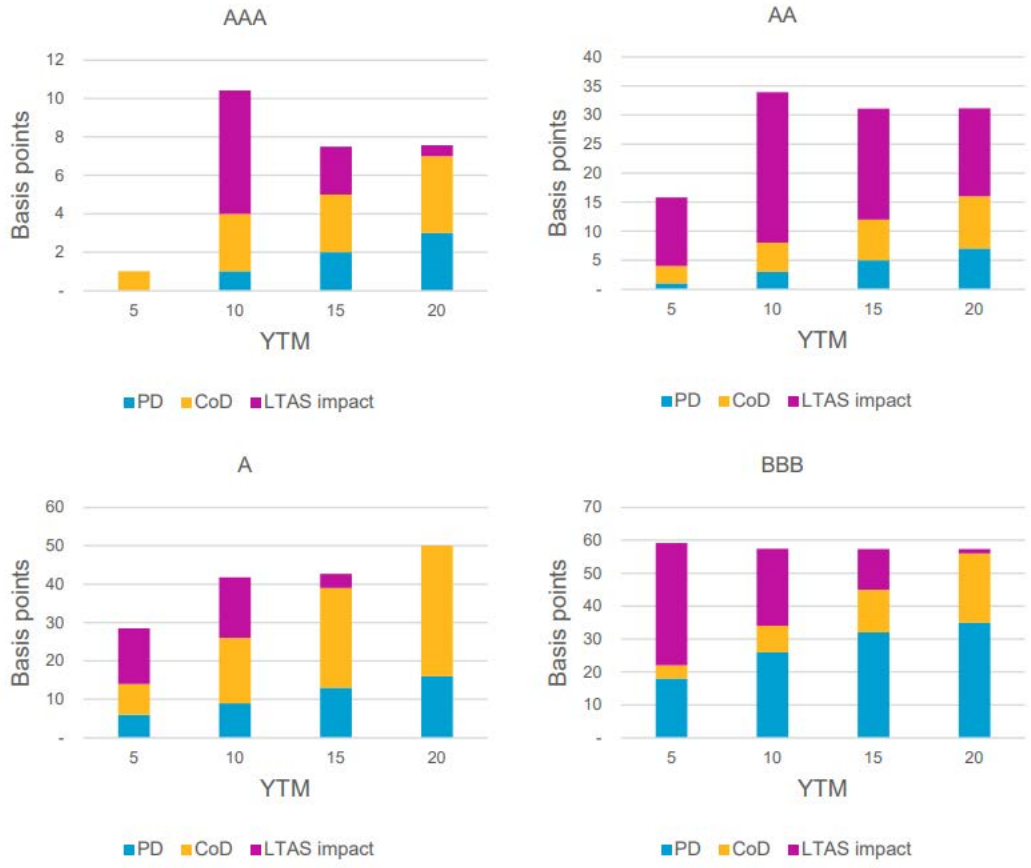
6.73 The Solvency II approach has allowances for default cost (PD) and a cost of downgrade (CoD). The PD can be thought of as being appropriate for a “buy and hold” strategy and the CoD being needed when considering a “buy and maintain” strategy to reflect the extra cost of assets being replaced after downgrades in order to maintain a stable credit quality for the portfolio.

6.74 The published EIOPA tables give these components so that the user can determine the fundamental spread. The FS is not simply the addition of the two because there is a “Long Term Asset Spread floor”, which actually bites in most cases. Under Solvency II, the CoD can be up to 3x the PD for common maturities and CQS of non-financial sector bonds and up to 2x for financial sector.

6.75 The charts in Figure 10 are taken from the WTW 2022 publication, “Association of British Insurers – Analysis of Proposed Solvency Reforms”[11]. They relate to bonds issued by non-financial entities as they make up much of the portfolio underlying the modelling. They show the make-up of PD, CoD and LTAS for the FS by rating and years to maturity for this sector.

[11] https://www.wtwco.com/en-gb/insights/2022/07/solvency-ii-review-analysis-of-proposed-solvency-ii-reforms

Figure 10: Breakdown of current Fundamental Spreads – Non-financial



6.76 As can be seen in the charts from the presence of the "LTAS impact", the LTAS floor bites in most cases and provides a material margin on top of the PD and CoD. Due to this, and the fact that the LTAS is a long-term average (by definition), the FS is relatively stable over time leading to a Matching Adjustment that is reactive to changes in portfolio credit spreads.

6.77 For the purposes of our modelling, we also consider approaches that differ from the Solvency II method. These are as follows:

6.78 *Alternative approach one* – this is to take a percentage margin from the credit spread to make allowance for default and downgrade risk, where appropriate. This approach has the advantage of being simple to apply and results in a larger nominal margin being taken from assets with high credit spreads.

6.79 Members of the Working Party are aware of some actuaries using a margin of around 20% to reflect these risks. This figure is mentioned to provide anecdotal evidence of the approach in practice, rather than offering a view on the suitability of the margin itself.

6.80 *Alternative approach two* – this is to consider other sources of data on default risk, such as data from the credit rating agencies.

6.81 For example, using the default rate data from the 2022 S&P publication "2021 Annual Global Corporate Default And Rating Transition Study"[12], a global average default rate for investment grade debt (weighted by outstanding debt) can be derived:

6.81.1 of 17bps over the 41 years for which data is available;

6.81.2 of 16bps using the most recent 20 years; and

[12] https://www.maalot.co.il/Publications/TS20220424121828.PDF

6.81.3 of 1bps using the most recent 10 years of data.

6.82 Using the same data, but this time mapping to the credit rating of the assets in the portfolio in the model, we can derive a portfolio-specific average of 10bps, 7bps and 1bp for the 41-year, 20-year and 10-year periods.

6.83 A tentative conclusion could be that, if the aim is capture PD and CoD (i.e. a buy and maintain strategy), then the 20bps deduction is not unreasonable for a typical portfolio in normal market conditions (reflecting a margin over an estimate of PD to cover CoD). However, if the aim is to assess default rate only, then something closer to 10bps might be more appropriate.

Hypothecation of asset cash flows to the liability cash flows

6.84 There will be some schemes who wish to adopt this approach where the investment strategy and starting funding level are such that the scheme is fortunate enough to have more asset cash flows than it actually needs to match the liability cash flows assessed on a prudent basis. In this scenario, it will be necessary to agree which assets are deemed to match the liabilities as the choice will affect the starting discount rate. A follow-on consideration is how the excess assets should be invested, which will depend amongst other things on whether the trustees are trying to target providing members with benefits over and above those required by the scheme's rules.

Agreement on the benefits underlying the liability cash flows

6.85 This is not an issue that is unique to a DDR approach, in that trustees and sponsors should agree the extent to which any discretionary benefits are to be included in the Technical Provisions so that they can be valued accordingly. However, the additional consideration is how these discretionary benefits affect the nature and term of the cash flows, and therefore the yield on the matching asset portfolio.

Understanding the scheme's actual investment strategy

6.86 When deciding on the adjustment to make for expected asset impairments, it is necessary to understand how the investment strategy is expected to develop over time. A further point to investigate is whether the scheme's bond allocations are being invested on a "buy and hold" or a more evergreen / constant maturity basis. Other things remaining the same, the former strategy implies a smaller adjustment for the uncertainties in the asset cash flows and the bonds are expected to be held even if the credit rating worsens. However, it is important to check the actual manager agreement as the Working Party is aware that within some "buy and hold" strategies the manager is still required to dispose of bonds when the credit rating falls below pre-agreed levels.

