Bank of England

Prudential Regulation Authority

Solvency II Review: Matching Adjustment and reforms to the Fundamental Spread

Introduction

1. The purpose of this document is to set out the PRA's current assessment of the need for reform to the Fundamental Spread (FS) within Solvency II, and how such reforms could be achieved. It covers:

- an explanation of the Solvency II Matching Adjustment (MA), the purpose of the FS and how it is currently calculated for the purpose of determining Technical Provisions;
- a discussion of the role of MA in financial resilience;
- why the PRA considers that aspects of the current design and calibration of the FS do not adequately reflect the risks insurers run;
- the evidence for the PRA's current position that the FS should include allowance for a credit risk premium (CRP), calibrated to deliver an outcome equivalent to at least 35% of credit spreads through the cycle; and
- how any reforms could be achieved which address the PRA's concerns while taking into account feedback received from firms in it's recent Quantitative Impact Study (QIS), in particular on volatility.

2. The MA recognises that insurers with predictable liability cash flows which are closely matched by their asset cash flows are not materially exposed to the risk of having to realise those assets in unfavourable circumstances. It permits those

insurers to discount their liability cash flows at a higher rate than the basic risk-free rate, resulting in a lower liability value. Consequently, the MA is a mechanism to allow insurers to recognise upfront, as loss-absorbing capital resources, a proportion of the spread they hope to earn over the lifetime of their investments.

3. The MA calculation relies on a set of assumptions about how much of the spread on those matching investments can safely be considered to be risk-free, and how much risk insurers retain during the life of these investments. This is because the MA – which effectively seeks to decompose the credit spread on an asset – is not observable. The use of assumptions to determine the MA is therefore unavoidable and their use of the MA exposes insurers to a concentrated form of model risk.

4. Many of the investments made by life insurers are long-term in nature. The assumptions underlying the MA calculation need to consider how these assets may perform over a very long period, including through economic downturns and extreme events which might occur over decades to come, including during the transition to net-zero. The range of assets giving rise to the MA benefit also continues to expand into more bespoke, internally rated and valued assets. These include, but are not limited to, exposures to property-backed investments, infrastructure assets and education loans.

5. Although it is possible to perform an MA calculation that covers all MA-eligible assets held by insurers, the current methodology and calibration underlying the MA calculation and the published FS tables were not developed to explicitly take account of the wide range of assets that insurers have invested in. For example, in the Technical Provisions section of the PRA Rulebook, 7.2(4) refers only to ‘external credit assessments’, however over 30% of assets in firms’ MA portfolios at year-end 2020 (YE20) were only internally rated. In addition, the Technical Information underlying the FS calibration refers extensively to ‘bond data’ but approximately 45%

of firms' MA portfolio holdings at YE20 were neither corporate nor UK government bonds.

6. As at YE20 – the calculation date of the QIS – life insurers' balance sheets benefitted from the MA by c.£81 billion (a c.£37 billion increase in Own Funds coupled with a c.£44 billion reduction in the SCR). In relation to Own Funds, the c.£37 billion MA benefit accounted for just over 38% of the total Own Funds for those insurers that made use of the MA. It is therefore a very material component of life insurers' capital resources. At year-end 2021 (YE21) the picture was similar with balance sheets overall benefitting from the MA by c.£80 billion and the MA benefit in the base balance sheet accounting for just over 35% of Own Funds. Due to its size and widespread use, and the concentrated element of model risk noted above, the PRA considers the appropriate design and calibration of the MA to be critical to the achievement of both its statutory objectives and the wider objectives of the Solvency II review.

The current MA design

7. Under Solvency II, the MA is applied as an increase to the liability discount rate; it is calculated by deducting the FS from the credit spread on the assets backing MA liabilities. The FS is intended to provide policyholder protection by covering the risks retained by an insurer on the assets matching its liabilities, predominantly credit risk.

8. Currently the FS is set as the sum of:

- the expected cost of losses from defaults (the Probability of Default, PD); and
- the expected cost of losses from downgrades (the Cost of Downgrade, CoD).

9. The FS is also subject to a floor based on a percentage of long-term average spreads (LTAS), although the rationale for the specific percentage originally chosen by the European Commission (35% for non-government bonds) is unclear.

10. All of these components are based on 30-year averages that are calculated based on data for government bonds and financial and non-financial corporate bonds only. In addition to this sector split, the FS varies by currency, term and Credit Quality Step (CQS).[1]

11. For sub-investment grade exposures there is a further addition to the FS in order to limit the MA on those assets to that achievable on an equivalent investment grade (ie CQS3) asset.

12. In summary the current FS design:

- uses historical data to determine expected future losses, making no explicit allowance for uncertainty around these;
- is calibrated using only government and externally rated financial and non-financial corporate bond data;
- is extremely stable over time due to being based on very long-term default, downgrade and spread statistics; and
- has a calibration that is driven by its floor for most currency/sector/term/CQS combinations.

The role of the MA in financial resilience

13. A key premise of Solvency II is the concept of 'going concern' and transfer value, where an entity should be able to withstand a severe adverse event, calibrated to a 1-in-200 level over 1 year, and still have sufficient assets for its portfolio of liabilities to be transferred to a third-party.

[1] For assets with credit ratings provided by External Credit Assessment Institutions (ECAIs), the CQS and hence FS assignation process is relatively prescriptive, with the only judgement in the FS mapping being over the categorisation by sector. In contrast, for internally rated assets there is more judgement involved in determining which CQS and hence which FS should apply.

14. The purpose of these requirements is to provide a minimum level of policyholder protection and to provide an early trigger point for supervisory intervention should it be needed.

15. The PRA also accepts and supports the case for a liability discount rate based on a risk-free rate adjusted for a liquidity premium[2] (the MA, in Solvency II terminology). This is because the insurer can match its predictable liability cash flows with the risk-adjusted cash flows of illiquid assets such that it materially reduces the risk of having to force-sell assets to meet liabilities as they fall due. The insurer receiving the liabilities is also likely to match the cash flows of predictable liabilities with the risk-adjusted cash flows of illiquid assets, and so there is a market price of replicating these liabilities. Therefore, the liquidity premium is compatible with the transfer value concept in the case of predictable liabilities, although the extent to which this is achieved in practice will depend on whether the deduction from the spread (or the FS) appropriately reflects the risks to which insurers are exposed. If part of the compensation for credit risk is included in the MA rather than the FS then this is likely to be incompatible with the transfer value concept.

16. The calibration of the MA requires balance. It should not be calibrated such that the level of policyholder security is excessive relative to the risks faced by insurers in respect of their MA portfolios. An appropriate MA treatment should promote safety and soundness of firms and policyholder protection, result in a competitive annuity market, and incentivise firms to invest in a wide range of long-term, illiquid, fixed interest assets which can also provide wider economic benefits. Firms' management

[2] In this context the 'liquidity premium' is defined as the element of the spread on an asset that compensates investors for the risk that the asset cannot be sold for its theoretical price in a timely manner, and this 'liquidity risk' includes the volatility of that premium over time.

of annuity business, as supported by the MA, is therefore aligned with the PRA's secondary competition objective and 'have regards' in relation to proportionality, competitiveness, innovation and long-term productive investment.

17. The MA however should not be calibrated such that the level of policyholder security is too low relative to the risks insurers face. The importance of the annuity income to policyholders, the high level of risk that results from the liabilities extending far into the future, and the difficulty of 'de-risking' the business once written (since it is likely to be difficult to trade out of relatively illiquid assets while also maintaining the MA that has already been reflected in a firm's solvency capital), make it a class of business for which it is particularly important to maintain an appropriate degree of policyholder security. This includes the ability to transfer the business to another insurer, if necessary, following a severe stress. An appropriate calibration of the MA is therefore fundamental to the PRA's primary objectives in respect of promoting the safety and soundness of the firms the PRA regulates and ensuring policyholders are appropriately protected.

18. The PRA recognises that there are no universally agreed methods for quantifying the liquidity premium/MA. Methodological purity and precise calibrations are neither achievable, nor does the PRA consider them necessary. The MA will always rely on judgements around assumptions about an asset's risk profile which cannot be fully validated in advance, but where the risk of assumptions being wrong is asymmetric and not allowing for uncertainty in assumptions increases this risk. The PRA approach has been to work within the market-consistent balance sheet principles of Solvency II, to construct an appropriate MA based on a range of information, and one which helps mitigate the risk that technical provisions understate the price at which liabilities could be transferred to a third party on an arm's length basis.

PRA Concerns

19. The PRA is concerned that weaknesses in aspects of the current formulation of the MA could allow firms to recognise upfront as capital resources part of the compensation that they hope to receive over the lifetime of their assets, for the credit risk that they will bear over that period.

20. The MA is intended to adjust insurers' balance sheets to better reflect their risk profile and its design should therefore align with good risk management. In particular, the MA is not intended to cover the compensation for retained credit risk to which firms remain exposed. This credit risk can vary both by asset class and over time depending on market and economic conditions. The MA, and therefore any weaknesses in its design, are particularly important for insurers writing annuity business.

21. Any weaknesses in the MA design or calibration, aside from being detrimental to both safety and soundness and policyholder protection, would have possible knock-on impacts on the ability of life insurers to be a sustainable source of long-term finance to the real economy. Addressing issues identified in respect of the level and design of the FS will ensure that the regime more appropriately reflects the risks to which insurers remain exposed on their investments, and reduces the likelihood that part of the spread is recognised upfront that subsequently cannot be earned.

22. The PRA considers that firms' MA portfolio assets are exposed to two sources of retained credit risk: (i) expected loss due to default (EL); and (ii) uncertainty around that EL for which a willing arm's length third party would demand a premium for taking on the risk. This second element can be referred to as the credit risk premium (CRP). Not allowing appropriately for both of these elements would likely lead to an FS that is not a true reflection of the risks retained by insurers in their MA asset

portfolios which in turn could materially reduce the likelihood that the assets and liabilities in the MA portfolio could be transferred to a third party post a 1-in-200 year stress event. This latter point, for the reasons set out in paragraphs 13 to 18 above, raises particular concerns in respect of both policyholder protection and the safety and soundness of individual firms and, by implication, the life insurance sector as a whole. It can also frustrate the important role that life insurers play in the wider economy.

