



BANK OF ENGLAND
PRUDENTIAL REGULATION
AUTHORITY

Consultation Paper | CP24/17

Solvency II: Internal models - modelling of the matching adjustment

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Responses are requested by Friday 9 March 2018.

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1 Overview

1.1 This consultation paper (CP) seeks feedback on a draft supervisory statement (SS) setting out the Prudential Regulation Authority's (PRA) proposed expectations of firms regarding the application of the Solvency II matching adjustment (MA) within the calculation of the Solvency Capital Requirement (SCR) (Appendix 1). The purpose of the proposals is to update, provide clarity and consolidate into a single draft SS the PRA's expectations regarding the modelling of the MA in internal models.

1.2 The CP is addressed to UK Solvency II firms and to the Society of Lloyd's and its managing agents. It is most relevant to firms with or seeking MA approval and which use a full or partial internal model to determine the SCR, together with UK Solvency II firms making an assessment as to the appropriateness of the standard formula for their risk profile.

Background

1.3 In order to share information with firms and clarify the policy environment as soon as was practicable, the PRA published Directors' letters and other communications (eg implementation updates) in advance of the implementation of the Solvency II Directive on 1 January 2016 (Solvency II day 1). In part, these publications set out PRA expectations as they were developed alongside the Directive framework. Expectations in respect of how firms should reflect the MA in their internal models were communicated in an implementation update in August 2014¹ and Executive Directors' letters in March 2015² and January 2016.³ In these communications, the PRA set out its expectation that a mechanistic recalculation of the MA following a stress event would not be consistent with the Solvency II requirements. The PRA also set out its framework for considering the risks in matching adjustment portfolios ('the PRA five-step framework').

1.4 In May 2016, the PRA published CP20/16⁴, which consulted on consolidating previous Solvency II Directors' letters into a series of SS. This included some of the content relating to modelling the MA in stress that was contained in the March 2015 and January 2016 letters.

1.5 Following the consultation, SS17/16⁵ included a chapter setting out the PRA's view that a mechanistic reapplication of the MA in the internal model was not appropriate. However, this SS did not include information on the PRA's five-step framework. This was because the framework was set out in the context of how the PRA developed its quantitative indicators (QIs). As explained in paragraph 2.9 of PS33/16,⁶ this content was expected to change over time due to evolving thinking and technical advances and so it was not deemed appropriate for publication in an SS.

1.6 The PRA recognises that the MA requirements were finalised later than other elements of the Solvency II Directive. This presented internal model development challenges for firms seeking to reflect the MA in their models ahead of Solvency II day 1. The PRA is aware that, as

1 'Solvency II: An update on implementation', August 2014:
www.bankofengland.co.uk/pradocuments/solvency2/solvency2updateaugust2014.pdf.

2 'Solvency II: internal model and matching adjustment update', March 2015:
www.bankofengland.co.uk/pradocuments/solvency2/intmodmaupdatemar2015.pdf.

3 'Reflections on the 2015 Solvency II internal model approval process', January 2016:
www.bankofengland.co.uk/pradocuments/solvency2/edletter15jan2016.pdf.

4 'Solvency II: consolidation of Directors' letters', May 2016:
www.bankofengland.co.uk/prapages/publications/cp/2016/cp2016.aspx.

5 'Solvency II: internal models – assessment, model change and the role of non-executive directors', November 2016:
www.bankofengland.co.uk/prapages/publications/ss/2016/ss1716.aspx.

6 'Solvency II: consolidation of Directors' letters', November 2016:
www.bankofengland.co.uk/prapages/publications/ps/2016/ps3316.aspx.

a result, a number of firms may wish to make changes to their modelling approaches for the MA. There are also likely to be firms seeking to obtain approval for models that cover the MA. The PRA recognises the complexity involved in modelling the MA for the purposes of calculating the SCR but also the risk management benefits of doing so. The PRA therefore seeks to support firms wishing to develop models in this area by giving more clarity as to its expectations of appropriate practice.

1.7 The draft SS (Appendix 1) sets out the full proposals on which the PRA is consulting. As a consolidated draft SS it includes an updated Chapter 3 from SS17/16¹; the proposed amendments to SS17/16 are shown in Appendix 2. This CP seeks view on these proposals.

1.8 This consultation closes on Friday 9 March 2018. The PRA invites feedback on the proposals set out in this consultation. Please address any comments or enquiries to CP24_17@bankofengland.co.uk.

1 See footnote 5 on the previous page.

2 Proposals

2.1 This chapter sets out the PRA's proposed expectations that form the draft SS. The PRA proposes to:

- transfer and amend Chapter 3 of SS17/16 to reflect more up-to-date thinking around the rationale for a 'mechanistic approach' being inappropriate;
- incorporate the PRA five-step framework as a tool firms could consider to ensure they are capturing all relevant risks in their approach to modelling the MA; and
- expand on the PRA's expectations as to how the MA should be reflected in internal models.

SS17/16 Chapter 3: the mechanistic approach

2.2 The PRA proposes to delete Chapter 3 'Credit Risk' from SS17/16 and incorporate an updated version into the draft SS to further clarify the PRA's expectations in this area.

2.3 The expectations regarding firms not adopting a purely mechanistic approach have been adopted into Chapter 2 of the draft SS. The rationale behind the expectations (the bullet point list in paragraph 3.1. of the current version of SS17/16) has been updated and is set out below.

2.4 The PRA maintains its view that a purely mechanistic reapplication of the method to determine the fundamental spread (FS) for the purposes of calculating the technical provisions would not be appropriate within the SCR calculation and this would not be consistent with the Solvency II tests and standards for internal models. The rationale for this is as follows:

- the approach used for calculating technical provisions is specifically designed to be used for this purpose. The SCR is intended to cover extreme scenarios. The techniques that are appropriate for valuing technical provisions may therefore not remain appropriate for re-valuing technical provisions under stress;
- it is implausible to assume that, following the one-year modelled stress, economic conditions will immediately revert to long-term average levels of spread, migration and default. This is the implicit assumption behind any calibration of the FS to long-term average data that is unconditional on, or relatively insensitive to, the modelled credit stress;
- it is difficult to reconcile applying a mechanistic approach with the requirements of the use test due to such an approach providing limited insight into the risks to which the firm is exposed and being unlikely therefore to rank risk appropriately to ensure that the model is widely used and plays an important role in the system of governance of the firm; and
- firms cannot know with any certainty whether and how the current EIOPA approach used for calculating technical provisions might be revised under extreme conditions, such as are intended to be captured in 1-in-200 stresses.

