



Technical Practices Survey 2020

Solvency II

Financial Services

September 2020

kpmg.com/uk

Welcome to the 2020 report.

The focus of our Technical Practices Survey is to enable UK life insurance firms to identify the key technical issues within the industry, and the range of methodologies and approaches that have been adopted by their peers.

We are incredibly pleased to see continued support for our survey as it evolves, with 24 participants submitting responses this year, including full submissions from 8 and partial submissions from 3 IM/PIM firms.

We have set out an executive summary overleaf. This provides an overview at a glance of how the key stresses and indicators of risk appetite compare to the median responses provided in this and the previous year's survey. The summary indicates that core stresses such as those on equity or interest rate risk have remained relatively stable relative to the prior year, as have the stresses relating to underwriting risk. We note that considerations of COVID-19 has not yet impacted risk and dependency calibrations and we anticipate that some changes, for example on market and mortality risk dependency, will be a feature of next year's survey.

Each year, in response to market developments and participant feedback, we select thematic areas to explore in more detail in our report. This year those areas include:

- Methodologies underpinning calibration of fundamental spread under stress, which showed the granularity with which firm's re-calculate the components of fundamental spread in stressed conditions and the importance of the glidepath assumptions;
- Firm's preparedness for climate change reporting and stress testing. This showed two of the areas for potential developments identified were firms' allocating sufficient resources dedicated to climate risk and the challenges of accessing the data required for a detailed assessment of climate risks; and
- Operational Risk modelling remains an area of focus and development. We were therefore keen to understand how recent events such as the focus on operational resilience and the emergence of Covid-19 had impacted the approach. The results show that these issues are on the radar of insurers with both leading to changes to the scenarios and the calibration.

We trust that you will find the report insightful. Please contact a member of the team for more information on any of the content.

How To Read The Report

Throughout the report we use the following indicators to help provide additional context to the information shown in the charts, where relevant:

Participant firm's response: ●

YE18 Median response: ◆

The top left hand corner of each page also indicates whether the charts on that page include answers submitted by SF, IM/PIM firms, or both.



James Isden

Director

Technical Practices Survey 2020

Executive Summary

An executive summary has been introduced to the Technical Practices Survey report this year. This summary provides an overview at a glance of how a respondent's submissions for the key stresses and indicators of risk appetite compare to the median responses provided in this and the previous year's survey.

The summary indicates that core stresses such as those on equity or interest rate risk have remained relatively stable relative to the prior year, as have the stresses relating to underwriting risk. When considering risk appetite, the range of Solvency Coverage Ratios at which a warning is triggered is broader across participants than the range at which immediate action would be required.

Blank boxes indicate no response.

TMTP, VA & MA

	Median Response (YE19)	Median Response (YE18)
Benefit of TMTP on Coverage Ratio	19%	31%
Overall Matching Adjustment (bps)	110	125

Market Risk

UK Equity Stress	-45%	-46%
Equity Implied Volatility Stress (10 years)	16%	18%
Currency Stress - EUR	-23%	-22%
Currency Stress - USD	-26%	-27%
Commercial Property Stress	-31%	-32%
Residential Property Stress	-30%	-30%

Interest Rate Risk

Interest Rate - Total Stress Up - 10 years	200	192
Interest Rate - Total Stress Down - 10 years	-145	-158
Interest Rate Volatility Stress - 10 years	18%	20%

Credit Risk - Average Credit Spread Stress (10 years)

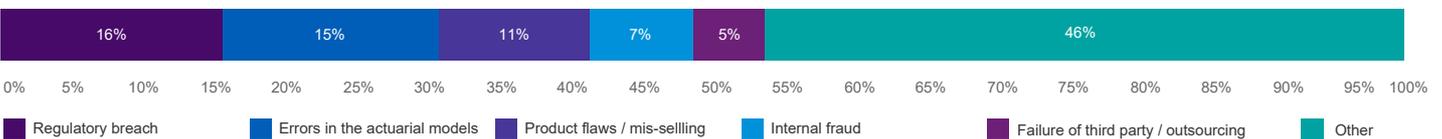
Financials - A	405	423
Financials - BBB	574	538
Non-Financials - A	255	247
Non-Financials - BBB	390	377

Longevity Risk

Female (Age 65) - Stress (increase in EoL, years)	3.2	3.0
Male (Age 65) - Stress (increase in EoL, years)	3.3	3.0

Operational Risk

Contribution of top 6 scenarios to Operational Risk Capital (Pre-Diversification)



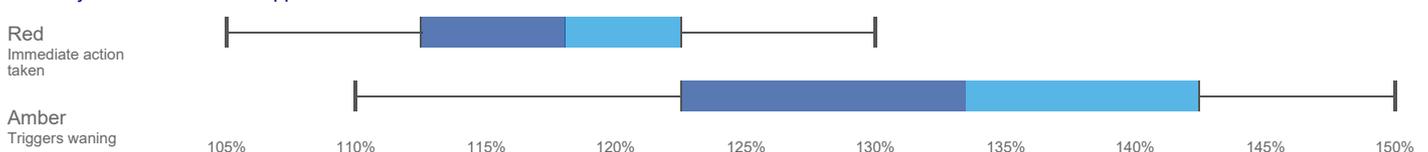
Diversification within Scenarios

Diversification within Scenarios	42%	54%
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Other Insurance Risks

Expenses Level Stress as % of BE	20%	21%
Mass Lapse Stress	30%	30%

Solvency Cover Ratio - Risk Appetite



Technical Practices Survey 2020

1. Balance Sheet

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

SF/IM

Balance Sheet Preparation

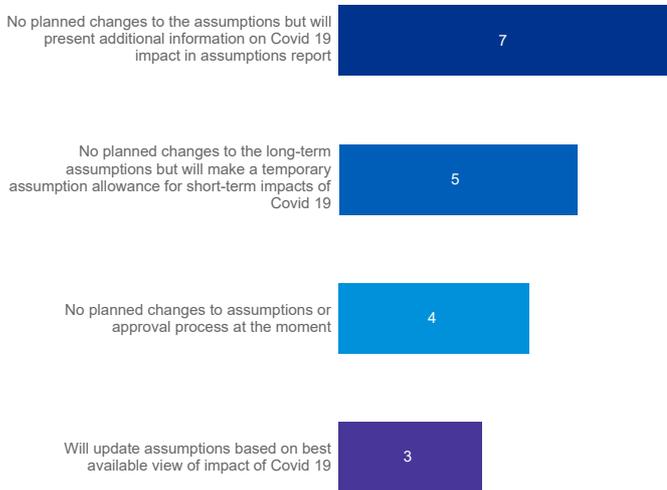
This section considers some of the key areas in the preparation of a company's base balance sheet.

In this year's survey, we asked about the impact of Covid 19 on the setting of demographic assumptions. We note that whilst Covid 19 had not yet had an impact, insurers are likely to continue to monitor their experience closely throughout the course of the year. five respondents noted that a temporary allowance would be set up for the short-term impacts of Covid 19.

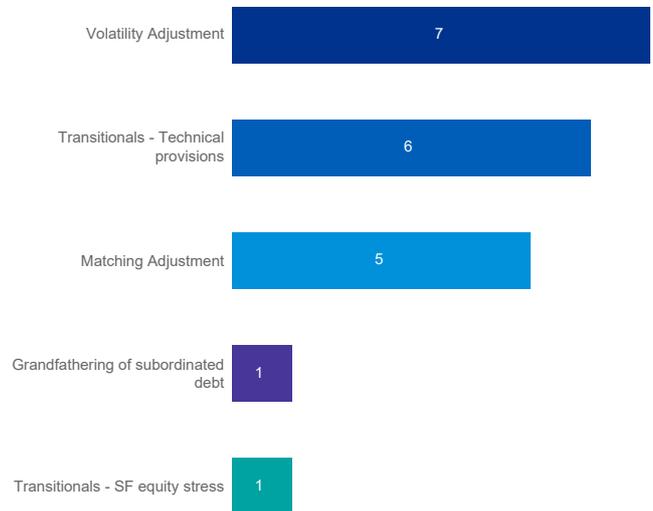
Key areas of development or model change remain broadly similar to at YE18, with firms highlighting credit and Matching Adjustment calibrations as areas of focus. The use of Long Term Guarantee Measures (LTGM) continues to be widespread. Of the four firms not making use of LTGM, one noted they are currently applying for the Volatility Adjustment.

EIOPA delayed its deadlines for consultations on reviewing technical aspects of supervisory reporting and public disclosure due to the impact of COVID-19 on firms, in order to alleviate the burden of firms in the market. An impact assessment by EIOPA is expected later this year. Our responses suggest that the most impactful of the Solvency II consultation proposals include changes to the Risk Margin calculation in terms of tapering and changes to interest rate calibrations under the Standard Formula.

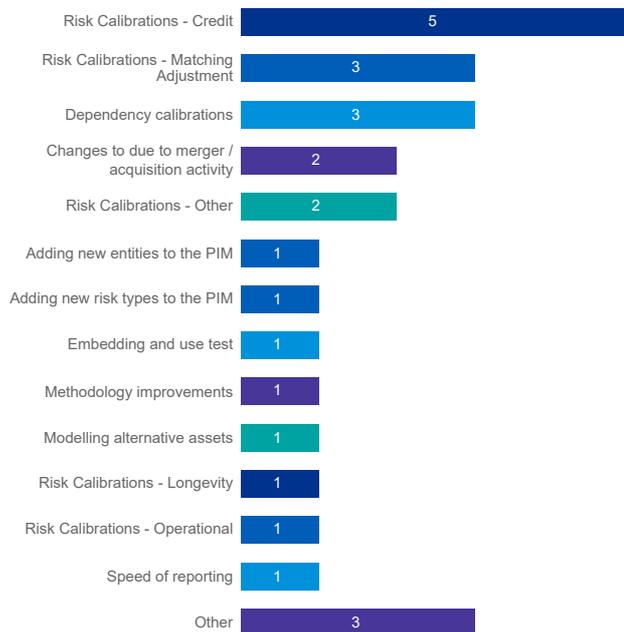
1.1 What is your current view of the impact of Covid 19 on your demographic assumption setting process?



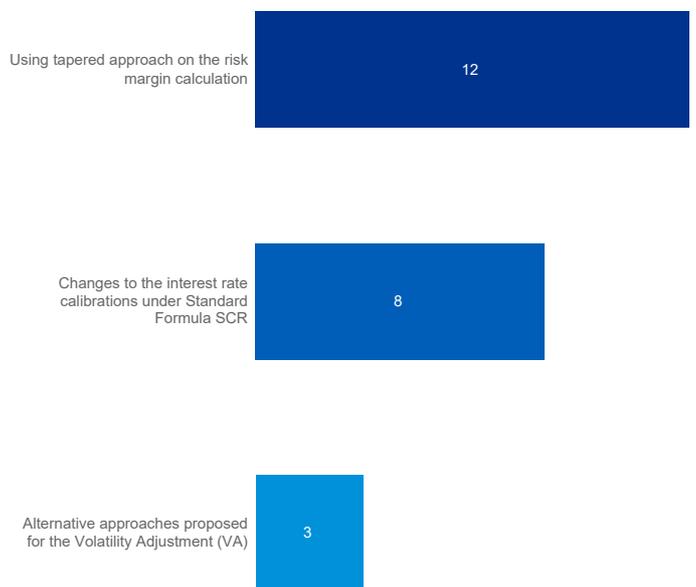
1.2 Which of the following long term guarantee measures do you use in your balance sheet?



1.3 What are the key developments or model changes that you will focus on in 2020 and 2021?



1.4 What do you anticipate to be the most impactful of the EIOPA 2020 Solvency II Consultation Proposals?



Risk calibrations – Other includes expense, equity release and commercial mortgage calibrations.
Other includes improvements to proxy modelling, a new platform, and an application for a dynamic VA.

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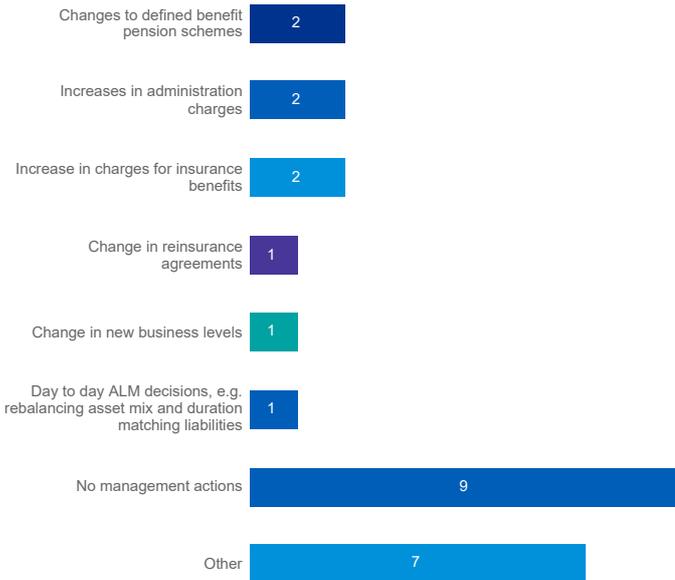
SF/IM

Management actions and Risk Margin

We have observed that firms have well-established management actions for with-profits business, and there have been no significant changes compared to YE18. Although limited respondents have shown expenses under mass lapse as actions, responses on other areas of the survey suggest that these actions are more widespread.

We have not observed any changes to Risk Margin projection methodology.

1.5a For non-profit business, which management actions are assumed in the capital measures listed at 31st December 2019?



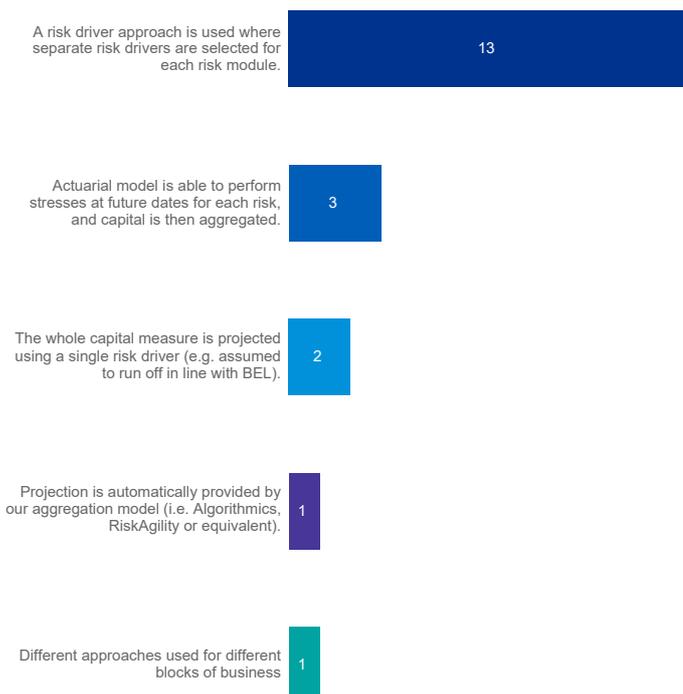
Other includes a reduction in expenses following a mass lapse event, passing profits / losses from non-profits business to with profits policyholders, cost saving initiatives, reviewing premium rates, and changing EBR in unit-linked funds.

1.5b For with-profit business, which management actions are assumed in the capital measures listed at 31st December 2019?

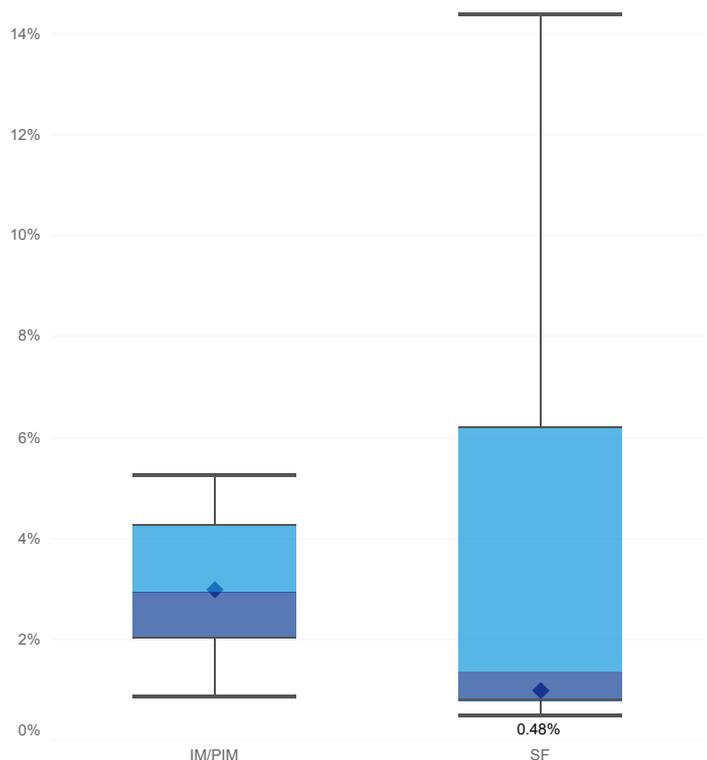


Other includes dynamic hedge rebalancing and cuts to basic asset share.

