

MILLIMAN REPORT

# The Insurance Capital Standard (ICS)

Not Just a Sideshow

February 2021

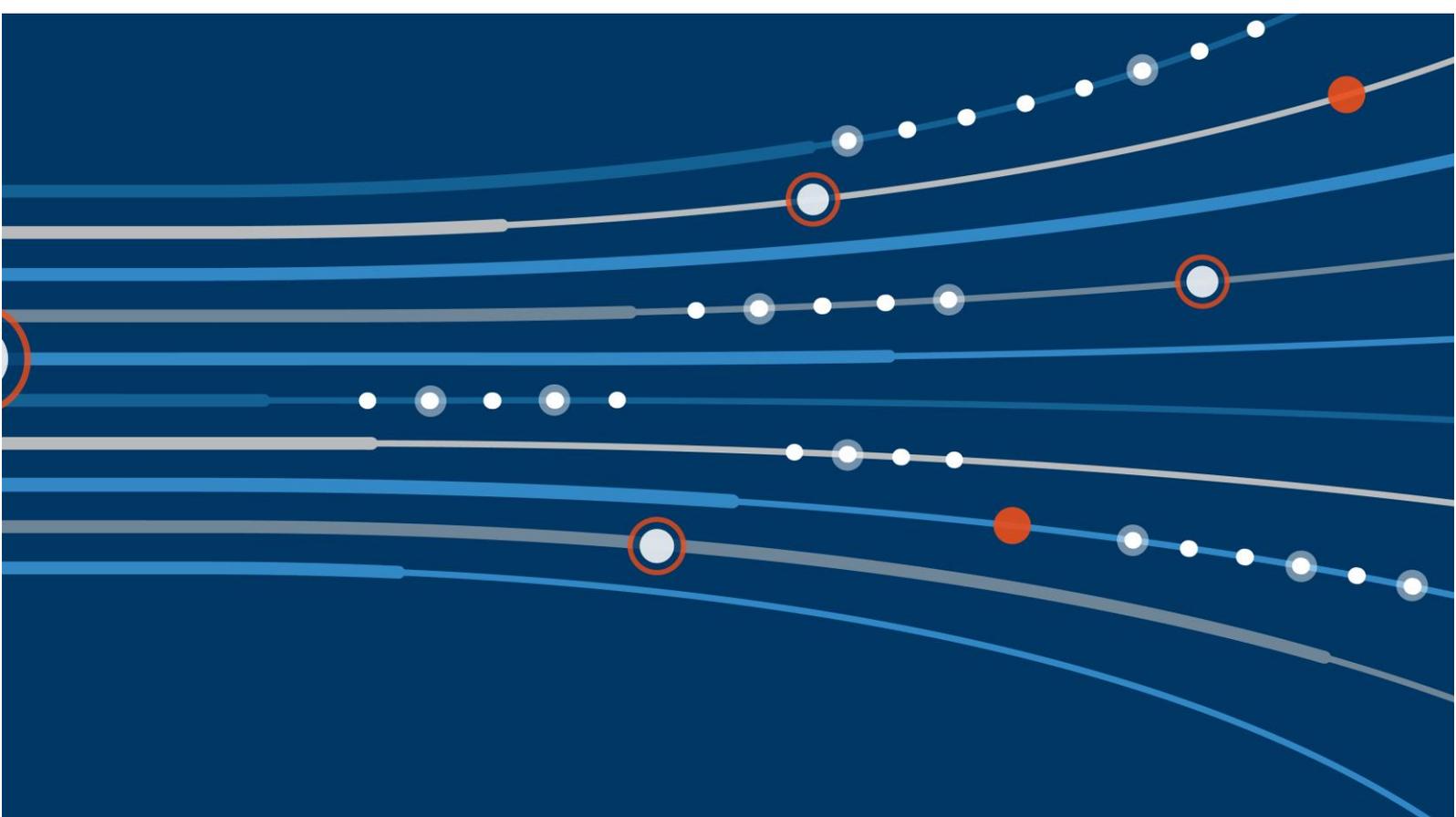
Neil Christy, FIA, CERA

Jack Huffer

Russell Osman, FIA

Philip Simpson, FIA

Russell Ward, FIA



## Table of Contents

<b>INTRODUCTION TO THE ICS.....</b>	<b>1</b>
WHY SHOULD WE CARE ABOUT THE NEW INTERNATIONAL INSURANCE CAPITAL STANDARDS? .....	1
A GLOBAL FRAMEWORK FOR INSURANCE SUPERVISION .....	2
THE IAIS GLOBAL FRAMEWORKS FOR SUPERVISION OF IAIGS.....	2
WHAT IS AN IAIG AND WHO ARE THEY? .....	3
<b>COMPARISON OF THE ICS TO SOLVENCY II.....</b>	<b>3</b>
ASSET VALUATION .....	3
BASE LIABILITY VALUATION .....	3
CAPITAL REQUIREMENTS .....	4
Interest Rate Risk .....	4
Spread Risk .....	5
Credit Risk .....	5
Longevity Risk .....	6
Expense Risk.....	6
Operational Risk .....	6
TECHNICAL PROVISIONS.....	6
Risk Margin vs MOCE.....	6
<b>ILLUSTRATIVE RESULTS.....</b>	<b>6</b>
CAPITAL CHARGE FOR SPREAD/DEFAULT RISK.....	7
CAPITAL CHARGE FOR INTEREST RATE RISK .....	7
OVERALL RESULTS .....	8
<b>CONCLUSION .....</b>	<b>10</b>
<b>ACKNOWLEDGEMENTS.....</b>	<b>10</b>
<b>APPENDIX 1 – COMPARISON OF ICS STRESS CALIBRATIONS VS SII.....</b>	<b>11</b>
AREAS OF SIMILARITY IN APPROACH.....	11
AREAS OF SIGNIFICANT DIFFERENCE IN APPROACH .....	11
<b>APPENDIX 2 – SUMMARY OF MODELLED SCENARIOS .....</b>	<b>12</b>
<b>APPENDIX 3 – IAIS LIST OF 30 PUBLICLY DISCLOSED IAIGS FROM 16 JURISDICTIONS.....</b>	<b>13</b>