Five-step framework

2.5 The PRA previously published (in CP20/16) its framework for assessing the risks in MA portfolios. The PRA has integrated this framework into the draft SS (Chapter 3 of the draft SS), as a basis against which firms can assess their approaches and determine whether the SCR is capturing all material and quantifiable risks to which they are exposed. The PRA has also set

out suggestions of good practice for the framework's implementation within firms' internal models within the draft SS.

2.6 The framework is recommended as a way to demonstrate that firms' approaches cover all material and quantifiable risks to which they are exposed. However, the PRA also accepts that firms could meet all of the proposed expectations without necessarily following this framework.

Reflecting the MA in internal models

2.7 The MA can provide a material increase to a firm's solvency coverage ratio. Part of this benefit comes from an increase in own funds as a result of applying an MA to calculate technical provisions. However, a material amount of MA benefit can also emerge via a reduction in the SCR. Modelling the MA for the purpose of calculating the SCR is complex and so there is a risk of the MA benefit in the SCR being overstated.

2.8 The process and assumptions for determining the MA for the purposes of calculating technical provisions are largely prescribed in the Solvency II Directive¹ and Solvency II Delegated Regulation (Delegated Regulation)². However, there is no similar discussion as to how the MA should be reflected in the SCR calculation where firms are using a full or partial internal model.

2.9 The PRA notes that use of an approach that fails to capture all of the elements that could give rise to a change in the FS calibration is likely to lead to an SCR that is not reflective of the quantifiable risks to which the MA portfolio is exposed. Given its inherent complexity, the focus of the PRA's expectations is therefore on how the FS calibration should be updated post-stress.

2.10 Firms are required to meet the MA requirements on an ongoing basis or risk losing MA approval.³ As part of the SCR calculation, firms should assess whether they continue to meet the MA requirements after a stress event. In the draft SS, the PRA sets out considerations that it proposes to expect firms to take into account when undertaking such an assessment.

2.11 If firms are unable to meet the MA requirements following a stress event then it may be possible to assume management actions can be taken to restore MA compliance. The PRA proposes in Chapter 5 of the draft SS the considerations firms should take into account when determining if such actions meet the requirements set out in Article 236 of the Delegated Regulation.

2.12 It is possible that if a firm chooses to assume rebalancing of its MA portfolio in order to restore MA compliance then it could assume either assets are injected from elsewhere in the business or assets are purchased in the market. The PRA accepts that both alternatives may be feasible. The draft SS sets out the PRA's proposed expectations in respect of the considerations firms should take into account, including in respect of the MA eligibility criteria and the implementing technical standard for the MA.

2.13 The PRA recognises that many firms hold a relatively wide range of assets in their MA portfolios. In particular these assets will differ in terms of their liquidity characteristics and the extent to which they exhibit standard features. The proposals set out in the draft SS primarily

1 Directive 2009/138/EC.

2 Commission Delegated Regulation (EU) 2015/35.

3 Rule 6.4 of the Technical Provisions Part of the PRA Rulebook.

apply to the risks arising from corporate bond assets within firms' MA portfolios. However, much of the draft SS could also be applied generically to the MA portfolio and the PRA would therefore expect firms to consider its content to be more widely applicable unless specifically stated otherwise. The PRA may issue further, more bespoke, expectations for the treatment of other assets within the MA portfolio as required.

2.14 In some cases, the proposed expectations could apply more widely to firms' overall credit risk modelling or internal models in general. The PRA encourages firms to consider if the expectations would be useful considerations in other areas of their modelling.

3 The PRA's statutory obligations

3.1 The PRA is required by the Financial Services and Markets Act 2000 (FSMA) to consult when setting its general policies and practices.¹ In doing so, it is required to comply with several statutory and public law obligations. The PRA meets these obligations by providing the following:

- a cost benefit analysis;
- an explanation of the PRA's reasons for believing that the proposals in this CP are compatible with the PRA's duty to act in a way that advances its general objective,² insurance objective³ (if applicable), and secondary competition objective;⁴
- an explanation of the PRA's reasons for believing that the proposals in this CP are compatible with its duty to have regard to the regulatory principles;⁵ and
- a statement as to whether the impact of the proposals in this CP will be significantly different to mutuals than to other persons⁶.

3.2 The Prudential Regulation Committee (PRC) should have regard to aspects of the Government's economic policy as recommended by HM Treasury.⁷

3.3 The PRA is also required by the Equality Act 2010⁸ to have due regard to the need to eliminate discrimination and to promote equality of opportunity in carrying out its policies, services and functions.

Compatibility with the PRA's objectives

3.4 The PRA considers that the proposals set out in this CP are compatible with its statutory objectives under FSMA. The proposals would contribute to the PRA's general objective to promote the safety and soundness of firms and the PRA's specific insurance objective to contribute to the securing of an appropriate degree of protection for those who are or may become insurance policyholders, by helping ensure firms make appropriate assumptions when reflecting the MA within their Solvency II internal models so reducing the risk to safety and soundness through the SCR being understated.

3.5 When determining the general policy and principles by reference to which it performs particular functions the PRA is legally required, so far as is reasonably possible, to facilitate effective competition in the markets for services provided by PRA-authorised persons in carrying out regulated activities. The PRA considers that the proposals in this CP will facilitate effective competition because they help ensure that risks in MA portfolios are properly assessed.

1 Section 2L of FSMA.

2 Section 2B of FSMA.

3 Section 2C of FSMA.

4 Section 2H(1) of FSMA.

5 Section 2H(2) and 3B of FSMA.

6 Section 138K of FSMA.

7 Section 30B of the Bank of England Act 1998.

8 Section 149.

Regulatory principles

3.6 The PRA has considered matters to which it is required to have regard, and it considers that the draft SS is compatible with the regulatory principles.