1.6 How do you project your capital requirements for the calculation of the risk margin?



1.7 What is the risk margin as a % of your technical provisions?



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1. Balance Sheet

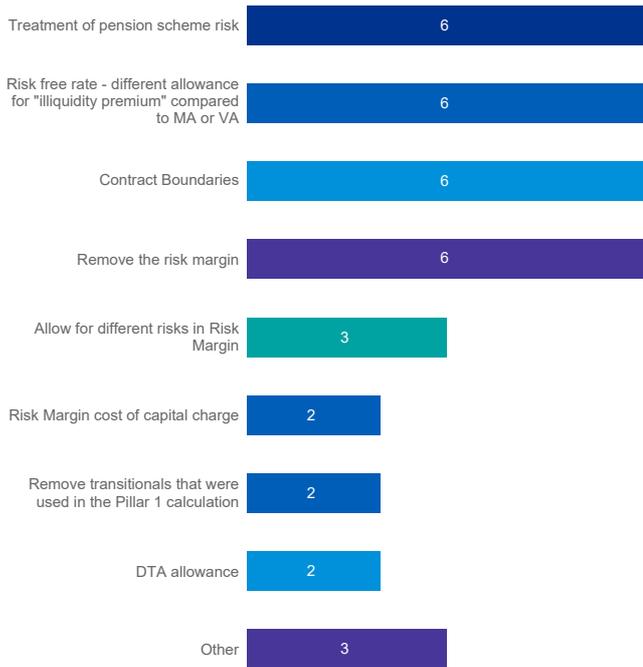
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SF/IM

Pillar II and ORSA

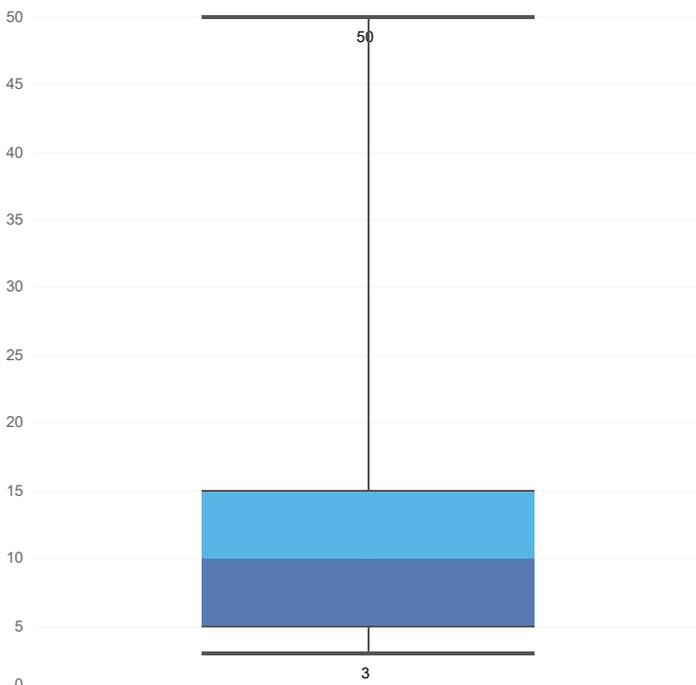
Firms continue to have differences between their Pillar 1 and Pillar 2 balance sheet and capital methodologies. Similar to last year, the most common differences relate to the risk margin, discount rates, pension scheme treatment and contract boundaries. Changes in the SCR are primarily driven by additional risks in scope for SF firms and more economic treatment of specific exposures, e.g. pension scheme.

1.8 Which of the following areas do you treat differently when performing your Pillar 2 calculations vs Pillar 1 calculations, in regards to Technical Provisions?

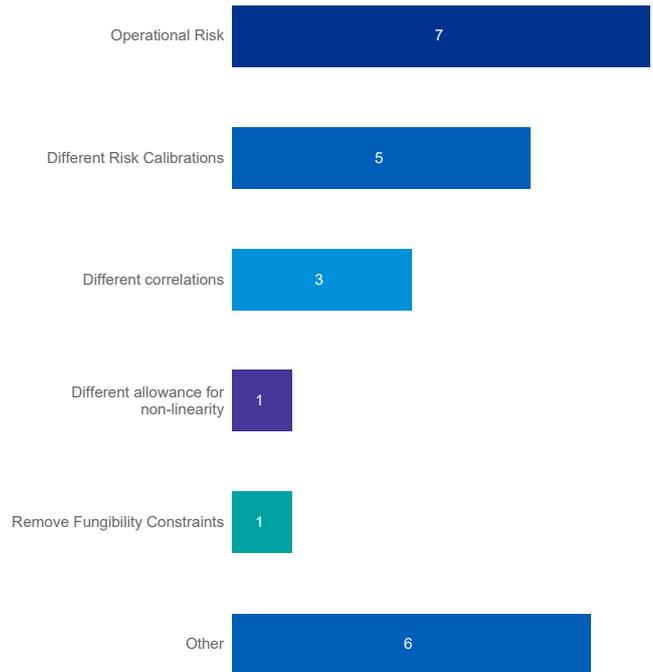


Other includes treatment of WP enhancements, removal of TMTP, RFR based on a mix of gilts and swaps, and allowance for a larger amount of group recharges in addition to those allocated to policy maintenance costs.

1.10 For how many years do you project your Pillar 1 balance sheet as part of your ORSA?

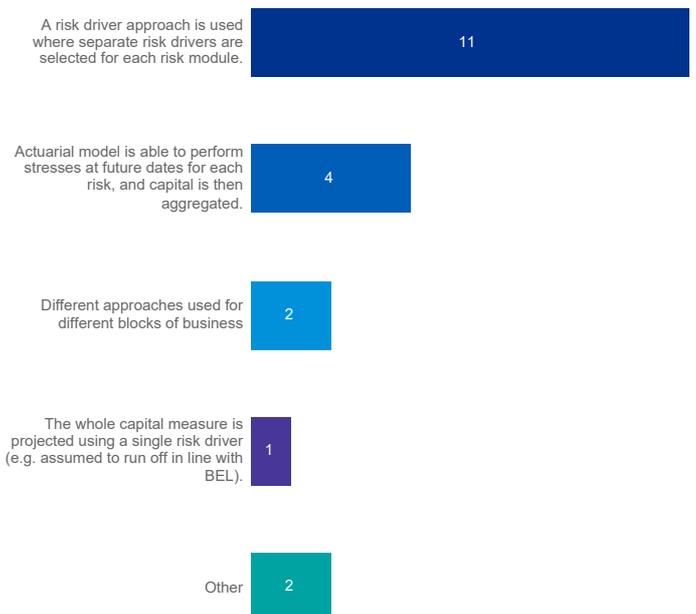


1.9 Which of the following areas do you treat differently when performing your Pillar 2 calculations vs Pillar 1 calculations, in regards to SCR?



Other includes additional risk categories, additional diversification and different staff pension scheme treatment.

1.11 How does your company project its future capital requirement in the ORSA?



Other includes a combination of modelling and risk drivers used for the different capital requirements for each risk.

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SF/IM - Only responded by IM

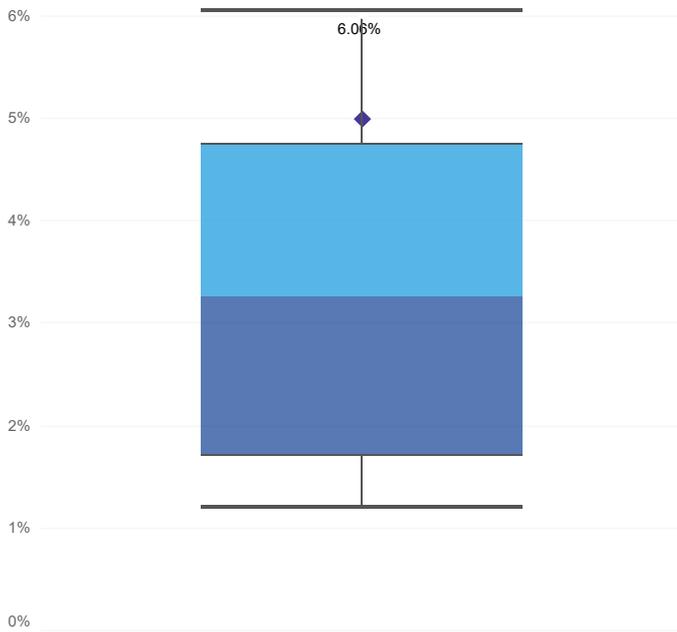
Transitional Measure on Technical Provisions

All participants who responded last re-calculated the TMTP on the 31st December 2019 as a result of the scheduled two-year re-calculation.

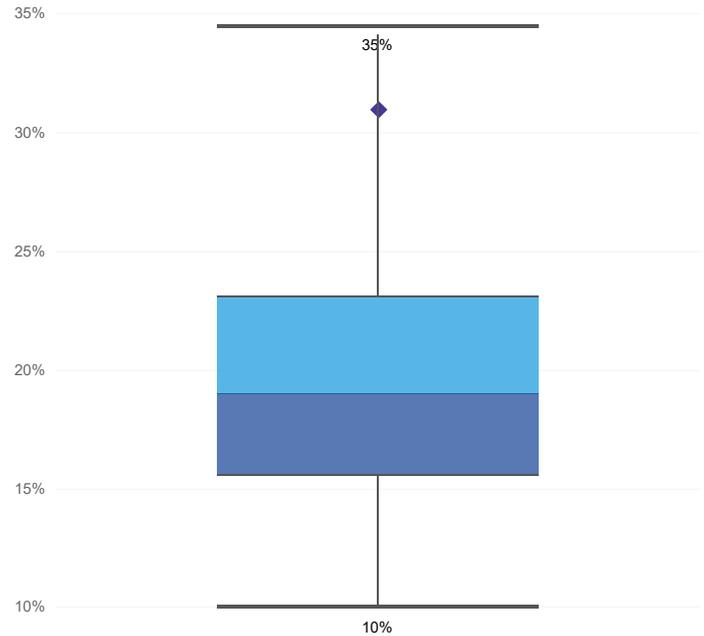
Although, not presented as a graphical response, we did query firms on whether they have made changes to their TMTP calculation methodology over the last year, or whether they plan to over the next couple of years. No firms reported changes made over 2019. However, some reported that over the next couple of years, planned developments include simplifying the FRR test calculation, reviewing existing approximations in the calculation and reviewing the treatment of pension schemes.

The coverage ratio benefit on using TMTP has reduced quite significantly from last year, although this is largely due to the sample of responses this year. Excluding the differences in participants, the trend observed is a smaller decrease in the impact of TMTP, from a median of 26% at YE18 to 19% at YE19.

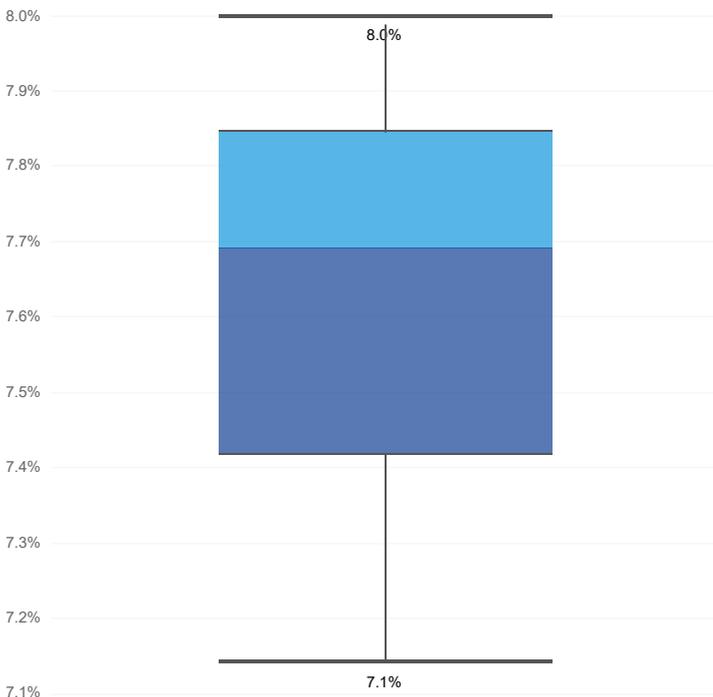
1.12 What is the transitional measures as a % of your technical provisions?



1.13 What is the coverage ratio benefit of using TMTP at YE19?



1.14 What is the overall rate of amortisation in 2019 in the absence of TMTP re-calculation?



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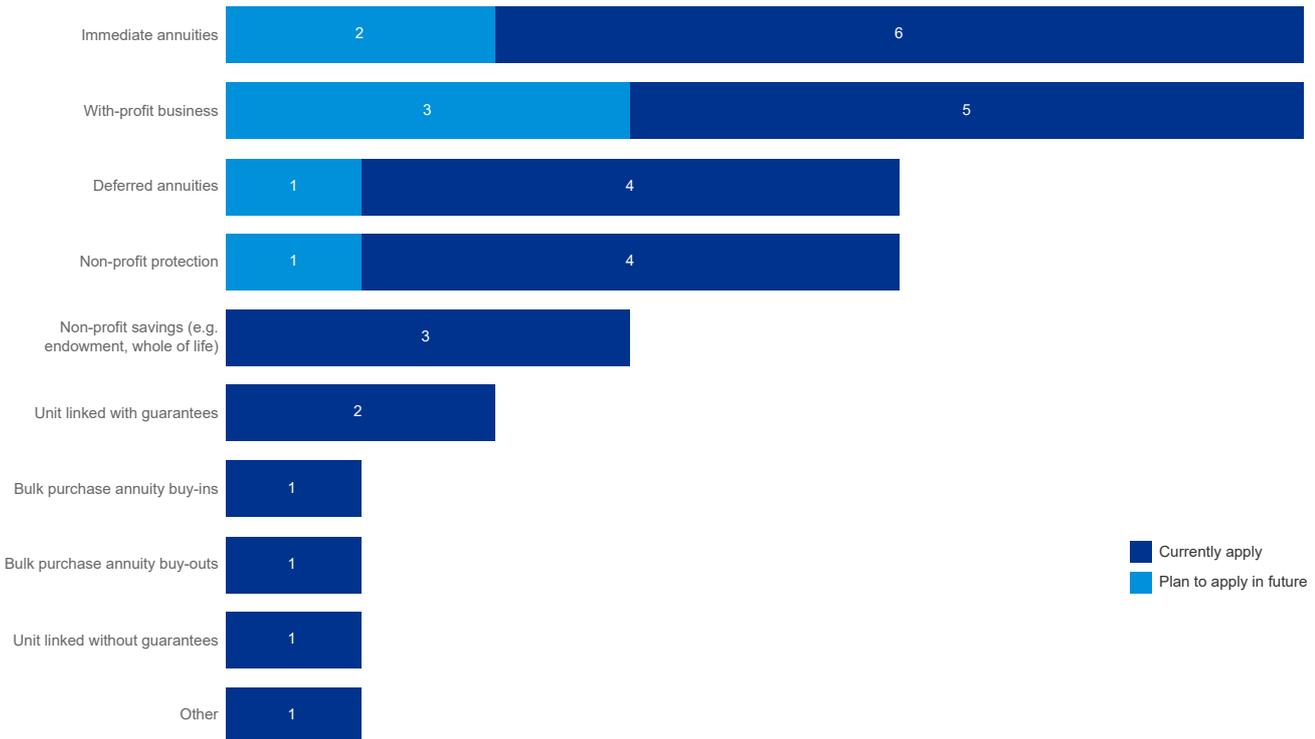
SF/IM

Volatility Adjustment

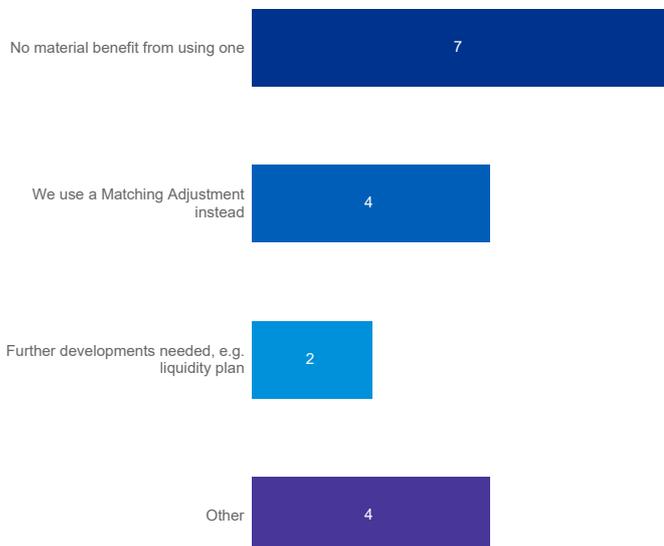
The Volatility Adjustment (VA) continues to be attractive to companies, with a number of companies planning to apply to use the VA for one or more types of business in the coming year. The Volatility Adjustment has been relatively volatile throughout the first six months of the year moving from 0.15% at YE19, to 0.50% at Q120 and 0.27% at HY20. At YE18, the Volatility Adjustment was 0.27%. During the market turmoil caused by Covid-19 the VA did dampen some of the impacts of spread widening which provided a benefit to the firms that used it.