## Introduction to the ICS

Large international insurers have been informally reporting to their regulators using the new international Insurance Capital Standard (**ICS**) since the beginning of 2020. In this note, we consider:

- Who may be affected by the new standard
- The impact the new standard has on the evaluation of available and required capital and how this compares with Solvency II (**SII**)
- Illustrative results

### WHY SHOULD WE CARE ABOUT THE NEW INTERNATIONAL INSURANCE CAPITAL STANDARDS?

The shape of post-Brexit insurance supervision in the UK remains unclear. If it diverges away from Solvency II then the UK may look to other international standards as a future template. For example, in 2018 the PRA in its response to the Treasury Select Committee's inquiry into Solvency II commented that:

*We agree with the Committee on the importance of having regard to the broader international context of insurance regulation when considering any changes to domestic rules. The PRA will continue to consider the consistency of UK insurance regulation with international capital standards and emerging accounting standards.*

More recently, in October 2020, HM Treasury (**HMT**) issued a Call for Evidence in support of its review of SII<sup>1</sup> in which a possible role for the ICS was again hinted at:

*The UK has been at the forefront of the development of an international framework for the consistent prudential regulation of the insurance sector across countries, namely the Insurance Capital Standard (ICS), which has been facilitated by the International Association of Insurance Supervisors (IAIS). International agreement to the ICS was achieved in November 2019. The current Solvency II regime is compatible with emerging international standards. The review of Solvency II will be informed by recent international prudential regulatory developments.*

The HMT Call for Evidence seeks views on issues and potential improvements to SII across a broad range of areas including:

- Risk Margin (**RM**)
- Matching Adjustment (**MA**)
- Calculation of the Solvency Capital Requirement (**SCR**)

In a number of the areas being explored, ICS takes a different line to SII<sup>2</sup> and thus might offer approaches that mitigate some of the well-known problems with SII whilst remaining part of an internationally accepted standard.

We can summarise the current position as follows:

TYPE OF FIRM	NATURE OF INTEREST
UK-based Internationally Active Insurance Groups (IAIGs <sup>3</sup> ) and UK-based subsidiaries and branches of IAIGs	Directly Affected – as ICS results are already being produced on a private basis as part of the 'monitoring period' prior to full implementation
Other UK insurers	Interested – as ICS approaches may influence the shape of changes to the UK supervisory regime over the next couple of years

We expect that many readers of this note will be in the last category. Therefore, the ICS may not just be something that affects IAIGs.

Having established why we should be interested in the ICS, we now provide a brief summary of its origins and development.

<sup>1</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/927345/Solvency\\_II\\_Call\\_for\\_Evidence.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/927345/Solvency_II_Call_for_Evidence.pdf).

<sup>2</sup> This remains the case, though some of the changes proposed by EIOPA in its opinion on the 2020 review of Solvency II, published 17/12/2020, seem likely to narrow the difference in impact of the two regimes – see [https://www.eiopa.europa.eu/content/opinion-2020-review-of-solvency-ii\\_en](https://www.eiopa.europa.eu/content/opinion-2020-review-of-solvency-ii_en).

<sup>3</sup> Defined below.

### A GLOBAL FRAMEWORK FOR INSURANCE SUPERVISION

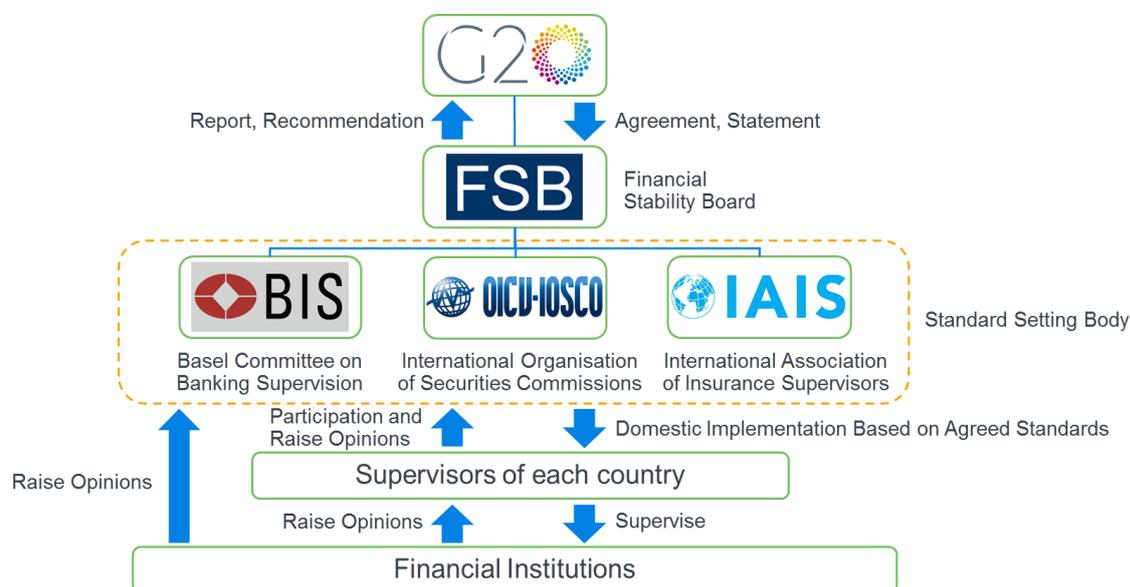
With the lesson of the global financial crisis, the Financial Stability Board (FSB) was established by the G20 in 2009. The role of the FSB is to deal with vulnerabilities in the financial system and to promote cross-border cooperation among authorities responsible for the stability of the financial system, including the insurance sector.

The International Association of Insurance Supervisors (IAIS) aims to supervise the Internationally Active Insurance Groups (IAIG) in an international supervisory framework. Supervision of IAIGs is complicated due to their cross-border characteristics.