Allowance for expected changes in the asset allocation

6.87 The typical maturity of investment grade bonds is less than available in the gilt market. There are long dated corporate bonds available however, they represent a much smaller proportion of the universe than the gilt market and becomes concentrated in some sectors and individual issuers. As a consequence, when an initial asset portfolio is designed it might be necessary to use credit assets to match the short to medium duration cash flows, with lower risk assets backing the longer duration cash flows.

6.88 As the cash flows start to unwind, the trustees might want to exchange some of the gilts for credit assets in order to improve the overall yield on the portfolio. There are two approaches that can be adopted to cater for this when considering the starting discount rate for the liabilities.

6.89 The first is to ignore the expected additional yield that is anticipated, which means a lower discount rate and that more assets are therefore needed than is expected to be the case. As gilts are sold and bonds purchased, a surplus would be expected to arise due to higher returns. To counter this, the trustees might wish to adopt a smaller starting buffer to offset this.

6.90 The second is to make some allowance in the discount rate for the anticipated yield improvement when the gilts are exchanged for bonds. In this scenario, an assumption is needed for the future terms on which these assets are purchased. Depending on views of the spreads expected to be available in future versus current market conditions, the assumption could be based on some combination of a constant margin and current spreads. The assumption would need to be kept under review.

Commentary on change in funding position

6.91 As part of the analysis, the Working Party considered how trustees might be kept informed of changes to the financial position of their scheme. The starting point would be some form of "analysis of surplus" but it became apparent that the items making up the change (or, to be more precise, the way in which they are described) were somewhat different from those that are typically used in traditional analyses.

6.92 For example, an analysis might need to cover the following items to explain the change in funding position over the period in question:

6.92.1 How have the liability cash flows paid out compared with those assumed at the start of the period?

6.92.2 How has the cash inflow from the assets compared with the assumption made at the start of the period?

6.92.3 How has any new accrual affected the cash flows?

6.92.4 How have the contributions towards accrual and any deficit recovery contributions improved the funding position?

6.92.5 Are there any changes required to the assumptions underlying the liability cash flows or the cash flows themselves as a result of:

a. The recent experience (e.g., amount of pension commuted or CETVs paid)?

b. Changes in views of the future (e.g., future mortality improvements)?

c. Market conditions (e.g., the level of inflation affecting real benefits)?

6.92.6 Does the asset experience imply a different view be taken on the assumption for the impact of future defaults and other asset-related risks in the portfolio?

6.92.7 Ignoring changes in market conditions, have there been any changes in views (for example, in relation to strength of sponsor covenant) that would imply a change be made to the level of assets to be held to back the liabilities?

6.92.8 Given movements in market conditions, what is the discount rate, based on the latest asset portfolio, that should be used for discounting the liability cash flows?

6.93 The Working Party acknowledges that changes in views and their impact might not feature in a more routine funding update, e.g., between formal valuations. However, we would expect due process to confirm that the position is unchanged.

Chapter 7: Implications for investment strategy and other areas

Introduction

7.1 In this chapter, we explore the potential impact of schemes adopting a DDR approach on:

7.1.1 investment strategy – how might DDRs change the way in which schemes invest;

7.1.2 settlement transactions – relative attractiveness and how they might fit into a DDR / cash flow matched strategy; and

7.1.3 member option terms.

Investment strategy

7.2 To date, many schemes have tended to invest in a range of liquid assets such as government bonds, investment grade credit and equities. Whilst similarly liquid assets are likely to continue to be attractive to those schemes that adopt a DDR approach, a key benefit of the approach is to widen the universe of assets the scheme can invest in, without introducing 'artificial' volatility in the funding position. This ultimately helps to mitigate the risk of making sub-optimal funding or investment decisions that might otherwise be driven by funding volatility and help build a more robust hedging strategy.

7.3 In relation to the latter, for well-funded schemes adopting a DDR approach there is an opportunity to build a hedging strategy that is not reliant on leverage – instead, hedging through physical assets and contractual cash flows. Such an approach could help schemes avoid the pitfalls and challenges many schemes faced in September and October 2022 as gilt yields rose rapidly following the Government's 'Mini Budget' and many schemes faced a liquidity crisis to maintain their hedging strategies. Please refer to Chapter 4 for information on this point.

7.4 In particular, illiquid assets such as social housing, infrastructure, ground rent and lifetime mortgages might form a larger proportion of the investment portfolio under cash flow matching and DDR strategies. This would allow schemes to capture additional illiquidity premium. These assets might otherwise have not formed part of a scheme's investment strategy if funding stability was a key objective and the scheme adopted a more traditional "gilts + fixed premium" discount rate approach.

7.5 That said, the choice as to whether and how much to hold in illiquid assets will ultimately be driven by a number of other key factors, such as the variability of scheme cash flows and ensuring benefits can be met, and whether a scheme is ultimately targeting a low dependency run-off strategy (in which case illiquid assets can be more readily built into the strategy) versus wanting to retain flexibility and optionality to move to buy-out in due course. Whilst holding illiquid assets does not necessarily preclude future buy-out, it does potentially add significant complexity and additional costs at the time of a transaction (e.g., through the haircut and additional capital charges an insurer would add to its premium for accepting the assets in-specie).

7.6 We have provided an example in Figure 11 to illustrate the qualitative difference between a typical buy & maintain strategy versus a possible mean-variance optimising strategy[13].

[13] A mean-variance optimising strategy relates to an approach which targets the highest level of expected return for a given (funding level) volatility 'budget'; or equivalently looks to minimise funding volatility for a given return objective. In general, this is driven by targeting diversification benefit between different asset classes within the strategy.

Figure 11: Illustrative portfolios: buy & maintain versus mean-variance optimising strategies

What are key differences of buy & maintain versus the mean-variance strategy?

Assets delivering contractual cash flows ↑

Focus on mean-variance optimisation ↓

Allocation to private assets ↑

Key investment takeaways

7.7 The benefits of the DDR approach are as follows:

7.7.1 DDR is a better way of setting return assumptions for assets that deliver contractual cash flows as compared to a gilts plus fixed margin approach.

7.7.2 Investment strategy can be set from 'first principle goals', i.e., paying benefits, while controlling risk. The funding methodology is then designed to appropriately reflect the investment strategy.

7.7.3 The DDR approach is consistent with a prudent funding philosophy. For example, the buffer in the Chapter 6 model dissuades excessive risk taking, because the haircut applied to low credit quality assets makes them unattractive in this context.

Settlement transactions

7.8 The end game for a scheme, i.e., whether to aim for a low dependency run-off or target buy-out will be driven by a number of factors which might change over time. The adoption or not of a DDR and cash flow matching strategy is then an implementation decision on how best to achieve the agreed end game.

7.9 For those schemes that adopt a long-term run-off strategy, a DDR and cash flow matching strategy is likely to be most attractive, particularly if the scheme is seeking to invest in illiquid assets to capture additional illiquidity premium whilst also seeking to minimise funding volatility. For such schemes at the larger end of the market, longevity and other demographic risks can be managed using longevity swaps – an increase in the number of schemes adopting a run-off approach might therefore drive increased demand for longevity swaps.

7.10 For schemes targeting buy-out, a DDR / cash flow matching strategy can also be complementary to this target. For example, partial buy-ins along the way to implementing a full insurance solution can in principle fit within the framework – a buy-in is indeed the ultimate cash flow matching asset. In particular, this will be the case where buy-in pricing is attractive relative to the yield on the assets earmarked for the premium payment. In these circumstances the incorporation of a buy-in within the wider strategy would be beneficial from a risk management and funding perspective.