Most respondents do not plan to apply for a Dynamic Volatility Adjustment this year, mainly because many do not have approval to use the base Volatility Adjustment yet.

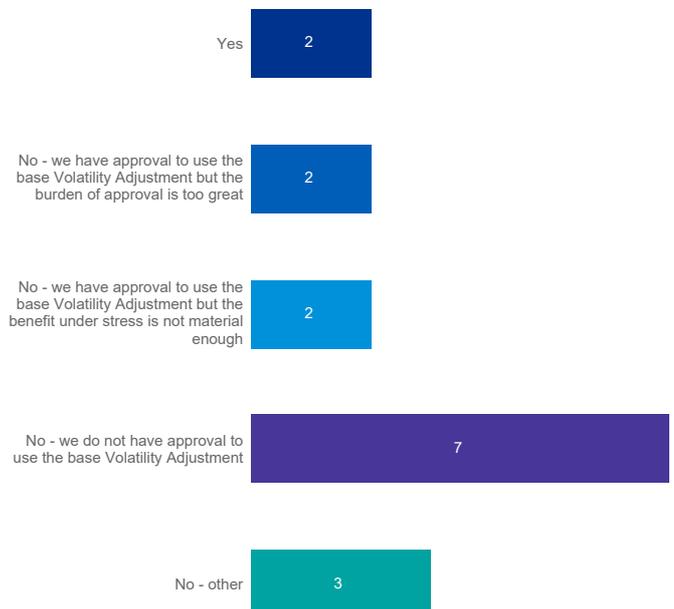
1.15 For which of the following types of business do you apply a Volatility Adjustment?



1.16 Where you do not use a Volatility Adjustment, what is the main reason for not doing so?



1.17 Do you intend to apply for the Dynamic Volatility Adjustment in the future?



Other includes awaiting PRA approval and needing further developments.

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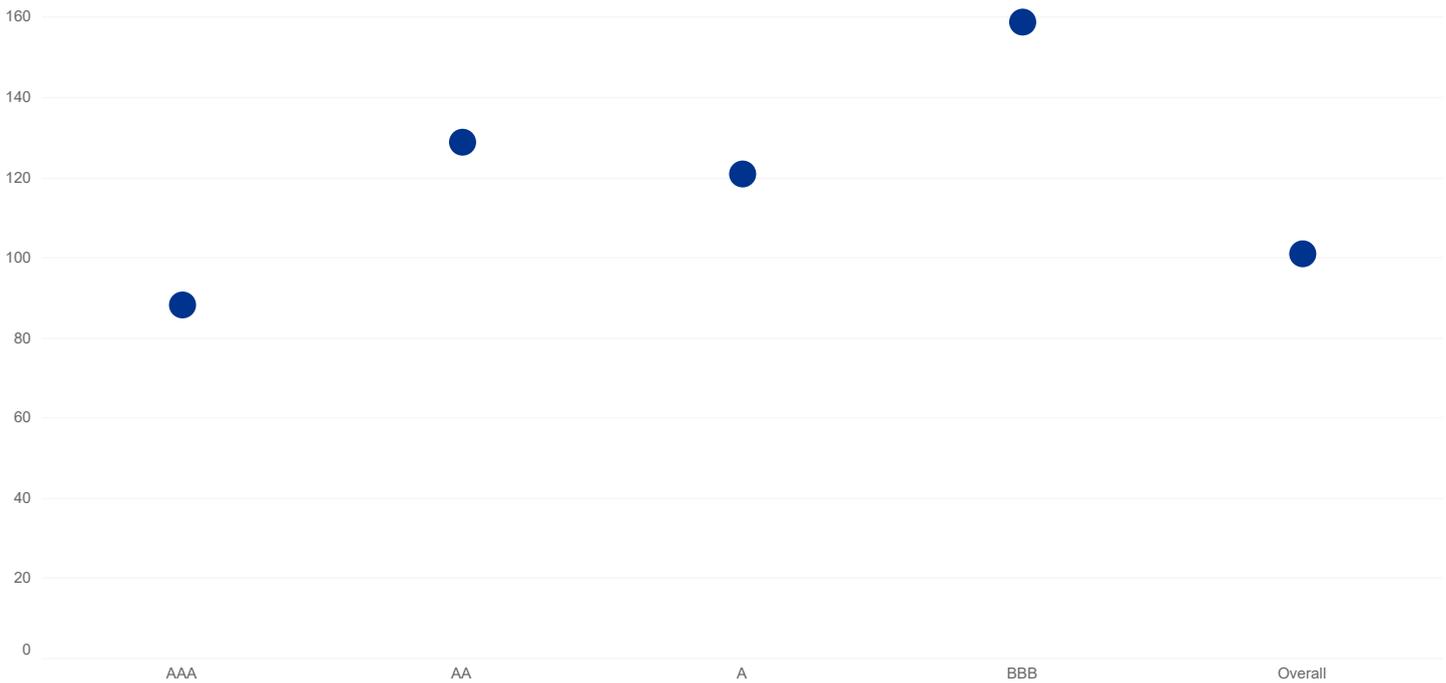
SF/IM - Only responded by IM

Matching Adjustment

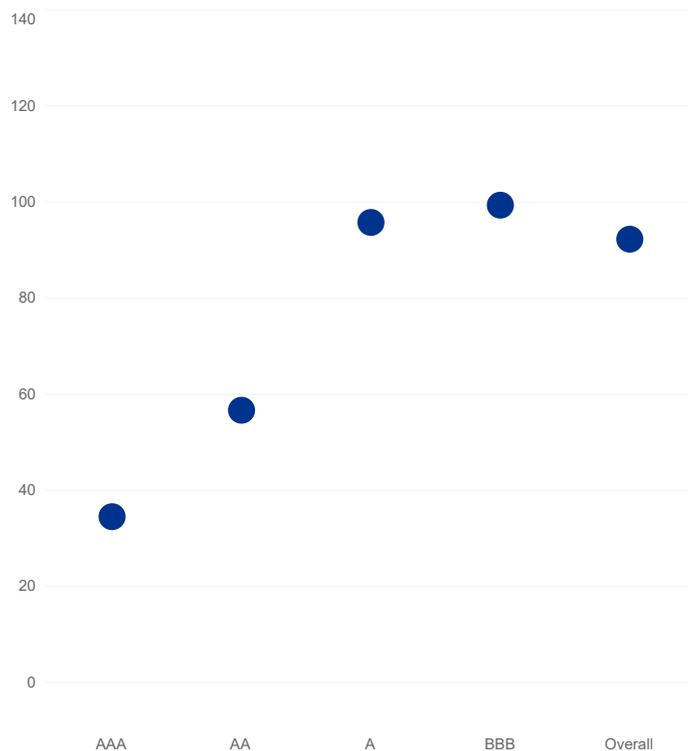
The average base MA decreased to 105bps at YE19 from 124bps at YE18 (comparing participants who participated in both YE18 and YE19 TPS survey). This is mainly driven by decrease in credit spreads over 2019 (iBoxx A rated corporates 10-15 years decreased by 44bps over 2019).

● Market Average ● Company Answer

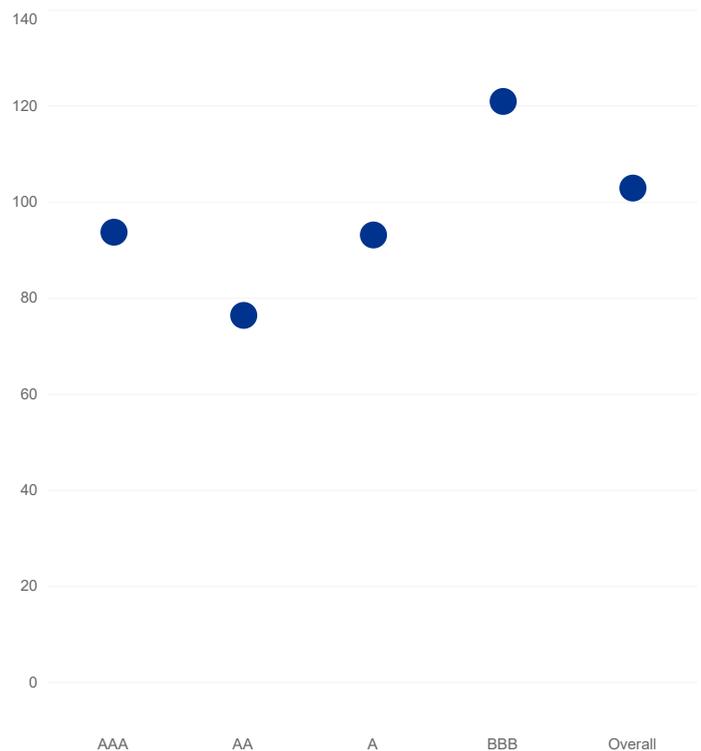
1.18a Base Matching Adjustment (in bps) - Overall



1.18b Base Matching Adjustment (in bps) - Financials



1.18c Base Matching Adjustment (in bps) - Non Financials



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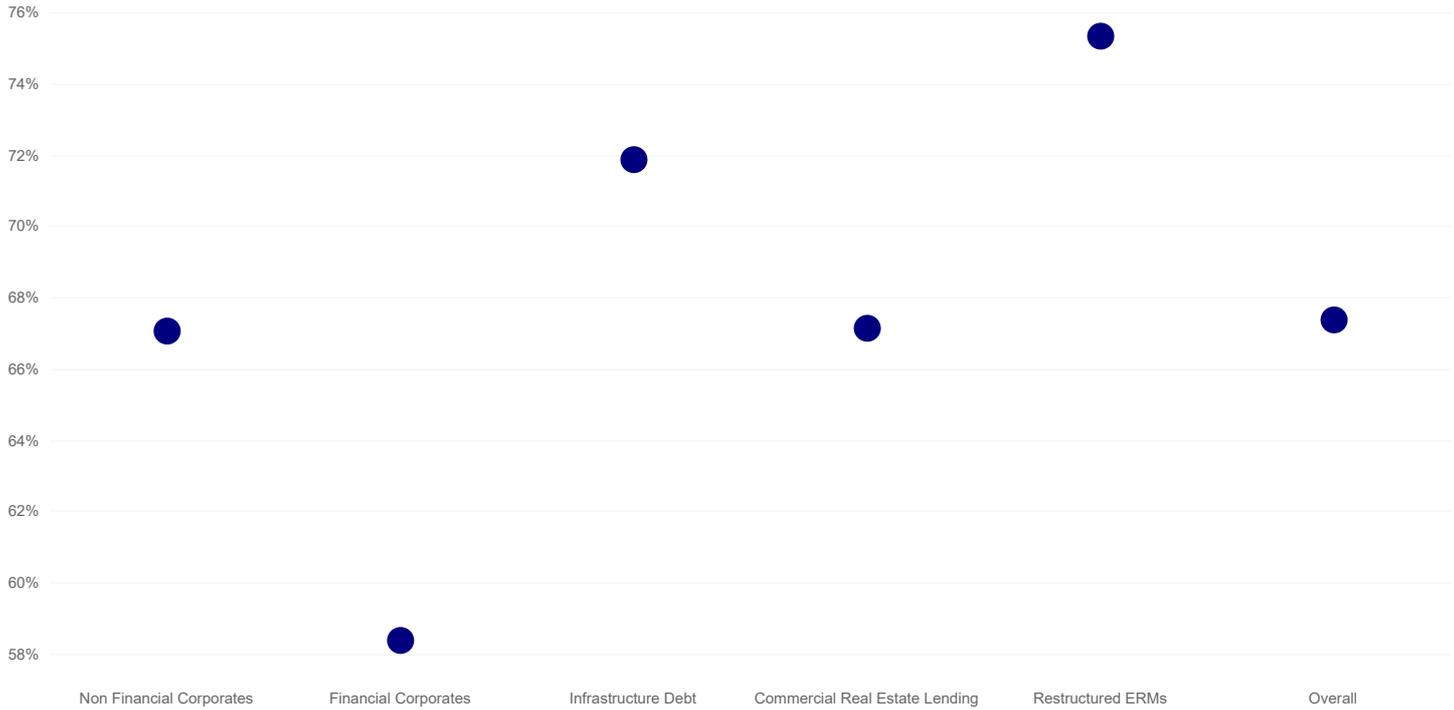
SF/IM - Only responded by IM

Matching Adjustment

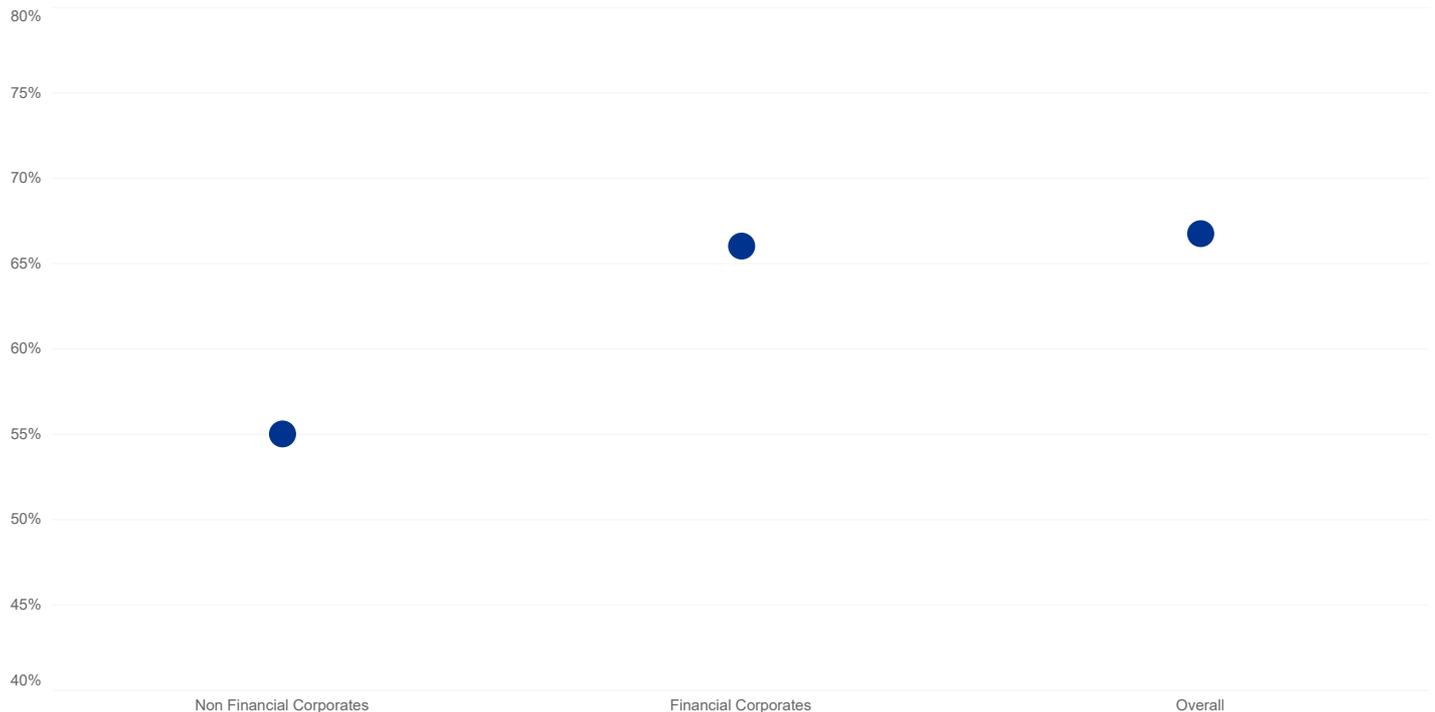
An average of 67% at YE19 of the assumed credit spreads goes to stressed MA as compared to 58% at YE18 (comparing participants who participated in YE18 and YE19 TPS survey).