23. More specifically, the PRA has the following three key concerns regarding the current FS construct:

i. **The FS does not capture all retained risks which insurers face and as such its level (in basis points) is generally too low.** This is because the FS does not fully and explicitly allow for uncertainty around credit risk (the CRP). The PRA considers that cash-flow matched insurers remain fully exposed to credit risk (in relation to both defaults and downgrades) and that it is unsound to recognise upfront as capital the compensation for credit risk that they hope to earn over the lifetime of their assets.

ii. **The FS is not sensitive to differences in risks across asset classes for a given currency, sector and CQS.** It assumes that all assets of the same currency, sector, term and CQS have the same amount of credit risk, calibrated to historical externally rated corporate and government bond data. This means firms are incentivised to hold high spread-for-rating assets, as all of the excess spread is taken credit for as MA upfront, so creating Tier 1 capital.

iii. **The FS does not adjust to reflect structural shifts in the credit environment over time, unless there are actual defaults or downgrades.** This means that any potential signal of change in credit risk contained in credit spread movements is discarded. The PRA recognises that spreads can be

more volatile than is justified by the genuine credit risk to future cash flows, and that significant smoothing is desirable to prevent unwarranted balance sheet volatility. However, insofar as changes in spreads signal genuine changes in credit risk, the PRA considers that it is inappropriate for insurers' balance sheets to entirely disregard such signals.

24. Each of these are discussed in turn below.

(i) Level of the FS

25. The FS and MA effectively decompose the credit spread on an asset into retained and non-retained risks.

26. As noted earlier, in order for the liability discount rate (post MA) to truly be an adjusted risk-free rate the PRA considers that the FS should capture both expected loss (EL) and the uncertainty around this expected loss in the given market conditions - the credit risk premium (CRP). This latter element incorporates a range of factors including:

- random year-on-year default variation;
- expected and unexpected downgrades, which will increase the risk of future loss;
- that historic data used for model calibration may not be a good guide to future experience due to changes in the economic, political or legal environment, as well as the transition towards a net-zero economy;
- that data segmented by rating may not be a reliable measure of current risk if there is uncertainty over that rating or if rating approaches have changed over time; and

- that some element of the variation in realised credit losses is non-diversifiable, and, like any non-diversifiable risk, investors are likely to require compensation for bearing it.

27. The main risk firms do not retain when holding bonds in MA portfolios is liquidity risk ie the risk that they cannot sell a given asset at its theoretical price in a timely manner as explained in paragraph 15 footnote 2. MA firms [3] holding assets to maturity are also not exposed to the risks associated with changes in liquidity over time as this source of volatility is not related to genuine prospective credit risk.

28. Whilst it is possible to conceptually identify and discuss all of these sources of risk, the decomposition of the credit spread is not observable. This leads to challenges in the quantitative measurement of an appropriate allowance for retained risk.

29. For EL it is possible to use historic data in respect of cumulative defaults to derive a calibration. The PRA considers that the EL is a stable 'through the cycle' measure, the calibration of which would only change materially were there to be a material and sustained change in credit conditions, where a long averaging period can be justified. To that end, the PRA considers that the existing PD[4] element of the MA design is an appropriate methodology for the calibration of the EL element of the FS.

30. The CRP – which represents uncertainty around expected loss – is likely to change more quickly than EL. This is because the CRP is intended to signal

---

3 Shorthand for firms that have PRA approval to use the MA in their Solvency II Pillar 1 balance sheet.

4 As defined in paragraph 8, PD is the Probability of Default element of the existing FS design and captures the expected loss from defaults. It is calculated based on historic default data.

increased uncertainty and potential concerns around future credit experience. Unlike EL, it is more difficult to calibrate the CRP using historic data, because:

- The CRP is not observable, as the spread decomposition is not observable and transaction prices where the CRP may have been separately identified are unlikely to be public, and certainly not in sufficient volume to form a credible data source for calibration purposes. Historic default data cannot be used to estimate it in isolation because, by its nature, such data is backward-looking and so captures what actually happened rather than the uncertainty around what could have happened. In particular, it ignores downgrades that increase credit risk on a forward looking basis but that do not lead to increased defaults. The current Solvency II approach to the cost of downgrade based on average transitions and fixed 'RC factors' or spreads for each rating is unlikely to represent an adequate allowance for the potential loss from downgrades, taking uncertainty into account. This is because such losses will be highly sensitive to (or increase materially due to) the variability of transition and spread experience in practice. Also, even where the Long-term Average Spread (LTAS) floor is 'biting', it is not clear if and how the calibration of the LTAS floor component of the current FS has taken this source of uncertainty into account.
- There is limited quantum of historic data. This applies to traded corporate debt generally, and more acutely for internally rated and valued assets that are increasingly present in firms' MA portfolios.
- The variation in historic defaults has, at times, been dampened by actions taken by central banks, governments and others. Historic levels of CRP, if they were observable, would have reflected the uncertainty around the extent to which those actors would have been willing and able to absorb losses that would otherwise have resulted in increased realised defaults.

31. The PRA has therefore instead turned to independent evidence, predominantly academic studies, but also validation work that compares the FS to actual historical credit losses. The PRA considers that both of these provide useful lenses through which to consider the issue.

Evidence from independent academic research

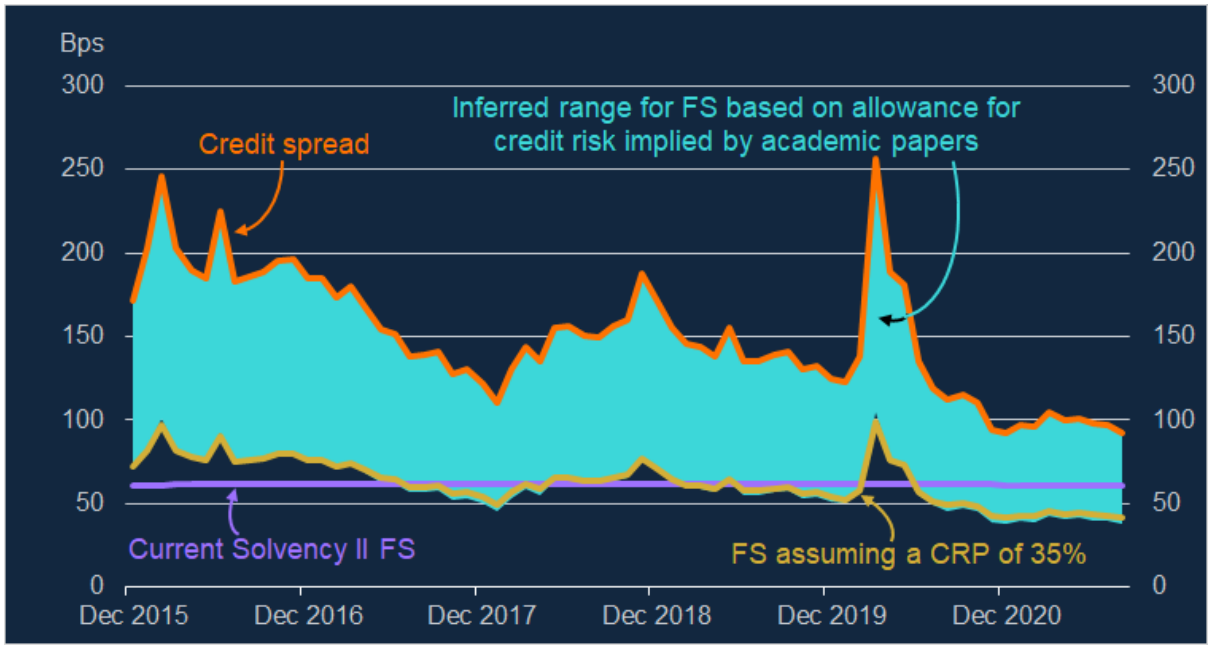
32. There are a number of academic studies that have considered the spread decomposition problem focussing on corporate bonds. Although all of these academic studies approach the problem in a different way, or cover different ground, models in this area generally fall into two types:

- models that directly estimate credit risk based on a structural model of the issuing firm; and
- models that estimate the liquidity premium first using a liquidity proxy. The allowance for credit risk is calculated as the total spread minus the estimated liquidity premium.

33. The PRA carried out a review of academic literature published in peer reviewed journals and selected those papers that used data relevant to the UK life insurance market and that produced results in the form of a decomposition of spreads which could inform an appropriate calibration of the CRP.

34. Based on consideration of the academic studies referred to in Annex A, the PRA has identified a plausible range in which the FS could fall. This is shown in Chart 1 for an illustrative A-rated 10-year financial bond.

Chart 1: Illustrative A-rated 10-year financial bond spread, the Solvency II FS, alternative academic views and an FS assuming the CRP is determined using 35% of spreads at each point in time



Source: IHS Markit data from Refinitiv Eikon and various academic publications (see Annex A). The x-axis has a monthly time frequency. Note that the chart is based on index spreads but in reality the spread level will vary for firms depending on the specific assets they are holding – if the spread on their assets is higher than the illustrated spread based on the corporate bond index, the 35% CRP FS line will also shift upwards accordingly but the current Solvency II FS will not move. The yellow line representing 'FS assuming a CRP of 35%' does not include any caps or floors.

35. Chart 1 clearly shows that the current FS (purple line) only falls within the range implied by academic studies (aqua block) when spreads (orange line) are relatively low. Even then, it is towards the lower end of the range. This is expected due to the spread-invariant nature of the current FS design coupled with the lack of explicit allowance for uncertainty around future credit losses. This uncertainty is an element that is considered to be captured in the credit spread and so is reflected in the credit element of the spread decomposition in all the academic studies the PRA has referenced.

36. Given the EL element of the FS is only around 15-20bps on average, this chart also shows that if the uncertainty around expected loss (the CRP) is allowed for then it would be a material element of the FS. The PRA rationalises this by noting that whilst expected losses are generally small for investment-grade assets, the degree of potential downside variance is high due to: limited data available to measure expected loss; limited upside potential for bond investors; past evidence of poor credit experience being clustered (increasing the likelihood of extreme credit events) and the potential for downgrades to increase the uncertainty around losses.

37. Whilst the PRA recognises that there is no academic work in this area that is considered definitive, the academic studies the PRA has referenced suggest a CRP equal to 35% of the credit spread to be the lowest level of allowance for uncertainty around expected loss that is capable of strong justification. This is supported by the 'FS assuming a CRP of 35%' line in Chart 1 which sits at the bottom of the range implied by the academic studies (the aqua area). However, in saying this the PRA notes that a CRP of 35% is well below the CRP implied by some of the studies referenced with some authors[5] estimating the investment grade liquidity premium to be close to zero. These studies give rise to the top end of the aqua area on the chart which sits very close to the total credit spread. The view that the liquidity premium may be close to zero is also shared by some market commentators who have argued that long-term investment should not be automatically assumed to give rise to a liquidity premium.