7.11 However, in targeting full buy-out, the most important target for the scheme is insurer pricing. There are a number of drivers, including appetite, capital requirements and asset opportunities (which will all vary between insurers) meaning it is not possible in practice to hedge or perfectly align a scheme's strategy to this target. A DDR approach is however more closely aligned with how an insurer values its liabilities and so a scheme pursuing this target could go some way to align its funding and investment strategy more closely with insurance pricing and track towards it with less funding volatility compared to a static "gilts+" target.

7.12 That said, a larger proportion of assets invested in long-term illiquid assets is likely to impact the ability to incorporate buy-ins (also an illiquid asset) and ultimately achieve buy-out – whilst insurers are increasingly able to accommodate illiquid assets as part of premium payment portfolios they often apply haircuts to valuations and add additional charges to cover the capital strain of holding these assets on their balance sheets. This will therefore potentially add costs to the buy-out. Careful planning needs to be undertaken to ensure flexibility is retained, e.g., to allow schemes to capitalise on market opportunities or change course as objectives are reviewed and revised over time.

7.13 In conclusion, a DDR approach is likely to appeal to those schemes targeting long-term run-off but can also be a helpful approach for those schemes also targeting insurance, or planning to include insurance as part of the investment strategy toolkit for managing risks.

Implications for scheme factors

7.14 As with any change in approach to funding, consideration needs to be given to other areas of running a pension scheme, such as the way in which the various scheme factors are set. The adoption of a DDR for scheme funding could, in theory, be used as a driver for setting factors that also move in sympathy with the future return on scheme assets.

7.15 We have considered cash equivalent transfer value (CETV) factors separately from other scheme factors. This is primarily because there are different legislative requirements for the former, although we acknowledge that it is regarded as good practice to provide trustees with an indication as to how the CETV factors compare with commutation terms – see page 3 of the Thematic Review Report.[14]

[14] https://www.actuaries.org.uk/system/files/field/document/Pensions-Thematic-Review...PDF

CETVs

7.16 The Occupational Pension Schemes (Transfer Values) (Amendment) Regulations 2008 place a requirement on the trustees to "have regard to the scheme's investment strategy when deciding what assumptions will be included in calculating the [CETV] discount rate" and that, taken as a whole, the assumptions "should lead to the best estimate" of the expected cost of providing the member's benefits.

7.17 It is common practice for the discount rate in a CETV basis to be updated each month for changes in market conditions, typically by using a market value adjustment that is linked to some form of published market index or by expressing the discount rate as being equivalent to a market data item plus or minus a fixed adjustment. An example of the latter would be to express the discount rate as the annualised yield on the Bank of England spot gilt yield at 20 years plus 2% pa.

7.18 An alternative approach would be to use a full yield curve rather than a market index as the starting point for the discount rate. This approach is more complex from a computational point of view but, aside from this, it does not affect the points made in this Chapter.

7.19 Updating the CETV discount rate for the latest estimate for future returns on the scheme's assets should, in theory, be reasonably straightforward for schemes that adopt a DDR for funding, and where the asset information is available at regular intervals. However, one point that needs to be considered is how to extract the relevant asset data. Assets that relates to the non-pensioner cash flows might be different from those assets backing the pensioner cash flows.

7.20 Another point that needs consideration is if the scheme has a large proportion of its investments held in illiquid assets. In this scenario, it will be important to consider the frequency with which the CETV discount rate is updated as there could be a potential funding strain arising in an increasing yield environment, such as the one that persisted across 2022.

7.21 Where the scheme is underfunded on its CETV basis, the trustees are able to pay reduced CETVs once they have commissioned an insufficiency report from the Scheme Actuary. If a DDR approach leads to a more stable funding level then the pressure to update the insufficiency report between formal valuations will be reduced.

7.22 In general, a proportionate approach could be taken in determining and updating the CETV terms if the risk of a material funding strain is low, e.g., if there are prudent margins in the funding basis, the scheme is well funded or the level of CETV take up is low.

Other factors

7.23 There are a number of factors that schemes need for the ongoing administration, such as factors for commutation, early and late retirement.

7.24 The way in which a funding approach interacts with scheme factors will depend on a number of considerations.

- 7.24.1 Powers under and wording of the rules and legislation – for instance, the rules might require commutation terms to be agreed with the employer. Changes can therefore sometimes take time to be agreed.
- 7.24.2 Philosophy underlying how the factors should be determined – some schemes have created polices to help with future reviews of factors.
- 7.24.3 Ease of administration – factors that remain unchanged for a longer period of time will result in a smoother administration process.
- 7.24.4 Communication and benefit planning – it is easier for a member to plan for retirement if the factors remain unchanged.

7.24.5 Impact on funding – depending on the level at which the factors are set, if market conditions change rapidly (such as happened in 2022 when gilt yields increased rapidly) factors that are not updated regularly can lead to funding strains.

7.25 In summary, theoretical accuracy (relative to any existing philosophies, for example) and the avoidance of funding strains are the main drivers for more frequent updates, whereas administration, benefit planning and wording of the rules can be drivers of less frequent changes. Pension schemes typically update factors after annual or triennial reviews and a move to a DDR approach does not necessarily mean more frequent updates to factors. However, as noted above, this depends on the relationship between the Technical Provisions and the factors in place – the greater the gap between the two, the less the need for more frequent updates.

Intervals for updating factors

7.26 To conclude this chapter, we note that it is typical for insurers to update member option factors at more frequent intervals than is the case for a typical occupational pension scheme. Given that the approach insurers take to funding liabilities is broadly consistent with a DDR approach, the adoption of a DDR for funding could lead to pension schemes adopting a more frequent cadence for updates should the trustees wish to do so (having weighed up the pro and cons that more frequent updates entail).

7.27 For illustration, should a scheme choose to go down this route, one option would be to adopt an approach such as the one in the text below which illustrates various points a scheme might want to build into a framework to assess factors on a more frequent basis.

Considerations	Possible response
How often should factors be updated?	Factors are reviewed on a quarterly basis, within two weeks of the relevant date
What size of change should trigger an update?	Establish a corridor of +/- 10% based on the commutation factors in force at age 60. Make a change if the implied factor falls outside this range Early and late retirement factors are also reviewed and updated if either factor has a 5% or higher impact on benefits for a member retiring 5 years late or early
What are the administration implications of a change being triggered?	The administration team will need two weeks' notice so any change will be effective from the first of the following month, at earliest
How long should retirement quotations be guaranteed for?	3 months, for consistency with CETVs

Chapter 8: How can the DDR approach fit within the new funding regulations and TPR's funding code?

Background

8.1 TPR ran the second of two consultations on the revised DB funding code between 16 December 2022 and 24 March 2023. This followed the Pension Schemes Act 2021 (PSA 21) receiving Royal Assent in February 2021 and DWP publishing their draft Occupational Pension Schemes (Funding and Investment Strategy and Amendment) Regulations 2023 (the FIS regulations) for consultation in July 2022. The funding clauses of the act will not come into force until the FIS regulations are also brought into force. The final regulations and code are expected to come into force together on 6 April 2024 at the earliest.