The FSB requested the IAIS to develop a global capital standard—the Insurance Capital Standard (ICS). The IAIS is the international standards-setting body for the insurance sector in which insurance supervisors and regulators from over 200 jurisdictions participate.

ICS is the global capital standard applied to IAIGs. The main objectives of the ICS are to protect policyholders and to contribute to financial stability by maintaining consistent, high supervisory standards in the IAIS member jurisdictions.

FIGURE 1: THE GLOBAL FRAMEWORK FOR SUPERVISION OF FINANCIAL INSTITUTIONS



### THE IAIS GLOBAL FRAMEWORKS FOR SUPERVISION OF IAIGS

The IAIS conducted consultations with stakeholders and field testing of the ICS between 2014 and 2019. Many aspects of the ICS have evolved over the course of field testing. The ICS was formally adopted at the end of 2019.

Since the beginning of 2020, a five-year monitoring period for the ICS has been in place. During this period, the IAIGs calculate and report their ICS figures, but supervisors take no action based on them. Regulators are collecting information on the ICS standard model, internal models, and other alternate measures (e.g., GAAP plus or aggregation method).

Implementation as a prescribed capital requirement will occur at the end of the monitoring period, starting in 2025. Given the historical path of development of the ICS, alongside other regulatory regime change such as the forthcoming introduction of IFRS 17, there must be the potential for some slippage in this timeline.

The ultimate goal of the ICS monitoring period is to achieve a single ICS for an IAIG that can be comparable across jurisdictions and meet the needs of the different regulators.

## WHAT ARE IAIGS AND WHAT DO THEY DO?

Essentially IAIGs are large insurers that write significant volumes of business in at least three countries.

An IAIS aims to carefully monitor insurance-dominated conglomerates, insurance groups, and any insurers whose distress or disorderly failure because of their size, complexity, and interconnectedness would cause significant disruption to the global financial system and economic activity.

For ICS, an IAIG is an insurance group that meets two criteria related to its international activity and size:

- The group's premiums are written in three or more jurisdictions and gross written premiums outside of the home jurisdiction are at least 10% of the group's total gross written premiums.
- Total assets of the group are at least USD 50 billion or gross written premiums are at least USD 10 billion (on a rolling three-year average basis).

The IAIS expects there to be about 50 IAIGs. It is up to local supervisors to identify which insurance companies are IAIGs; there appears to be some discretion available to local supervisors in making this determination.

On 28 May 2020, the Bank of England identified the IAIGs headquartered in the UK as: Aviva, BUPA, Legal and General, and RSA. This is quite a varied list as we have one composite insurer (Aviva), one life insurer (L&G), one health insurer (BUPA), and one general insurer (RSA).

On 18 May 2020, the European Insurance and Occupational Pensions Authority (EIOPA) issued a list of IAIGs headquartered in the European Union. These are:

- |                              |                          |
|------------------------------|--------------------------|
| ▪ Aegon*                     | ▪ GROUPAMA               |
| ▪ Ageas#                     | ▪ Grupo Mapfre           |
| ▪ Allianz#                   | ▪ Hannover Re*           |
| ▪ Assicurazioni Generali     | ▪ Munich Re*             |
| ▪ AXA#                       | ▪ NN Group               |
| ▪ BNP Paribas Cardif         | ▪ SCOR#                  |
| ▪ CNP Assurances             | ▪ SOGECAP                |
| ▪ COVEA*#                    | ▪ Vienna Insurance Group |
| ▪ Crédit Agricole Assurances |                          |

See [www.eiopa.europa.eu/tools-and-data/registers/list-internationally-active-insurance-groups-iaigs-headquartered-eu\\_en](http://www.eiopa.europa.eu/tools-and-data/registers/list-internationally-active-insurance-groups-iaigs-headquartered-eu_en)

\*Group includes a UK presence predominantly in the life insurance market

#Group includes a UK presence predominantly in the non-life insurance market

On 1 July 2020, the IAIS published a list of IAIGs publicly disclosed by group-wide supervisors (GWSs). The IAIS identified 48 IAIGs from 16 different regulatory jurisdictions, 30 of which were publicly disclosed by the relevant GWSs (list shown in Appendix 3).

## Comparison of the ICS to Solvency II

This section compares the main features of the ICS to Solvency II, outlining their similarities and important differences under the relevant headings.

### ASSET VALUATION

The approach is very similar to Solvency II with assets taken at market value.

### BASE LIABILITY VALUATION

The approach to valuation is the same under both regimes—a market consistent expected present value of future cash-flows calculated gross of reinsurance and special purpose vehicles. Under the ICS this value is known as the Current Estimate (CE). The respective treatments of aspects such as contract boundaries, management actions, and allowance for policyholder behaviour are broadly consistent.

Where the two regimes do diverge is around the application of an illiquidity premium to the valuation of liabilities. Under the ICS, liabilities are allocated to one of three buckets:

ICS LIABILITY BUCKET		COMPARISON WITH SOLVENCY II
<b>Top Bucket</b>	For annuities in payment with no cash-in benefits and with close matching criteria applied. The illiquidity premium can be assessed on a granular basis for different blocks of business; driven by spreads available on separately managed portfolios of eligible assets held by the insurer, less a haircut for credit risk based on data provided by the IAIS.	Similar to the Matching Adjustment
<b>Middle Bucket</b>	Widens the scope of business and relaxes the close matching criteria a little but also introduces other qualification tests. The illiquidity premium is calculated as a single uplift across all business in the bucket reflecting the insurer's actual portfolio but using both spread and risk correction data supplied by the IAIS.	No equivalent
<b>Bottom Bucket</b>	Covers all liabilities not allocated into the Top or Middle buckets. The illiquidity premium is provided directly by the IAIS based on a reference portfolio of assets typically held by IAIGs.	Similar to the current Volatility Adjustment
<b>No ICS equivalent</b>	Under SII, significant portions of insurance liabilities are valued using the risk-free rate with no adjustment. There is no equivalent 'bucket' under the ICS and it is unclear if insurers will be required to place all their liabilities into one of the three buckets described above or whether there will be flexibility to adopt a more prudent approach and value some business at the risk-free rate if desired.	Valuation at the risk-free rate with no adjustment

## CAPITAL REQUIREMENTS

The broad approach taken under the Standard Model of the ICS is very similar to that adopted under the SII Standard Formula. In particular:

- The taxonomy of risks addressed is similar but not exactly the same.
- Stresses are calibrated for each risk intended to represent an adverse 1 in 200 year realisation of the risk based on an exposure period of 1 year (99.5% 1 year value at risk).
- Stresses are applied to the whole balance sheet at the valuation date (time 0 approach).
- The capital requirements for individual risks are aggregated using correlation matrices.