3.7 The PRA considers that the regulatory principles of most relevance to the proposals are:

- the need to use resources in the most efficient way – the specification of the PRA’s proposed expectations in an industry-wide communication allows firms to understand the factors the PRA considers to be important in assessing firms’ modelling approaches for the MA and therefore should help the internal model (change) approval process to operate more efficiently;
- that the PRA exercises its functions as transparently as possible – the proposals clearly set out the PRA’s expectations in respect of how the MA should be reflected within firms’ internal models and therefore indicates to firms the factors the PRA is likely to take into account in assessing internal model (change) applications. Further, the PRA hopes that the consolidation of all relevant material into a single SS (as drafted in Appendix 1) will make it easier for firms to meet its expectations; and
- that the PRA exercises its functions in a proportionate manner - the principle of proportionality has been considered in developing these proposals. The PRA acknowledges that the impact of these proposals may vary between firms depending primarily on differences in their risk exposures. However, the PRA considers that the contents of the draft SS are proportionate to the risks to which firms are exposed in this area, and the expected benefits of ensuring such risks are modelled appropriately.

Cost benefit analysis

3.8 The draft SS clarifies the PRA’s expectations as to how the Solvency II requirements could be met. The proposals provide clarity and consistency on the PRA’s expectations and should provide assistance to firms regarding any future development of their modelling approaches in respect of the MA. It shares with the industry a number of the considerations the PRA is likely to take into account in assessing internal model (change) applications against the Solvency II tests and standards for internal models but does not impose additional requirements. Therefore, while firms will incur ongoing costs of model development in order to maintain compliance with the Solvency II regime the PRA does not expect firms to incur any additional costs as a direct result of the proposals set out in the draft SS. The overall economic effects of the Solvency II requirements in this area have been considered previously.¹

HM Treasury recommendation letter

3.9 HM Treasury makes recommendations to the PRC about aspects of the Government’s economic policy to which the PRC should have regard when considering how to advance the PRA’s objectives and apply the regulatory principles.

3.10 Of the recommendations not already considered in the ‘Compatibility with the PRA’s objectives’ and ‘Regulatory principles’ sections above, the PRA considers the competitiveness recommendation as the most relevant to the proposals in this CP. The Government wishes to

1 See the Financial Services Authority’s (FSA’s) CP11/22 ‘Transposition of Solvency II – Part 1’, November 2011: www.bankofengland.co.uk/publications/Documents/other/pr/policy/2013/transpositionofsolvency2-1cp11-22.pdf; and the PRA’s CP16/14 ‘Transposition of Solvency II: Part 3’, August 2014: www.bankofengland.co.uk/pr/Pages/publications/cp/2014/cp1614.aspx.

ensure that the United Kingdom remains an attractive domicile for internationally-active financial institutions. The PRA does not consider that any of the proposals set out would restrict competitiveness of such institutions as the expectations do not impose any new requirements or enhanced requirements for different types of firm.

Impact on mutuals

3.11 When making general policy, the PRA considers whether, in its opinion, the impact of its proposals on mutuals will be significantly different from the impact on other firms. The PRA does not consider that the effect of the draft SS on mutuals will be significantly different to that on other firms.

Equality and diversity

3.12 The PRA has performed an assessment of the policy proposals and does not consider that the proposals give rise to any equality and diversity implications.

Appendices

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- 1 Draft supervisory statement ‘Solvency II: Internal models - modelling of the matching adjustment’**
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- 2 Draft amendments to SS17/16 ‘Solvency II: internal models – assessment, model change and the role of non-executive directors’**

Appendix 1: Draft supervisory statement ‘Solvency II: Internal models - modelling of the matching adjustment’

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2	Allowing for a matching adjustment within the SCR calculation
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4	Impact of a one-year stress on the matching adjustment
5	Maintaining compliance with the MA requirements in stress conditions
6	Validation of the amount of MA assumed in the SCR calculation

1 Introduction

1.1 This supervisory statement (SS) sets out the Prudential Regulation Authority's (PRA) expectations of firms regarding the application of the Solvency II matching adjustment (MA) within the calculation of the solvency capital requirement (SCR).

1.2 The SS is addressed to UK Solvency II firms and to the Society of Lloyd's and its managing agents. It is most relevant to firms with or seeking MA approval and which use a full or partial internal model to determine the SCR, together with UK Solvency II firms making an assessment as to the appropriateness of the standard formula for their risk profile.

1.3 This statement should be read in conjunction with the following Parts of the PRA Rulebook:

- Technical Provisions (Chapters 6 and 7);
- Solvency Capital Requirement – General Provisions (Chapter 3);
- Solvency Capital Requirement – Internal Models (Chapters 10 to 16); and
- Investments (Chapter 2).

1.4 It should also be read in conjunction with the document 'The PRA's approach to insurance supervision'.¹

1.5 The PRA has considered the relevant sections of the Solvency II Directive² and the Solvency II Delegated Regulation (Delegated Regulation)³ when setting the expectations noted in this SS.

1.6 The European Insurance and Occupational Pensions Authority (EIOPA) publication entitled 'The underlying assumptions in the standard formula for the Solvency Capital Requirement calculation'⁴ will also be relevant for firms using this SS in the context of an assessment of standard formula appropriateness.

1.7 The MA allows firms to adjust the relevant risk-free interest rate term structure for the purposes of calculating the best estimate of a portfolio of MA-eligible insurance or reinsurance obligations. To apply an MA, firms must have PRA approval, as per Regulation 42 of The Solvency 2 Regulations 2015. Firms with MA approval are permitted to apply an MA for the purposes of determining both technical provisions (TPs) and the SCR. Firms should have confidence that the level of MA benefit assumed in each of these calculations is fit for purpose. This SS covers the application of an MA as part of the SCR calculation.

1.8 The PRA recognises that many firms hold a relatively wide range of assets in their MA portfolios. These assets will differ in terms of liquidity and complexity; many of them may not be traded assets. The PRA's expectations set out in this statement primarily apply to the risks arising in respect of corporate bond assets within firms' MA portfolios. However, many of the expectations apply irrespective of the assets held and the PRA would therefore expect firms to consider the expectations set out in the SS to be more widely applicable unless specifically

1 March 2016: www.bankofengland.co.uk/publications/Pages/other/prasupervisoryapproach.aspx.

2 Directive 2009/138/EC.

3 Commission Delegated Regulation (EU) 2015/35.

4 25 July 2014.

stated otherwise. In a number of places (eg paragraphs 4.10, 4.14, 4.19, 4.21, 5.14 and 5.15) the SS sets out specific expectations in relation to illiquid assets. In future, the PRA may issue further, more bespoke, expectations for the SCR treatment of other assets within an MA portfolio, such as illiquid assets.