38. However, the PRA is supportive of the conceptual arguments for the liquidity premium and does consider there to be evidence of a liquidity premium in the spread of assets exposed to credit risk (as discussed in paragraph 15). The PRA therefore

---

5 'A hybrid information approach to predict corporate credit risk', Bu, Kelly, Liao, Zhou. 'Corporate bond liquidity before and after the onset of the subprime crisis', Nielsen, Feldhutter, Lando.

views these papers as providing further evidence that aspects of the current MA calculation are likely to be under-calibrated rather than that no MA should exist at all. Focussing on papers that are more supportive of a liquidity premium, and placing more weight on those that provided the most granular results by rating and over time, namely van Loon 2017 and Webber 2007, the plausible upper end of a reasonable range for the CRP reduces from 100% to around 55% of the credit spread in the PRA's view.

39. Therefore, in summary the PRA considers the academic research referenced to support a reasonable range for the CRP to sit between 35% and 55% of the credit spread for corporate bond assets.

40. That said, some stakeholders have referred to other academic papers which in their view would have supported a significantly lower CRP calibration. A list of the papers that have been referenced to us at the time of writing is included in Annex B. The PRA has carefully considered these papers, and particularly the points made by stakeholders in which the papers have been referred as supporting evidence, however the PRA has decided not to use them directly to inform the calibration of the CRP because:

- Some papers do not use data that is relevant to the UK life insurance market For example, 'The Credit Spread Puzzle - Evidence from a Quasi-Natural Experiment'[6] suggests that credit risk accounts for only 17% of credit spreads for A rated bonds and 33% for BBB bonds. However, this study covers the narrow market of bonds issued by German savings banks and state banks, entities which are typically owned by local governments. The bonds therefore

[6] Claussen, C., Kriebel, J., Pfingsten, A., 2020, The Credit Spread Puzzle - Evidence from a Quasi-Natural Experiment, Proceedings of Paris December 2021 Finance Meeting EUROFIDAI – ESSEC, http://dx.doi.org/10.2139/ssrn.3646166

have a very different risk profile to the assets that UK insurers invest in within their MA portfolios.[7]

- Some papers focus on a comparison between default rates and credit spreads and therefore do not provide results which would inform the calibration of the CRP.[8].
- Others do not provide results that could be used to decompose spreads. For example, in some cases the analysis focuses on changes to spreads over time rather than the absolute level of spreads[9].

41. Nevertheless, these academic references have provided us with valuable qualitative insights. Whilst none of them refutes the fact that spreads provide genuine information about credit risk, some of them help support the argument that corporate bond markets can be subject to overreaction leading to short term volatility in spreads which are not reflective of credit fundamentals.[10] The PRA has also noted feedback from the QIS which highlighted the potential disadvantages of an approach to the FS which included a CRP component linked to current spot spreads. This has been factored this into the proposed FS design discussed below.

42. The PRA also considers the findings from this academic research can be used to form a basis for the CRP in respect of assets that are not corporate bonds including property-backed assets and infrastructure. Although a number of these assets

---

7 Another issue with this paper is the fact that the results imply a negative allowance for credit risk for AA rated bonds. The authors do not provide an explanation for this result.

8 See for example: Giesecke, K., Longstaff, F., Schaefer, S., Strebulaev, I., 2010, Corporate Bond Default Risk: A 150-Year Perspective, NBER Working Papers 15848, https://doi.org/10.1016/j.jfineco.2011.01.011

9 See for example: Friewald, N., Nagler, F., 2018, Over-the-Counter Market Frictions and Yield Spread Changes, Journal of Finance, http://dx.doi.org/10.2139/ssrn.3082955

10 See for example: Bordalo, P., Gennaioli, N., Sheifer, A., 2016, Diagnostic Expectations and Credit Cycles, NBER Working Papers 22266, http://dx.doi.org/10.1111/jofi.12586

benefit from potential risk mitigants such as collateral, this is counter balanced by the fact that they also face increased uncertainty in respect of the future performance, particularly as many of them include bespoke features that have not been tried and tested in a range of economic conditions. This is discussed in more detail below (Section (ii) paragraphs 56 to 68) and supports inclusion of all assets exposed to credit risk in the PRA's validation based on historic credit losses (paragraphs 44 to 51) as well as other analysis shown.

43. Separately from the academic literature referred to above, evidence from the credit default swap market also suggests that the cost of purchasing credit protection contains a sizable risk premium, which can vary from 1 to 10 times the size of expected loss.[11] For reference at YE20, a CRP of 35% of spreads equates to approximately 2 to 3 times the size of expected loss and this suggests that evidence from the CDS market is consistent with a CRP of this level or higher ie is consistent with the 35% to 55% range set out in paragraph 39.

Validation based on historical credit losses

44. Historic average returns data for assets exposed to credit risk can provide useful empirical evidence as to historic levels of the CRP. However, particular percentiles of the historic return distribution do not have a direct bearing on a risk premium estimate and so historical data cannot be used in this way to estimate the CRP element of the FS. Indeed, as discussed in paragraph 30 historical default data is backward-looking and so captures what actually happened rather than uncertainty around what could have happened. In particular, it ignores downgrades that increase credit risk on a forward looking basis but do not lead to increased defaults.

[11] See for example: Berndt, A., Rohan, D., Duffie, D., Darrell, J., Ferguson, M., 2017, Corporate Credit Risk Premia, Stanford University Graduate School of Business Research Paper No. 17-71, http://dx.doi.org/10.2139/ssrn.3077352

45. The purpose of any historical data comparison is therefore not to derive the CRP, but to assess the extent to which the credit losses sustained by a well-managed firm going through a credit crisis could be covered by the FS, for which the firm has made allowance in the valuation of its liabilities. As potential acquirers of the firm's liabilities would have to manage them over many decades, heavily relying on the accompanying assets transferred, it is reasonable to assume that they would want to understand the extent to which the book of business was able to withstand credit losses in a downturn. A high level of coverage would suggest to a potential acquirer that the liabilities had been valued in a reasonable manner ie that the FS is sufficient to enable a transfer of the business.

46. As discussed in paragraphs 70 and 71, when considering validation against historical credit losses, the PRA considers it important to take into account other external factors which might have affected the level of credit losses experienced in certain periods of heightened stress, for example extraordinary actions of governments and central banks. To ignore these factors would be to permit firms to assume that such support would necessarily be available in the future and that they could therefore reduce their liabilities in anticipation – a case of moral hazard.

47. Due to the limited history of credit markets and the dampening effects of public authority actions in more recent adverse periods (ie 2008/09 and 2020), the 1930s default and downgrade experience is the most useful reference point available. Although around 90 years ago, with differences in economic and financial environments compared to now, and with more limited data being available, it remains an important historic example of material adverse credit experience which is not distorted by significant government action[12]. A substantial level of coverage

[12] A possible challenge is that the experience observed in the 1930s is no longer relevant to today's market conditions, for example because the transition experience at the time was driven by a concentration of defaults in railroad companies, which is less relevant to exposures

against a 1930s scenario could help give comfort to an existing insurer and any potential acquirer as to the resilience of the book of business to adverse credit experience.

48. The PRA has estimated the annualised credit loss (in bps) that would have been incurred over the 10 year period from 1930 to 1939 assuming corporate bond transition and default experience and industry portfolio weights by CQS (based on YE20 asset data), excluding sovereigns and quasi-government assets. This covers both losses due to defaults and the cost of replacing downgraded assets over the period. This latter element was included to approximately allow for the increased losses from assets that downgrade but do not default, a component that the PRA would expect a well-managed acquirer of the book to consider. The PRA has then compared this estimated loss on an annualised basis to the FS on the same portfolio. Its estimates indicate that an FS calculated using a CRP of 35% to 55% of the credit spread gives a credible coverage of the 1930s experience that is not inconsistent with the PRA's expectation that a party taking on a book of business that benefits from an MA would seek a material level of resilience of the transferring book to potential credit events, including those seen historically.

49. That said, and related to points made in paragraph 44 above, the FS is expressly not designed to cover a particular percentile of credit loss. Rather, it is intended to be used in the construction of an appropriate risk-free rate for the market-based valuation of illiquid liabilities that are closely matched by MA-eligible assets. For that

today. While it is true that railroad companies were a key component of the defaults of the Great Depression, they arguably represented an industry whose interconnectedness was a large driver of market behaviour – not unlike financial firms in current market conditions and recent crashes. Commentators have also reasoned that the Great Depression bears more resemblance to recent crashes than at first suggested, for example O'Rourke, K.H. and Eichengreen, B. (2009) 'A tale of two depressions', *Chartered Accountants Journal of New Zealand*, 88(4), pp. 70–71.

reason, any test of this nature cannot be used to establish a specific calibration of the FS, but can only serve as a validation tool.

50. The PRA notes that firms may currently use validation against actual historical default events to assess the adequacy of their SCR calibrations for credit risk and has noted the benefits of such validation in its internal model review work. The SCR is discussed in more detail in paragraphs 101 to 104. However, an important point to make here is that the PRA is concerned that certain aspects of the FS design may lead to an MA benefit that exceeds the level at which the business could be transferred to a third party. Achievement of an adequate transfer value is the role of the base balance sheet, whereas the SCR is intended to cover the impact of a 1-in-200-year stress on capital resources. The risk margin does not include credit and market risks as compensation for uncertainty arising from those risks is considered to be already adequately reflected in the Best Estimate Liabilities (BEL). Nevertheless, at present the risk of the transfer value being inadequate is mitigated to some extent by the strength of the risk margin which can compensate for an excessive MA. However, if the risk margin calibration is reduced then the weaknesses in aspects of the FS design will become more exposed. This ability to transfer the business after one year provides a critical 'bridge' between the 1 year VaR methodology used in the solvency capital framework and the long-term risk profile of insurance business.

51. Therefore whilst the methodology and calibration used to determine the SCR should be revisited if any change is made to the FS design, the base FS and the FS assumed in stress must be considered in terms of whether they are each meeting their own objectives[13]. Put another way, a stronger SCR is not necessarily a good or

[13] Relying on a stronger SCR to make up for deficiencies in the FS is also inadvisable because SCR capital reflects diversification between all risks. As a result, the resources actually held by

appropriate mitigant for a weak balance sheet – the two elements each serve a different purpose and should not be considered to be automatically interchangeable.