● Market Average ● Company Answer

1.19 Proportion of base spread realised as MA - Overall



1.20 Proportion of increase in spread realised as MA under Stress - Overall



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SF/IM

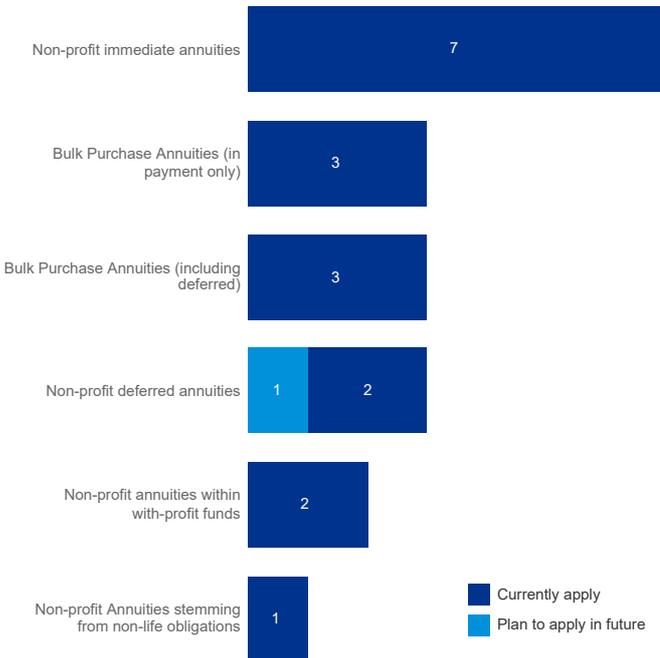
Matching Adjustment

As expected, the Matching Adjustment is most commonly used for immediate annuities. However, some companies also use the Matching Adjustment for deferred annuities, including open market option and bulk purchase annuities.

We found that some companies are still planning an extension to the Matching Adjustment coverage showing that this is still an evolving area where some firms are keen to extend the benefit of the Matching Adjustment.

We have also observed that the maximum level of make whole spread considered to make each asset eligible for Matching Adjustment, has remained broadly unchanged from YE18. Additionally, all respondents noted that they use the risk free rate to discount the reinsurance asset in the Matching Adjustment portfolio.

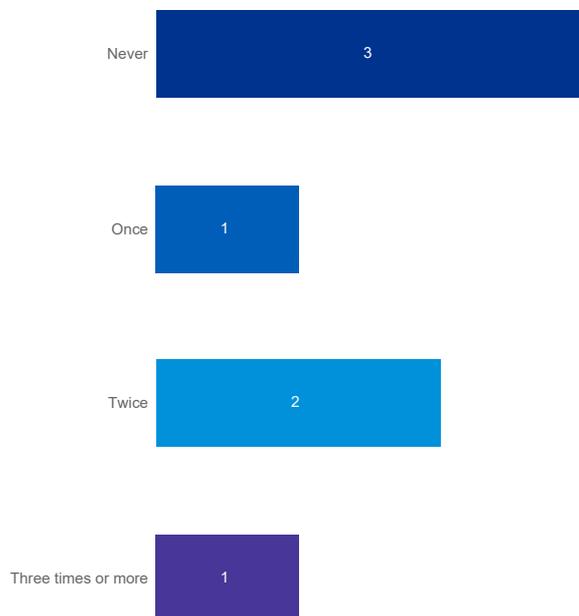
1.21 Which of the following business classes do you have approval to include in your Matching Adjustment portfolios, or do you plan to apply for in the future?



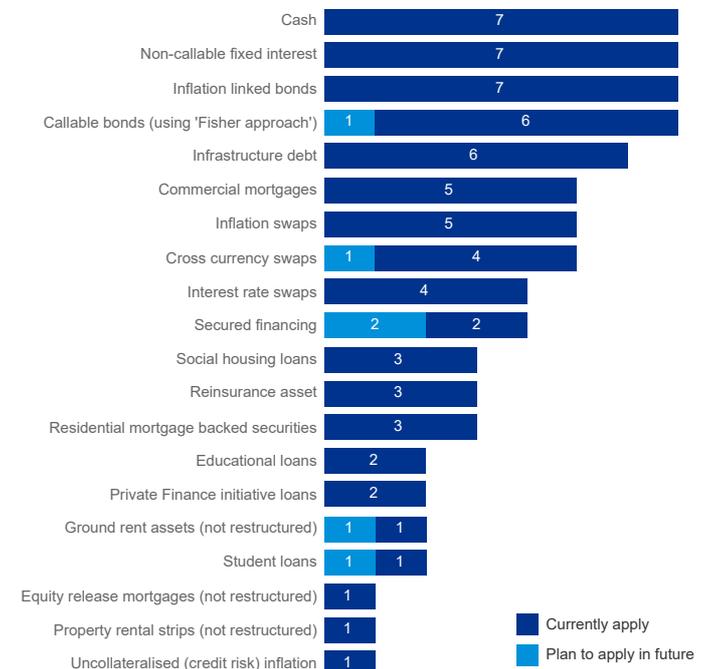
1.22 Where you do not use a Matching Adjustment, what is the main reason for not doing so?



1.23 How many times have you extracted surplus from the Matching Adjustment fund in the last 12 months?



1.24 Which of the following asset classes (excluding any restructures for e.g. equity release mortgage assets) do you have approval to include in your Matching Adjustment portfolios or do you plan to apply for in the future?



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2. Standard Formula-specific Risk

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SF

Preparation

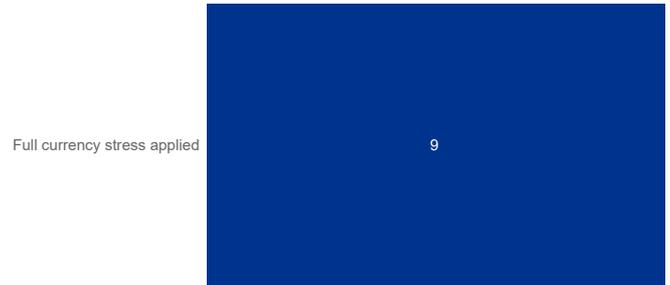
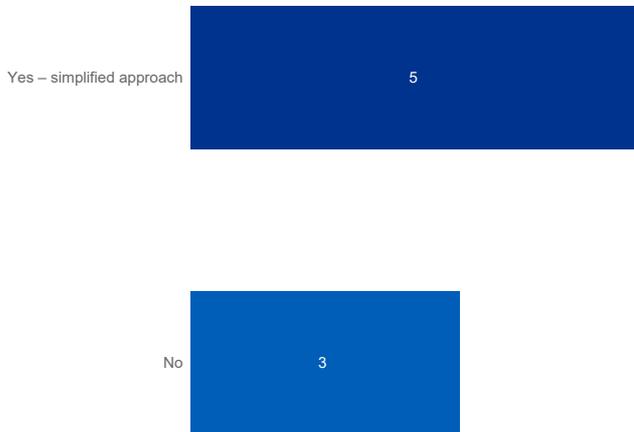
In response to feedback received, SF responses to mortality and operational risks are now presented alongside IM responses. Please refer to Section 6 for mortality risk and Section 8 for operational risk responses.

Treatment of derivatives in the preparation of the Balance Sheet seems to be split between not being modelled explicitly or being modelled with a simplification. Additionally, all respondents have stated that assets denominated in non-GBP currencies have a full currency stress applied. Both are consistent with the pattern observed last year.

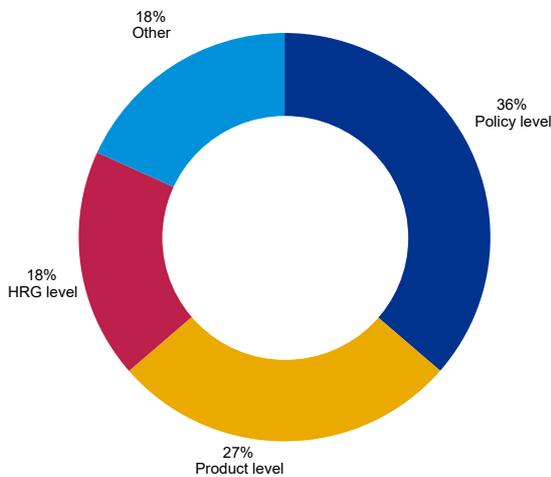
The survey found that all firms who responded are applying the full stress to non-GBP assets and therefore the use of FX hedging is limited.

2.1 Where you have derivatives within a fund that you invest in, do you model these explicitly in the SCR?

2.2 How do you stress assets denominated in non-GBP currencies which are backing liabilities in the same currency?



2.3 At what level do you apply the most onerous of longevity risk and mortality risk test?



Other includes separate testing of the two risks, and including both in the Life & Health modules.

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2. Standard Formula-specific Risk

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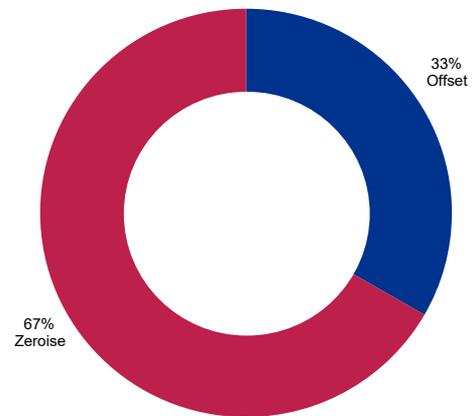
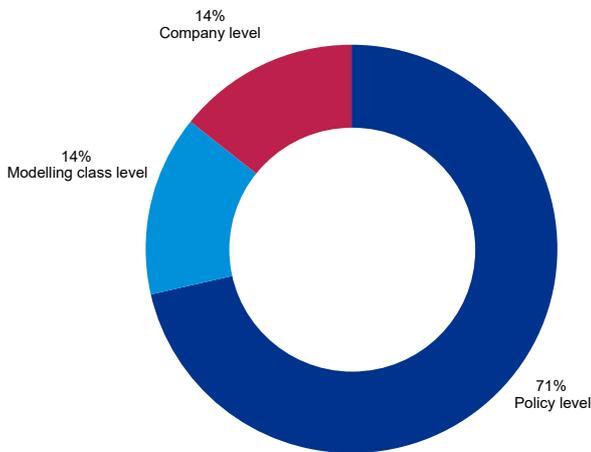
SF

Lapse Risk

There are no firms for whom the up lapse stress is the most onerous, this is due to the calibration of the mass lapse which outweighs the up stress. We have explored the treatment of expenses given the responses to the EIOPA Q&A and PRA comments and found that practice still varies widely. A number of firms set out reasons for the assumption that expenses are variable in the mass lapse scenario, this included available management actions or expense arrangements with external parties. There are no notable differences in the approach between the firms for which the mass lapse bites and those for whom the down stress bites.

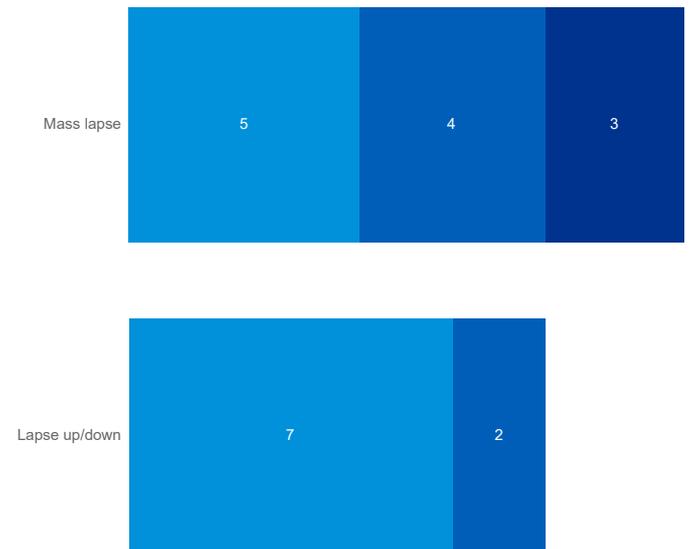
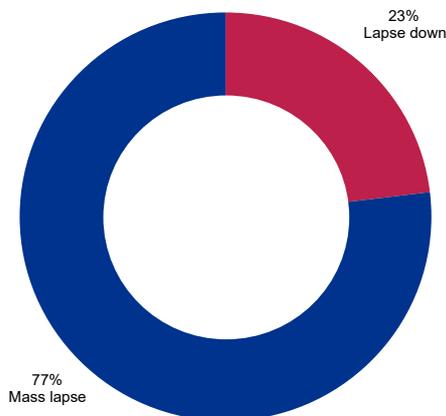
2.4a In performing the calculation for the up and down Lapse stress, at what level do you allow for offsetting BEL movements between policies?

2.4b Within the policy groups in part a), do you offset BEL movements or zeroise the beneficial results?



2.5 Which of the lapse stresses is the biting one for your capital requirement?

2.6 What assumption do you make about expenses in each of the lapse stresses?



- Assume that some expenses are overheads which run-off over time but not directly in line with policy numbers
- Assume that some expenses are overheads which stay fixed and do not vary in line with policy numbers
- Assume that the expenses vary in line with policy numbers

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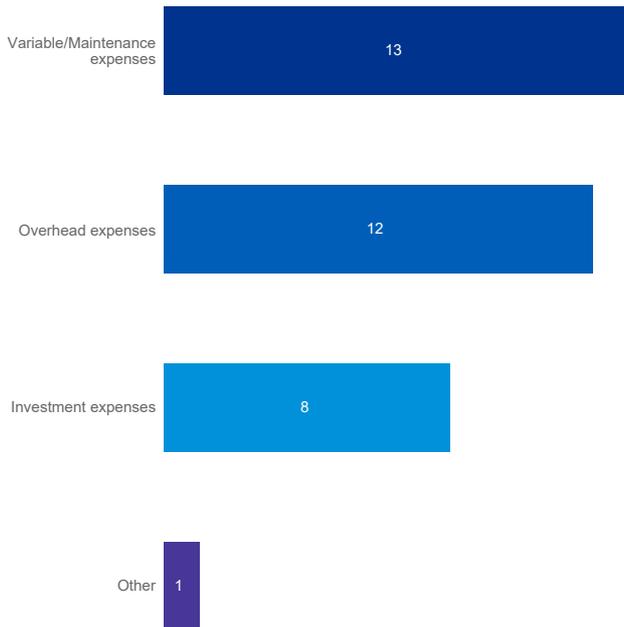
SF

Expense Risk

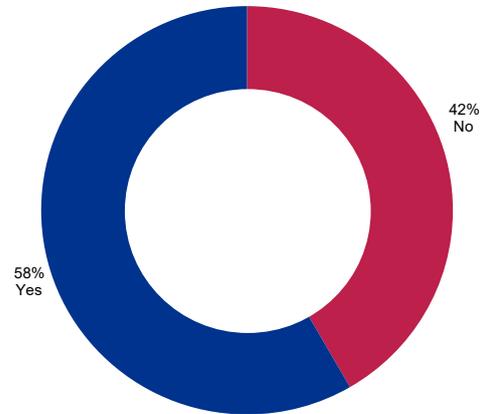
We continue to see a variety of approaches to investment expenses, but almost all companies stress both the overhead and variable expenses. The approach to outsourced expenses varies and depends on the actual agreements in place. Some firms mentioned approaches such as not stressing for inflation or only stressing at the end of the term of the outsourcing showing how the approach to capital is varied depending on the contractual arrangements are.

The issues firms find challenging in the Standard Formula SCR remain similar to last year's list with the lookthrough approach on assets still seen as the most challenging overall.

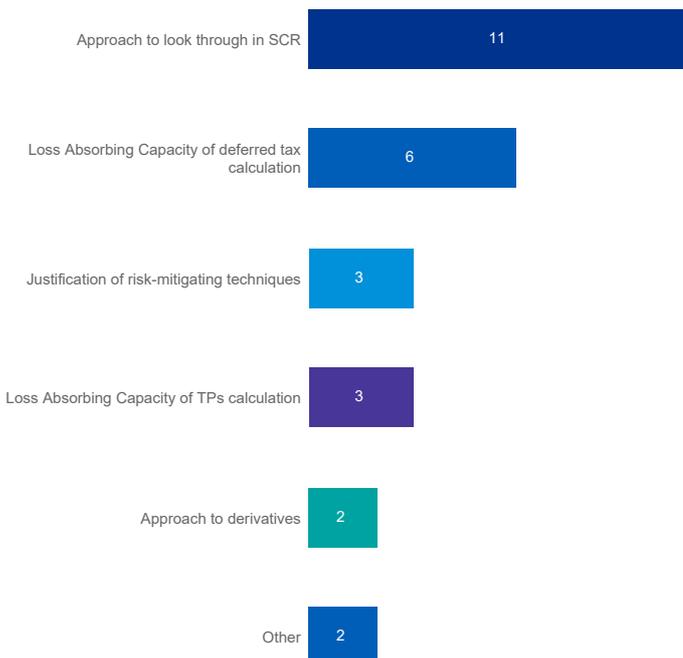
2.7 Which of your expenses are subject to the stressed expense stress?



2.8 Do you stress your fixed outsourced expenses in the expense risk SCR?



2.9 What are the 3 most complex areas of the standard formula SCR to model?



Other includes policy level modelling for lapse risk, and counterparty risk.