1.9 The chapters that follow set out the PRA's expectations in relation to the modelling of the MA within the SCR calculation. The PRA considers that meeting these expectations will be in line with its general approach to the supervision of firms.

- Chapter 2 of the SS clarifies the PRA's overarching expectations as to how the MA should be captured in the SCR and the extent to which firms' modelling approaches for the MA should be constrained by the approach used in the calculation of TPs.
- Chapter 3 then discusses a framework for the modelling of the MA within internal models.
- Chapters 4 to 6 expand on the steps within this framework.

2 Allowing for a matching adjustment within the SCR calculation

2.1 The requirements for the calculation of the MA are set out in Technical Provisions 7.2(2), which states that 'the matching adjustment shall not include the fundamental spread reflecting the risks retained by the firm'.

2.2 For the purposes of determining TPs, the fundamental spread (FS) calibrations used in the MA calculation are provided by EIOPA in technical information produced in accordance with Technical Provisions 7.3 to 7.5. However, no similar technical information is provided in order to calculate the SCR.

2.3 A firm's SCR should capture all material and quantifiable risks¹ to which it is exposed. The calculation of the SCR should therefore allow for any changes to the FS and MA following a stress event. In doing this, firms should determine the risks to which the MA portfolio is exposed, how these risks could affect the FS and MA and assess how this impact is captured within the SCR calculation.

2.4 The PRA has identified three high-level reasons why the FS could change following a stress:

- (i) changes in investment portfolio quality due to the occurrence of a stress;
- (ii) assumption changes to reflect an updated forward-looking view of the FS following the stress; and
- (iii) assumed management actions, including rebalancing of the MA portfolio, that are required to maintain MA compliance following a stress. The extent of the actions required will be driven by the extent of any mismatch between the asset and liability cash flows following a stress event within the MA portfolio.

2.5 For the purposes of assessing how the assumptions underlying the FS calibration could change post-stress (2.4[ii] above), it is important that firms' internal models are not inappropriately constrained by the assumptions and parameters used to calculate TPs. The PRA would therefore not expect firms to adopt a purely 'mechanistic approach' to determine

¹ General Provisions 3.3(1) and Internal Models 11.6.

the FS following a stress that directly follows the assumptions and methodology used to determine the FS for the purpose of calculating TPs. The PRA considers that a 'mechanistic approach' based on the re-application of the approach used to calculate TPs is unlikely to result in an SCR that takes into account all quantifiable risks to which a firm is exposed.

2.6 Firms should ensure that their chosen method to determine the FS under stress takes account of all quantifiable risks to which they are exposed. Firms should particularly consider those risks that have been retained within their MA portfolio(s) and ensure that their modelling approach results in an SCR that covers those risks at the 99.5% confidence level.

3 A framework for determining the matching adjustment used in the SCR calculation

3.1 The PRA has developed a five-step framework that sets out how the MA could be considered in the context of the SCR calculation. The steps in the framework are:

Step 1: re-value the MA portfolio assets under a one-year stress;

Step 2: calculate updated fundamental spread values, reflecting the stressed modelled economic environment;

Step 3: verify whether the MA qualifying conditions are still met (allowing also for any changes in liability cash flows/values);

Step 4: if step 3 has failed, then the cost of re-establishing an MA compliant position should be estimated; and

Step 5: re-calculate the MA. Note that based on the analysis in the previous steps this may need to be based on a re-balanced MA asset portfolio.

3.2 The PRA considers that this framework will help firms to exhibit and validate that their approach covers all material and quantifiable risks to which they are exposed. Therefore, it would be good practice for firms to reconcile their approach with the steps in the framework in their internal model documentation.

3.3 The chapters that follow contain the PRA's more detailed expectations as to how the MA should be reflected within the SCR calculation. These have been linked, where appropriate, to the relevant steps in the PRA's framework for ease of reference. However, the PRA considers that firms should be able to meet these expectations regardless of the modelling approach they have used.

4 Impact of a one-year stress on the matching adjustment

4.1 The SCR is defined as corresponding to 'the Value-at-Risk of [the firm's] basic own funds subject to a confidence level of 99.5% over a one-year period'.¹ The modelled change in basic own funds will capture any change in the MA.

4.2 When considering how a stress event can impact the MA, the PRA expects firms to capture both:

¹ PRA Rulebook: SII Firms – Solvency Capital Requirement – General Provisions 3.4.

- changes in the value and cash-flow profile (before and after risk adjustment) of assets held in the MA portfolio as a result of the stress event; and
- changes in the cash-flow profile of the MA liabilities as a result of the stress event.

4.3 These changes can result from either actual portfolio losses due to the stress event or from changes in valuation assumptions triggered by new data or other information emerging over the one-year period. Furthermore, new risks may emerge in stress and existing risks could become more prevalent.

4.4 Steps 1 and 2 of the PRA's five-step framework address the first of the points in paragraph 4.2 above. The second point is relevant to Steps 3, 4 and 5 and is discussed in Chapter 5.

Asset side stress to MA portfolio assets

4.5 The PRA expects firms to determine the change in the MA asset portfolio value over one year. This is intended to capture only those assets that were already in the MA portfolio pre-stress and not any assets subsequently injected in order to rebalance the portfolio post-stress.

4.6 Any firm that does not explicitly model a change in the value of the assets is unlikely to be able to demonstrate that it can continue to meet the MA requirements in stress, and in particular to determine whether the value of assets in the MA portfolio covers the best estimate value of the MA liabilities.

4.7 The methodology used to calculate the asset values under stress should also determine the credit quality (ie credit rating) of each asset under the modelled stresses. This is a key input into the MA in stress calculation.

4.8 Many of the considerations in modelling asset-side credit risk are common to the modelling of the FS. The remaining paragraphs in this chapter refer only to the FS. However, the PRA encourages firms to consider their wider applicability.

Risks retained in stress

4.9 When modelling the stressed FS, the PRA expects firms to consider at least the following risks:

- downgrade and default risk (discussed below under 'Modelling considerations in respect of downgrade and default risk');
- basis risk; and
- concentration risk.

4.10 The PRA expects the range of risks is likely to be broader for assets other than corporate bonds such as direct lending, reflecting their more bespoke nature.