8.2 TPR's draft code reflects the draft regulations. The final form of the regulations is not yet known and may change following the DWP's consultation. Any changes that are made to the final regulations when they are laid in Parliament will need to be reflected in TPR's final code. The legislative requirements in the PSA21 and draft regulations are provided in Appendix 5.

DDRs for mature schemes

8.3 Under the draft regulations, schemes past their relevant date, need to target a funding level of at least 100% on a low dependency funding basis. In setting the low dependency funding basis, there is a presumption that the scheme's assets are invested in accordance with a low dependency investment allocation. There is, therefore, an explicit link between the low dependency funding basis and investment allocation in the legislation.

8.4 The draft code specifically mentions a DDR approach as a possible approach for setting the low dependency discount rate, where a scheme has purchased cashflow matching assets. As per the explanation in Chapter 2, the discount rate can be based on the return of those assets adjusted to allow for a prudent level of default and downgrade informed and evidenced by historical data to give a return.

8.5 The draft code explains TPR's expectations around cashflow matching assets:

8.5.1 Assets where the income and capital payments are stable and predictable and provide either fixed cashflows or cashflows linked-to inflationary indices.

8.5.2 The main asset classes include cash, government bonds and corporate bonds. Interest rate and inflation derivatives (including gilt repos) can also be deemed as matching where they provide payments to match the liabilities of the scheme.

8.5.3 Illiquid and alternative credit including, for example, some property and infrastructure related investments, can also potentially be used for matching purposes.

8.5.4 TPR expect that matching assets would be heavily weighted towards investment grade bonds (or equivalent) but some sub-investment grade assets may usefully contribute to meet scheme outgo.

8.6 The code also puts some requirements on the low dependency investment allocation (LDIA) in relation to the short-term resilience to adverse changes in market conditions. In particular, as a minimum, trustees are expected to test for a one-year, 1-in- 6 stress scenario when testing for resilience and, assuming they are fully funded on a low dependency funding basis, for the results of this test to be limited to a change in funding level of 4.5%.These stress tests could be used to inform the level of the funding buffer as described in Chapter 6. Beyond this level is likely to mean that the scheme is not sufficiently cashflow matched and/or the level of growth assets is such that the overall portfolio is not resilient to changes in short-term market conditions.

8.7 The draft code also explains how trustees may choose to use a partial DDR approach. For example, they may use the "risk-free rate +" approach for parts of the asset portfolio with longer durations and the DDR where assets match the cashflows. As and when further matching assets are bought and become appropriate, the associated liabilities can be moved over to the DDR approach.

8.8 Such an approach would also fit well with schemes that are close to, but not having yet reached, their relevant date and have already invested a proportion of their assets in assets that match the cashflows.

DDRs for immature schemes

8.9 Where the effective date for the valuation falls before the relevant date, the TPs must reflect the funding and investment strategy in two ways:

8.9.1 In relation to the period following the relevant date, the assumptions must be calculated in a way that is consistent with the low dependency funding basis assumptions as determined in the funding and investment strategy.

8.9.2 In relation to the period before the relevant date, the assumptions must be consistent with the planned investment transition, as set out in the journey plan element of the funding and investment strategy.

8.10 The draft code proposes an approach for trustees to take when assessing the maximum level of investment risk supportable now, based on the covenant supporting the scheme, that a scheme can take and what de-risking should be assumed in the period prior to its relevant date. This maximum level drives the limit on how high the discount rates used to calculate TPs can be. In practice, this means that if the discount rates are set below this maximum level there is a lot of flexibility in the approach that trustees can take.

8.11 There is, therefore, nothing in the legislation or draft code that restricts the use of DDRs for relatively immature schemes. Indeed, if higher risk taking can be supported by the employer's covenant, this means the scheme can potentially invest in a wider range of assets than when the scheme has reached its relevant date and the trustees can reflect that in a DDR approach. For example, an immature scheme should be able to adopt approaches 4 and 6 as set out in Chapter 2, with some allowance for growth assets within the discount rate.

8.12 The legislation requires that the assumptions for the TPs will be consistent with the low dependency funding assumptions after the relevant date. So, if an allowance made for investing in growth assets in the near future is reflected in a DDR, the trustees may need to reflect planned future de-risking within their DDRs. One way this could be done is to look at planned future changes in the investment strategy and reflect that in the discount rate year by year into future. For example, using approach 6 as set out in Chapter 2, the DDR for each year could reflect the planned reduction in the allocation to growth assets and increase in allocation to traditional credit and gilts/LDI through the journey plan.

8.13 Using a DDR approach may create more complexity than a risk-free rate plus fixed margin approach. This is particularly the case for immature schemes if there is some allowance for non-matching assets. Such complexity will lead to a greater level of explanation being needed in the scheme's statement of strategy. There is also more likelihood of TPR seeking further evidence from trustees around how the approach is an appropriate funding strategy for the scheme.

Fast Track compliance route

8.14 As well as consulting on the new code, TPR also consulted on their twin track regulatory approach to assessing valuations and the proposed design of Fast Track.

8.15 Fast Track represents TPR's view of tolerated risk for a scheme and sets out a series of quantitative parameters that need to be met. If a scheme meets all the Fast Track parameters, they are unlikely to scrutinise the valuation submission further.

8.16 The Fast Track parameters cover:

8.16.1 the low dependency funding and investment strategy

8.16.2 Technical Provisions (TPs)

8.16.3 investment risk

8.16.4 recovery plans

8.17 The key Fast Track parameters for a DDR approach are those for TPs and the low dependency funding strategy:

8.18 The TPs parameters are a percentage of the low dependency liabilities based on scheme maturity which trustees can compare themselves against when doing their actuarial valuation. There is, therefore, no reason a scheme using a DDR approach could not meet this parameter as long as the resultant TPs calculated using the discount rate at the valuation date, were at least as high as the parameter for a scheme of that maturity. For relatively immature schemes which are using a cash flow matching approach and reflecting that in their discount rate, this is likely to be a relatively easy parameter to meet.

8.19 Under Fast Track, schemes are required to adopt a discount rate for their long-term funding target basis at the relevant date of no more than gilts + 0.5%. Under a DDR approach the margin over gilts is expected to vary over time and so, depending on the market conditions at the time of the valuation, this discount rate could be more or less than gilts + 0.5%. At any particular valuation, this could mean the scheme could meet this parameter because the DDR results in something less than gilts + 0.5%. However, there would be some uncertainty around meeting the parameters at future valuations.

8.20 Schemes which do not meet the Fast Track parameters will need to do a Bespoke valuation submission. Bespoke submissions can be used by schemes that want to take more risk than available under Fast Track and can demonstrate that the total risk run by the scheme is supportable by the employer covenant and in line with the maturity of the scheme. As a result, it is likely that many mature schemes using DDR approaches based on a cash flow matching approach will use Bespoke. This will allow schemes to reflect their actual investment strategy and the returns they expect to get from that strategy in their discount rate which are higher than gilts + 0.5% (at least some of the time).

8.21 If trustees submit a Bespoke valuation, they will need to explain in the statement of strategy how their investment strategy and funding approach using a DDR complies with the legislation and principles in the code.

Chapter 9: What new skills does the DDR approach ask of actuaries?