Impact of CRP calibration of level of FS

52. The level of the FS – and therefore the size of the MA – does not change the overall amount of profit insurers will earn over the duration of their investments – this will depend on how well the investments perform in practice. Instead, the MA affects how quickly these profits are recognised as capital resources in the prudential regime ie it governs how much future investment profit an insurer can recognise upfront in its Solvency II balance sheet. The current MA regime does this by calculating the level of FS (in bps) that should be deducted from the asset spread. However, the premise that all spread can be earned risk-free unless proved otherwise is potentially imprudent, particularly where firms are investing in a wider range of bespoke assets subject to idiosyncratic risks and internal restructuring. Put another way, the size of MA being claimed needs to be justified as appropriate and not just viewed as an automatic output of a calculation process.

53. It is clearly the case that the larger the MA on any given portfolio of assets the greater the risk that sufficient future investment returns equal to the size of the MA are not achieved which would lead to losses that would need to be recognised in the future. Although the MA eligibility criteria act as a key prudential safeguard against some of the key risks which the MA introduces to the balance sheet, there remains a risk that the MA may not materialise, including due to adverse credit experience and/or through losses being incurred on the forced sale of assets or collateral eg following defaults, downgrades, changes in longevity assumptions, margin calls, pre-payments and exercise of call options. This would put pressure on insurers' balance

firms in respect of credit risk can be materially less than the headline amount of standalone credit risk SCR.

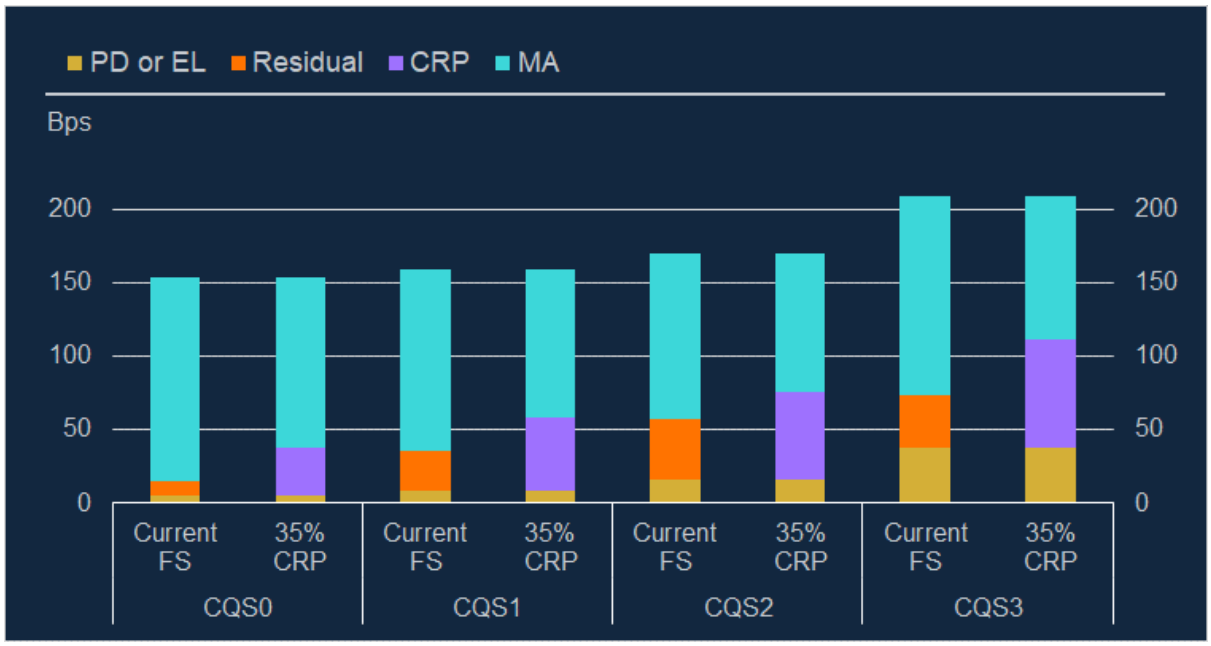
sheets and – in more extreme cases – potentially lead to insurers being unable to meet all of their liabilities as they fall due.

54. The PRA has framed its view of the CRP calibration as a percentage of the asset spread, rather than as an absolute level of bps or similar in its own right. The attractiveness of a percentage of spread approach is three-fold:

- It varies naturally between assets/asset classes and over time without the need for regular – potentially material – recalibrations.
- It is a very simple expression that is relatively easy to implement and communicate but can still produce outputs that are very granular in terms of bps or £ amounts by asset.
- It allows studies that have been completed at different dates or which have referenced different data to inform the PRA's view – percentage of spread is a more uniform currency.

55. The PRA has analysed the level of MA benefit provided by the current Solvency II approach at YE20 and has compared this to applying an FS based on a 35% CRP at the same date (Chart 2). Chart 2 differs from Chart 1 as it is based on firms' actual asset holdings for each CQS and also includes the impact of caps and floors (as appropriate). It shows that although – for investment grade assets – the FS based on a 35% CRP gives a lower MA, the MA is still a very material benefit in all cases. For instance, assuming a 35% CRP, the MA is 57% of credit spreads across all assets in MA portfolios.

Chart 2: Comparison of current MA versus MA that would have been obtained using a CRP based on 35% of spreads as at YE20



Source: MA Asset & Liability Data submissions by firms as at YE20 and PRA analysis. Assets classified as 'UK government', 'non-UK government', 'quasi government' and 'other' have been excluded. The residual component under the current FS design refers to the combined impact of the Cost of Downgrade (CoD), LTAS floor and the cap on the MA for sub-investment grade assets. Please note that PRA calculations have been used for both the current Solvency II FS and 35% CRP designs to ensure consistency. The figures in this chart are post transition to SONIA[14].

(ii) Risk sensitivity of the FS to differences across asset classes

56. The PRA's second key concern with the current MA construct is the lack of risk sensitivity of the FS to differences across asset classes.

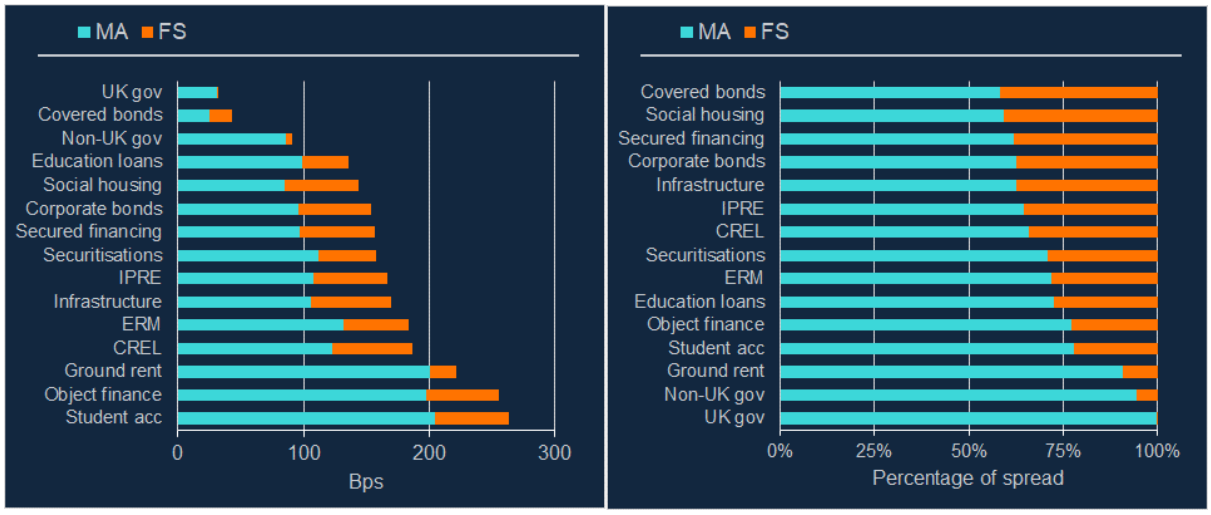
57. Since the start of the Solvency II regime in 2016, the PRA has observed a growing trend of insurers investing their MA portfolios in an increasingly diverse

14 Whereas figures for all other charts in this paper are before transition to SONIA.

range of assets (c.45% of assets were invested in assets other than corporate or UK government debt as at YE20, compared with c.15% whilst Solvency II was being negotiated at YE14).

58. This shows that the existing Solvency II MA framework has already allowed firms to invest in a wide range of assets, including high-yielding and illiquid assets such as property-backed investments. If the Solvency II reform package also includes a widening of the asset eligibility criteria then this trend is likely to continue. For these more idiosyncratic assets, there is an increased risk that the MA calibration, which is based on historical financial and non-financial corporate bond data, does not appropriately capture the inherent credit risk. It is certainly the case that the MA-efficiency (level of MA generated for a given rating) of different asset classes varies markedly (Chart 3 as at YE20) and this raises questions as to whether these differences in MA benefit – expressed as both bps and percentage of spread – are in line with the risk/reward profile of such assets.