A tabular comparison of stress calibrations between the ICA and SII Standard Formula is provided in Appendix 1. The section below provides additional detail on the risks most relevant to an annuity portfolio—the basis of our analysis later in the paper.

### Interest Rate Risk

Under Solvency II, the interest rate risk stress is the more onerous of two scenarios: Interest Rate Up and Interest Rate Down. These stresses are applied by using a stressed discount curve which is calculated based on a proportional increase/decrease to the base EIOPA risk-free yield curve as at the valuation date. EIOPA publishes the interest rate up and down stress curves alongside the base curve, however the stress curves can also be easily calculated from the base curve.

One noted limitation of the current Solvency II interest rate risk stresses is that no down stress is applied at any duration where the base curve itself is already negative. This means that in a low or negative interest rate environment the interest rate down stress is likely to be significantly constrained and thus much smaller than the rates up stress. This results in an asymmetry of capital requirements between firms who are fundamentally exposed to rates down versus rates up.

The interest rate stress is under review as part of the EIOPA Solvency II 2020 Review and current proposals look to address the limited impact of the interest rate down stress in a low or negative interest rate environment. Based on the outcome of the review recently announced by EIOPA, the anomaly referred to above (i.e., no down stress where rates are already negative) is likely to be addressed.

For the ICS interest rate stress, the calculation is more complex. The interest rate capital requirement is calculated using a formula based on five scenarios. These scenarios are:

- Mean Reversion (**MR**)
- Level Up (**LU**)
- Level Down (**LD**)
- Twist Up-to-Down (**TU**)
- Twist Down-to-Up (**TD**)

The five scenarios are calculated independently and then combined. The LU, LD, TU, and TD scenarios are combined assuming they follow a joint Normal distribution and the 99.5% percentile of the subsequent result is calculated. The combined result for the level and twist stresses, known as LT, is calculated for each currency to which the firm is exposed. LT is then added to the MR scenario using the following formula:

$$\max \left( 0, \sum_i MR_i + Var_{99.5} \left( \sum_i LT_i \right) \right)$$

Where  $i$  represents the index of all currencies to which the firm is exposed.

The IAIS publishes the stressed curves alongside the base curve. However unlike under Solvency II, the derivation of the stress curves is complex and cannot be easily calculated from the base curve.

The evaluation of capital required for interest rate risk under the ICS is certainly more complex than under Solvency II, but it incorporates a wider range of possible changes to interest rates and does not have the same limitations regarding negative interest rates as the current Solvency II approach. In effect, we see the ICS interest rate stress as being closer in nature to what many internal model companies do for their interest rate stressing.

### Spread Risk

The spread stress under the Solvency II Standard Formula is a one-directional stress which calculates the capital requirement where spreads widen. The amount by which the spread widens is determined by the asset type, the credit rating, and the term to maturity.

The ICS spread stress is known as the Non-Default Spread Risk (**NDSR**) stress and consists of two separate stresses:

- A widening of spreads (**NDSR Up**)
- A narrowing of spreads (**NDSR Down**)

The change in spreads can be reflected in the illiquidity premium uplifts applied in the valuation of the liabilities, with the level of offset provided by this varying with the degree to which the assets and liabilities are closely matched.

The most onerous result between the NDSR Up and Down stresses is then selected for aggregation with other risks, with some of the correlation factors used varying with the direction of the biting stress.

As suggested by the title, the NDSR stress is intended to capture the risk of changes to that part of the spread that reflects compensation for factors other than the risk of actual credit defaults. The risk of adverse change in actual credit defaults is addressed under the credit risk module of the ICS. This means that for corporate bonds the stressing of the total spread is undertaken in two parts under the ICS (i.e., spread risk and actual default risk) with some allowance for diversification between these two impacts. This is different to Solvency II where assets are stressed either under the spread risk module or the counterparty credit risk module but not under both. In our view, the ICS approach accords more closely with the reality of there being two different risks (namely spread changes and actual defaults) for which changes do not move in lock step.

### Credit Risk

Our focus for this paper, given the scope of our illustrative modelling, was corporate bonds. Under the ICS a separate allowance is made (as noted above) for the risk of increased default losses via a reduction in the market value of these assets. The reductions applied vary by term and credit rating.

## Longevity Risk

The longevity risk stress under Solvency II and under the ICS is applied in the same way. The stress consists of a percentage decrease in mortality rates at all ages for all policies where a decrease will increase the reserve. The only difference comes in the percentage decrease applied to the mortality rates, being slightly lower for ICS at 17.5% versus the 20% applied under Solvency II.

## Expense Risk

The expense risk stress is also applied similarly for Solvency II and the ICS. The stress under each includes a relative increase to the level of expenses and a separate absolute increase to the level of expense inflation. Under Solvency II, this is specified as a 10% relative increase in expenses and an absolute increase of 1% in the annual expense inflation rate. For the ICS, the equivalent figures for the UK are 6% and 1%, respectively.<sup>4</sup>

## Operational Risk

For a closed annuity block, the evaluation of operational risk under the ICS is unchanged compared with Solvency II, being 0.45% of the gross current estimate / gross BEL, respectively.

### TECHNICAL PROVISIONS

#### Risk Margin vs Margin over Current Estimate

The Risk Margin equivalent under the ICS is the Margin over Current Estimate (**MOCE**). Similar to the Risk Margin under Solvency II, it is an additional margin held above the liabilities to provide some protection against the uncertainty in future cash flows related to the non-financial risks attached to them.