Introduction

9.1 The skills and knowledge demanded of actuaries for the DDR approach already exist, in aggregate, within the actuarial community. Nonetheless, the primary areas where we anticipate upskilling would be needed for significant uptake of this approach across the industry would be:

9.1.1 Breadth of asset and liability understanding

9.1.2 Development and calibration of funding buffers

9.1.3 Data proficiency

9.1.4 Understanding of funding 'philosophy'

9.1.5 Judgement and communication

Breadth of asset and liability understanding

9.2 Within the pensions industry, actuaries traditionally identify as specialising on the 'liability side' (scheme actuaries) or the 'asset side' (investment consultants). Deeper understanding of the nuances of both sides of the balance sheet will be helpful in order to implement this in practice.

9.3 It is worth noting that, since the advent of the concept of Integrated Risk Management, pensions actuaries have been encouraged to focus more on the linkages between funding, investment and covenant. The DDR approach as modelled in Chapter 6 provides further encouragement for actuaries to understand more about both asset and liability risks.

9.4 We anticipate that the onus of understanding will fall most heavily on scheme actuaries, particularly in a stressed economic environment. In this instance, a scheme actuary would need to have a deep enough understanding of the specific assets held to take a view around whether, for example, high credit spreads simply reflected a significant illiquidity premium (which could justify an associated large spread within the budgeting discount rate), or whether it reflected an increase in default risk which wasn't reflected in other indicators such as credit ratings. Similar comments would apply to other assets classes.

9.5 In practice, we would expect the scheme actuary to work more closely with the investment adviser rather than for the scheme actuary to become an investment expert in their own right. However, there is a general need for the scheme actuary to have a wider range of knowledge about the various asset classes that comprise a matching portfolio. As a first step, this report includes a glossary of typical asset classes.

9.6 Determining a clear framework in advance around whether, and how, a scheme actuary might advise trustees when they should 'over-ride' a DDR approach on the basis of very abnormal market conditions would be helpful for both trustees, sponsors, and advisers alike. Investment and actuarial advisers will be better positioned to understand alternative points of view / priorities and judge when the overall approach is effective if pensions actuaries are able to converse knowledgeably in this area.

9.7 Convergence of asset and liability side understanding is being driven in part by the increasing maturity of the market, particularly as schemes approach their end game. As such, the emerging role of 'strategic adviser' will be well placed to navigate a DDR approach, whether that supports a longer-term objective to run off or insure the scheme.

Data proficiency

9.8 The DDR approach creates a tighter coupling of asset data and liability valuations. In particular, it introduces a dependency between the provision of asset cash flow, valuation, and credit rating data, and the resulting discount rate and liability estimate. To the extent there are lags in the availability of asset data (which is particularly prevalent in illiquid markets), this can introduce challenges between the timely estimation of liability information to aid responsive decision making.

9.9 As such, a clear understanding of how to make data flows efficient and timely, and how to navigate or approximate incomplete datasets, becomes particularly important to ensure that a DDR based approach does not feel onerous to stakeholders, whether advisers or trustees. Importantly, understanding the impact of incomplete or lagged data, and how to interpret and respond to liability estimates that are impacted by this limitation, will be necessary.

Understanding of funding 'philosophy'

9.10 The theory behind a DDR approach in the context of a scheme mainly using credit is underpinned by a set of beliefs around:

9.10.1 The relationship between credit spreads and underlying default risk;

9.10.2 The existence of, and variability in, illiquidity premiums over time; and

9.10.3 The ability of a pension scheme to warehouse illiquidity risk over the course of the investment period

9.11 Understanding, and being able to tightly articulate, the rationale behind the approach will be necessary for scheme actuaries looking to advise trustees on its adoption, particularly to the extent this leads to a divergence in funding methodology. A requirement to understand the 'philosophy' behind any given funding approach is already a necessary for scheme actuaries, but the relative novelty of the DDR approach versus recent consensus sharpens the need to understand it in sufficient detail.

Judgement and communication

9.12 Although judgement and communication are not new skills for actuaries and are part of the core tenets of the profession, it will be important for the actuary to present a relatively complex framework with lots of moving parts so that it is transparent and easily understood. On a case-by-case basis, judgements will need to be made between a theoretically 'pure' approach and pragmatic, practical, implementations and approximations. The ability to communicate these judgements would be a particularly important skill to exercise in this instance.

9.13 One aspect of the DDR approach is a greater focus on asset and liability cash flows as well as balance sheet measures, such as technical provisions, which have been a key output of an actuarial valuation under other approaches. As a consequence, the way in which advice and analysis is communicated to the trustees may rely more on visual presentations of the cash flows and how those generated from the asset compare with those relating to the liabilities. This may complement comparisons based on discounted values.

9.14 Actuaries will need to adopt the consulting tools and standard materials they use to provide advice to reflect this and new metrics may need to be developed to capture the key features of a DDR approach. These metrics may well be different to those currently used to understand and monitor schemes' strategies under other valuation approaches. These new tools and metrics will help trustees and employers understand the risks associated with a DDR approach and agree on their funding strategies.

Chapter 10: Conclusions and suggested next steps

Key conclusions

10.1 DDR approaches in conjunction with cash flow matching strategies are increasingly being used by DB schemes and are likely to become more popular over time as closed schemes mature and head towards their end game, whether that be run-off on a low-dependency basis or buy-out. The high-level benefits of a DDR approach include greater consistency of funding and investment strategies, opportunities for investing in a wider universe of assets that includes more illiquid assets and opportunities for actuaries to provide valuable input into integrated funding and investment strategies.

10.2 There are various different approaches to expressing the discount rate in a DDR approach (see Chapter 2). The most appropriate to use depends on the circumstances of the scheme (i.e., size, maturity) and types of investment strategy adopted including the level of cash flow matching with contractual income assets.

10.3 A DDR approach is likely to be more suitable for schemes that have portfolios with well-matched assets and liabilities, with investment strategies practising a “buy and hold” approach, which are large enough to provide governance bandwidth to effectively manage a DDR approach, and whose stakeholders are focussed on end game alignment.

10.4 A DDR approach creates different considerations for members, trustees and sponsors of schemes compared to other approaches across a number of areas. Overall, a DDR approach especially when used in conjunction with a cash flow matching strategy is likely to create more stability and certainty in terms of sponsor payments and providing members’ benefits but also potentially higher costs and/or reduced scope for discretionary increases. The approach also increases the governance complexity for trustees in the short term.

10.5 The Working Party has performed some modelling, in order to help with our own thinking as to what such an approach might look like practice. For this modelling we considered what discount rate could be set based on a strategy that produces a set of asset cash flows which broadly match the scheme’s expected cash flows and the buffer to be added to allow for other risks. The Working Party advocated the buffer plus discount rate approach on the grounds of transparency around the level of the cash flow matching risks in the investment strategy and non-investment related risks (such as mortality and member options).

10.6 When adopting DDR approaches, pensions actuaries can learn from how insurance companies comply with insurance regulatory regime (“Solvency II” and the “proposed Solvency UK”) and the concept of the Matching Adjustment (“MA”) – the regulatory mechanism that allows insurers to adjust liability discount rates to take credit for a proportion of the spread on well-matched backing asset. However, there are fundamental differences between the insurance and pensions regime in terms of greater flexibility on how to determine the discount rate used to calculate Technical Provisions, greater freedoms over whether certain assets can be considered suitable for a DDR approach and looser rules over the extent to which asset and liability cash flows need to be matched.

10.7 A DDR approach is likely to appeal to those schemes targeting long-term run off. It widens the universe of assets that schemes can invest in without introducing ‘artificial’ volatility in the funding position. This opens up the possibility of higher proportions being invested in illiquid assets such as social housing, infrastructure, ground rent and lifetime mortgages, allowing schemes to capture the additional illiquidity premium.