Chart 3: Comparison of MA and FS for different asset classes as at YE20



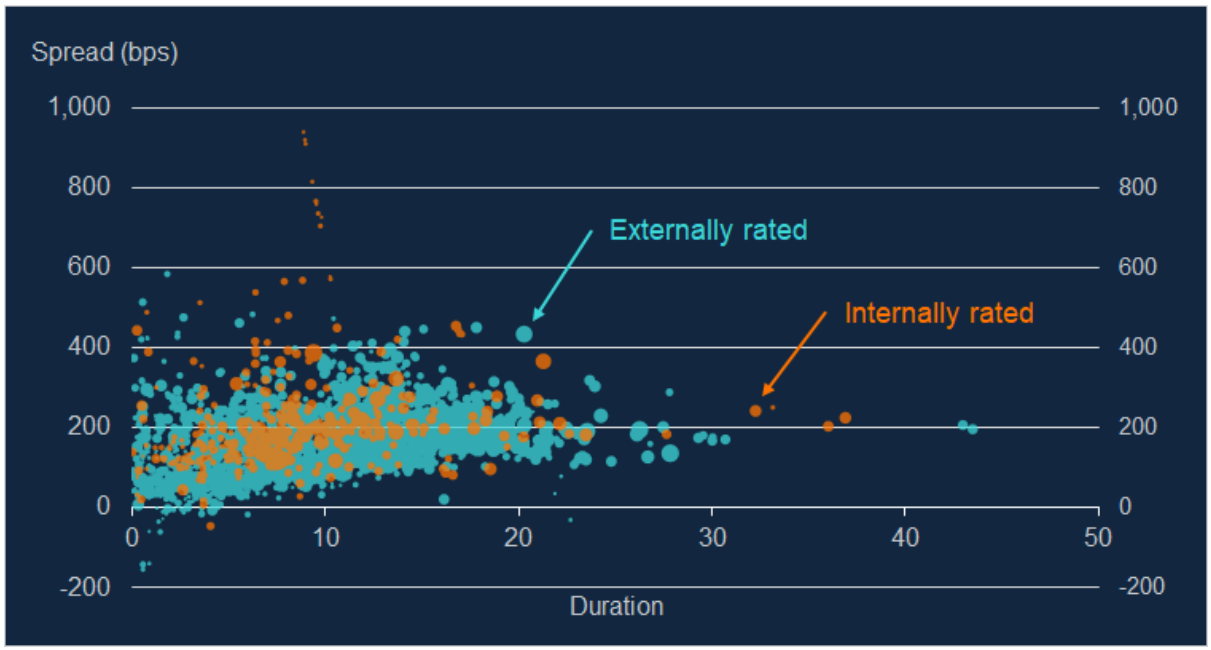
Source: MA Asset & Liability Data submissions by firms as at YE20. The chart on the left is ranked by spread in bps (lowest to highest); the chart on the right is ranked by MA as a percentage (%) of

spread (lowest to highest). Assets classified as ‘quasi government’ and ‘other’ have been excluded as these contain derivative exposures which distort the comparison. Asset classes – agricultural mortgages and sale and leaseback - where firms have reported limited holdings are also excluded.

59. Further analysis of asset data at YE20 reveals features of insurers’ asset portfolios that support concerns as to the adequacy of the existing MA framework for the full range of assets held by insurers.

60. For example, Chart 4 - covering CQS 3 non-financial assets (ie assets that firms have classified as CQS3 and with a sector allocation of non-financial for the purposes of calculating the MA) - shows that there is a very large dispersion of spreads across assets held by firms in this rating bucket. At YE20 the spread on the BBB 10-15 year non-financial iBoxx index was c.120 bps. However, 73% of insurers’ CQS3 non-financial assets by market value (64% by number) had spreads in excess of this level. This is perhaps unsurprising given the incentive under the current MA framework for firms to seek out high-spread assets within a given rating category.

Chart 4: Spreads by duration (years) for internally and externally rated CQS3 non-financial assets



Source: MA Asset & Liability Data submissions by firms as at YE20. Assets classified as 'UK government', 'non-UK government', 'quasi government' and 'other' have been excluded. The size of each dot represents the sum of the market value and the MA on the asset in question.

61. Some stakeholders have argued that the large spreads observed are compensation for the high illiquidity associated with such bespoke exposures. It may be the case that some bespoke exposures include a greater liquidity premium (although this is not always the case given the highly competitive nature of some investments). However it is not clear that all of the additional spread observed in such assets should be recognised upfront as MA benefit.

62. Furthermore, if a firm were to be required to transfer such assets to another party then there is a significant question as to whether such assets would be accepted on their current valuation, if at all – regardless of the currently large MA available. The PRA has observed instances where firms have not been willing to take on certain

existing asset holdings either at all or without a very material delay in order to conduct the necessary due diligence, and this risk is likely to increase the more bespoke and specialised the exposure. Therefore, recognising upfront all of the additional spread from such assets would run counter to a transfer value regime under Solvency II.

63. Whilst features such as collateralisation can be effective in mitigating risk, if the collateral is highly illiquid then the lag in converting the collateral to a more liquid form can lead to a gap in asset cash flows received by the MA portfolio. This increases the risk of the firm being unable to meet liability cash flows as they fall due. It also gives rise to potential shortfalls / reinvestment risk when the collateral is eventually liquidated, given the work-out costs involved as well as the concentration of the backing collateral across different loans. As the MA is justified on the ability to match liability outflows with asset inflows, any material delay in realising the value of collateral diminishes the certainty that can be attributed to the resulting MA. Put another way, relying fully on collateral to justify a lower FS and consequently larger MA may not be appropriate as there could be some circumstances where illiquid collateral assets must be sold with resulting exposure to market risk and potentially material transaction costs, so reducing the effectiveness of the collateral in practice.

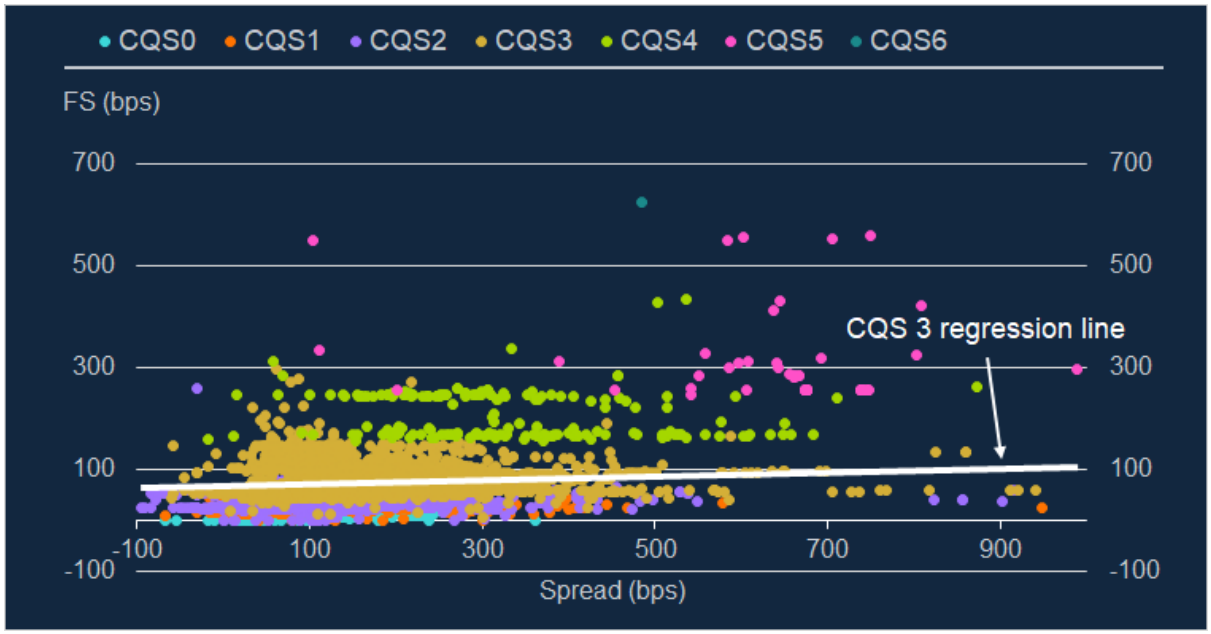
64. Assets which cannot be classed as either corporate or government debt do not form homogeneous asset classes, with asset class allocations often telling us relatively little about the nature and risk profile of individual loans. It is also the case that many transactions are private loan agreements which limits the amount of publicly available data on which to base risk calibrations. Producing granular FS calibrations for the wide range of loans held by firms is therefore not practicable.

65. The current PRA view is that private lending therefore presents additional challenges for firms in terms of both asset valuation and the identification and

monitoring of risks. A number of such loans can also rely on illiquid collateral which is not MA eligible. As explained above, these factors are more likely to increase the uncertainty of expected loss, rather than reduce it, all other things being equal. Whilst the PRA welcomes moves firms have made to develop and maintain specific expertise in these areas, the often relatively high spreads on these assets are likely to reflect this uncertainty and the MA framework needs to ensure this is adequately captured.

66. The current FS is agnostic to these points and shows limited variation (in bps) across investment grade exposures (Chart 5 which shows the position for all CQS levels and focusses on CQS 3 assets as a case study). The relatively tight range of FS (in bps) is noticeably different to the variation observed in the credit spread itself where the range is materially wider, suggesting that there could be quite different risk profiles present in a given rating class. The low gradient of the linear regression shown for CQS 3 assets (white line that is indicated on the chart) further emphasises this disconnect between the FS and the spread.

Chart 5: Relationship between spread and FS (bps)



Source: MA Asset & Liability Data submissions by firms as at YE20 and PRA analysis. Assets classified as 'UK government', 'non-UK government', 'quasi government' and 'other' have been excluded.

67. The PRA also finds that in a small but not negligible number of cases, just under 1% by market value, the MA benefit (in £) exceeds the market value of the asset, so more than doubling the extent to which the asset contributes to the regulatory balance sheet. This tends to happen (as one would expect) for longer duration assets, and particularly those with high spreads. This raises the potential concern that the MA may be inappropriately generous at longer durations and could incentivise risk taking far into the future that is higher than justified given the associated risks.

68. Therefore, whilst the PRA considers the conclusions drawn on the level of the FS to be a useful starting point for non-corporate bond assets (paragraph 42), it considers the points raised in this section to necessitate careful consideration of whether any further adjustments are needed to reflect idiosyncratic risks in respect of

such assets. This is particularly important to avoid a situation, in which any measures to dampen volatility in the FS as a whole may inadvertently lead to differences between assets not being appropriately recognised.