Technical Practices Survey 2020

3. Market Risk (excluding Credit Risk)

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

IM

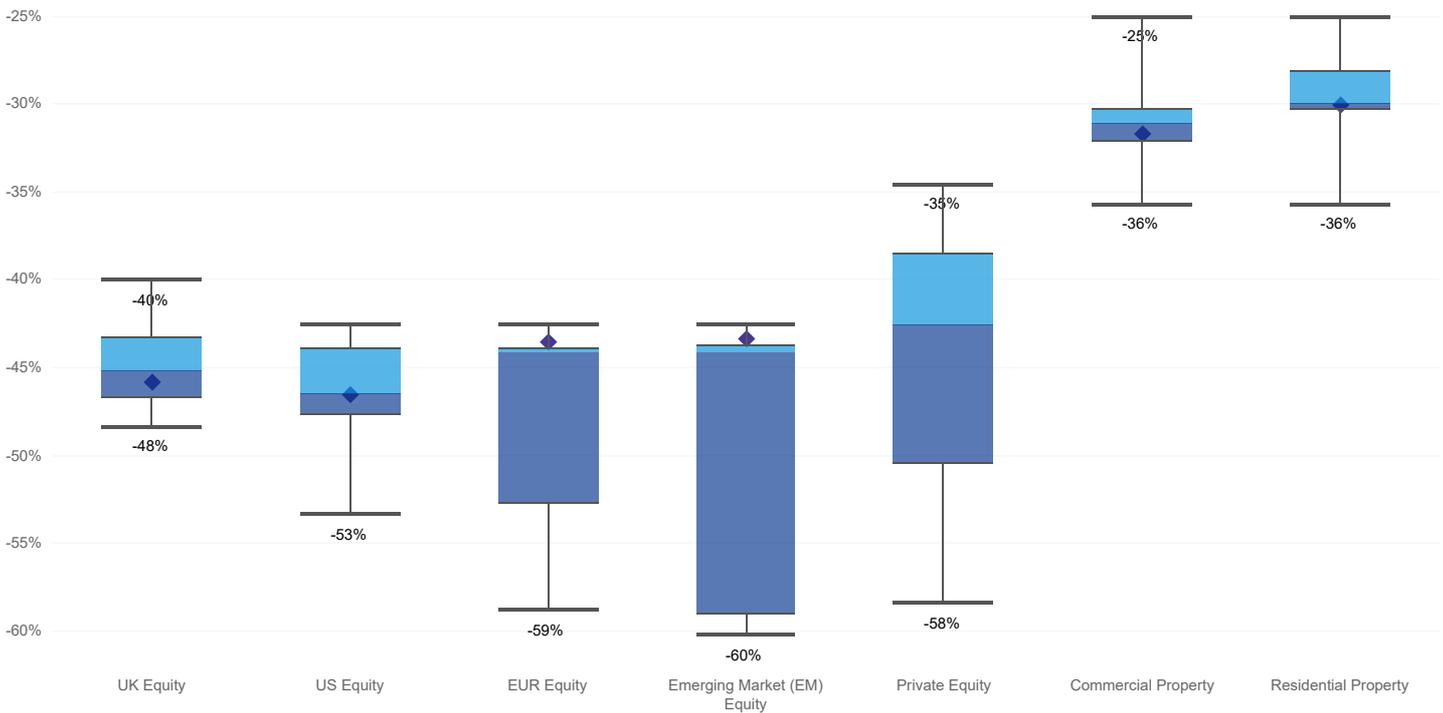
Core Calibrations - Equity and Property

All of the core stress calibrations detailed in the survey have remained broadly similar to those used by firms at YE18. Responses also indicate that there have been very limited changes made to the statistical distributions used to model market risks, or to the indices used as part of those calibrations.

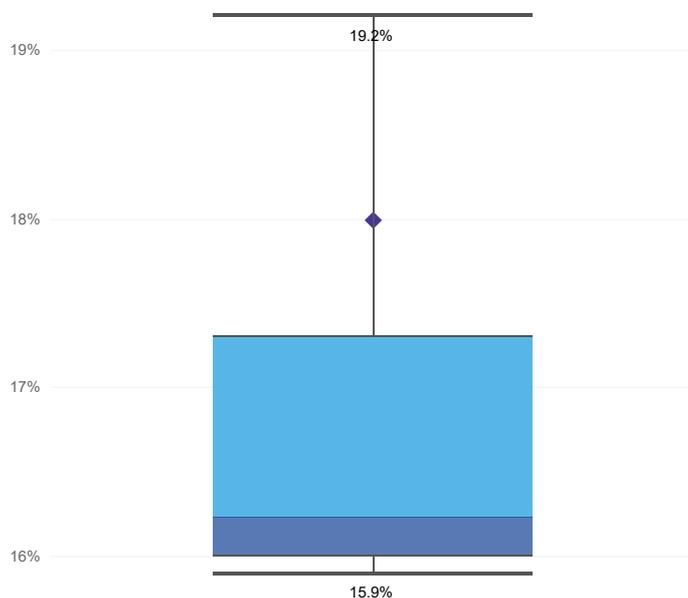
The median equity stress is between 44% and 46% across the three main currencies. The median equity volatility stress is 13% at the 10 year term.

In addition to last year's survey, stresses for commercial and residential property have been included. Most firms apply the same stress to both property types, though three firms have small differences in the stress applied. The median stress is 31% for commercial property and 30% for residential.

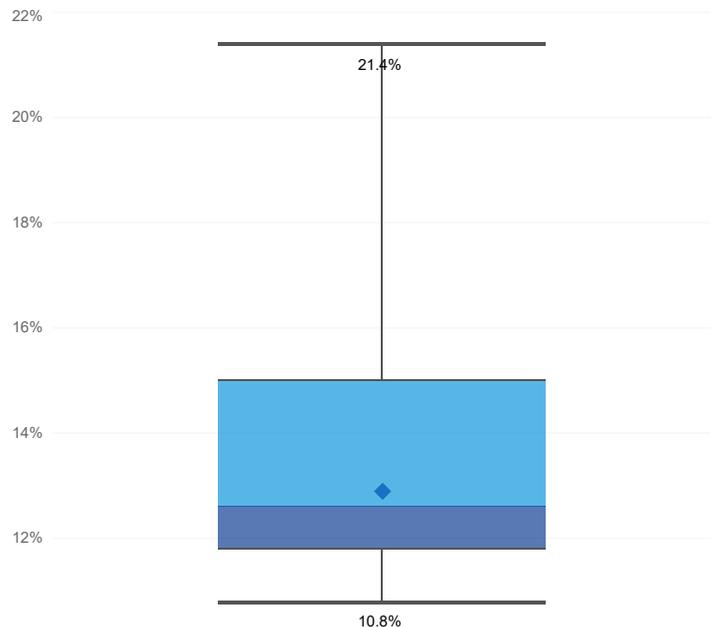
3.1 Equity and Property 1-in-200 stress - Reduction percentages



3.2 Equity Rate Volatility - Base



3.3 Equity Rate Volatility - 1-in-200 additive stress



No participants indicated a differentiation in calibrations across terms.



Technical Practices Survey 2020

3. Market Risk (excluding Credit Risk)

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

IM

Core Calibrations - Property, Currency and Inflation

The median currency stresses are relatively unchanged from last year, although for USD, the range of the stresses has decreased from -40% to -31%.

3.4 Commercial Property Rate Volatility - Base

Under 5 years 5 years 10 years 15 years 20 years

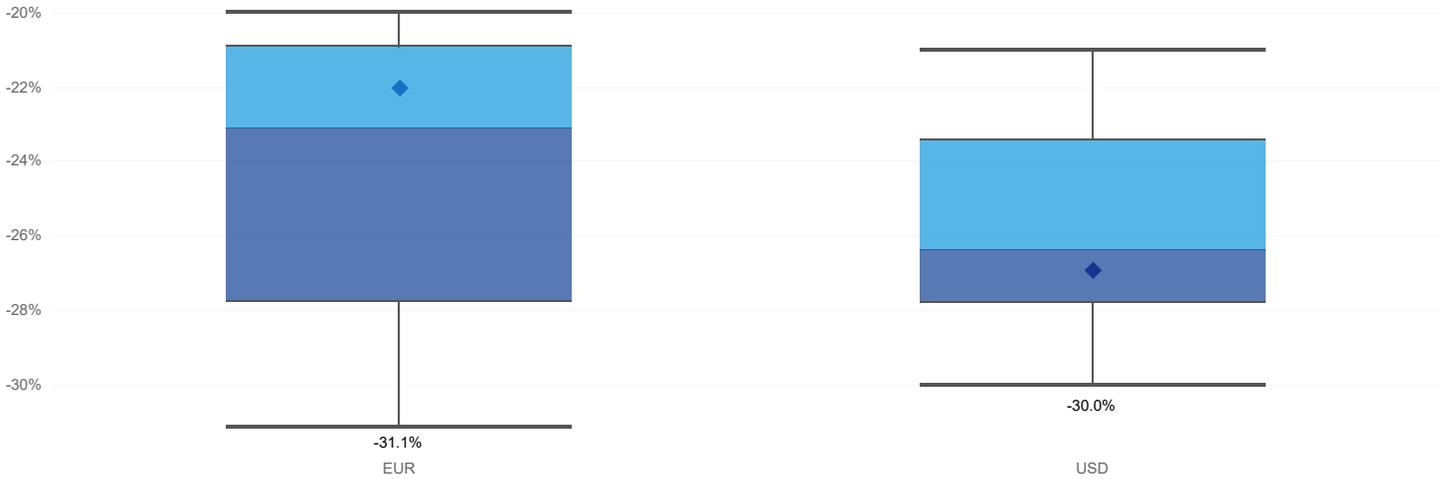
Market Average	16%	15%	16%	16%	16%
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3.5 Commercial Property Rate Volatility - 1-in-200 additive stress

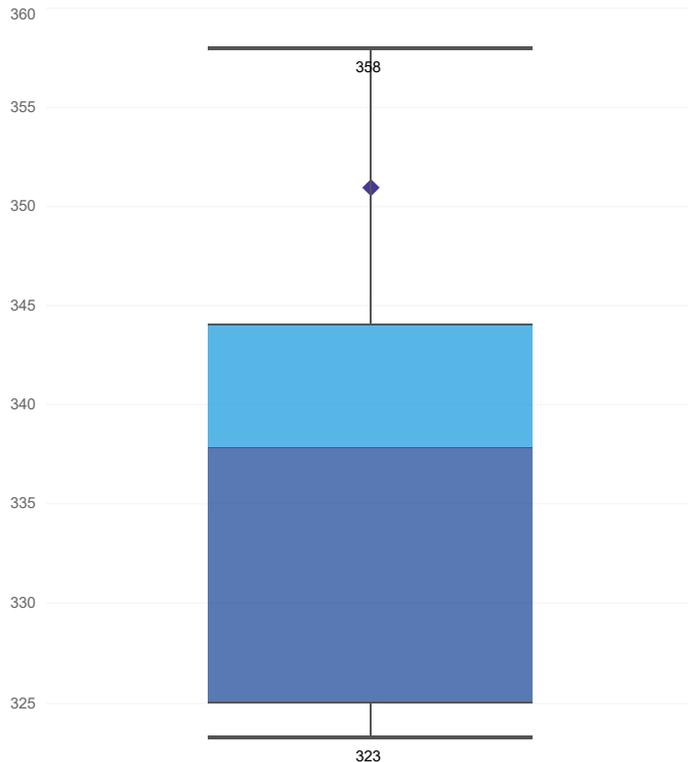
Market Average	7%
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No participants indicated a differentiation in calibrations across terms.

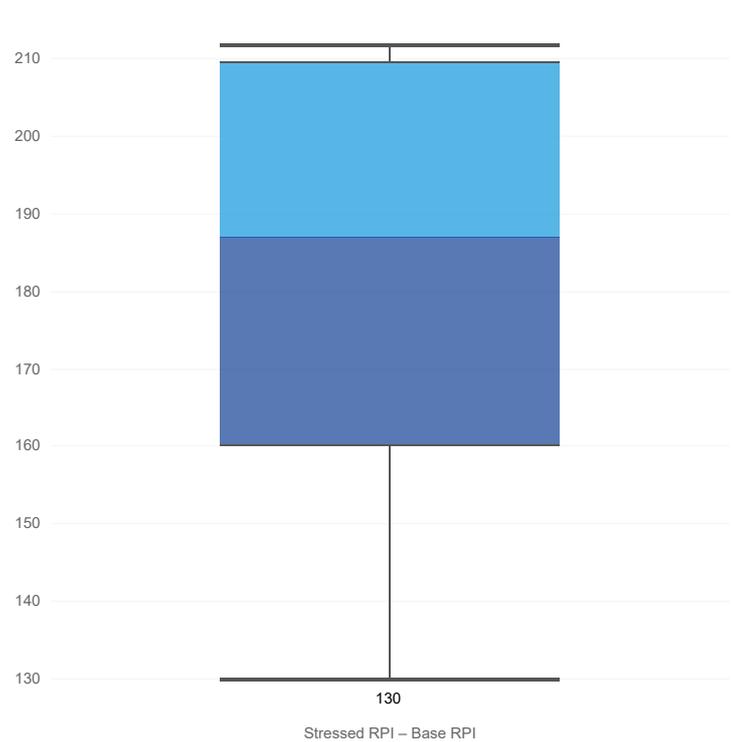
3.6 Currency stress - Depreciation with respect to GBP



3.7a Market inflation - Base RPI - 10 year tenor (bps)



3.7b Increase in stressed RPI - 10 year tenor (bps)



4. Interest Rate Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

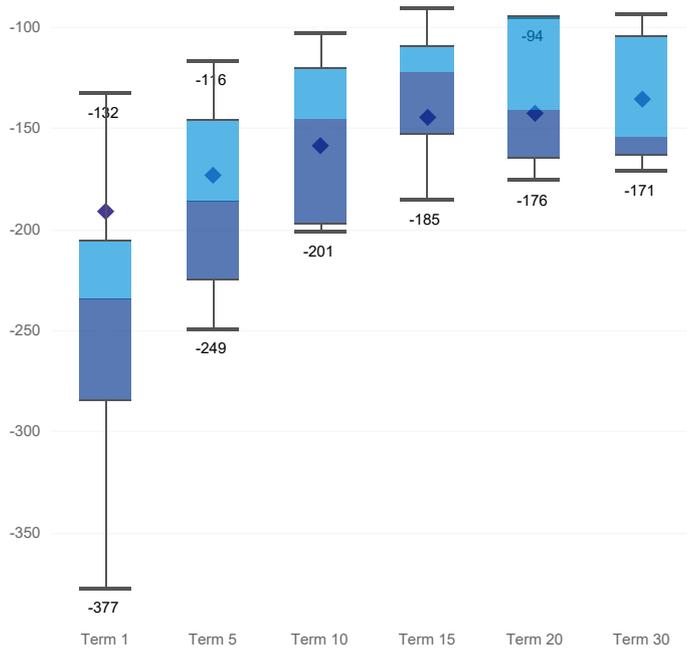
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Interest Rate Calibration

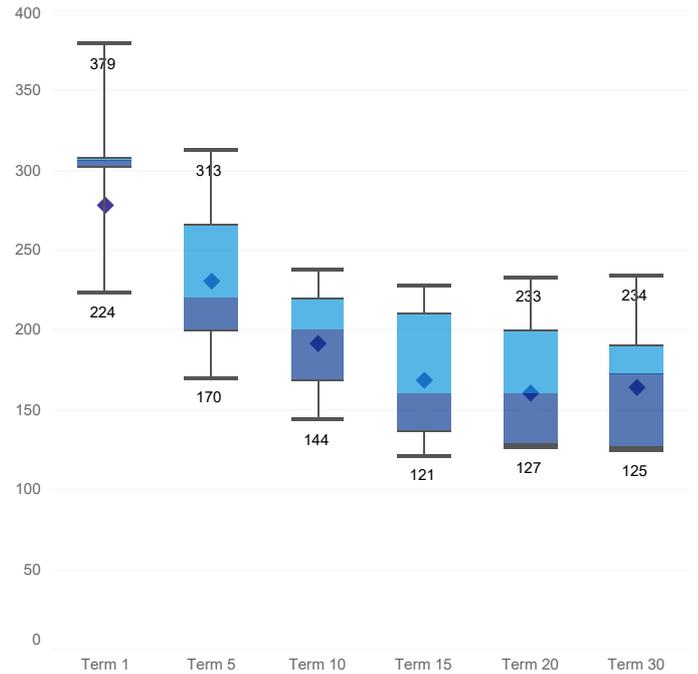
Interest rates remain a key risk for many firms. Interest rates fell significantly over 2019. This resulted in half of the companies responding to the interest rate stress calibrations reporting lowered interest rate stresses at YE19 compared to at YE18, with the other half of the respondents reporting interest rate stresses that were materially similar to YE18. In reviewing the results, we noted that there is no clear correlation between the use of a displacement/additive model, and whether stresses have decreased from YE18.