10.8 A DDR approach may increase trustees’ (and sponsors’) appetite to ‘run on’ a pension schemes for longer, perhaps with a view to targeting surplus generation (for example, by accepting some degree of asset and liability cash flow mismatch and therefore taking more risk than theoretically necessary) which could be used to increase members’ benefits and/or shared with the sponsor depending on the circumstances.

10.9 A DDR approach can also be helpful for those schemes targeting buy-out or planning to include insurance as part of the investment strategy toolkit for managing risks. The approach

is more aligned with how an insurer values its liabilities and so can help a scheme align its strategy more closely with insurance pricing. For schemes following this strategy. illiquidity risk needs to be carefully managed.

10.10 The adoption of a DDR approach may lead to pension schemes updating member option factors more frequently and could require trustees to consider how best to set CETVs to reflect changes in schemes' best estimate returns.

10.11 A DDR approach, appropriately constructed, could be consistent with TPR's draft code of practice, which reflects the new FIS regulations, both due to come into force in 2024. The draft code specifically mentions a DDR approach as a possible approach for setting the low dependency discount rate, for a mature scheme, which has passed its relevant date and has invested in cashflow matching assets.

10.12 There are some new skills that actuaries advising on DDR approaches will need to develop. Actuaries working on the 'liability side' and 'asset side' will need to work more closely together and understand each other's area to some degree. There are some potential challenges around lags in asset data making timely estimation of liability information more difficult. Communication around DDR approaches will be key, and will be important for scheme actuaries to present a relatively complex framework with lots of moving parts so that it is transparent and easily understood.

Proposed next steps

For the actuarial profession

10.13 The DDR approach in conjunction with cash flow matched strategies is a new area for many actuaries and is likely to become more prevalent over time and will require actuaries to develop new skills. We suggest that the actuarial profession looks at the training and guidance on DDR approaches that is available to scheme actuaries and other pension specialists including:

10.13.1 Reviewing the curriculum for two key assessments for students working in the field of pensions, SP4 – Pensions and Other Benefits Specialist Principles and SA4 – Pensions and Other Benefits Advanced, and considering whether any changes are required to reflect the use of DDR approaches in DB scheme funding.

10.13.2 Considering issuing guidance for practising actuaries on how assets which provide cash flows that are fixed and bond-like in nature, but that are less liquid and more esoteric than the portfolio of gilts and high-quality corporate bonds that are often used to match cash flows, can be incorporated into a DDR approach to funding a scheme. This guidance should help actuaries understand the risks inherent in the assets so that they can explain the position clearly to the trustees and advise on an appropriate level of prudence in the funding assumptions.

10.14 We also recommend that the actuarial profession takes forward some actions based on our findings in this report including:

10.14.1 Sponsoring research on how DB schemes can make effective use of "bond-like", illiquid assets in a cash flow matching approach. This could include consideration of social housing, infrastructure, ground rent and lifetime mortgages and other real assets. This research could feed into the guidance to actuaries for such asset classes proposed above.

10.14.2 Sponsoring research into the funding and investment implications of inflationary pension increases that are subject to caps and floors.

10.14.3 Sponsoring further work in the area of correlation of liability side risks. As explained in Chapter 6, correlation of these risks is important when considering the buffer for liability risk to incorporate into the DDR approach. In combination with hedging of

inflationary increases, such risks will become more important to manage as schemes being more mature and adopt cash flow matching approaches.

For TPR

10.15 We recommend that, if practical, TPR captures information on a scheme's DDR approach regarding the way in which the margin above a risk-free rate is determined at the valuation date and future dates. This could be part of the information provided in the new Statement of Strategy which trustees will be required to submit to TPR in future.

For Scheme Actuaries

10.16 DDR approaches rely on accurate modelling of benefit cash flows. As a result, we recommend that scheme actuaries encourage trustees to take appropriate legal advice on the detailed benefit entitlements of members to ensure the modelling is sufficiently accurate.

10.17 Accurate modelling also relies on the quality of the data held in respect of members' benefits. Data cleansing exercises will help improve a DDR approach and to the extent that there is uncertainty around the quality of the data, this should be built into the assessment of the liability risks discussed in Chapter 6.

10.18 We note that these final two suggested next steps are similar to the requirements of the current version of TAS 300 so we do not believe that they should be controversial.

Acknowledgements

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Appendices

1. Glossary of investments typically used in cash flow-driven strategies
2. Cash flow matching tests for the Solvency II MA
3. Key liability cash flow assumptions for modelling in Chapter 6
4. Summary of modelling shown in Chapter 4
5. Legislative requirements for DB schemes coming from the PSA21 and draft FIS regulations

Appendix 1: Glossary of investments typically used in cash flow-driven strategies

A1.1 The table below provides the typical features of the asset classes as generally available to pension schemes. There is a full spectrum of collateral quality etc. available, so the descriptions below are not definitive but more cover the majority of the relevant market accessed by pension schemes. The information for each asset class in the column "public/private" is intended to give an indication of expected liquidity, although it should be noted that this will vary as market conditions change.

Name	Other names	Type	Coupon/ Redemption	Public/ Private	Typical rating	Features
Government Bonds	Sovereign Bonds	Debt	Fixed (or inflation linked)/ Fixed or Inflation linked	Public	AAA-BBB	Developed Market bonds issued by governments of high credit rating
Sterling Corporate Bonds	IG	Debt	Fixed/ Fixed Small issuance of inflation linked corporate bonds	Public	AAA-BBB	Companies or non-governmental agencies issued debt where proceeds are contractual and in GBP (even if issuer is a non-GBP company). Investment Grade so considered low risk in terms of default risk.
Overseas Corporate Bonds	IG	Debt	Fixed/ Fixed	Public	AAA-BBB	Same as Sterling Corporate Bonds except payments are in another currency (e.g.,: USD, EURs, JPY, AUD etc.) Relative to GBP liabilities there is both spot FX risk and relative interest rate risk.
Emerging Market Debt		Debt	Fixed/ Fixed	Public	Local Currency is AA-BB with skew to BBB. Hard currency is similar but also includes more sub-investment grade	Bonds issued from governments or companies of Emerging Markets. Can be • Governments issuing in their own 'local currency' (e.g., Brazil Real, Mexico Peso) • Governments issuing in USDs 'hard currency' • Companies issuing typically

Name	Other names	Type	Coupon/ Redemption	Public/ Private	Typical rating	Features
						in USDs hard currency Currency risk can be much higher (if local currency) and default/ re-structuring risk is more significant
High Yield Bonds	Junk/ Sub-investment Grade	Debt	Fixed/ Fixed	Public	BB – CCC (or below)	Higher risk from default perspective. Smaller market than IG and smaller issues so liquidity is typically lower. Often have prepayment features.
Private Placements		Debt	Fixed/ Fixed	Private	Similar to public corporate bonds with BBB rating being most typical	
Leveraged Loans	'Loans' Syndicated Loans	Debt	Floating/ Typically amortising	Private	BB – CCC (or below)	A commercial loan provided to a high yield company provided by a group of lenders. Typically less liquid than high yield but sit higher in capital structure and secured on assets (so greater security). Often have prepayment features.
Distressed Debt		Debt	Depends	Private	CCC– D	Debt of a financially distressed or insolvent entity. Price is materially below par. Whilst is debt and contractual, there is much less certainty about getting that money back and the skill is in maximising return given the situation. Typically handed to specialist Distressed Debt managers.
Asset Backed Securities	ABS securitisations	Debt	Floating/ Typically amortising	Public??		Pools of loans are securitised through a Special Purpose Vehicle (SPV or SPE) where the