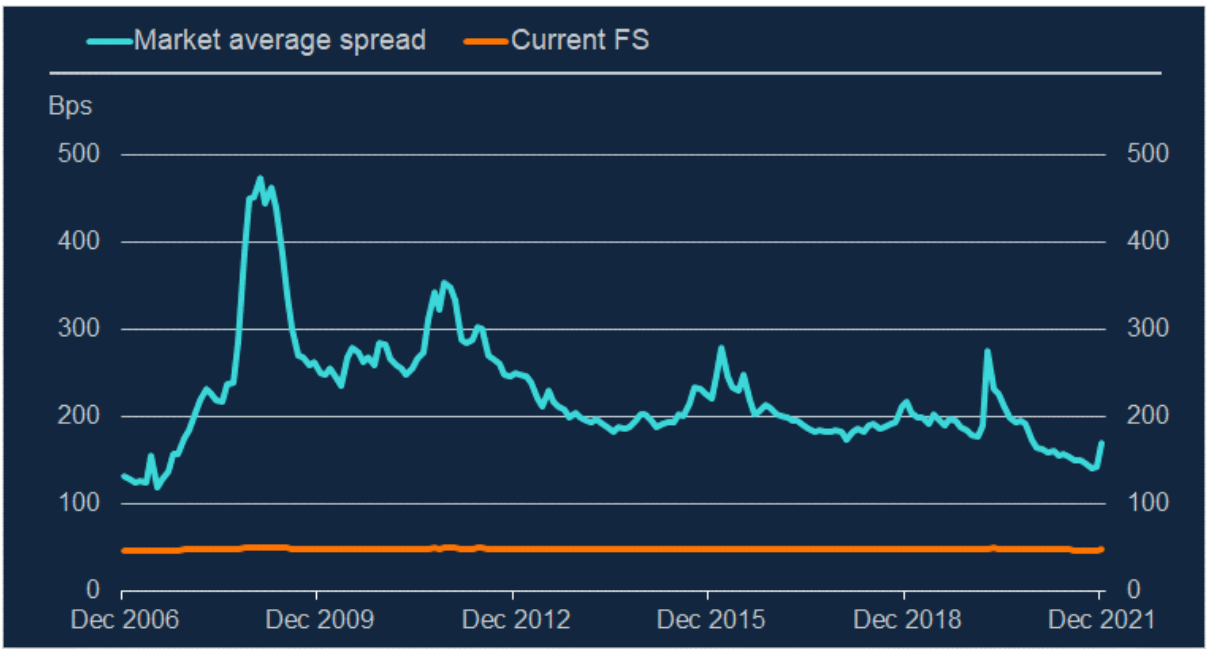
(iii) Risk sensitivity of the FS to structural shifts in credit conditions over time

69. Turning now to the PRA's third key concern with the current MA construct, the lack of risk sensitivity to structural shifts in credit conditions over time.

70. The PRA considers that ratings downgrades and widening credit spreads are both potential indicators of changes in the level of, and uncertainty around, future credit losses. However, the virtually horizontal line in Chart 6 shows that the FS, as currently formulated, is highly risk insensitive to any change in credit spreads over time including during both the financial crisis of 2008/09 and the recent COVID-19 pandemic. Whilst it can be argued that these are both examples of spreads moving in response to increased illiquidity in the credit markets, in both cases there were also very material interventions by public authorities that dampened adverse credit experience.

71. It is therefore important to note that any analysis of historical experience benefits from hindsight. When spreads first increased both in 2008/09 and March 2020, there was materially less clarity as to what the ultimate credit experience would look like. However, the current FS makes a strong assumption that, in the absence of downgrades and defaults, none of this change is indicative of the potential commencement of a shift in credit conditions. This means that the regulatory regime does not reflect the most up-to-date view (through spreads) of the risk landscape.

Chart 6: Comparison of the market average credit spread and the current Solvency II FS over time



Source: ICE BofA Merrill Lynch data from Refinitiv Eikon, MA Asset & Liability Data submissions by firms as at YE20, EIOPA and PRA analysis. The x-axis has a monthly time frequency.

72. Indeed, an FS that discards potentially valuable risk signals in respect of the future credit risk faced by firms effectively assumes (ie takes the optimistic view) that either low default experience and credit risk premia of the immediate past will continue into the future and/or any future credit market deterioration can and will be mitigated by the actions of public authorities. To rely upon such assumptions in a core aspect of the prudential regulatory regime for insurers is not prudent, particularly given the length of time over which the associated liabilities extend, and presents a risk to policyholder protection and the safety and soundness of both individual firms and the sector as a whole. It is therefore the PRA's current view that the reliance on CQS as the key risk indicator in the existing MA design needs to be reconsidered so as to ensure that important risk signals regarding potential structural changes in credit conditions are not being missed. Incorporating credit spreads to

some degree into the CRP can better ensure that such risk signals are captured and that the FS adjusts in a timely manner to reflect them.

73. That said, the PRA is cognisant of the trade-offs associated with increasing the risk sensitivity on the FS calculation given this would lead to firms' balance sheets adjusting more rapidly than under the current regime, where the MA almost fully absorbs any changes in asset prices arising purely from movements in credit spreads. The PRA also recognises that movements in asset spreads can include noise as well as risk signal. The precise decomposition of the spread is difficult to determine in benign times and can become particularly unreliable in stress situations. In order to minimise undue volatility and filter out noise as much as possible it is arguably better to not focus on current spot spreads directly but instead look at averages and idiosyncratic spread differences between asset holdings. The paragraphs below discuss ways in which the FS can be adjusted to be a better reflection of signals of structural change in credit risk – by introducing the credit spread as a further risk indicator - without being unduly volatile.

Proposed FS / MA design and implementation considerations

74. Based on the concerns and supporting evidence discussed above, the PRA considers that:

- The FS should increase from its current level in order to reflect uncertainty in respect of expected future default losses.
- The FS should capture 'basis risk' reflecting that there are differences in risk between assets of the same rating, and that this can in part be informed by the size of the spread on assets.

- The FS should be more sensitive to structural changes in credit conditions, but should not introduce excessive volatility onto the balance sheet.

75. Finding a design that achieves these objectives can be challenging and consideration needs to be given to aspects that go beyond £ impacts on the regulatory balance sheet. In particular, investment behaviour incentives as well as any business model implications will need to be considered.

76. Whilst the PRA remains of the view that credit spreads contain useful information as to future risk signals, responses received to both the QIS and the accompanying Qualitative Questionnaire have highlighted the disadvantages of excessive volatility being introduced onto the balance sheet. This feedback has been taken into account in formulating an MA design with properties that are intended to dampen volatility significantly (compared to the QIS parameters) while still making use of the information inherent in credit spreads.

77. The QIS analysis also showed that an additional adjustment tested for Valuation Uncertainty (VU) – that was intended to address potential incentives to overvalue assets if the FS was dependent on the asset spread – had been applied by firms to a larger number of assets than the PRA had anticipated. This had the impact of increasing the FS for assets where the PRA had not intended such an increase to be applied. The PRA has reflected on this, as well as comments received on the VU more generally in QIS responses, and in particular notes that the implementation of the VU as tested adds complexity to the FS design and has the potential to dis-incentivise investment in high-quality illiquid assets.

78. In summary, the PRA currently does not consider that an explicit VU adjustment is needed in the FS design. In general, a simpler FS design that is better aligned to

the core risks retained by firms is preferable. At this stage the PRA has therefore focussed on refining the CRP component compared to that tested in the QIS.

79. The PRA considers the CRP should be primarily based on through the cycle features such as averages, and caps and floors. These are somewhat different from the QIS formulation, where both QIS A and QIS B scenarios contained a CRP component that responded immediately to information in current asset spread movements. A CRP based on average spreads over a reasonable averaging period would avoid firms taking unnecessary actions that are not in response to a genuine sustained change in risk exposure, while still ensuring that the level of retained risk is reflected appropriately. Temporary spikes in credit spreads may reflect a market over-reaction, or a response to risks to which insurers are not exposed, and a stabilising mechanism is desirable to prevent inappropriate and excessive volatility being introduced to insurers' balance sheets. However, where changes in spread levels persist over time, this is a stronger indication that the level of retained risk has changed, and the use of average spreads would allow such structural changes in risk to be reflected appropriately on insurers' balance sheets.

80. An approach to setting the CRP which seeks to reflect structural changes to credit risk but avoid shorter-term volatility naturally involves some trade-offs. As explained, the PRA currently considers that, as a minimum, any CRP should be calibrated to deliver an outcome through the cycle equivalent to 35% of credit spreads. Consequently, in seeking to achieve this minimum through the cycle there may be times during the cycle when the CRP design implies a calibration which is more or less than 35% of spreads. Such stabilising mechanisms should allow firms to make appropriate risk management decisions during times of temporary turbulence and are similar to how the previous UK regulatory regime – the Pillar Two Individual Capital Adequacy Standards (ICAS) – operated. It is also reflective of the

PRA's view that when credit spreads are unusually high or low then the extent to which they contain useful information on future risk signals becomes more limited.

81. Overall, the PRA considers that expressing the CRP as a percentage of spreads, averaged over a suitable period and subject to appropriate caps and floors, could be the most effective way of reflecting the recent and prevailing credit conditions for each specific asset class. In contrast, an alternative approach based on applying, for example, a fixed CRP in basis points (or £) would be less risk sensitive, and may need to be calibrated at a higher level, or be materially recalibrated more frequently, to ensure that it remained appropriate, and in particular did not understate credit risk during periods of adverse credit experience.

Potential formulations of the CRP – the 'index-spread' approach

82. As discussed in the HMT consultation document, the Government and the PRA are considering the merits of an FS methodology that incorporates market measures of credit risk. Under such a design, the FS would be the sum of allowances for:

- the expected loss (EL), determined by the historic profile of defaults and recovery rates associated with assets of a certain credit rating; and
- a credit risk premium (CRP) based on market measures of the asset spread (replacing the cost of downgrade, long-term average spread floor, and sub-investment grade cap components in the current methodology).

83. One way in which the CRP could be designed to address the PRA's concerns with the current FS, while avoiding undue volatility, is by defining the CRP in the following way:

CRP = X * (average spread of reference index over n-years)
+ Z * (difference between spread of asset and that of a reference index),

where the same reference index[15] would be used in X and Z. The PRA refers to this as the 'index-spread' approach.

84. The parameters X, Z, and n should be calibrated to result in a fundamental spread that appropriately reflects an asset's credit risk, including the risks associated with the rise in holdings of assets other than corporate bonds, while avoiding undue volatility on life insurers' balance sheets. In terms of an overall outcome, the PRA considers that the parameters chosen for X and Z could be used to achieve an allowance equivalent to a minimum of 35% of spread, through the cycle.

85. More specifically:

- The X term is intended to primarily address the concern that the level of the current FS is too low as it does not take account of uncertainty around future expected default losses.
- The Z term is intended to primarily address the concern that the current regime overly incentivises investment in assets with high spreads for a given rating. It does this by applying a higher FS (in bps) to these assets but at the same time recognises there are other assets for which the reverse is true (ie they have lower spreads than average).
- Overall the X term is intended to respond if there is a structural shift in credit conditions and the Z term is intended to remain stable unless the idiosyncratic risks on a specific asset move differently to an appropriate reference index.

15 Note that the terms 'reference index' (used above) and 'comparator index' (used in the HMT consultation document) are equivalent.

This 'index-spread' approach should therefore avoid the introduction of undue volatility to the Solvency II balance sheet.

Considerations for 'X'

86. The first term of the CRP, X * (average spread of reference index over n-years), is similar to one of the QIS components, where a percentage was applied to the 5-year average spread of a corporate bond index of the same sector and CQS as an individual asset[16].

