BANK OF ENGLAND
PRUDENTIAL REGULATION
AUTHORITY

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Dear Chief Actuary

Solvency II: Two and a half years on

This letter to Chief Actuaries of life insurers is part of the ongoing dialogue between the PRA and the Chief Actuary community. We encourage you to share this letter with your board, and others at your firm as appropriate, and we welcome your feedback.

Solvency II came into effect over 2 years ago, since when we and the life insurance industry have been learning the practicalities of operating under the Solvency II regime. The past two and a half years have also provided opportunities for us all to learn, from developments such as the market movements following the EU referendum, the reduction in expected longevity improvements, and the continued effects of operating in a low yield environment.

The purpose of this letter is to share some of our learnings and observations from our regulatory activities under the Solvency II regime, and to reiterate some of the expectations that we have published during that time.

There has been significant focus on the matching adjustment (MA) which is not surprising given the material benefit it provides to firms. We see this as an area where further embedding is necessary to streamline application processes and improve capital modelling in internal models. Internal models remain at the forefront of our attention, in particular in areas of longevity risk, credit risk and dependency modelling. The efficiency of our assessment of firms' internal model applications relies on the quality of the application, model validation and the internal model documentation.

We have also considered other aspects of regulatory requirements introduced by Solvency II, including observations from our thematic reviews on the projection periods for calculating the technical provisions for unit linked products and firms' approaches to stress testing in their Own Risk and Solvency Assessments (ORSAs).

Finally we remind you that the Chief Actuary role is a Senior Insurance Management Function within the Senior Insurance Managers Regime (SIMR). We expect Chief Actuaries to keep up to date with their duties under SIMR, as set out in the PRA Rulebook.

Below we explore the topics in detail.

Matching adjustment in technical provisions

Changes to MA Applications

In considering options to make the MA application process more streamlined within the constraints of the Implementing Technical Standards (ITS) requirements, the PRA has stated in its recently published Supervisory Statement (SS) 7/18[1] that the PRA's approach will be proportionate and appropriate to the changes firms are seeking to make in their applications.

In particular, the PRA will accept updated MA applications where the changes to the most recently approved MA application are clearly shown (eg 'tracked changes'), along with a 'clean' version of the updated application and a confirmation that text which has not changed in the MA application and is not highlighted as part of the tracked changes, has remained static. If the application is approved, firms will complete the process by submitting, shortly thereafter, a final version of the updated MA application that reflects any changes agreed during the application review process. The PRA has found it helpful where

[1] 'Solvency II: Matching adjustment', July 2018: https://www.bankofengland.co.uk/prudential-regulation/publication/2018/solvency-2-matching-adjustment-ss.

firms have provided a summary of proposed changes separately and the appropriate cross-references to the updated MA application.

Firms may propose not to update sections of the existing MA application where the change does not relate to that section. For example, it may not be necessary to update the mortality risk assessment where the updated MA application is solely to add a new asset class. The PRA has found it helpful where firms have set out clearly where they have proposed not to update the existing MA application.

As the PRA has also stated in SS7/18, there may be circumstances in which firms could submit an additional MA application while an existing application is still being considered by the PRA, for example if the inter-dependencies between the changes are minimal and where the circumstances of the second application are such that a quicker decision might be possible. It would be helpful if firms discussed the feasibility of doing so on a case-by-case basis with their supervision team before making the application. If a second application is approved before the review of the first is completed, firms should update the first application to reflect this.

Fundamental spread

Chief Actuaries will be aware that the fundamental spread (FS) tables tabulated for credit assets depend on the assigned FS sector and the asset credit quality step (CQS). As discussed in SS3/17[2], while the FS assignation process is relatively prescriptive for assets with credit ratings provided by External Credit Assessment Institutions (ECAIs), there is more judgement involved for internally-rated assets.

In 2017 we conducted a survey to collect asset information on firms' MA portfolios. In reviewing this data, we noted a variety of approaches across MA portfolios as to how the assets are assigned to the FS sectors (eg 'Financials'), particularly for less liquid asset classes. We encourage Chief Actuaries to understand the significance of this assignment, and to ensure that an appropriate FS, in particular one that reflects the risks retained by the firm, is applied.

More generally, we remind firms that, as stated in SS3/17, where material reliance is being placed on the CQS mapping for internally-rated assets, the Chief Actuary and Chief Risk Officer will need to be satisfied that an appropriate FS is being applied.

Modelling of the MA in internal models

We have previously acknowledged that the finalisation of the MA later than other elements of Solvency II presented internal model development challenges for firms seeking to reflect the MA in their internal models ahead of Day 1 of Solvency II. Further model development is therefore likely to have been or to be necessary for a number of firms that currently have approval to use an internal model covering the MA. Other firms are seeking to apply to use models that cover the MA for the first time.