Name	Other names	Type	Coupon/ Redemption	Public/ Private	Typical rating	Features
						SPV is bankruptcy remote from the originator of those loans. Loans can be things such as • Credit card receivables • Car loans • Student loans • Aircraft leases Common to tranche these to create levels of subordination.
Mortgage-Backed Securities	MBS	Debt	Fixed/Fixed	Public	AAA – BBB they often get 'tranched' into higher to lower rated bonds	A particular form of ABS where the pool of loans is mortgages. Two varieties: RMBS Residential-MBS CMBS: Commercial-MBS
Covered Bonds		Debt	Fixed/Fixed	Public	High Investment Grade	A bond secured on a pool of mortgages but crucially not bankrupt remote from the originator. Recourse to the originating bank provides greater security as they tend to sit quite high up the capital structure.
Commercial Real Estate Debt	Real Estate Lending	Debt	Fixed or Floating/ Fixed	Private	Generally not externally rated but depending on LTV, typically an internal rating would be lower investment grade	Typically Mortgages on commercial property with low Loan to Values (LTV) which creates high security for lender.
Long Lease Property	High Lease Value	Real Estate	Fixed or inflation linked Coupon/ Sale proceeds at Market Value	Private	n/a	Ownership of a Commercial Property which has a lease for a long period (typically 12 – 25 years) generally with high quality tenants making the rental

Name	Other names	Type	Coupon/ Redemption	Public/ Private	Typical rating	Features
						income secure. Valuations however tend to reflect the sale proceeds with some dampening from the larger proportional value derived from rents.
Ground Rents		Real Estate	Typically inflation linked rent for 50 – 100+ years	Private	n/a	Ground Rent on a commercial property (often hotels/ leisure parks). If the tenant on the building defaults, then the lender takes hold of the property which is a large multiple of the ground rent, so borrower is highly incentivised to keep paying ground rent. Collateral quality is deemed to be very high.
Rental Strips	Income strips	Debt	Generally rents are subject to annual increases linked to RPI or CPI (inflation measures), often with a "cap and collar".	Private	n/a	Typically a strong covenant tenant (often the public sector) commits to a long lease, usually 30 – 50 years.
Residential Lending		Real Estate		Private	n/a	Residential (i.e. for living) rather than commercial use. Examples include : • Student Accommodation • Social Housing Economic cycle for these can be different (hence diversifying) from standard commercial property holdings.
Equity Release	Lifetime Mortgages	Real Estate	Quasi fixed/ Unknown	Private	n/a	Mortgage secured on a residential property. Interest rate 'rolls up' until repayment following death of last surviving borrower.

Name	Other names	Type	Coupon/ Redemption	Public/ Private	Typical rating	Features
Infrastructure Debt		Debt	Fixed or Inflation Fixed or inflation Often amortising	Private	Typically Low Investment Grade	Varying infrastructure projects such as Transport • Roads • Trains • Bridges Energy • Wind Farms • Solar Social • Schools • Hospitals

Appendix 2: Cash flow matching tests for the Solvency II MA

A2.2 To help the PRA adopt a consistent approach to assessing the adequacy of cash-flow matching firms must provide the results of the following tests for each MA portfolio in their formal application submissions[15]:

Test 1: Accumulated Cash-flow Shortfall Test

- project best estimate liability cashflows in the MA portfolio at annual intervals;
- project cashflows from assets in component A, after being adjusted for that part of the fundamental spread that corresponds to the probability of default, at annual intervals;
- any cashflow surpluses and shortfalls arising in the year should be calculated and accumulated at the risk-free rate;
- firms should note the highest accumulated shortfall from all future years in the projection; and
- firms should calculate the present value of liabilities in the MA portfolio (at the valuation date) discounted at the risk-free rate

A2.3 Threshold rate: the maximum accumulated shortfall in any year of the projection should not exceed 3% of the present value of liabilities.

Test 2: 99.5th Percentile Value at Risk (VaR) Test

- calculate the 99.5th percentile 1-year value at risk (VaR) of the MA portfolio for each of interest rate, inflation and currency risks;
- the calculations should consider the change in the value of both the assets and the liabilities within the portfolio as a result of each stress;
- the PRA wishes firms to calculate undiversified capital requirements corresponding to a confidence level of 99.5% over a 1-year period for each of the risks specified in the first bullet point above. Where firms split a risk into components (such as might be the case for interest rate and currency risk), the PRA asks firms to aggregate these components into a single capital number for that risk, and to explain the approach adopted in determining this single number;
- the PRA is also asking firms to set out the best estimate liabilities of the MA portfolio, calculated by discounting at a rate equal to the relevant basic risk-free interest rate plus the MA;
- firms should then compute 6 statistics: the undiversified 99.5th percentile 1-year VaR capital requirement for the MA portfolio for each of interest rate, inflation and currency risks, and the result of dividing each of these capital requirements by the best estimate liabilities of the MA portfolio; and
- for the purposes of this calculation, the assets to be included are those hypothecated to components A and B, i.e. those that are required to cover the best estimate value of the liabilities.

[15] Note that where this information request makes reference to components A, B and C these are as defined in Paul Fisher's letter to the industry of 15th October 2014

A2.4 Threshold rate: the undiversified 99.5th percentile 1-year VaR capital requirement should not exceed 1% of the firm's calculated best estimate liabilities for any of the three risks.

Test 3: Notional Swap Test

- the aim of this test is to establish by how much the MA would change if the firm were able to eliminate any surplus or shortfall in its net (asset less liability) cashflows by investing in a 'notional swap' which emulates a perfectly matched position;
- firms are asked to set out:

  the notional MA calculated by using the assets hypothecated to component A only (i.e., firms should state the amount of MA in bps);

  the notional MA calculated by scaling the market value and cashflows (after being adjusted for that part of the fundamental spread that corresponds to the probability of default) of the assets in component A either up or down by a single factor until the present value of the future surpluses and shortfalls is zero when discounted at the basic risk-free interest rate (this is what is referred to as the 'notional swap approach' mentioned in Paul Fisher's letter to the industry of 15th October 2014); and

  the market value of the assets in component A after they have been scaled in accordance with the above.
- the frequency of the time intervals used for the cashflows in this calculation should be consistent with how the firm conducts its matching.