Basis risk

4.11 Possible sources of basis risk that the PRA expects firms to allow for in respect of their MA portfolios include:

- if firms make use of historical data to inform their calibrations or assumptions, the dataset(s) used may not be reflective of the actual holdings and/or risk profile of the MA

portfolio. Even if historical data does perfectly reflect firms' holdings, the past may not be a good guide to the future and so an element of basis risk should be assumed to be present;¹

- when firms choose to implement hedging strategies that are imperfect hedges; and
- if the risk profile of some of the firm's assets differs materially from the assumptions used by EIOPA to calibrate the FS for the purposes of calculating the TPs.

Concentration risk

4.12 Concentration risk can arise from a firm being disproportionately exposed to, for example, a given issuer or sector. If concentration risk is not captured in the FS used in the calculation of TPs, for example if the FS calibration implicitly assumes the portfolio is well-diversified, then firms may be exposed to additional concentration risk.

4.13 In assessing the extent to which a firm is exposed to concentration risks in its MA portfolio, the PRA expects a firm to use a number of different approaches including potentially:

- analysing the composition of its current MA portfolio(s) and the associated investment mandates and policies to identify potential areas of concentration, for example, large single name exposures, sector exposures, or simply concentration arising from having relatively few different asset holdings comprising the total portfolio;
- including quantitative measurements where possible (eg using the Herfindahl index²); and
- conducting stress and/or scenario testing to assess to what degree concentration risk in the MA portfolio could crystallise in a severe credit event.

4.14 Concentration risk on non-corporate bond assets is likely to be more complex and could arise from a wider range of sources. Where a firm has material exposure to assets other than corporate bonds in its MA portfolio, then any analysis of concentration risk exposure should reflect the nature of these assets and the types of concentration risks to which they give rise.

4.15 If a firm considers it does not have material exposure to concentration risk, it should be able to justify this conclusion through analysis of its own portfolio and should show how any potential concentration risks are mitigated (eg through exposure limits in the investment mandates).

4.16 If through the firm's analysis it considers its exposure to concentration risk to be material, it should make an allowance in the model calibration for the additional variability in losses that might be incurred in an economic stress. If this allowance is based on an approximation, the firm should be able to show that this approximation is reasonable given the risk exposure it is intended to capture.

General modelling considerations when determining the FS calibration post stress

4.17 The PRA does not have a preference or expectation as to the methodological approach used by firms to determine the FS calibration post stress, as long as the chosen approach meets the required tests and standards.

1 It may also be the case that calibrating statistics based on historical data does not fully capture the statistical qualities of the forward-looking distribution.

2 The Herfindahl index is a simple measure of concentration risk, defined as the sum of the squares of the 'market shares' of each asset, where the 'market share' is the ratio of an asset's value to the total asset value in the MA portfolio.

4.18 The PRA expects firms to justify the granularity of the modelling performed to determine the FS calibration post stress (eg by asset class, credit quality step (CQS), sector, term).

4.19 As a starting point the PRA expects firms to consider modelling the FS at the same level of granularity as in the calibration provided by EIOPA for the purposes of calculating TPs. However, a different level of granularity can also be justified. This is likely to be particularly pertinent where the firm's MA portfolio includes a material proportion of assets other than corporate bonds.

4.20 Firms should strike a balance between modelling to a level of granularity that reflects a firm's risk profile and ensuring sufficient credible evidence, supported by expert judgement, to develop calibrations reliably at this level of granularity.

4.21 In the case of firms that have material exposure to non-corporate bond assets (eg illiquid, direct investments) within the MA portfolio, the PRA expects a bespoke modelling treatment to be developed to determine the FS calibration in stress for these assets. Where firms do not distinguish between asset classes in their modelling, then the appropriateness of the model for each asset class should be clearly justified.

4.22 The PRA is open to firms applying proportionate modelling approaches (likely to contain limitations and approximations) where they have only small exposures to certain asset classes, but the PRA does not expect firms to make material investment decisions using a model that does not appropriately reflect the risk profile of such investments.

4.23 Firms may seek to use their models to determine the change in FS in stress or the total FS in stress. While the PRA does not have a preference for either metric, firms are expected to acknowledge, when determining their preferred approach, that these metrics imply two markedly different modelling philosophies that will have a direct impact on the extent to which the SCR behaves in a cyclical manner. The PRA expects firms to understand and justify the approach they have chosen and its limitations. Where a firm has identified scenarios where the approach operates in a way it considers inappropriate (eg produces counter-intuitive results relative to the change in risk profile), the firm should identify the actions it could potentially take in response, for example introducing an overlay using expert judgement.

4.24 When firms use historical data they should consider whether the data is:

- of sufficient length and quality to contribute towards a credible calibration for the risk in question;
- likely to contain a sufficiently extreme event or events to be useful for calibration purposes; and
- useful in determining how potential future credit events may manifest themselves.

4.25 In particular, firms should capture the risk that actual migration and default rates over the future holding period of their assets are more onerous than historical events. The PRA also expects firms to set out clearly any judgements made around potential future crisis events that may differ in nature, magnitude and duration to crises seen previously.

Modelling considerations when determining an updated forward-looking view of the FS post stress

4.26 Firms may determine a stressed FS calibration by modifying the approach used to produce the FS for determining the TPs.

4.27 Article 77c of the Solvency II Directive and Article 54 of the Delegated Regulation set out the calculation method for the MA, the assumptions which underpin the MA and the approach which EIOPA should use to derive the technical information used to calculate the MA in accordance with Technical Provisions 7. While the PRA considers that the MA calculation method should not change in stress, the MA assumptions in the Solvency II Directive and Delegated Regulation are specifically set out in the context of the TPs calculation and firms should therefore consider whether they remain appropriate in stress.

4.28 Firms should ensure that the MA on sub-investment grade assets remains appropriate. Unless there are strongly justified arguments for moving away from the requirement in Technical Provisions 7.2(3) that (for the purposes of determining TPs) the MA on sub-investment grade assets does not exceed that on assets of investment grade credit quality of the same duration and asset class, then the PRA expects firms to continue to apply this restriction in stress conditions.

4.29 The PRA expects firms to maintain a floor (ie a minimum level of FS) based on long-term average spreads as part of their calibration of the FS in stress. As a minimum, the PRA expects firms to reapply the methodology and calibration of the floor as set out in Article 77c of the Solvency II Directive. The PRA expects any changes to the floor to be well justified. They should not result in a calibration below that which would have been obtained by re-applying the methodology and calibration used to calculate the TPs.