The calculation of the MOCE for life insurance business is based on the 85th percentile<sup>5</sup> of a normal distribution. The normal distribution used to calculate the MOCE is defined by:

- Mean - equal to the current estimate of the life business obligations
- 99.5th percentile - equal to the life risk charge<sup>6</sup>

Similar to the Solvency II Risk Margin, the MOCE has no allowance for market risks, but the MOCE also excludes operational and counterparty risks which do feed into the Risk Margin calculations. Both the MOCE and the Risk Margin are excluded from the calculations of the capital requirements. We note that under the recently announced EIOPA review of Solvency II, the degree of onerousness of the Risk Margin is set to reduce.

## Illustrative Results

We now explore the implications of the ICS for annuity liabilities for which we evaluate available and required capital under both the Solvency II Standard Formula and the ICS<sup>7</sup>. The illustration is based upon a representative portfolio of level in-payment annuity liabilities constructed using CMI data—assuming a 10% UK market share. Furthermore, we assume an asset portfolio comprised of vanilla zero coupon corporate bonds with a composition based on typical portfolios from EIOPA Quantitative Reporting Template (QRT) analysis. The assets are assumed eligible for the ICS Top Bucket and Solvency II Matching Adjustment.

To provide a richer exploration of the implications of the ICS, a number of scenarios were considered which varied in three key dimensions:

1. By the extent of the duration mismatch between the assets and liabilities.
2. Influenced by (1), eligibility for any illiquidity premium
3. Finally, by the overall credit quality of the portfolio of backing assets

A full listing of the scenarios considered can be found in Appendix 2.

<sup>4</sup> Figures vary by region with a range of 6-8% for the expense stress and 1-3% for the increase to the annual expense inflation rate.

<sup>5</sup> The 65<sup>th</sup> percentile is used for non-life insurance business.

<sup>6</sup> This includes the following risks: mortality, longevity, morbidity/disability, lapse, and expenses.

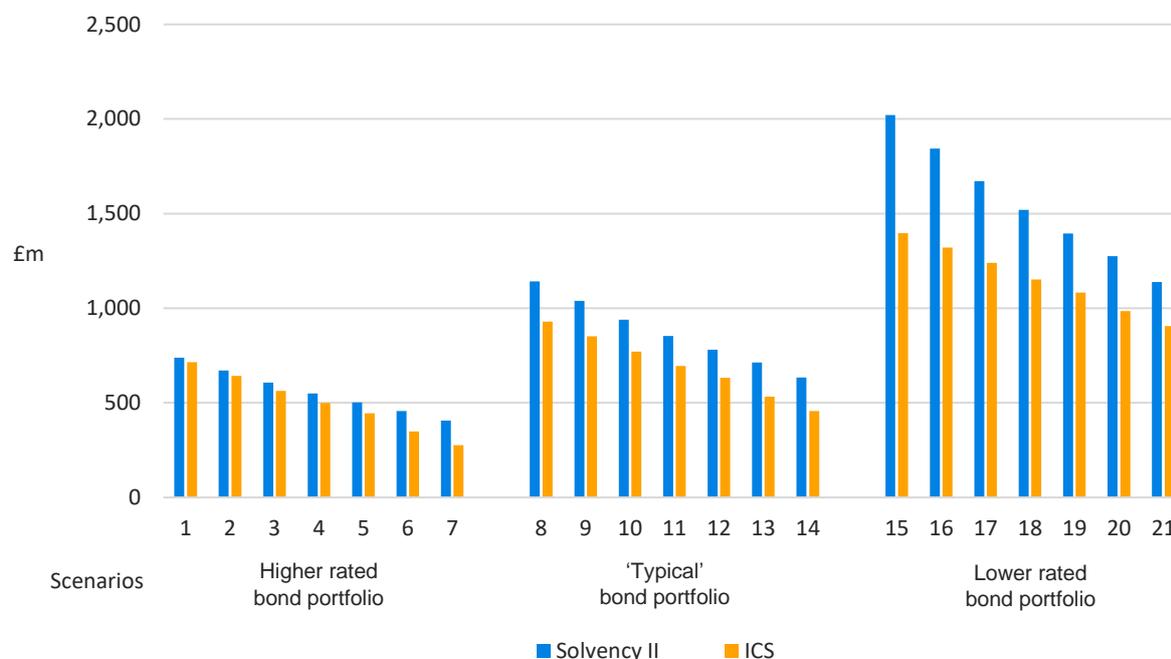
<sup>7</sup> We note that the ICS does contemplate an allowance for internal models but at present it is unclear how this will work in practice and in particular the relationship with any internal model already approved for use under Solvency II.

## CAPITAL CHARGE FOR SPREAD/DEFAULT RISK

The comparison here is between the Spread Risk charge under Solvency II and the combination of the NDSR and the Credit Risk charge in respect of corporate bonds under the ICS<sup>8</sup>.

Figure 2 shows these capital charges for each of the scenarios. The scenarios are grouped into three different blocks depending on the credit quality of the portfolio of backing assets (as shown in Appendix 2).