Following consultation in 2017/18, we published SS8/18[3] on the modelling of the MA in firms' internal models. The SS sets out the PRA's expectations of firms, bringing together a number of points that had been set out previously together with new materials, particularly in respect of rebalancing the MA portfolio in stress.

We recognise the challenges involved in modelling the MA under stress. In particular, the portfolio-level nature of the MA calculation, the need to meet the MA eligibility criteria continuously, and the interactions between different risks that can have an impact on the MA portfolio, mean that models need to strike a balance between complexity and usability. As set out in PS19/18[4] the PRA is not seeking to push firms to develop complex modelling methodologies unnecessarily. However, it is essential that firms can demonstrate that their approach adequately captures the risks to which the business is materially exposed. A key concern underpinning the SS is whether firms' existing approaches will continue to do this over time, particularly if the firm invests in a wider range of asset classes. We highlight three particular areas where improvements are most likely to be required:

i. **Asset-side risk modelling** - Some firms have focussed their modelling efforts on determining the MA in stress, with less attention being given to the methods used to revalue the assets held within

[2] 'Solvency II: Matching adjustment – illiquid unrated assets and equity release mortgages', July 2017: www.bankofengland.co.uk/prudential-regulation/publication/2017/solvency-2-matching-adjustment-illiquid-unrated-assets-and-equity-release-mortgages-ss.
[3] 'Solvency II: Internal models – modelling of the matching adjustment', July 2018: https://www.bankofengland.co.uk/prudential-regulation/publication/2018/solvency-2-internal-models-modelling-of-the-matching-adjustment-ss.
[4] 'Solvency II: Internal models – modelling of the matching adjustment', July 2018: https://www.bankofengland.co.uk/prudential-regulation/publication/2017/solvency-ii-internal-models-modelling-of-the-matching-adjustment.

their MA portfolios in stress conditions. We consider that appropriate modelling of asset-side risks is essential to enable firms to ensure that the MA eligibility criteria continue to be met in stress. It will also assist in identifying and quantifying the risks retained by the firm on its asset holdings, and can give important insights into the extent to which a firm is reliant on the MA to withstand certain stress scenarios.

ii. **Rebalancing** - Rebalancing of the MA portfolio will be required in some scenarios in order to maintain an appropriate level of matching. It is for firms to justify that their proposed rebalancing strategies are credible in the circumstances assumed. From a prudential soundness perspective, we would have material concerns if a firm's Solvency Capital Requirement (SCR) were to be understated as a consequence of overly optimistic assumptions as to the nature and extent to which the firm would be able to rebalance. It is this concern that sits behind a number of the expectations set out in SS8/18.

iii. **Validation** - For balance sheet items as complex as the MA, it is appropriate to ensure that the resulting stress calibrations are considered through different lenses and that key modelling assumptions are subject to an appropriate degree of scrutiny. To that end we have encouraged firms to validate their assumptions/outputs using different techniques to those used in their primary calibrations and methodologies. We have also suggested that such validation is done throughout the different stages of the calibration of the MA in stress. The intention of SS8/18 is not for firms to maintain and run parallel models for the MA; instead it seeks to ensure that the resulting calibration used can be justified against historical experience and data as well as current and forward-looking judgements.

Finally, we note that the continuing trend for firms to invest in a wider range of assets, many of which are bespoke and illiquid in nature, creates further challenges to ensuring that internal models appropriately reflect the risks to which these assets give rise. The focus of SS8/18 is on externally-rated corporate bond assets but a number of the expectations will have wider application and so should also be of relevance to more diverse asset portfolios. We intend to follow up where appropriate with any further expectations in respect of other asset classes.

Modelling of longevity risk in internal models

Most firms have started to adapt their longevity best estimate assumptions to reflect the recent experience of slower population mortality improvements. In general, the approach taken has been cautious, reflecting the uncertainty over the cause and duration of the slowing. Additionally, a number of firms have given explicit consideration to the evidence of faster mortality improvements for higher socio-economic groups.

As increasing weight is placed on the evidence of slowing mortality improvements in the best estimate assumptions, we encourage firms to consider whether longevity risk calibrations in their internal model adequately reflect the possibility of the best estimate assumptions returning to a higher level of improvements.

David Rule, as Executive Director of Insurance Supervision, referred in his speech in 2017[5] that we have concluded we should make some changes to our quantitative indicators in light of recent longevity experience. These indicators are used as one input into our reviews of whether insurers' models meet Solvency II tests and standards – further guidance on how the PRA uses quantitative analyses as part of model approval is set out in SS17/16.[6]

Modelling of dependency in internal models

We have observed that internal model firms use a range of different algorithms or approaches to ensure that their correlation matrices (derived using a combination of data analysis and expert judgements) are positive semi-definite (PSD) matrices.