4.30 More widely, firms may also wish to apply other limits to the FS in stress. Often these will be grounded in historical experience or expressed as a percentage of total spread widening. While such limits can be helpful, they should not be an essential feature of firms' models or overshadow the importance of any more detailed modelling work undertaken.

4.31 Notwithstanding the above points, the PRA expects the methods used to determine the stressed FS calibrations to be consistent with the methods used by EIOPA to determine the FS calibration for the purposes of calculating TPs. This is grounded in Solvency Capital Requirement – Internal Models 11.2(3). Both the TPs and SCR calculations are required to include an FS that reflects the risks retained by the firm. However, within their internal models, firms may need to develop approaches that use different models and/or assumptions to those used to calibrate the FS for the purposes of determining the TPs calculation, in order for the SCR to take account of all quantifiable risks to which the firm is exposed. Firms are nonetheless expected to ensure that they use the EIOPA calibration to determine the FS for purposes of calculating TPs.

4.32 Specifically for corporate bonds, firms are expected to ensure that if they are using an approach to model the FS that cannot closely replicate the FS used to calculate the TPs (in basis points or £ millions), consideration should be given to:

- how the FS or MA used to determine the TPs would compare to a proxy calculation based on the firm's own assumptions and what the key reasons are for any difference; and

- how the firm has chosen to express the FS in stress (ie as the total FS or as the change in FS) and whether the difference between its assumptions at the 50th percentile compared to the EIOPA assumptions could give rise to the SCR being potentially under- or over-stated.

Modelling considerations in respect of downgrade and default risk

4.33 The matrix format of historical transition data potentially makes it difficult to model and/or compare transition data over time. When using transition data, the PRA expects firms to:

- consider different approaches to comparing transition matrices and assessing their relative strength. The PRA's preferred approach is for firms to consider the whole matrix rather than just a single cell or small selection of cells. However, a firm could also use an approach that considers only a selection of cells provided it has a procedure to translate the output of this alternative approach into a whole matrix;
- compare their modelled 1 in 200 transition matrix and matrices at other extreme percentiles against key historical transition events, notably the 1930s Great Depression (and 1932 and 1933 experience in particular). This should include considering how the matrices themselves compare as well as relevant outputs; and
- justify any shortfall between their 1 in 200 transitions scenario and the actual transitions experience implied by these events (and the impact of this on the level of capital held). Firms should explain how they have validated that the level of stress they are applying is capturing all quantifiable risks to which they are exposed in this context.

4.34 In relation to transitions data for corporate bond assets, withdrawn ratings are a specific feature of the data that should be allowed for. A rating is withdrawn where an entity or financial instrument is no longer rated by the ratings agency concerned. Reasons for withdrawals of rating can be varied and are not necessarily indicative of impending downgrade or default. Firms should be able to justify the reasonableness of the approach used to allocate withdrawn ratings across the transition matrix as well as provide sensitivity analysis that quantifies the impact of using different allocations.

4.35 In order to ensure that the stressed FS calibration fully captures the risks retained on a forward-looking basis, firms should consider whether their chosen methodology would allow the stressed experience (for one or more of the metrics modelled) to revert to more normal levels over a given period rather than instantaneously. This can be achieved through an explicit incorporation of a reversionary period (a 'glide path') within the model but other approaches are also possible.

4.36 In calibrating a glide path, the PRA expects consideration to be given to historical data and events as well as the theoretical justification.

4.37 Where a glide path is being modelled in respect of more than one element of the model (eg transitions and spreads) then the length and severity of the stressed period for different elements would not automatically be considered independent. The relationship between different glide paths should therefore be considered and any inconsistency should be justified.

4.38 Allowing stressed experience to revert to 'normal' over an extended period should not be seen as a correction for limitations elsewhere in the model.

5 Maintaining compliance with the MA requirements in stress conditions

5.1 In order to take credit for an MA benefit in stress, firms need to check that their MA portfolio continues to meet the MA requirements¹.

5.2 In particular the PRA expects firms to evidence that the MA portfolio continues to be adequately matched and that the asset eligibility criteria continue to be met.

5.3 When undertaking this assessment, firms should ensure that they have allowed for the impact of a stress event on both the assets and liabilities within the MA portfolio. For example, a longevity stress could result in an increase in the liability value, and an increase in longer-dated liability cash flows. Firms should also ensure that the FS assumptions used in this assessment are consistent with those used to stress the assets and liabilities in the MA portfolio.

5.4 Following a stress event, firms may conclude that the result of the assessment referred to above is that the MA qualifying conditions would no longer be met. Steps 3 and 4 of the five-step framework cover checking and maintaining continued compliance with the MA qualifying criteria. The remainder of this chapter sets out the PRA's expectations regarding any potential actions that could be assumed to restore such compliance. The PRA expects firms' assumed actions to be limited to those necessary to restore compliance. They should not include, for example, steps to optimise an already compliant portfolio in a stressed environment.

Re-establishing MA compliance post stress via rebalancing

5.5 An assumption that a firm can rebalance an MA portfolio post stress within the SCR calculation constitutes a future management action within the internal model. Firms are therefore expected to show how their proposed approach to rebalancing meets the requirements set out in Article 236 of the Delegated Regulation. In particular, firms should clearly set out how the impact of rebalancing is allowed for within the calculation of the SCR.

5.6 In determining the conditions in which MA portfolios require rebalancing, firms should consider all risks that could affect the cash flow profile of the MA portfolio and ensure that the full cost and impact of any rebalancing is captured in the SCR.

5.7 Where a firm has reinsured all or part of the business in its MA portfolio, it should consider the extent of any rebalancing that may be required in the event of reinsurer default, and the reasonableness and achievability of this.

5.8 Firms should be able to demonstrate how the actions they propose to take to re-establish matching reflect: (i) the source of the stress (eg credit default or migration, longevity); (ii) the nature of the stress; and (iii) the severity of the stress. Firms should demonstrate that their proposed actions are realistic in the given stress event and show how they have taken account of how the type of stress could affect their ability to take such actions. Different management actions will likely be required in different scenarios, ie the same management actions need not be appropriate across the probability distribution forecast.