**FIGURE 2: CAPITAL CHARGES FOR SPREAD /DEFAULT RISK UNDER MODELLED SCENARIOS**



These results show that the capital charge under the ICS is lower than for Solvency II, and that the ICS benefit becomes more pronounced (in both absolute and, for the vast majority of scenarios, relative terms) as the overall credit quality of the asset portfolio declines. A number of factors contribute to this result:

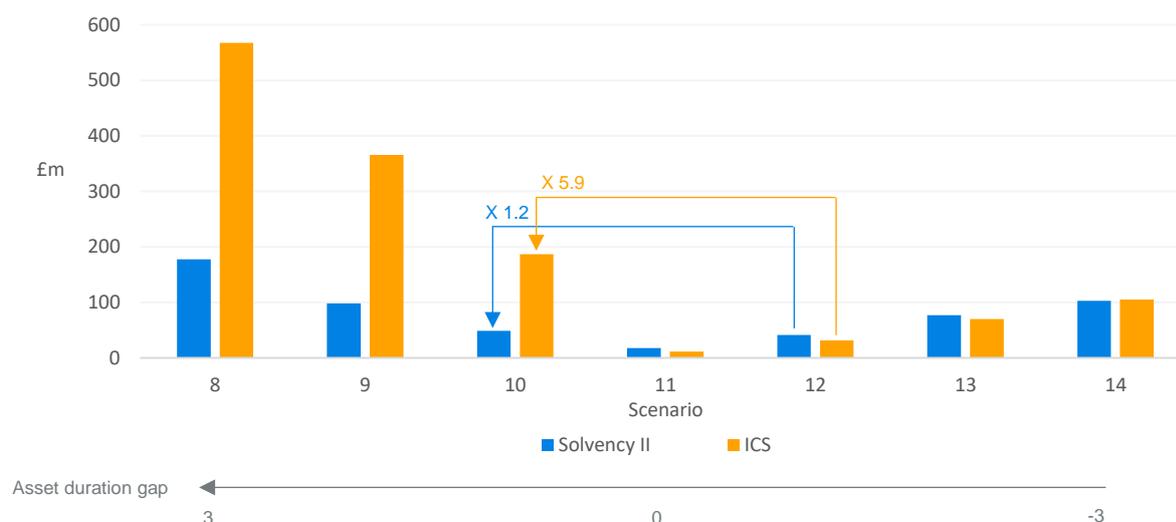
1. The level of the stress parameters themselves
2. The allowance, under the ICS, for some diversification between the NDSR and Credit Risk elements of the impact
3. A less restricted ability, under the ICS, to pass through the changes in spreads into the valuation of the liabilities

## CAPITAL CHARGE FOR INTEREST RATE RISK

The following graph shows the interest rate capital charge for each of the scenarios that were modelled using the 'typical' backing asset portfolio that was based on EIOPA QRT analysis. The x-axis indicates the duration gap between the backing assets and annuity liabilities.

<sup>8</sup> For this direct comparison, the combination of the NDSR and the Credit Risk charge allows for diversification between the two elements on a standalone basis, i.e., contemplating only those two risks. In reality there will be diversification with other risk modules.

FIGURE 3: CAPITAL CHARGES FOR INTEREST RATE RISK UNDER MODELLED SCENARIOS



The required capital for interest rate risk under the ICS is significantly more onerous under scenarios where assets have a longer duration than the liabilities. Furthermore, the required capital varies considerably more as the duration mismatch changes. Recall that the ICS capital charge is the sum of a mean reversion stress and the outcome of stresses to the level and slope of the interest rate curve. In the current low interest rate environment, the mean reversion component is an interest rate up stress. Thus, if the outcome of the level and slope stresses results in a rate up scenario biting (scenarios 8, 9, and 10 above) there is something of a ‘double whammy’ with positive capital charges arising from both elements. On the other hand, where an insurer is exposed to scenarios where interest rate down is the biting direction (scenarios 12, 13, and 14 above) the mean reversion scenario remains an interest rate up stress and shows offsetting behaviour. This asymmetric behaviour of the ICS interest rate risk would be reversed in a time of high interest rates.

The ICS approach may consequently lead to a more volatile interest rate capital requirement for closely (but not perfectly) matched asset-liability positions, where the biting direction of the interest rate stress can switch over time. For example, moving from a position of being short one year in asset duration (scenario 12) to being long one year (scenario 10), we find the Solvency II capital charge increases by a factor of about x 1.2 but this expands to x 5.9 for the ICS.

One final observation is that the high capital charges arising where assets have a longer duration than the liabilities is clearly a factor to bear in mind for insurers with existing (or planned) material exposures to long-dated illiquid assets.

## OVERALL RESULTS

The table below provides a comparison of results for the other capital charges relevant to our model annuity portfolio together with a comparison of overall capital requirements both pre- and post-diversification, as well as the Risk Margin/MOCE. We have selected an illustrative range of scenarios modelled using the ‘typical’ backing asset portfolio.

FIGURE 4: COMPARISON OF CAPITAL CHARGES, CAPITAL REQUIREMENTS, AND RISK MARGINS/MOCE UNDER MODELLED SCENARIOS

Scenario	Longevity Risk	Expense Risk	Capital Requirement	Risk Margin vs MOCE
8	c.25% higher under SII	c.35% higher under SII	Pre Div: c.5% lower under SII Post Div: c.5% higher under SII	c.55% higher under SII
10	c.20% higher under SII	c.30% higher under SII	Pre Div: c.5% higher under SII Post Div: c.15% higher under SII	c.50% higher under SII
12	c.20% higher under SII	c.30% higher under SII	Pre Div: c.10% higher under SII Post Div: c.20% higher under SII	c.50% higher under SII
14	c.25% higher under SII	c.35% higher under SII	Pre Div: c.20% lower under SII Post Div: c.25% higher under SII	c.55% higher under SII

The required capital for operational risk is very similar between SII and the ICS across all scenarios.

The separation of credit risk on bonds into its own risk module contributed to the greater diversification benefit under the ICS for our model annuity portfolio (as can be seen when comparing the pre- and post-diversification capital requirements in the above table).