There is a wide disparity in the interest rate stresses (including interest rate volatility and gilt-swap spread stresses, produced by different companies) reflecting the variety of methodologies adopted in the industry. The differences may also reflect companies targeting appropriate stresses to reflect their exposure to interest rate risk by duration.

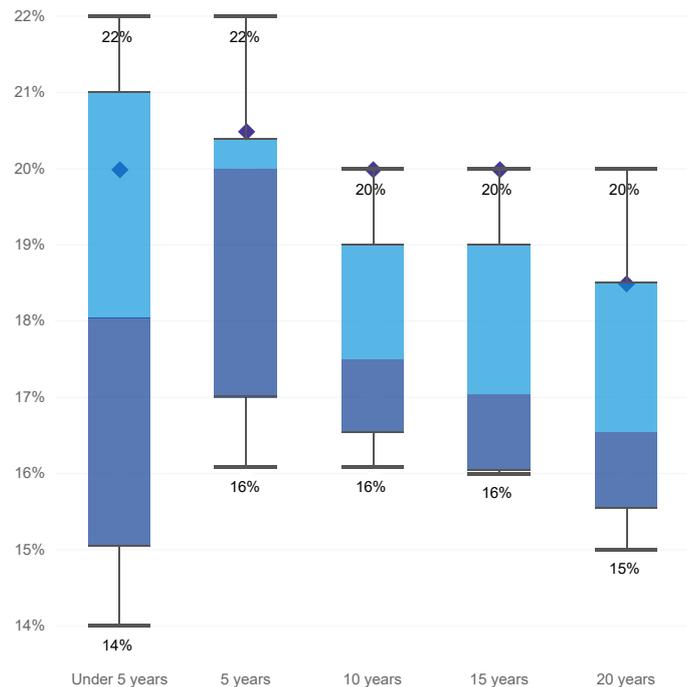
4.1 Interest rates 1-in-200 down shocks (bps)



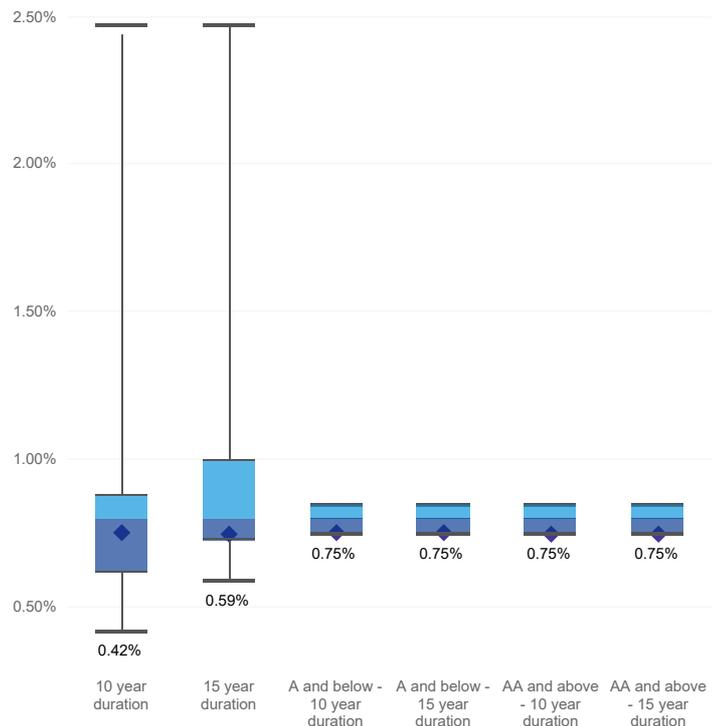
4.2 Interest rates 1-in-200 up shocks (bps)



4.3 Interest Rate volatility - 1-in-200 stress



4.4 Sovereign/swap spread - 1-in-200 stress



Technical Practices Survey 2020

4. Interest Rate Risk

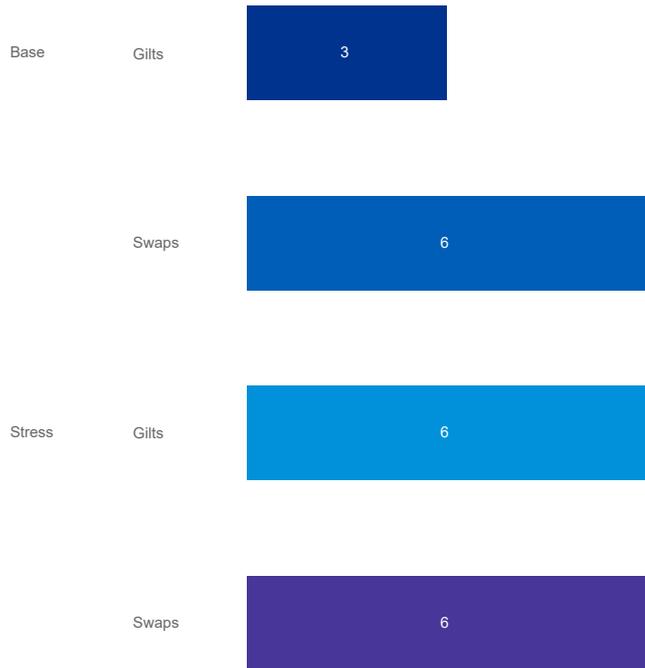
1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

IM

Interest Rate Calibration

Most companies use principal components analysis (PCA) to model their interest rate stresses in their internal model, with both gilt and swaps data used equally by firms for their interest rate risk modelling

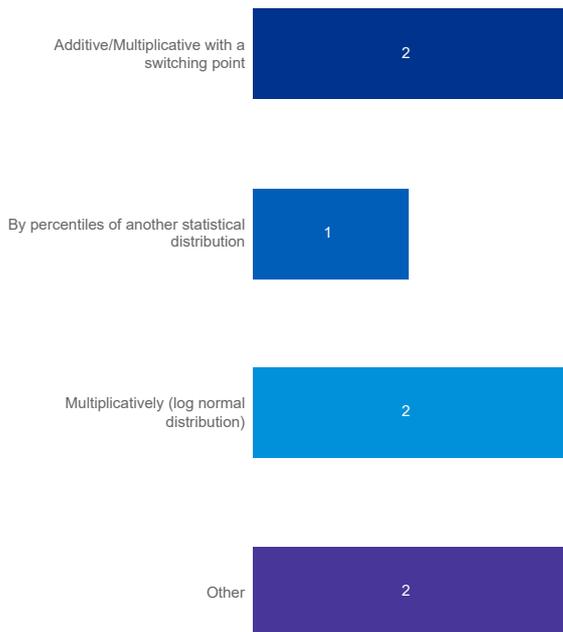
4.5 What market data is used to calibrate the models used for interest rate base and stress projections?



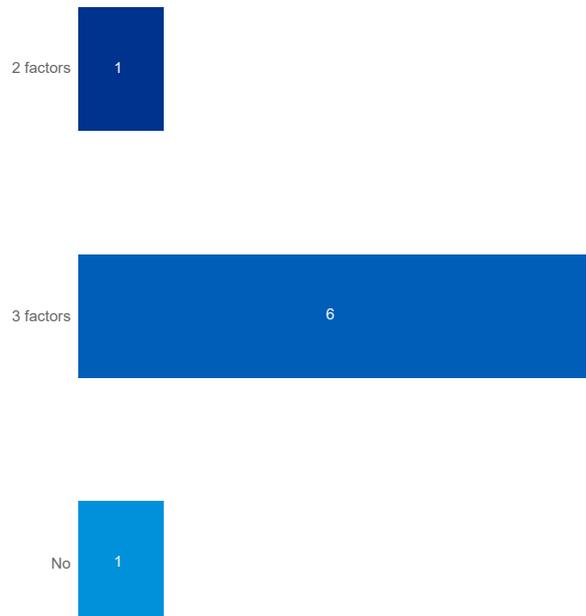
4.6 Do you apply any expert judgement overlays to interest rates market data used for base and stress calibrations?



4.7 How are shocks applied to interest rates?



4.8 Is principal component analysis (PCA) used in calibrating shocks to projected interest rates?



Other includes a generalised lambda distribution to gilt yields and a student t distribution to swap spreads; and a displaced relative model.

4. Interest Rate Risk

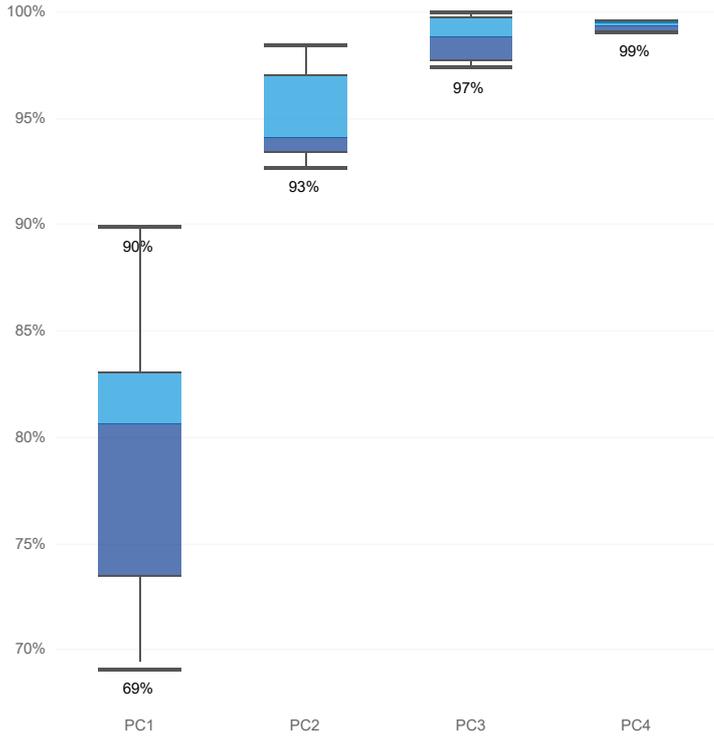
1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

IM Principal Components Analysis

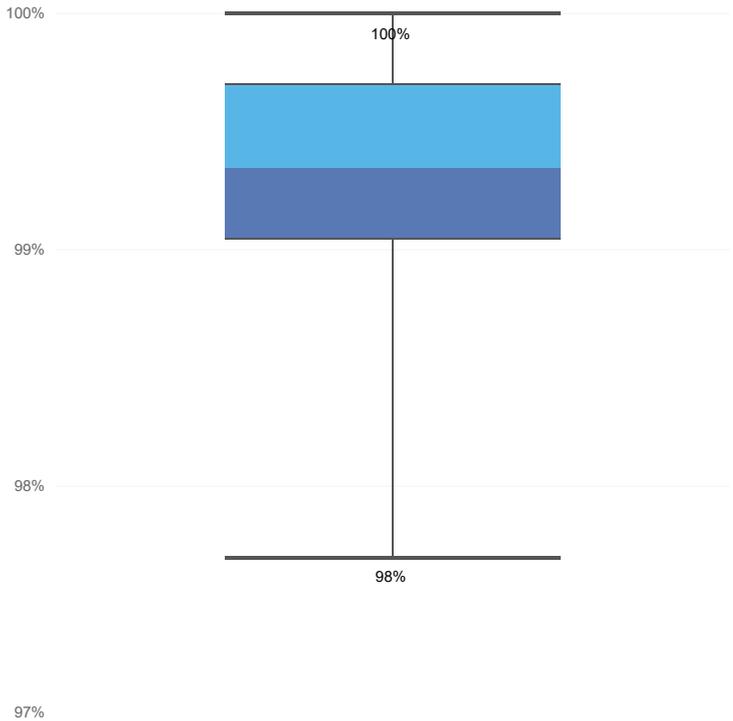
As highlighted on the previous page, most firms use either two or three principal components (PCs) in their modelling. However, we note that, regardless of the number of components used, companies are able to explain between 98% and 100% of the volatility in the interest rates using their chosen number of PCs.

We note that there were no strong correlations assumed between PC factors.

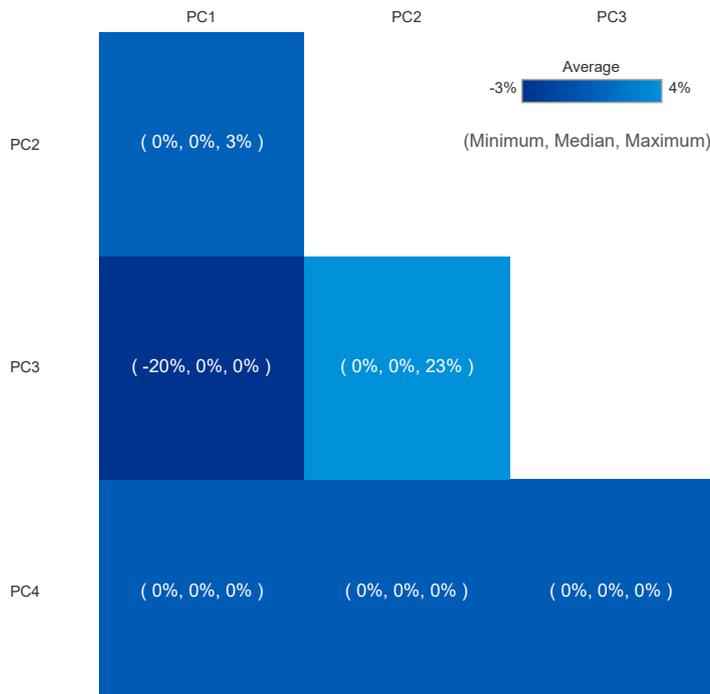
4.9a If you use PCA to calibrate interest rate stresses, what proportion of the volatility in interest rates is explained by the PC factors?



4.9b What is the total proportion of the volatility in interest rates which is explained by the PC factors?



4.10 If you use PCA to calibrate interest rate stresses, what correlations do you assume between the components?



4. Interest Rate Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

IM

Interest Rate Calibration

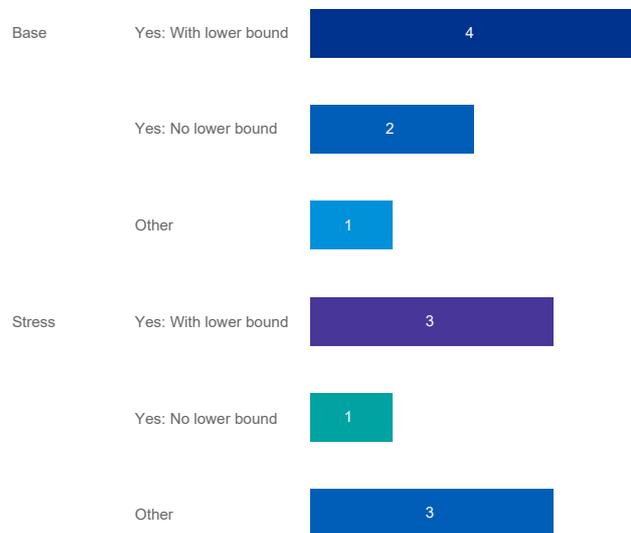
Most respondents allow for negative interest rates in their risk models, with most of those companies applying a lower bound to the interest rates produced by their interest rate risk model.

We observed that two out of seven participants do not apply lower bounds. For the rest of participants, the use of a lower bound is static i.e. the same across all durations, with only one additional firm reporting that the lower bound varies across duration.

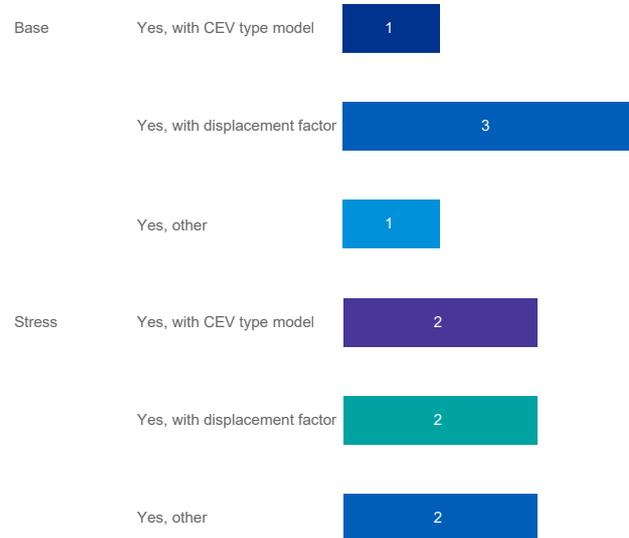
This year we asked, for models that allow for negative interest rates with a lower bound, whether the lower bound bites at YE19. Firms who answered this question reported that the lower bound does not bite at YE19.

Seven respondents indicated that they hold capital for the spread between swaps and gilts.