1 Technical Provisions 6.

5.9 Following a stress, the PRA expects firms to:

- re-establish cash flow matching in Component A of the MA portfolio¹ as measured using the tests the firm has implemented to assess the adequacy of matching in its MA portfolio. The PRA would also expect firms to have regard to how the level of matching measured using the PRA's 3 tests² compares to the indicative thresholds the PRA has published for those tests; and
- consider whether additional assets are needed in Component B³ to ensure that the value of assets equals the value of best estimate liabilities within the MA portfolio and determine any costs of re-establishing MA compliance.

5.10 Any rebalancing action should be consistent with the firm's wider risk management framework and the Prudent Person Principle (PPP).⁴ In particular, firms should consider whether their investment policies (as drafted) may prevent proposed rebalancing actions from being completed in practice.

5.11 Rebalancing actions assumed in SCR calculations should take account of any such restrictions and should either operate within the current policies (as drafted) or should clearly set out changes required to the policies together with justification as to why they are achievable. In the latter case, such justification should include discussion of the governance that would be enacted to make potential changes to the investment policies if necessary and the timescales that would be needed to do this. Any planned changes to investment policies would need to be compatible with the firm's wider risk management framework and the PPP. On rebalancing, the PRA considers one or both of the following options to be viable provided the option is demonstrably feasible in the stress scenario in question:

- demonstrating that the required eligible assets are held outside the MA portfolio and can be injected post-stress; and/or
- assuming the required assets have to be purchased from the market and demonstrating that sufficient funds will be available to achieve this.

Injection of eligible assets from elsewhere in the business

5.12 Where a firm assumes that any rebalancing can be done by injecting eligible assets from outside the MA portfolio, the PRA expects the firm to be able to demonstrate that:

- assets held outside the MA portfolio meet the MA eligibility criteria and have the same features as those already in the MA portfolio;
- the appropriate amounts of eligible assets are available outside the MA portfolio;

1 Component A of the MA portfolio refers to the assets whose cash-flows replicate the expected liability cash-flows after being adjusted for the component of the fundamental spread that corresponds to the probability of default.

2 The PRA tests referred to here are set out in 'Solvency II: internal model and matching adjustment update', March 2015: www.bankofengland.co.uk/prd/Documents/solvency2/intmodmaupdatemar2015.pdf (Annex to Appendix 3). At the time of writing, the tests are subject to consultation as part of CP21/17 'Solvency II: Matching adjustment'; October 2017; www.bankofengland.co.uk/prd/Pages/publications/cp/2017/cp2117.aspx.

3 Component B of the MA portfolio refers to the additional assets that, when added to component A, result in the value of the assigned portfolio (ie components A and B combined) being equal to the best estimate of the liabilities within the MA portfolio.

4 Investments 2.

- the eligible assets outside the MA portfolio are of the appropriate duration and credit quality step (CQS);
- the assets outside the MA portfolio are not encumbered or required for other purposes (eg to meet margin calls on derivatives held outside the MA portfolio);
- it has performed a detailed assessment of investment concentration and correlation to ensure that there is not a risk of it assuming it has assets available to inject into the MA portfolio to replace any defaulted assets when in reality the degree of common exposures means that a number of the assets outside the MA portfolio would also have defaulted; and
- it has considered the degree to which its MA portfolio may hold concentrated exposures following actions taken to rebalance the portfolio post stress and has reflected this in the SCR.

Asset purchases: availability considerations

5.13 Where a firm assumes that rebalancing involves purchasing of new assets, the PRA expects the following points to be considered and appropriately allowed for in the SCR:

- the availability and liquidity of the assets being sought;
- the likely level of competition for the assets in question. After a systemic market event, it is feasible that there could be a flight to quality in the market and firms should allow for this and the impact it could have on price;
- potential new or increased risks that the assets sought could introduce to the MA portfolio (eg increased concentration of exposures); and
- whether the firm can reasonably expect to do the trading needed in the two-month timeframe available to restore compliance with the MA requirements.

5.14 The PRA would not usually expect firms to assume that new illiquid assets could be purchased in stress. In the PRA's view, completing such transactions is likely to be particularly difficult in stress conditions and within the required timescales.

Asset purchases: funding considerations

5.15 Where a firm assumes that rebalancing involves purchasing of new assets, the PRA also expects the following points to be taken into account as to how the purchases will be funded:

- where a firm assumes it can use assets outside the MA portfolio to fund such purchases, the liquidity of these assets should be assessed in order to determine the feasibility of undertaking this action in practice;
- the PRA would not usually expect firms to assume the replacement assets are purchased using the proceeds from defaulted assets or the sale of assets downgraded below investment grade. This is due to the difficulty in objectively determining prices or recovery rates in a stressed environment and the likely delay in receiving such recoveries (ie there is

considerable doubt as to whether the recoveries could be obtained within the two-month timeframe to restore MA compliance);¹

- the PRA would be unlikely to consider it realistic for purchases to be funded by an assumed sale of illiquid assets; and
- the PRA would expect demonstration of the ability of the firm to sell the assets in question regardless of whether these assets sit in the MA portfolio (ie that they are not otherwise required or encumbered).

5.16 An allowance should be made for expected transaction costs in a stressed environment. This allowance should take account of the likelihood that such costs will be higher in stress than in normal conditions. This is particularly pertinent where large trading volumes are envisaged – the PRA expects firms to hold capital to allow for transaction costs.

5.17 The PRA also expects firms to undertake sensitivity tests to reflect the risk that it is not possible to purchase the assets intended to be purchased post stress. In particular the PRA considers that it is a useful comparator for firms to show the impact on the stressed MA and the SCR if only gilts were available in order to indicate the extent to which reliance is being placed on obtaining assets that attract a higher MA benefit.

Assessment of whether MA compliance has been re-established

5.18 Firms should clearly demonstrate that sufficient MA-eligible assets are held to cover the MA liabilities in conditions as at the valuation date, and are readily available (or may be obtained) to cover the MA liabilities in stress. One possible method to demonstrate this is a ‘matching rectangle’² assessment. If a firm chooses this approach (or similar approaches that achieve the same outcome), the assessment should be completed in both current and a suitable number of stress scenarios across the probability distribution forecast. Any such assessment should consider the balance sheet gross of the transitional measure on technical provisions (TMTP).