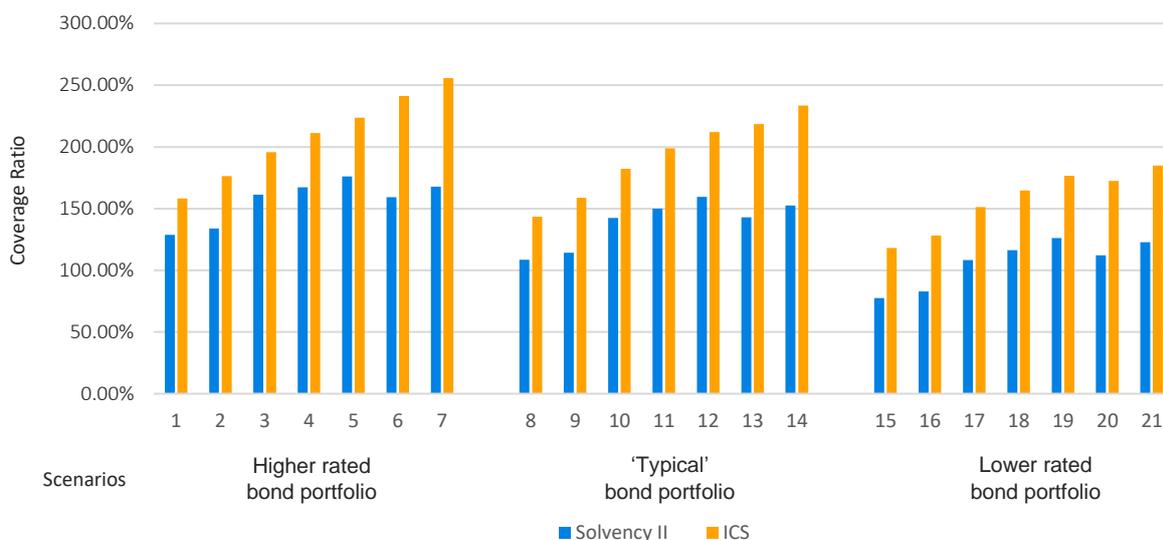
The required capital is only part of the story as the evaluation of available capital also differs due to the varying allowances made for the impact of illiquidity premia in setting the valuation discount rates. This difference can be seen in the below table.

**FIGURE 5: COMPARISON OF ICS AND SOLVENCY II ANALYSES UNDER MODELLED SCENARIOS**

MODELLED SCENARIOS	ICS CLASSIFICATION	SII CLASSIFICATION	COMPARISON
10 and 12	Top Bucket	MA eligible	Our analysis indicated a SII BEL c.1% higher than the ICS CE. Both regimes embed an illiquidity premium but this is slightly more generous under the ICS.
8 and 14	General Bucket	Valuation at risk-free rate	Our analysis indicated a SII BEL c.3% higher than the ICS CE.  Here SII makes no allowance for illiquidity while the ICS continues to embed an uplift, albeit reduced compared to the Top Bucket.

Finally, the results below combine the differences in both required and available capital to illustrate the overall impact of the ICS on the solvency cover ratio.

**FIGURE 6: COMBINED DIFFERENCE IN REQUIRED AND AVAILABLE CAPITAL UNDER MODELLED SCENARIOS**



The chart above indicates that, for our modelled block of in-payment annuities, the ICS delivers a consistently higher solvency cover ratio when compared with Solvency II.

## Conclusion

Based on our analysis to date, we note the following key observations:

- Application of illiquidity premia appears more generous under the ICS, leading to lower reserves (BEL vs. CE) under ICS compared with Solvency II.
- Capital for spread/credit risk on corporate bonds is generally lower under ICS compared with Solvency II, in particular for portfolios tilted towards lower credit ratings.
- Separation of credit risk on bonds into its own risk module contributed to greater diversification under ICS.
- The combination of mean reversion and level/twist stresses for interest rates introduces a gearing effect on capital in the current environment where interest rates up bites. This may increase capital volatility where the biting direction of the stress switches between rates up and rates down.
- The MOCE under the ICS is a simpler calculation that would be less sensitive to interest rates compared with the Risk Margin under Solvency II. For annuity business, its quantum also seems likely to be lower than the current Solvency II Risk Margin.<sup>9</sup>
- Overall, for annuity in-payment business under the ICS, there is likely to be an improvement in Own Funds, reduction in Capital Requirement and hence a double boost to the Solvency Coverage Ratio.
- While the ICS does not address all the issues afflicting Solvency II, it does appear to offer an approach in a number of areas that is worthy of serious consideration as the UK seeks to shape its prudential regulation of insurers in the post-BREXIT world.

Finally, we are conscious that EIOPA has now provided an opinion on the 2020 review of Solvency II. Should the measures proposed by EIOPA be implemented, e.g. the revised Risk Margin, they will change the comparison between the ICS and the Solvency II Standard Formula. To explore this development further, we plan to extend this paper in the near future.

## Acknowledgements

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### CONTACT

**Neil Christy**  
[neil.christy@milliman.com](mailto:neil.christy@milliman.com)

**Jack Huffer**  
[jack.huffer@milliman.com](mailto:jack.huffer@milliman.com)

**Russell Osman**  
[russell.osman@milliman.com](mailto:russell.osman@milliman.com)

**Philip Simpson**  
[philip.simpson@milliman.com](mailto:philip.simpson@milliman.com)

**Russell Ward**  
[russell.ward@milliman.com](mailto:russell.ward@milliman.com)

<sup>9</sup> The Risk Margin is under review as part of the EIOPA Solvency II 2020 Review. Based on the outcome of the review recently announced by EIOPA, the Risk Margin is likely to be reduced.

## Appendix 1 – Comparison of ICS Stress Calibrations vs. SII

### AREAS OF SIMILARITY IN APPROACH

RISK	SOLVENCY II STANDARD FORMULA	ICS
<b>Mortality</b>	+15% mortality rates	+10/12.5% (country dependent)
<b>Longevity</b>	-20% mortality rates	-17.5% mortality rates
<b>Lapse Up/Down</b>	+50% long-term rates	+20%/40% (country dependent)
<b>Mass Lapse</b>	-40% retail/-70% non-retail	-30% retail/-50% non-retail
<b>Expense</b>	+10% expenses/+1% inflation	+6-8% expenses/+1-3% inflation (country and time dependent)
<b>Life Catastrophe</b>	+0.15% mortality rates	Terrorism: property, mortality, and morbidity impacts Pandemic: 1 per 1000 death increase
<b>Property</b>	-25% property value	-25% property value
<b>Equity</b>	Type 1: -(39% + symmetric adjustment) Type 2: -(49% + symmetric adjustment) Strategic: -22%	Listed shares: -35%/-48% Hybrid debt: stress based on rating Other equity: -49% Volatility increase scenario
<b>Currency</b>	More onerous of +/-25%	More onerous of two defined scenarios based on currency held and long or short position.