These PSD algorithms or approaches alter the pair-wise correlations in order to make sure that the matrices become internally consistent. Some of them can result in large changes to key correlation pairs that could have an inappropriately large impact on the SCR and/or resulting risk margin.

We encourage firms to establish processes to ensure that their PSD algorithm or approach does not lead to material changes in their most material correlations, and that these should be embedded in their model validation. Examples of good practice that we have observed include application of the firm's expert

[5] 'Changing risks and the search for yield on Solvency II capital', July 2017: www.bankofengland.co.uk/speech/2017/changing-risk-and-the-search-for-yield-on-solvency-2-capital.

[6] 'Solvency II: internal models – assessment, model change and the role of the non-executive directors', updated July 2018: www.bankofengland.co.uk/prudential-regulation/publication/2016/solvency2-internal-models-assessment-model-change-and-the-role-of-non-executive-directors-ss.

judgement and either implementing an algorithm with 'weights' to reflect correlations by importance, or setting tolerances on movement of correlations.

Internal model documentation

Good quality documentation is a benefit to all concerned, and in particular it reduces the risk of any misunderstanding that would cause unnecessary work for both us and firms.

A clear executive summary with effective signposting of contents allows the reader to understand the main points being made and to locate the evidence sufficiently. Reviews can be more effective if the documentation provides a clear picture of how the topic being covered relates to other components of the internal model.

We encourage firms to ensure that the internal model documentation sets out clearly and succinctly:

- a concise summary of the proposed methodology;
- details of the calibration;
- the key judgements made in forming the methodology and calibration including the use of any data;
- consideration of alternatives to the key judgements;
- the results of the calibration including the impact on capital;
- the validation of methodology, calibration and results, including sensitivity analysis of the key judgements;
- limitations and weaknesses of the proposal; and
- criteria and circumstances under which a recalibration of the risk will be required.

Where the documentation relates to a model change, our view is that it is good practice for firms to set out the rationale for the change.

We take this opportunity to remind firms of the importance of good quality documentation of the key judgements made in their modelling work as detailed in the 'PRA Solvency II Insurance Directors' update 12 February 2015'[7] including:

- that there is a mechanism to ensure that key judgements are identified;
- that there is a process that will ensure that decision making and approval on key judgements is taken at the appropriate level;
- challenge on key judgements is appropriately captured within the documentation;
- the level of documentation and validation of the judgement is proportionate to the importance of the decision; and
- the definition of expert judgement is appropriately broad, in that as well as identifying critical individual parameters, it may incorporate:
  - fundamental methodology decisions on how a firm will quantify a particular issue; and
  - the design of a process, or an implicit assumption, that will influence a wide range of other decisions/judgements.

Finally, we suggest the following that should help firms make their documentation more accessible to the reader:

- the use of graphs and other pictorial evidence can be useful, however where they are used they need to be explained as to why they are relevant, what inferences are being drawn from them, and why it is appropriate to do that;
- any results presented should be clearly explained together with the conclusions that should be drawn from those results; and
- firms should clearly explain or comment on the various sources of information provided in their documentation, and in particular set out how that information is used in the internal model.

We encourage Chief Actuaries to review their firms' documentation and submission with the above in mind.

Contract boundaries / projection period for calculation of technical provisions

As part of the ongoing review of Solvency II technical provisions, the PRA became aware of an inconsistency between the approach taken by some firms to projecting future cash flows, and a published opinion from the European Insurance and Occupational Pensions Authority (EIOPA) as to the correct

[7] www.bankofengland.co.uk/prudential-regulation/letter/2015/pra-solvency-2-insurance-directors-update.

approach. We understood this inconsistency to have arisen because of an interpretation of Article 18 of the Solvency II Delegated Regulation (Delegated Regulation)[8] and the presence of unilateral rights within certain insurance contracts that allow the undertaking to terminate the contract. Some firms were applying a 'short' projection period (only projecting cash flows for the notification period prior to the right to terminate) irrespective of the intention of whether to actually terminate the contracts in practice.

As mentioned at the Association of British Insurers' Unit-Linked Forum on 7 December 2017, we consider that it would be incorrect to apply an interpretation of Article 18 of the Delegated Regulation that results in a short cash-flow projection period for obligations relating to periods already paid, unless a firm can evidence a clear intention of exercising the termination option and the requirements of Article 23 of the Delegated Regulation on 'Future Management Actions' are met.