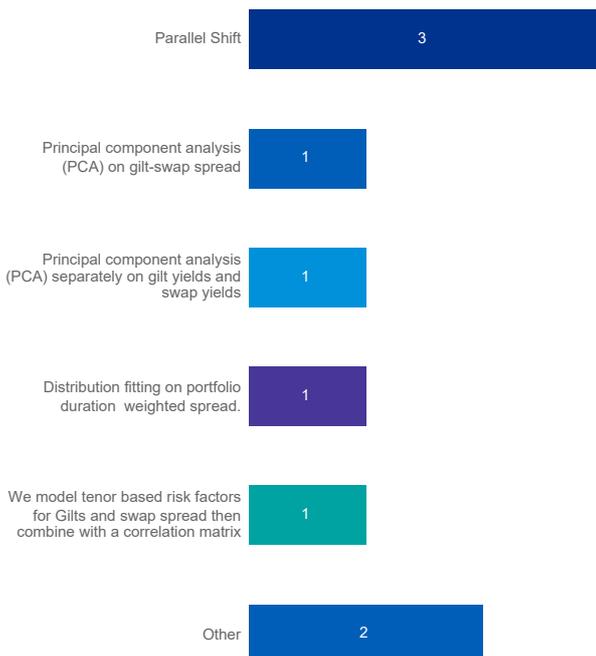
4.11 Does your interest rate model allow for negative interest rates for base and stress purposes?



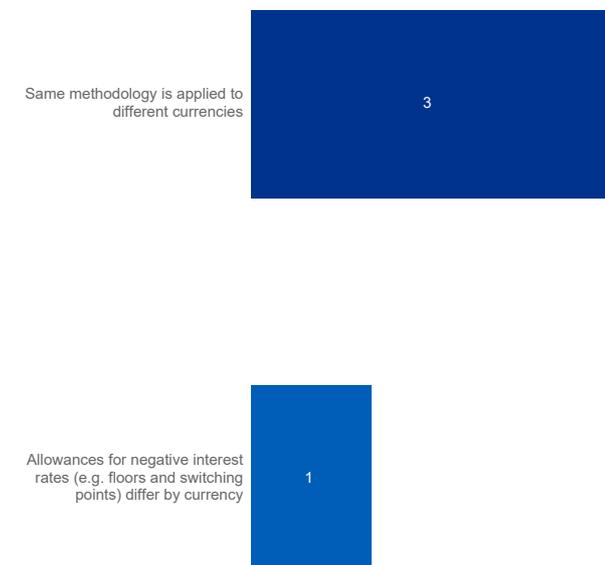
4.12 Which model do you use to allow for negative interest rates for base and stress purposes?



4.13 When determining your gilt-swap spread stress, what method do you use?



4.14 If you have exposure to interest rate risk in multiple currencies, do the calibrations differ by currency?



Other includes distribution fitting on portfolio duration; and modeling tenor-based risk factors for gilts and swap spread and combining with a correlation matrix.

Technical Practices Survey 2020

4. Interest Rate Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

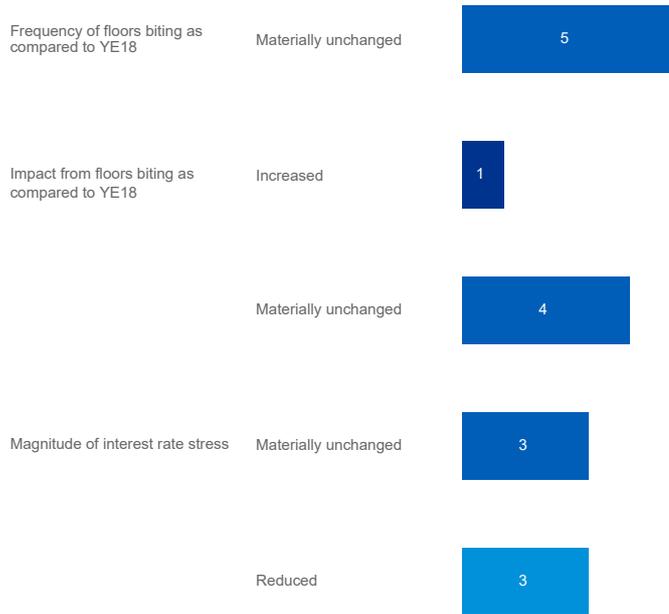
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Interest Rate Calibration

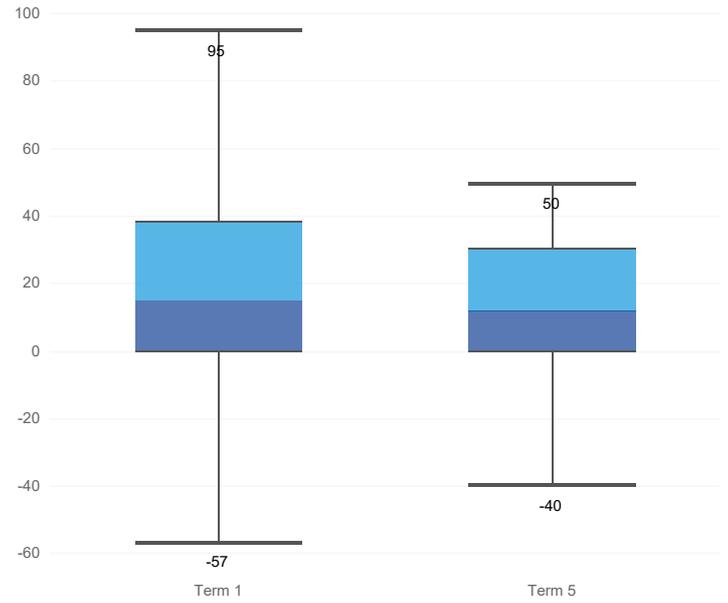
No participants reported any changes to the model or statistical distribution used for interest rate risk or interest rate volatility risk in the last 12 months.

Most companies' 1-in-200 interest rate stresses were materially unaffected by the reduction in interest rates over 2019, with any floors applied not becoming more likely to bite. However, one respondent indicated that they would expect a larger 1-in-200 interest down stress given a further 50bps reduction in interest rates, with the rest of firms being split roughly in half between expecting a reduction in the stress, and expecting no change.

4.15a How is the overall calibration of the interest rate 1-in-200 stress at YE19 affected by the reduction in base interest rate over 2019?



4.15b If base interest rates were to fall 50bps, what is the change in your 1-in-200 interest rate stress (in bps)?



A negative sign indicates a stronger stress compared to the original interest rate downward shock. For example, if the original downward stress is -100bps, and this moves to -130bps after a 50bps fall in base interest rates, the chart will show -30bps.

Technical Practices Survey 2020

5. Credit Risk

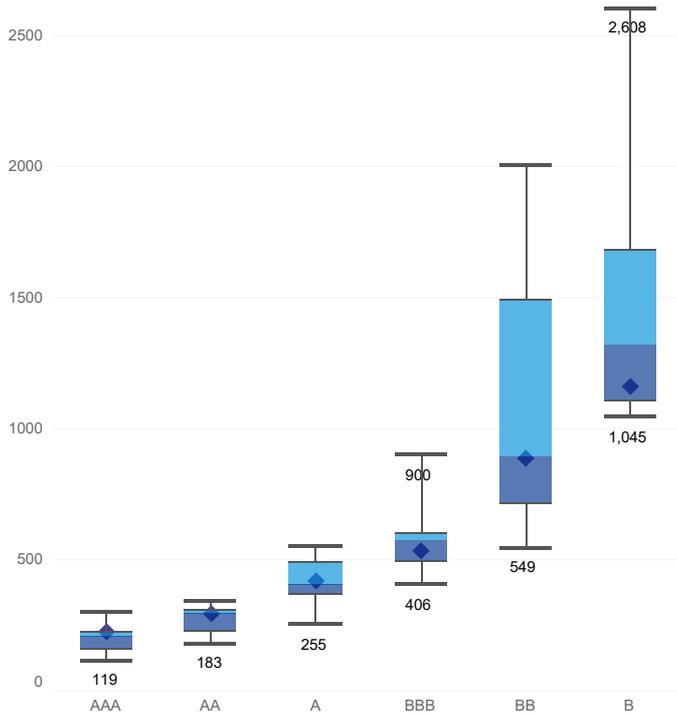
1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

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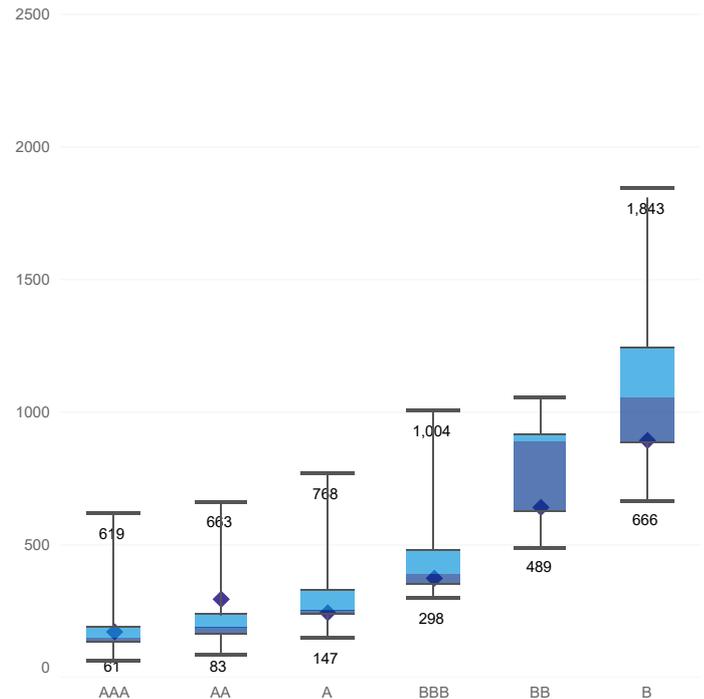
Core Calibrations - Credit spread

Credit risk remains a significant risk for a number of firms, especially annuity providers. The wide range of corporate spreads stress seen in financials rated BB and B indicates lack of exposure among life insurers' books.

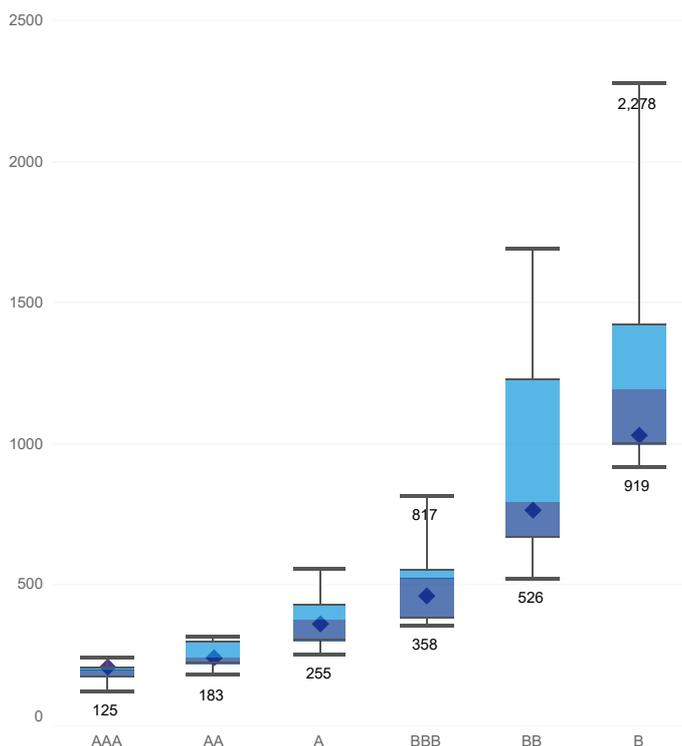
5.1a Total Corporate Spreads Stress (Financials 10 years)



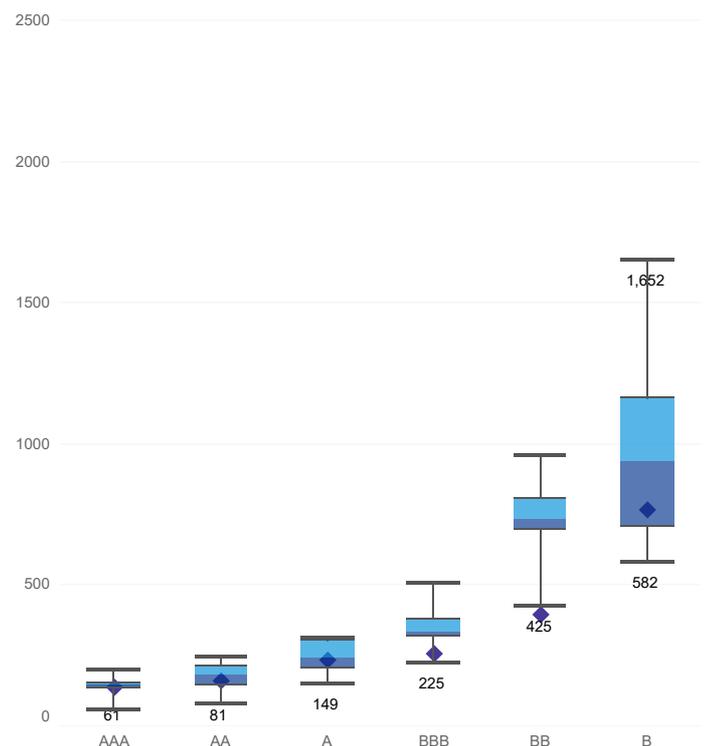
5.1b Total Corporate Spreads Stress (Non Financials 10 years)



5.1c Total Corporate Spreads Stress (Financials 15 years)



5.1d Total Corporate Spreads Stress (Non Financials 15 years)



5. Credit Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

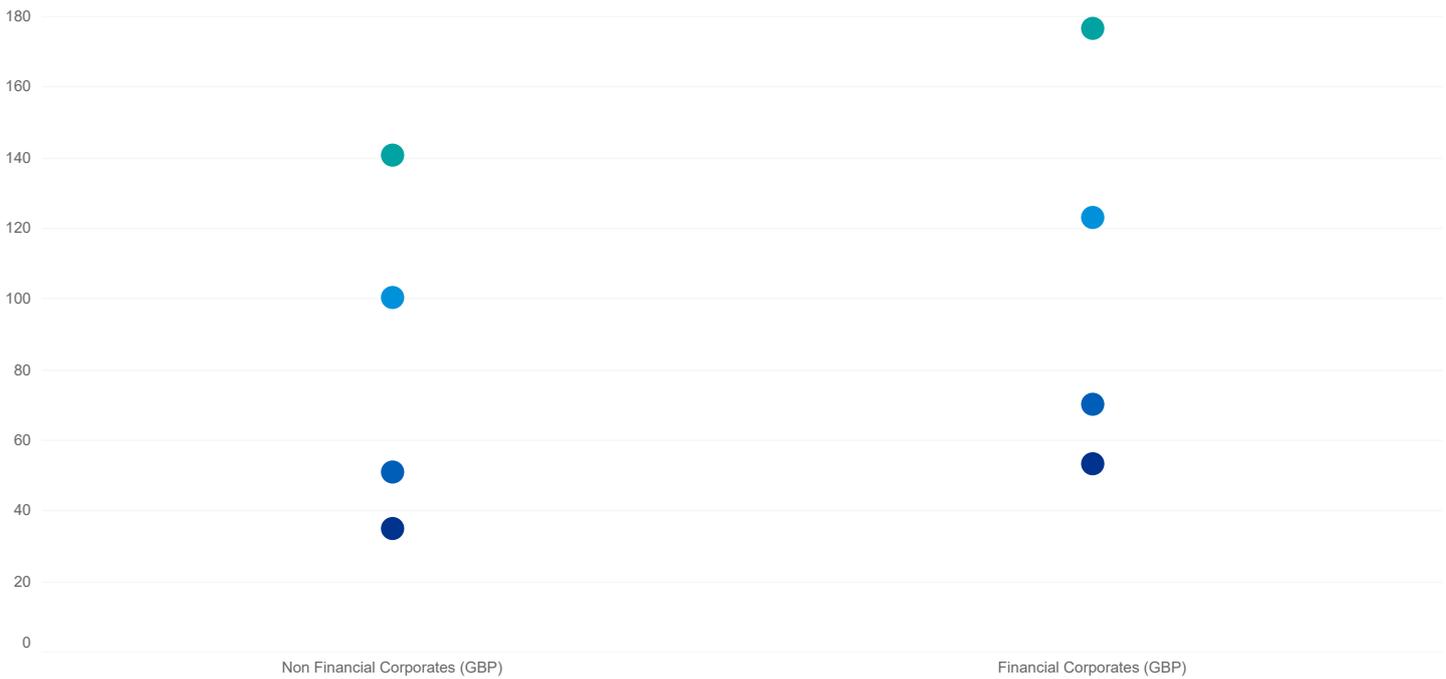
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Core Calibrations - Credit spread

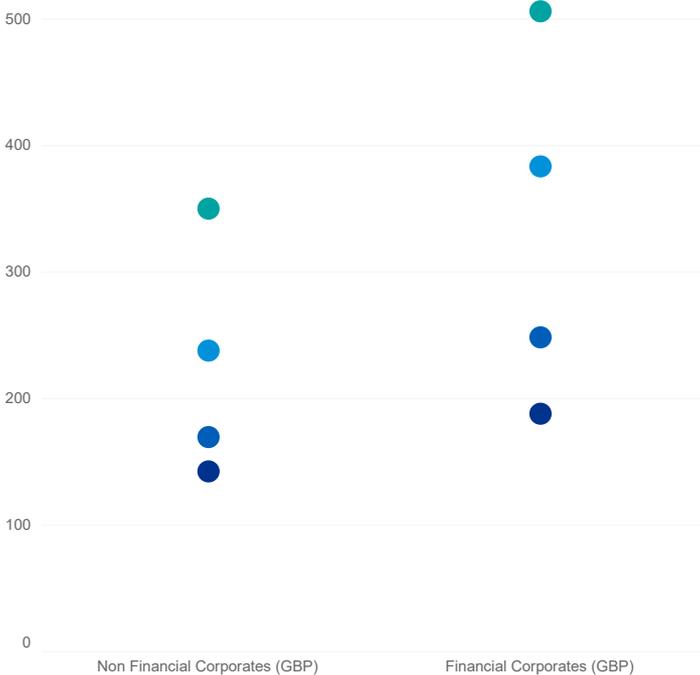
We have continued to benchmark the 1-in-200 default and downgrade component of the credit stress, as it is indicative of the credit spread stress capital net of offset from changes in MA. As compared to YE18, there appears to be a marginal increase in Fundamental Spread under Stress. This remains a key area of current calibration development for firms and regulatory interest, which we will monitor carefully.