### AREAS OF SIGNIFICANT DIFFERENCE IN APPROACH

RISK	SOLVENCY II STANDARD FORMULA	ICS
<b>Interest Rate Risk</b>	Most onerous of interest rate up and down stresses	Formula based on 5 scenarios: <ul style="list-style-type: none"> <li>Mean reversion (MR)</li> <li>Level Up (LU)</li> <li>Level Down (LD)</li> <li>Twist Up-to-Down (TD)</li> <li>Twist Down-to-Up (TU)</li> </ul> $\max \left( 0, \sum_i MR_i + Var_{99.5} \left( \sum_i LT_i \right) \right)$
<b>Spread Risk</b>	One-directional stress for corporate bonds Dependent on credit quality step (CQS) and duration to maturity Stress covers default and illiquidity risks associated with corporate bonds	Non-Default Spread Risk (NDSR) <ul style="list-style-type: none"> <li>Spread Up and Down stresses</li> <li>Flow into market risk correlation as two separate stresses</li> <li>Dependent on the ICS rating category (RC)</li> </ul> Credit Risk <ul style="list-style-type: none"> <li>One directional stress</li> <li>Different stresses for different asset types</li> <li>Stress factors dependent on the RC and duration to maturity</li> </ul>

## Appendix 2 – Summary of Modelled Scenarios

	ASSET DURATION GAP*	ASSET PORTFOLIO COMPOSITION	ICS BUCKET	SII BUCKET
1	3	Skewed in favour of higher rated bonds	General	RFR
2	2		General	RFR
3	1		Top	MA
4	0		Top	MA
5	-1		Top	MA
6	-2		General	RFR
7	-3		General	RFR
8	3	Typical portfolio	General	RFR
9	2		General	RFR
10	1		Top	MA
11	0		Top	MA
12	-1		Top	MA
13	-2		General	RFR
14	-3		General	RFR
15	3	Skewed in favour of lower rated bonds	General	RFR
16	2		General	RFR
17	1		Top	MA
18	0		Top	MA
19	-1		Top	MA
20	-2		General	RFR
21	-3		General	RFR

\* Macaulay duration of the assets less the Macaulay duration of the liabilities. Calculated using ICS discount curves, SII equivalents differ slightly.

## Appendix 3 – IAIS List of 30 Publicly Disclosed IAIGs from 16 Jurisdictions

NUMBER	NAME OF IAIG	GROUP-WIDE SUPERVISOR (GWS)	JURISDICTION OF GWS
1	Aegon N.V.	De Nederlandsche Bank - DNB	Netherlands
2	Ageas SA/NV	National Bank of Belgium	Belgium
3	AIA Group Limited	Insurance Authority (IA)	China, Hong Kong
4	Allianz SE	Bundesanstalt für Finanzdienstleistungsaufsicht (BaFin)	Germany
5	Assicurazioni Generali S.p.A.	Istituto per la Vigilanza sulle Assicurazioni (IVASS)	Italy
6	Aviva plc	Prudential Regulation Authority (PRA)	United Kingdom
7	AXA	Autorité de Contrôle Prudentiel et de Résolution (ACPR) (Prudential Supervision and Resolution Authority)	France
8	Berkshire Hathaway, Inc.	Nebraska Department of Insurance	United States
9	BNP Paribas Cardif	Autorité de Contrôle Prudentiel et de Résolution (ACPR) (Prudential Supervision and Resolution Authority)	France
10	British United Provident Association Limited	Prudential Regulation Authority (PRA)	United Kingdom
11	Chubb Group of Companies	Pennsylvania Insurance Department	United States
12	CNP Assurances	Autorité de Contrôle Prudentiel et de Résolution (ACPR) (Prudential Supervision and Resolution Authority)	France
13	COVEA	Autorité de Contrôle Prudentiel et de Résolution (ACPR) (Prudential Supervision and Resolution Authority)	France
14	Crédit Agricole Assurances	Autorité de Contrôle Prudentiel et de Résolution (ACPR) (Prudential Supervision and Resolution Authority)	France
15	Fairfax Financial Holdings Limited	Delaware Department of Insurance	United States
16	GROUPAMA	Autorité de Contrôle Prudentiel et de Résolution (ACPR) (Prudential Supervision and Resolution Authority)	France
17	Grupo Mapfre	Dirección General de Seguros y Fondos de Pensiones	Spain
18	Great Eastern Holdings Group	Monetary Authority of Singapore (MAS)	Singapore
19	HDI Haftpflichtverband der Deutschen Industrie V.a.G.	Bundesanstalt für Finanzdienstleistungsaufsicht (BaFin)	Germany
20	Legal & General Group Plc	Prudential Regulation Authority (PRA)	United Kingdom
21	Liberty Mutual Insurance Group	Massachusetts Division of Insurance	United States
22	Münchener Rückversicherungs-Gesellschaft Aktiengesellschaft in München	Bundesanstalt für Finanzdienstleistungsaufsicht (BaFin)	Germany
23	NN Group N.V.	De Nederlandsche Bank - DNB	Netherlands
24	Prudential Financial, Inc.	New Jersey Department of Banking and Insurance	United States
25	Prudential Plc	Insurance Authority (IA)	China, Hong Kong
26	Reinsurance Group of America, Incorporated	Missouri Department of Insurance, Financial Institutions & Professional Registration	United States
27	RSA Insurance Group plc	Prudential Regulation Authority (PRA)	United Kingdom
28	SCOR	Autorité de Contrôle Prudentiel et de Résolution (ACPR) (Prudential Supervision and Resolution Authority)	France
29	SOGECAP	Autorité de Contrôle Prudentiel et de Résolution (ACPR) (Prudential Supervision and Resolution Authority)	France
30	Vienna Insurance Group AG Wiener Versicherung Gruppe	Financial Market Authority (FMA)	Austria

Source: IAIS