However, we also recognise that Solvency II permits firms to use methods to calculate technical provisions that are proportionate to the nature, scale and complexity of the risks underlying their insurance and reinsurance obligations. As such, we consider the use of a short cash-flow projection period to be an acceptable simplification subject to the requirements of Article 56 of the Delegated Regulation being met.

The assessment as to whether the requirements of Article 56 are being met is for each firm to perform. Chief Actuaries are reminded of the need to evaluate (in quantitative and qualitative terms) any error introduced by the adoption of a proportionate methodology.

Approach to stress testing in ORSAs

In 2017, we reviewed the approach to stress testing and reverse stress testing described in the ORSAs of a sample of the largest life insurers.

Stress testing

Most firms had a reasonable approach to stress testing, with a suitable range of scenarios and sensitivities applicable to the main risk types (eg equity market falls, and mortality shock).

A range of severities of stress were investigated by firms in the scenarios. We think that firms should not be content that the range they have used defines the maximum severity – there is still a chance that more severe scenarios could happen.

At least one firm included 'walkthrough' scenarios. A walkthrough scenario is where a firm does not attempt to quantify likelihoods, but instead talks qualitatively about possible sequences of events. Where the assumed conditions are adverse, we consider this sort of scenario to be helpful in exploring a sequence of events and possible mitigating actions, even if its probability and effects cannot currently be easily quantified.

Reverse stress testing

Firms generally had a clear definition of failure, with the better firms considering exhaustion of capital along with other possibilities (such as exhaustion of liquidity, collapse in brand reputational value, lack of shareholder support, or withdrawal of regulatory approval).

It is important to be open-minded in thinking through what could cause the business model to fail. Firms should not be too easily satisfied that a scenario derived through such an analysis is considered an extremely unlikely combination of circumstances and can therefore be dismissed.

We noted two reverse stress test scenarios that we thought were generally not well covered to be where :

1. a firm's strategy is extremely successful in some respects and this leads to a dangerous build-up of exposure and risk in perhaps unfamiliar areas; and
2. a firm is using mark-to-model for its illiquid assets, and it turns out that the values have been significantly overstated.

Management actions

Most firms had a reasonable view of possible management actions but planning for the use of such actions seemed quite high-level. We recommend that firms think through their proposed management actions in more detail in order to increase confidence that in a stressed situation such actions will deliver

[8] Commission Delegated Regulation (EU) 2015/35.

the expected benefits. As set out in SS4/18,[9] we expect management actions to be realistic, credible, consistent with regulatory expectations, and achievable.

Solvency and Financial Condition Reports (SFCRs)

In October 2017, the PRA published a note[10] following three roundtables it hosted in September with insurers, investors, and analysts to discuss the first round of SFCRs published by EU insurers in 2017. In particular, the PRA gathered views from investors and analysts on how the SFCR disclosures can be improved. Feedback from these discussions suggested two main areas for increased disclosures:

- The most important priority was disclosure of the sensitivity of SCR coverage ratios to changes in market and other key variables, and having consistent disclosures of these sensitivities across insurers.
- Analysts and investors also wanted more granular and consistent disclosures on the drivers of movements in SCR coverage. This would include a breakdown of sources of capital generation, changes in risk assumptions and changes in modelling approach, as mentioned in David Rule's speech last year[11].

Upcoming activities

Finally, we alert you to a number of initiatives we are embarking on.

- The PRA is carrying out a review of its internal guidance to assess proxy models as part of firms' applications for internal model approval or changes to an existing internal model. As part of this process, the PRA is conducting a survey with firms that seeks to capture, at a high level, firms' approach to proxy modelling.
- Earlier this month, the PRA issued a consultation on an update to the SS3/17[12] that would build on the four key principles currently set out by providing additional clarity about the PRA's expectations for valuation of the no-negative-equity guarantee for the purpose of the effective value test and on the applicability of transitional measures on technical provisions.
- The PRA is further developing its views on the modelling of other less liquid assets, in particular the treatment of these assets and their associated matching adjustment within firms' internal models.

If you would like to discuss the content of this letter, please speak to your usual supervisory contact in the first instance.

Yours sincerely

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[9] 'Financial Management and planning by insurers', May 2018: www.bankofengland.co.uk/prudential-regulation/publication/2018/financial-management-and-planning-by-insurers-ss.

[10] 'Solvency II: Solvency and Financial Condition Report roundtables': www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/publication/solvency-and-financial-condition-report-roundtables.

[11] See footnote 5 above.

[12] Consultation Paper 13/18 'Solvency II: Equity release mortgages', July 2018: www.bankofengland.co.uk/prudential-regulation/publication/2018/solvency-ii-equity-release-mortgages.