87. This term of the CRP would be subject to an appropriate floor, similar to that applying to the current FS, and cap. The cap and floor would act to constrain this term within reasonable bounds during times of very high or very low general spread levels.

88. X is envisaged to represent the level of CRP based on the PRA view (ie at least 35%), although the actual level of X could be slightly different to achieve this outcome depending on the choice of Z. Two points in the definition are being considered: firstly, related to the reference index and secondly, related to the averaging window (see section below).

Considerations for the choice of reference index

89. The PRA envisages that the same reference index would be used for both the X and Z terms. This is to ensure the calibration is internally consistent.

16 The QIS made the simplifying assumption that the 5-year average spread was the same for all currencies.

90. However, the PRA is open to views on suitable reference indices. These could be corporate bond indices, as currently used in the FS calculation, or alternatives based on other underlying assets. Where alternatives are suggested, the PRA would like to understand better the advantages and disadvantages.

91. For example, using the current corporate bond indices as reference indices has the advantage of simplicity and clarity, given that they already underlie the FS calibration; there is also a suitably long dataset from which to form the required moving averages. However, the PRA would consider views where firms are able to provide arguments and evidence that other suitable reference indices would be more appropriate.

Considerations for the averaging period, 'n'

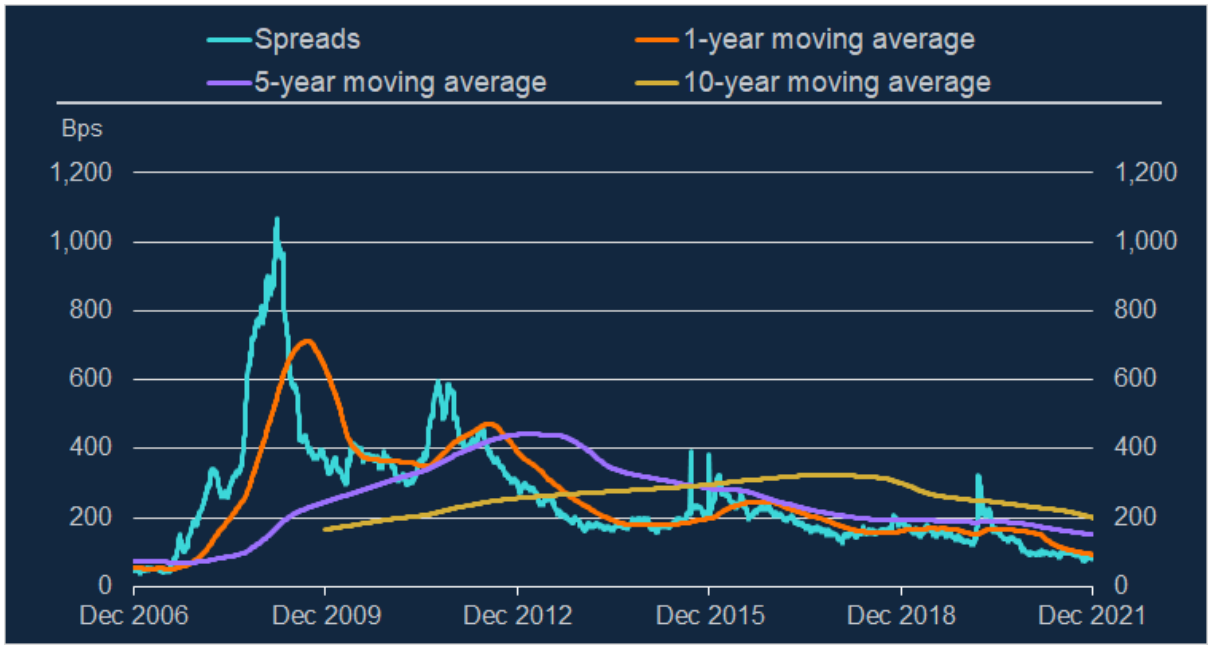
92. The choice of the averaging period for the 'X' component, 'n', should reflect the desired level of risk sensitivity in the FS, with a balance needing to be struck between filtering out the noise from day-to-day spread movements and capturing genuine credit risk signals that are inherent in the prevailing and recent historical spreads.

93. The PRA considers that a 5-year averaging period could be a reasonable basis for setting the CRP, as it would be sufficiently responsive to any sustained change in the level of spreads, without over-reacting to short-term changes.

94. A shorter averaging period (eg 1 year) is possible but is more prone to pick up 'noise' rather than 'signal' and could result in excessive balance sheet volatility. A longer averaging period (eg 10 years) could result in a CRP / FS that is too slow to respond to spread signals as they start to emerge so resulting in a CRP/FS that is not reflective of prevailing market conditions until much later. A longer term average

also retains information from past credit events for longer than they are likely to be relevant risk indicators. See Chart 7 below which illustrates this point where the 10 year average spread exceeds the 5 year average spread materially during 2018.

Chart 7: Comparison of actual spreads on A-rated financial bonds to different moving averages of the spread over time

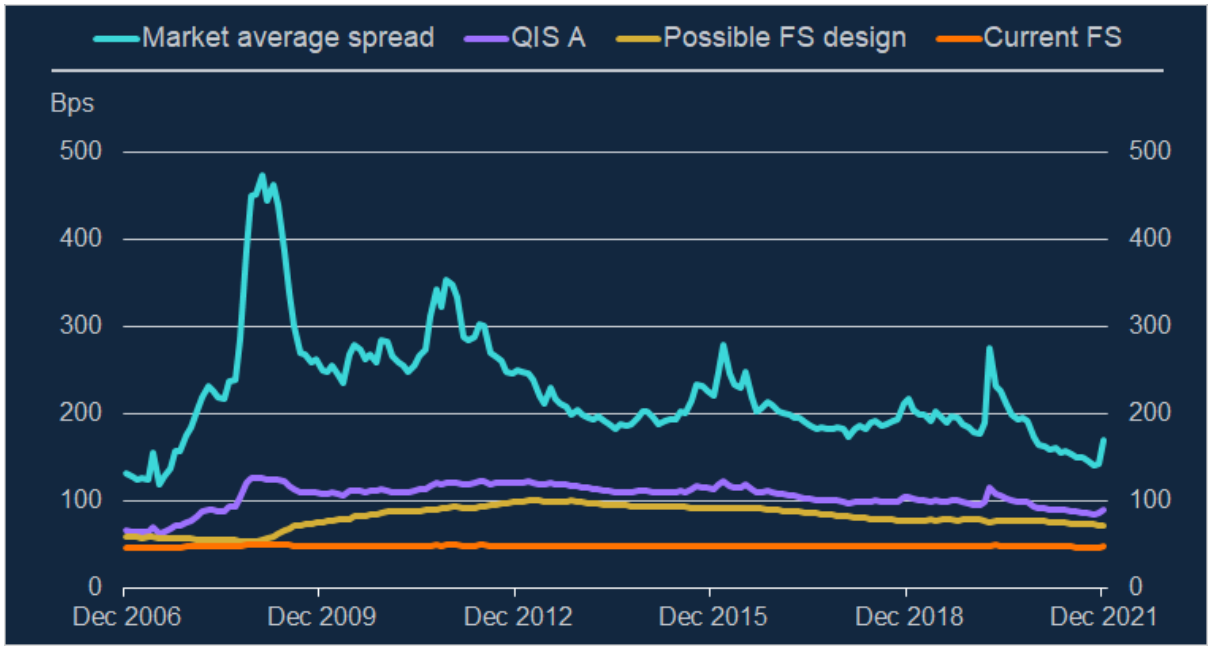


Source: IHS Markit data from Refinitiv Eikon and PRA analysis. The x-axis has a daily time frequency.

95. Chart 8 illustrates how FS calibrations based on a possible 'index-spread' formulation and a 5-year averaging period compare against the 'hybrid' FS that was tested under the QIS A scenario, as well as the existing Solvency II FS. It can be seen that the proposed formulation is significantly less volatile than the FS that was tested in the QIS A scenario but does adjust over time to reflect new information coming through from changing credit spreads. It is however based on a reference corporate bond index as well as the assumption that the Z element of the CRP is stable over time – the PRA would welcome input from the industry as to what extent this latter assumption is reasonable in practice. Chart 8 also assumes the average is

updated monthly in line with the current frequency at which the Solvency II Technical Information is published – the PRA would welcome input from the industry as to whether a monthly update of averages used in this formulation of the FS would present any practical difficulties.

Chart 8: Comparison of the volatility of different possible FS designs over time



Source: ICE BofA Merrill Lynch data from Refinitiv Eikon, MA Asset & Liability Data submissions by firms as at YE20, EIOPA and PRA analysis. The x-axis has a monthly time frequency but the average used to calculate the CRP (for 'QIS A' and 'Possible FS design') has been calculated using daily spread data.

Considerations for 'Z'

96. The second term of the CRP, Z * (difference between spread of asset and that of a reference index), is designed to address the basis risk between assets and the index, or the idiosyncratic risk where the individual credit spread is very different from the reference index, indicating additional risk. The difference could be positive or negative; for example, the differences would largely cancel out for an investor in the constituents of the reference index.

97. By focusing on the excess spread, this component filters out the general level of market spreads and focuses only on the idiosyncratic component of the spreads. This is expected to materially reduce the resulting balance sheet volatility that would arise from a direct link to prevailing asset spreads. As the difference could be positive or negative, at a portfolio level this component will only result in an addition to the FS where there is a systematic difference with respect to the calibration set, ie to the extent that the assets in the MA portfolio differ from those used to calibrate the FS.

98. For example, if the financial A-rated corporate bond index has a spread today of 100bps over a risk-free bond of a suitable term, and a particular financial asset has a spread of 125bps over the same risk-free equivalent, then Z would apply to the 25bps excess spread over this index, ie Z x (125bps-100bps).

Concluding remarks on the index-spread approach

99. In summary, the advantages of this 'index-spread' approach are that it:

- dampens the undue market spread volatility arising from the index (through the averaging of the index component over time rather than using index spot spreads);
- addresses the basis risk in the current FS design by basing the calibration on prices of assets held by firms in their MAPs, rather than solely on corporate bond indices which may not be directly relevant; and
- limits balance sheet volatility arising from the Z component to that arising from the portfolio-wide idiosyncratic differences between assets held and the reference index.