A2.5 Threshold rate - there would be no specific hurdle rate set for this test but we would expect firms to explain where the scaling factor as calculated above showed a ratio above 100% or below 99%

Appendix 3: Key liability cash flow assumptions for modelling in Chapter 6

Financial assumptions	
RPI inflation	BoE Gilts market implied RPI curve
Pension increases	Fixed: actual Inflation-linked: relevant inflation assumption with allowance for caps and collars based on Black-Scholes model
Expenses	No allowance
Demographic assumptions	
Mortality: base table	Pre-retirement: 100% SAPS3 (all-health) Post-retirement: member-specific Sample average life expectancies from age 65: 22.1 years (male) / 24.7 years (female)
Mortality: future improvements	CMI 2021 model 1.5% pa long-term rate 0.25% addition to initial mortality improvements All other parameters in line with the CMI 2021 core projection.
2nd life: proportion married	85% (males) / 75% (females) at normal retirement age
2nd life: age difference	Male (female) spouse is 3 years older (3 years younger)
Cash commutation	Members commute 80% of HMRC maximum at retirement (equivalent to ~20% of pension)
Retirement age	Normal Retirement Age, or earliest age at which benefits can be taken unreduced. This is age 60 for most members
Transfers out	No allowance

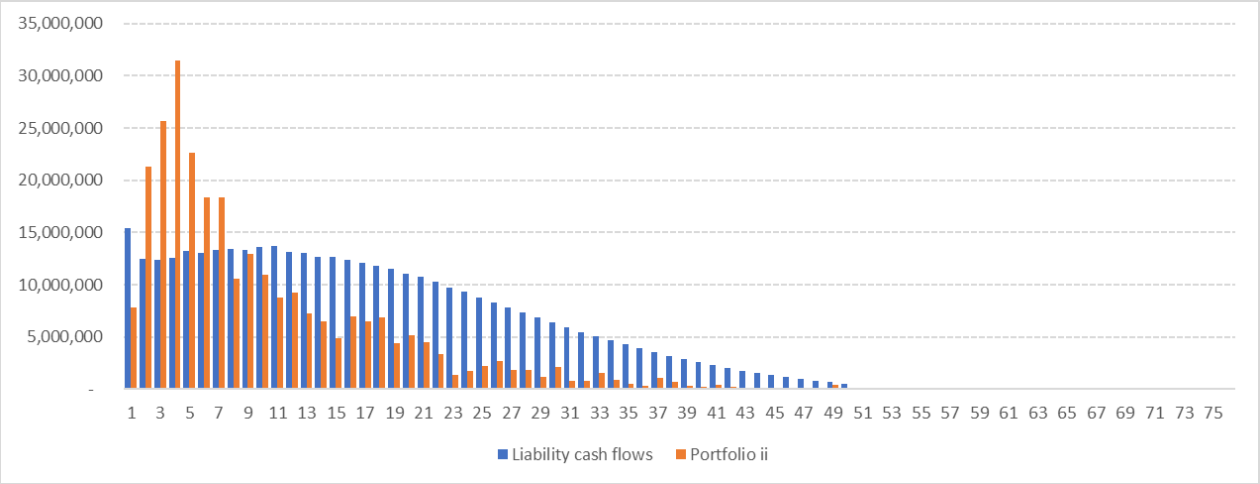
Appendix 4: Summary of modelling shown in Chapter 4

Portfolio of bonds with cash flows similar to those available from the All Stocks GBP Corporate Bond Index

Liability Cash Flows vs Portfolio cash flows

Weighted Average Maturity c. 16.6 vs 9.5 years respectively

Duration c. 11.5 vs 7.0 years respectively (based on constant yield of 5% p.a.)



A4.1 Cash flows were assumed fixed and discounted off a gilts curve plus a spread depending on the methodology below.

A4.2 Assets were taken as a set of cash flows discounted off a gilts curve plus a single spread based on GBP Corporate Bond index spreads at each year end. (Exception was end 2020 when spreads recovered significantly and for the purpose of illustrating a DDR approach, we overwrote the year end spread with near peak spread in that year at end March).

Valuation Methodology

1. Fixed Premium +1.5% over all maturities
2. Proportional Credit Spread with maximum allowance. Max allowance was 1.5% (i.e., 50% of 3%).

A4.3 The charts used in Chapter 4 were based on a constant maturity, i.e. not allowing for cash flows running off and maturing. This was done for simplicity as when cash flows are allowed to mature 'sequencing risk' occurs which, whilst a real risk to pension schemes, could be particular to the scheme modelled at the time a financial event occurs. For example, in this analysis after 30 years, the scheme would be quite mature thus not as exposed to the events to 2020.

A4.4 Where a maturing model was run, cash flow mismatches were assumed to be re-investment into the same pool of assets based on the net cash flow of the scheme that year.

A4.5 To better isolate the impact of risk premium moves (rather than the risk-free rate) a simple LDI portfolio was included to hedge residual risk between the assets and the liabilities duration scaled to the assets at the start of that year (with a maximum of 100% of liabilities). Any profit / loss generated was assumed to be retained (i.e. not re-invested into the corporate bond portfolio).

Appendix 5: Legislative requirements for DB schemes coming from the PSA21 and draft FIS regulations

A5.1 The new scheme funding regime will comprise two separate, but interlinked, requirements:

A5.1.1 To plan for the long-term funding of the scheme.

A5.1.2 To carry out valuations showing the current funding position of the scheme.

A5.2 The new regime will require trustees to carry out these steps in planning for the long-term funding of the scheme:

A5.2.1 To plan a funding 'end game' over the long-term

A5.2.2 To set a journey plan, bridging from the current funding position to that 'end game'

A5.2.3 To record the above, and further supplementary matters, in a statement of strategy.

A5.3 For the purposes of determining their 'end game', trustees must determine:

A5.3.1 How they intend the scheme to provide benefits in the long-term (their long-term objective)

A5.3.2 The funding level calculated on the low dependency funding basis they intend the scheme to have reached, which must be at least 100%, and the investments they intend to hold, at a particular date (the relevant date).

A5.4 Benefits can be provided by schemes in the long-term in a number of ways, including:

A5.4.1 Running off the scheme, paying the benefits from the scheme as they fall due

A5.4.2 Buying out members' benefits with an insurer

A5.4.3 Transferring the scheme assets and liabilities to a DB superfund or another consolidation vehicle

A5.5 A scheme's relevant date is set by the trustees and must not be later than the end of the scheme year in which the scheme is expected to reach (or did reach) significant maturity. For the purposes of regulation 4(1)(b) of the FIS regulations, the draft code prescribes that a scheme reaches significant maturity when the duration of liabilities, calculated using low dependency funding basis, is 12 years[16].

A5.6 The draft regulations require that trustees must plan for, on and after the relevant date, scheme assets to be invested in accordance with a low dependency investment allocation (LDIA) under which:

A5.6.1 Cash flows from the investments are broadly matched with the payments under the scheme, and

A5.6.2 Value of the assets relative to the value of the scheme's liabilities is highly resilient to short-term adverse changes in market conditions

A5.7 Trustees must determine a low dependency funding basis using actuarial assumptions which are set

[16] DWP have indicated that they expect the approach for calculating the duration of liabilities for this purpose to be changed in the final regulations to be based on a fixed date. TPR have indicated they will be reviewing the 12 years as the point of significant maturity to reflect the new definition.

A5.7.1 assuming that the scheme's assets were invested in accordance with the low dependency investment allocation and

A5.7.2 such that if one was to presume that the scheme was fully funded on that basis then no further employer contributions would be expected to be required.

A5.8 Trustees must determine the funding level on the low dependency funding basis they intend the scheme to have achieved as at the relevant date and the target level must be at least 100%.

A5.9 Trustees must have a journey plan for how they intend the scheme to reach its long-term funding target. As part of this, trustees must consider how the level of investment and funding risk they intend to take will change over time. This risk will be dependent on the strength of the employer covenant and, subject to that, the maturity of the scheme.

A5.10 Trustees must prepare a written statement of strategy which explains their approach, with the level of evidence and explanation required in the statement depending on the scheme's circumstances.

A5.11 Under Part 3 of the Pensions Act 2004, trustees must obtain actuarial valuations every year. However, trustees can choose to obtain valuations at up to triennial intervals, provided that they obtain an actuarial report for each intervening year.

The assumptions used in the actuarial valuation must be consistent with the funding and investment strategy.

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