6 Validation of the amount of MA assumed in the SCR calculation

6.1 As per Step 5 of the PRA five-step framework, firms are expected to perform a recalculation of the MA in stressed conditions. This calculation should apply the same calculation method as that used to determine the MA for the purposes of calculating the TPs.

6.2 Firms are also expected to validate the MA benefit assumed in the SCR calculation.

6.3 When validating the amount of MA assumed in the SCR calculation, the PRA expects firms to explicitly and separately cover the assumed impact of the stress event on the level of MA benefit, and the impact of any management actions taken to restore MA compliance.

6.4 For the purpose of ensuring the MA is appropriately reflected in firms’ internal models, the PRA expects firms to set out an approach that allows for the full range of risks and risk interactions to which the MA portfolio is exposed. Specifically for the MA portfolio, the PRA expects a firm to consider explicitly the impact of underwriting risk stresses the MA portfolio could suffer (eg a longevity stress and the associated requirement to find additional long-dated

1 Technical Provisions 6.4.

2 An actuarial technique for summarising which assets are apportioned to which liabilities.

cash flows to match the additional long-dated liability cash flows arising after an adverse change in longevity assumptions).

6.5 Where a firm does not have an internal model covering all risks to which the MA portfolio is exposed, the PRA expects these risks and associated risk interactions to be considered in the own risk and solvency assessment (ORSA). Over time, firms should aim to incorporate all risks to which the MA portfolio is exposed in their full or partial internal model, with consideration given as to any temporary measures that may be required.

6.6 Modelling management actions (to restore MA compliance) within the internal model is complex, especially for firms that determine their SCR using stochastic methods. Such actions can also change the ranking of scenarios and therefore the ultimate SCR. Firms should consider the effect of the management actions in a suitable number of scenarios across the probability distribution forecast to ensure an appropriate scenario ranking is achieved.

6.7 If a firm is using a variance-covariance approach to determine the SCR, the PRA expects the firm to consider whether any further adjustments are required to restore MA compliance in the SCR scenario. This can potentially be incorporated as an end-piece adjustment (eg via a non-linearity adjustment).

6.8 The PRA expects firms to validate the level of MA benefit assumed in the SCR calculation using a methodology that differs from the primary methodology used to calibrate the stressed MA. In particular, where a calibration method is highly reliant on expert judgement, the validation approach should aim to make use of historical data (if possible) to demonstrate the appropriateness of the output, and vice-versa.

6.9 Where firms' models to determine the stressed FS are modifications of the approach used by EIOPA to determine the FS for the purposes of calculating the TPs, the PRA expects the models to be capable of replicating the FS provided by EIOPA in the same economic conditions. This should act as a check on whether the model is fit for purpose.

6.10 While the PRA recognises the importance of industry benchmarking surveys as a validation tool, care needs to be taken to ensure that comparable metrics are being assessed and that the surveys used take adequate account of potential differences between firms including the:

- approach to rebalancing; and
- concentrations of exposure.

6.11 Also, while simple metrics such as the MA in stress as a percentage of the spread widening have an intuitive appeal, the MA is a portfolio-level calculation and care needs to be taken to ensure that this is appropriately reflected in any conclusions based on benchmarking studies. Firms should not place material reliance on such an assessment for the purposes of validating the modelled matching adjustment in stress unless it is sure that the comparison is on a truly like for like basis.

Appendix 2: Draft amendments to SS17/16 ‘Solvency II: internal models – assessment, model change and the role of non-executive directors’

In this appendix new text is underlined and deleted text is struck through.

3 Credit Risk

This chapter has been deleted, and has been included in [insert details of final supervisory statement following consultation].

~~3.1 For the purposes of assessing credit risk, it is important that firms’ internal models do not adopt a purely ‘mechanistic approach’ to calculating fundamental spreads for the matching adjustment (MA) using the methods and assumptions prescribed by the European Insurance and Occupational Pensions Authority (EIOPA)³ for the purposes of calculating technical provisions (in technical information in accordance with Article 77(e) of the Directive) following the modelled stresses to economic conditions. The PRA believes that this approach is not consistent with the T&S for model approval because:~~

- ~~• EIOPA’s approach is specifically designed to be used for the purposes of calculating technical provisions. At present, economic conditions are relatively benign and EIOPA has undertaken its calibration work in this context. The solvency capital requirement (SCR) is intended to cover extreme scenarios. The techniques that are appropriate for valuing technical provisions in base conditions may not remain appropriate for re-valuing technical provisions under stress. For example, firms should consider the risk that the actual migration and default rates over the future holding period of their assets are more onerous than historic averages;~~
- ~~• it is implausible to assume that economic conditions will necessarily immediately revert, following the one-year modelled stress, to long term average levels of spread, migration and default, which is the implicit assumption behind any calibration of fundamental spread to long term average data that is unconditional on (or relatively insensitive to) the modelled credit stress;~~
- ~~• EIOPA’s approach is new, and firms cannot know with any certainty whether and how EIOPA might revise its approach under extreme conditions such as a 1-in-200 credit stress event;~~
- ~~• for the reasons noted above, a mechanistic approach based on the re-application of EIOPA’s calibration methodology, where the methodology has not been updated to reflect the modelled credit conditions, is unlikely to result in a stressed level of technical provisions that corresponds to a transfer value of liabilities; and~~
- ~~• reliance on predictions of EIOPA’s technical information for the purposes of calculating technical provisions to assess the level of risk capital that a firm needs to hold is difficult to reconcile with the requirements of the use test and, in particular, the wider use of the model in a firm’s risk management system.~~

~~3.2 For these reasons, a purely mechanistic approach to calculating the amount of the MA under stress, or the fundamental spread, is unlikely to satisfy the requirement that the SCR shall take into account all quantifiable risks to which a firm is exposed¹. Indeed, the standard~~

¹ See Solvency Capital Requirement – General Provisions 3.3 of the PRA Rulebook.

formula does not mechanistically assume the same fundamental spreads post-stress as are applied for the purposes of calculating technical provisions. The PRA therefore encourages firms to ensure that their internal models do not, through adopting a purely mechanistic approach to assessing the level of fundamental spreads under stress, ignore any of the quantifiable risks to which firms are exposed. Firms should particularly consider those risks the firm has retained within an MA portfolio and ensure that the parameters of their models result in an SCR that covers those risks at the 99.5% confidence level.

...