100. Where some industry participants have suggested the need for greater granularity in the calibration, for example by considering notches of ratings such as

BBB+ and BBB-,[17] the Z parameter would automatically pick up basis risk arising from concentrations in particular notches within a credit rating. While more granular tables could still be incorporated in the solution, they may not be necessary to address the points raised.

The SCR

101. The SCR is intended to represent the 99.5th percentile change in Basic Own Funds over the next year. For internal model firms there is a further requirement that the SCR allows for all quantifiable risks. The MA affects the SCR calculation in two key ways:

- it reduces the impact of any spread widening assumed in stress, as part of that spread widening is attributed to an increase in liquidity risk; and
- it drives the overall SCR in £ as the discount rate used in each scenario reflects an MA.

102. As mentioned above, the PRA considers that a key premise of Solvency II is the concept of going concern and transfer value, where an entity should be able to withstand a 1-in-200 event and still have enough assets for its portfolio of liabilities to be transferred to a third party. In line with measuring the strength of the base FS, the PRA still considers that the 1930s credit default experience can be a useful historic reference point when assessing the appropriateness of any SCR calibration for the FS in stress.

103. The PRA also recognises that if the design and calibration of the FS were to change then this would have implications for how firms reflected any such changes

[17] See paragraphs 106 to 109 for further discussion on the topic of notched ratings more generally.

in their SCR methodology and calibration to ensure its ongoing appropriateness. Firms would need time to consider the implications for their internal models and any changes required to approved internal models would need to follow the appropriate process.

104. The PRA intends to collect further information from firms on implications of any changes to the FS design and calibration for the SCR later this year. However, it is not the PRA's current expectation that such changes would necessarily lead to a material change in the level of SCR capital held by firms.

Other possible changes suggested to the FS design

105. As part of its engagement with firms through the QIS, the PRA has considered proposals for reforming the FS which have been put forward by some industry stakeholders. Three main themes have emerged from these suggestions:

- increasing the granularity of the FS based on rating modifiers (or 'notches');
- introducing a rating uncertainty allowance; and
- placing more reliance on the Pillar 2 part of the Solvency II framework.

Use of rating modifiers ('notches')

106. Some stakeholders suggested that the current FS could be made more granular, in order to address the issue of the potentially large differences in the level of risk across assets of the same currency/sector/term/CQS. This increased granularity would involve the use of rating modifiers (or 'notches') that split a CQS into more granular rating categories. For example, CQS 3 could be split into three buckets: BBB+, BBB and BBB-.

107. If such an approach were adopted then there would be a material increase in the number of FS tables that are published on a monthly basis. However, it is not clear to us at this stage that the impact on the FS would be sufficiently material – in either direction – to justify the operational impact of such a change.

108. More importantly, whilst this proposal relates primarily to two of the PRA's concerns regarding the current FS (risk sensitivity of the FS to different assets and level of FS), the PRA considers that it does not go far enough in its suggested mitigation. In particular, ratings notches only focus on a more granular calibration for expected losses and do not explicitly allow for uncertainty around that. The continued focus of the FS on the rating of an asset alone also discards the potentially important and most up-to-date risk signals that could be contained in an asset's credit spread. Expanding on this, even where a rating was both 'accurate' (to the level of notches) and 'correct' (ie there is full agreement on the rating across different ECAIs), there is no guarantee that the FS itself is appropriate to all assets of that given rating.

109. That said, the PRA has sought to take into account the important points made about granularity of the FS in its updated 'index-spread' design for the CRP, and is exploring how more granular indices could be used to calibrate both the X and Z terms within this design. The PRA would therefore welcome any thoughts on these proposals and also suggestions of the extent to which granularity would be workable in this regard.

A rating uncertainty allowance

110. Some firms have explicitly acknowledged that the robustness of credit ratings can vary depending on the source of the rating (in particular the extent to which ECAI validation exists for the rating in question) and/or the information available in

order to derive the rating. It is argued that such uncertainty can lead to questions as to whether the ‘correct’ FS mapping has been applied to the underlying asset.

111. The possibility of applying a temporary adjustment to the FS has also been suggested if an asset is put on negative ratings watch or if there are movements in an asset’s idiosyncratic risk profile.

112. The PRA agrees that these points – which can collectively be referred to as ‘ratings uncertainty’ – can contribute to increased uncertainty regarding future credit experience. However, the PRA considers this to be only one source of such uncertainty and there are a number of other factors at play which are not incorporated if only uncertainty around rating is considered. Sources of uncertainty other than due to rating are discussed in paragraph 26.

113. On top of this, the PRA notes that the academic studies both it and other stakeholders have referenced do not attempt a granular breakdown of the credit risk element of the credit spread. This is due to spread decomposition not being observable and increasingly granular decompositions of spread therefore being at material risk of spuriousness. An approach that therefore attempts to quantify very specific elements of uncertainty around future expected loss experience is therefore at risk of giving false comfort and lacking a sufficiently sound calibration basis.

114. As a final point, applying an automatic FS increase if firms use internal ratings methodologies or have limited ECAI validation potentially dis-incentivises firms to continue to improve their internal ratings processes and to be open as to the limitations of existing processes.

115. All of the above said, the PRA is in agreement that ratings uncertainty is a valid issue and that there is also the possibility for an asset of a given rating to be impacted by idiosyncratic risks that impact on its likely future credit experience.

However, the PRA's preference is to incorporate this into an FS design that includes an allowance for uncertainty across all assets and then adjusts that to fit most closely with the specific risk profile of each individual asset holding. This is what the 'index-spread' approach set out in paragraphs 82 to 100 is seeking to achieve and the PRA would welcome any comments on this approach.

Greater reliance on firms' own view of risk and solvency assessment

116. Industry stakeholders have also made the comment that more reliance should be placed on firms' own views of risk within the Solvency II Pillar 2 framework, where risk management systems are already in place to pick up various credit risk signals that go beyond the credit rating.

117. The PRA acknowledges that Pillar 2 has an important role to play within the Solvency II regime. However, it does not consider that strong risk management and control processes fully mitigate the risks associated with a Pillar 1 regulatory capital position that is not appropriately reflective of the risks to which firms are exposed. This is particularly important given that key decisions on business strategy, distributions of profits and investment are often heavily based on Pillar 1 metrics. The Pillar 1 balance sheet is also what external users see, and place reliance on, regarding the financial resilience of a firm, of which the MA is often a very material part.

118. While it is true that it is in firms' long-term interests to have adequate risk management that accurately identifies credit risks, firms are also subject to competing incentives and pressures from different stakeholders and over different time horizons. It is therefore unwise for the regulatory framework to place reliance on the successful operation of Pillar 2 measures across firms to address material

deficiencies in the Pillar 1 requirements. In particular, the MA calibration is subject to a ‘winners’ curse’ whereby those firms that have a more optimistic view of future credit outcomes are best placed to win business. Competitive dynamics in the market may lead to collective over-reliance on the assumptions underlying the regulatory Pillar 1 calculation, notwithstanding the fact that these assumptions may not adequately capture the underlying risk. This risk is exacerbated by the concentrated model risk inherent in the MA specification. As a result, the PRA considers that the deficiencies in the current FS design require a Pillar 1 solution to ensure these issues are addressed appropriately across firms.

Annex A – Academic papers referenced in calibrating an appropriate allowance for the CRP

- Bu, D., Kelly, S., Liao, Y., & Zhou, Q., 2018, A hybrid information approach to predict corporate credit risk, The Journal of Futures Markets, vol. 38, no. 9, pp. 1062-1078. https://doi.org/10.1002/fut.21930
- Chen, H., Cui, R., He, Z., Milbradt, K., 2018, Quantifying Liquidity and Default Risks of Corporate Bonds over the Business Cycle, The Review of Financial Studies, Volume 31, Issue 3, Pages 852–897, https://doi.org/10.1093/rfs/hhx107
- Feldhütter, P., Schaefer, S., 2018, The Myth of the Credit Spread Puzzle, The Review of Financial Studies, Volume 31, Issue 8, Pages 2897–2942, https://doi.org/10.1093/rfs/hhy032
- Feldhütter, P., Schaefer, S., 2019, Debt Dynamics and Credit Risk, http://dx.doi.org/10.2139/ssrn.3410079
- Dick-Nielsen, J., Feldhütter, P., Lando, D., 2012, Corporate bond liquidity before and after the onset of the subprime crisis, Journal of Financial Economics, 103, issue 3, p. 471-492. https://doi.org/10.1016/j.jfineco.2011.10.009
- van Loon, P., 2017, Empirical Studies in Corporate Credit Modelling: Liquidity Premia, Factor Portfolios and Model Uncertainty, PhD thesis, Heriot-Watt University, https://www.actuaries.org.uk/documents/pvl-final-thesis
- Webber, L., 2007, Decomposing Corporate Bond Spreads. Bank of England Quarterly Bulletin, https://www.bankofengland.co.uk/quarterly-bulletin/2007/q4/decomposing-corporate-bond-spreads

Annex B – Other academic papers referenced by stakeholders at the time of writing

- Claussen, C., Kriebel, J., Pfingsten, A., 2020, The Credit Spread Puzzle - Evidence from a Quasi-Natural Experiment, Proceedings of Paris December 2021 Finance Meeting EUROFIDAI – ESSEC, http://dx.doi.org/10.2139/ssrn.3646166
- Huang, J., Nozawa, Y., Shi, Z., 2019, The Global Credit Spread Puzzle. PBCSF-NIFR Research Paper, http://dx.doi.org/10.2139/ssrn.3453959
- Giesecke, K., Longstaff, F., Schaefer, S., Strebulaev, I., 2010, Corporate Bond Default Risk: A 150-Year Perspective, NBER Working Papers 15848, https://doi.org/10.1016/j.jfineco.2011.01.011
- Collin-Dufresne, P., Martin, J., Goldstein, R., (2001), The Determinants of Credit Spread Changes, http://dx.doi.org/10.2139/ssrn.191668
- Friewald, N., Nagler, F., 2018, Over-the-Counter Market Frictions and Yield Spread Changes, Journal of Finance, http://dx.doi.org/10.2139/ssrn.3082955
- Bordalo, P., Gennaioli, N., Sheifer, A., 2017, Diagnostic Expectations and Credit Cycles, NBER Working Papers 22266, http://dx.doi.org/10.1111/jofi.12586
- Manning, M., Exploring the Relationship between Credit Spreads and Default Probabilities, 2004, Bank of England Working Paper No. 225, http://dx.doi.org/10.2139/ssrn.641262