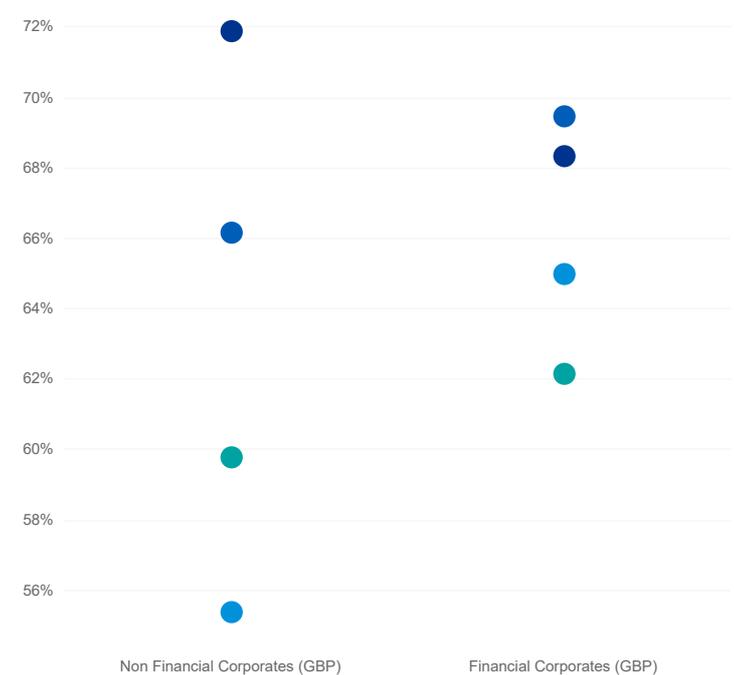
5.2a Average 1-in-200 default and downgrade only component stress (15 year)



5.2b Average 1-in-200 total credit spread stress (15 year)



5.2c 1-in-200 average Matching Adjustment stress as a % of total spread stress (15 year)



5. Credit Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

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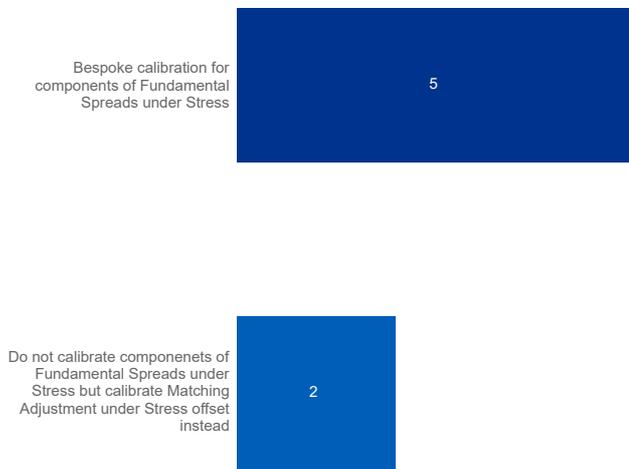
Fundamental Spreads under Stress (Modelling)

This year, we asked additional questions regarding the calibration of Fundamental Spreads under Stress and found that most firms calibrate the bespoke components of FS under Stress with a minority calibrating the MA under Stress offset instead.

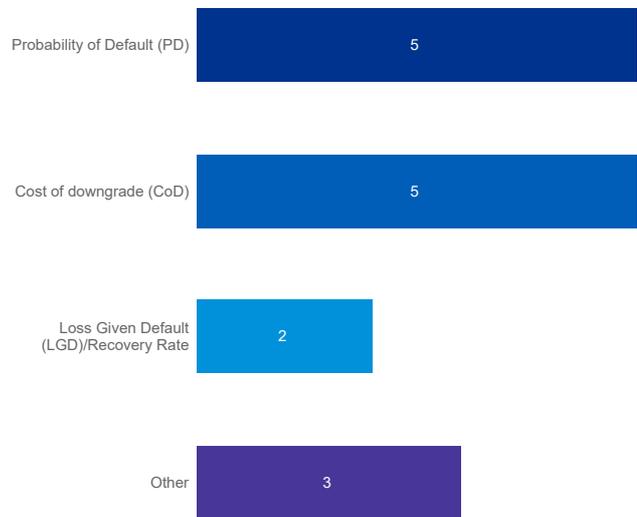
Where firms do calibrate the Fundamental Spread under Stress, there are two components to those re-calibrations: changes to the FS table and changes to the MA portfolio under Stress, e.g. credit quality mix, liability changes etc.

For firms with bespoke calibrations for components of FS, firms typically replicate EIOPA's methodology, with some adjustment to specific components to reflect an internally-developed assessment of the stressed environment. One of the components we see firms adjusting is the recovery rate as seen in question 5.6 below. The recovery rate is a key differentiator for the differences in Fundamental Spreads under Stress observed for different asset classes in last year's survey.

5.3 What is your approach to Fundamental Spreads under Stress?

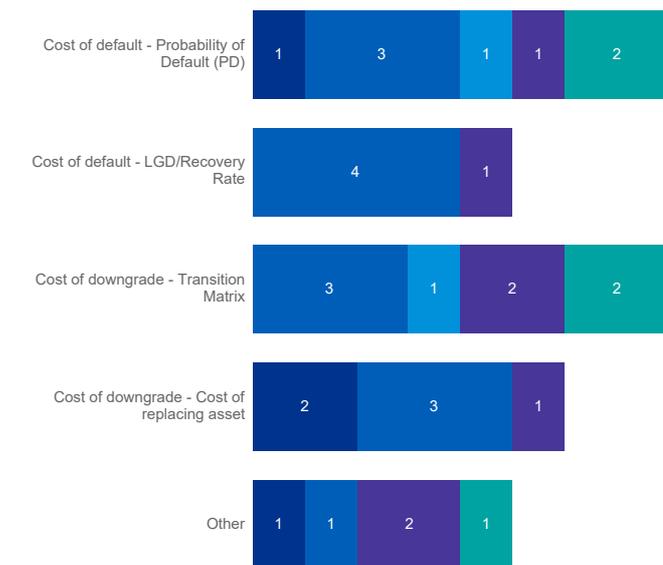


5.4 What are the Stressed FS components that you calibrate separately?



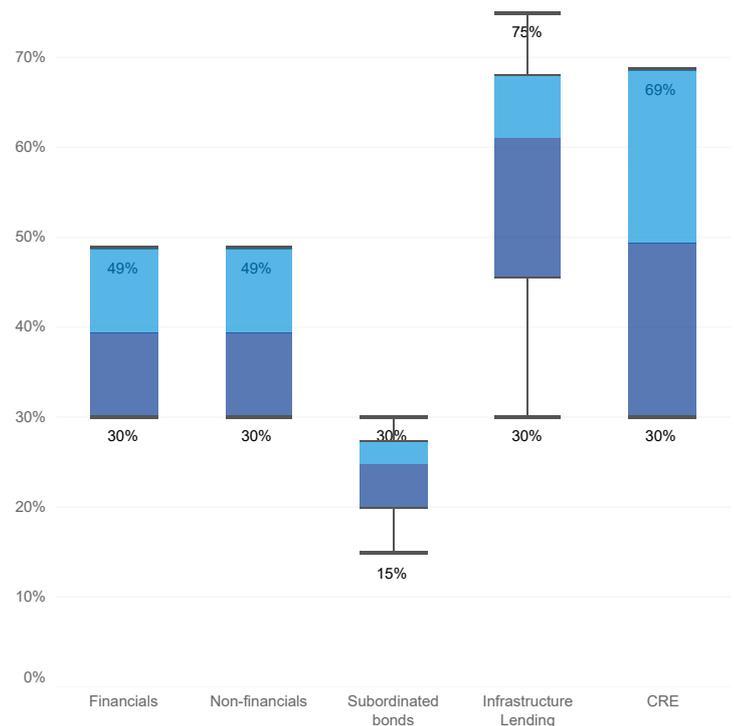
Other includes Rc factors and LTAS.

5.5 How do you calibrate the components of stressed FS?



- Expert Judgement
- Historic Data (Full period)
- Internally developed scenario analysis focusing on periods such as 1930s Great depression
- Replication of EIOPA methodology
- Other

5.6 What is your average assumed 1-in-200 recovery rate?



Technical Practices Survey 2020

5. Credit Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

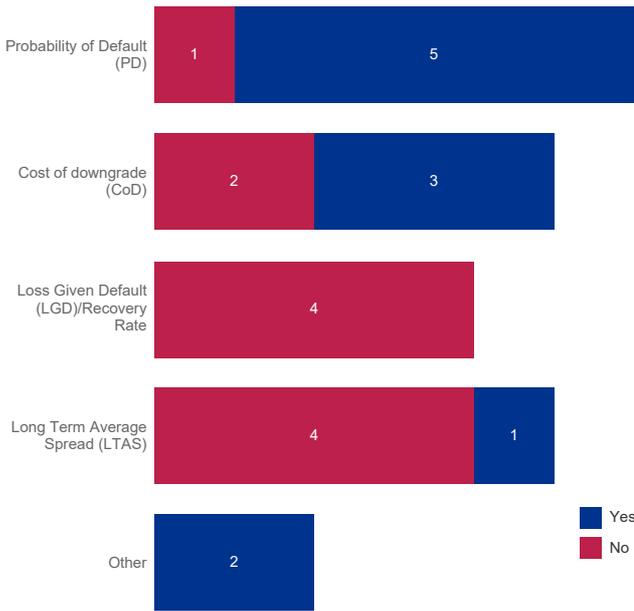
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Fundamental Spreads under Stress (Glidepath)

The incorporation of glidepath in methodology allows the stressed experience to revert to more normal levels over a given period rather than instantaneously.

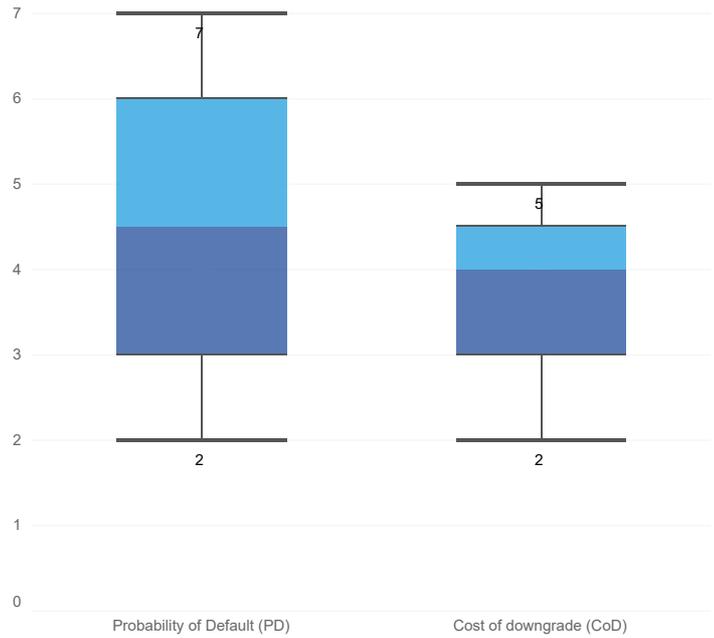
Most firms apply a glidepath to the PD and CoD components, with one firm applying glidepaths to the FS and LTAS instead. The median years of glidepath used for PD and CoD is 4.5 and 4 years respectively. The majority of firms uses a geometric glidepath reverting to pre-stress long term conditions.

5.7a Do you allow for a glidepath period for transitions within each of the components respectively?

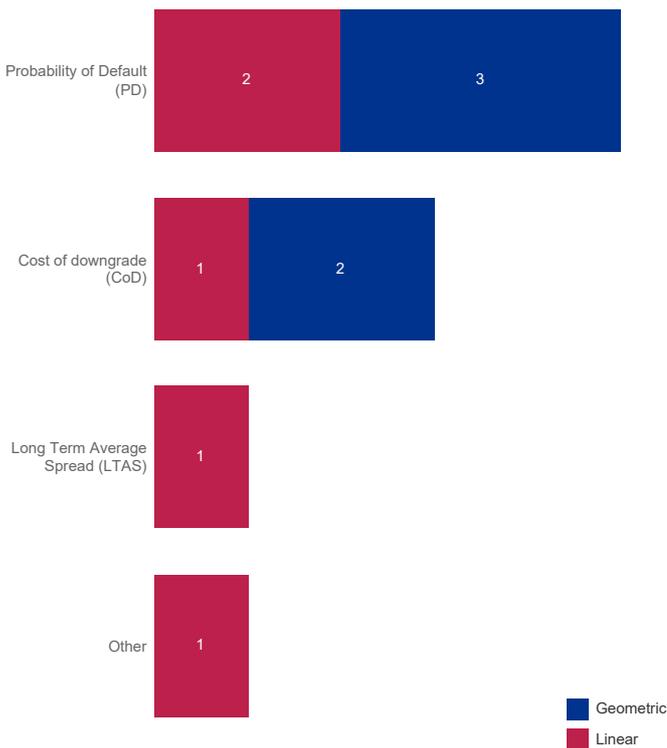


Other includes Fundamental Spreads overall.

5.7b How many years of glidepath?

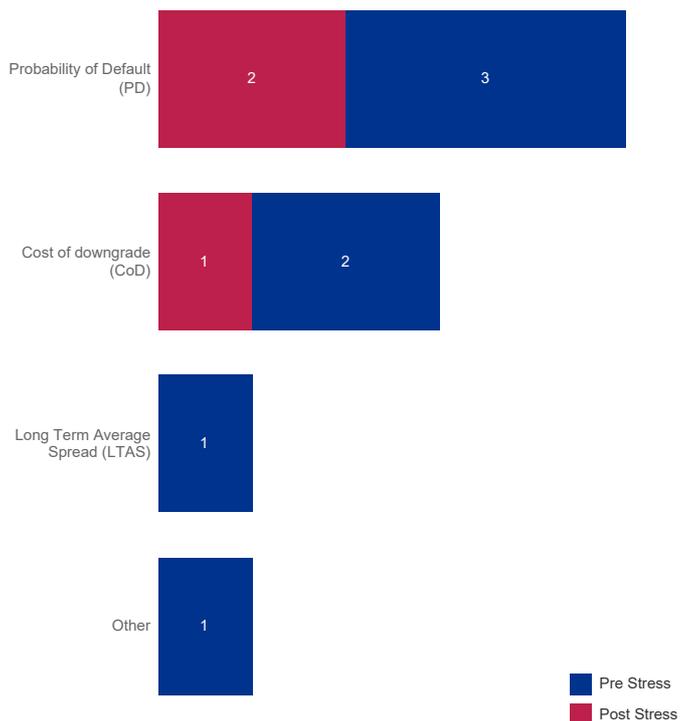


5.7c Is the glidepath linear or geometric?



Other includes Fundamental Spreads overall

5.7d Does the glidepath revert to pre-stress or post-stress long-term conditions?



Other includes Fundamental Spreads overall

5. Credit Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

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Fundamental Spreads under Stress (Granularity)

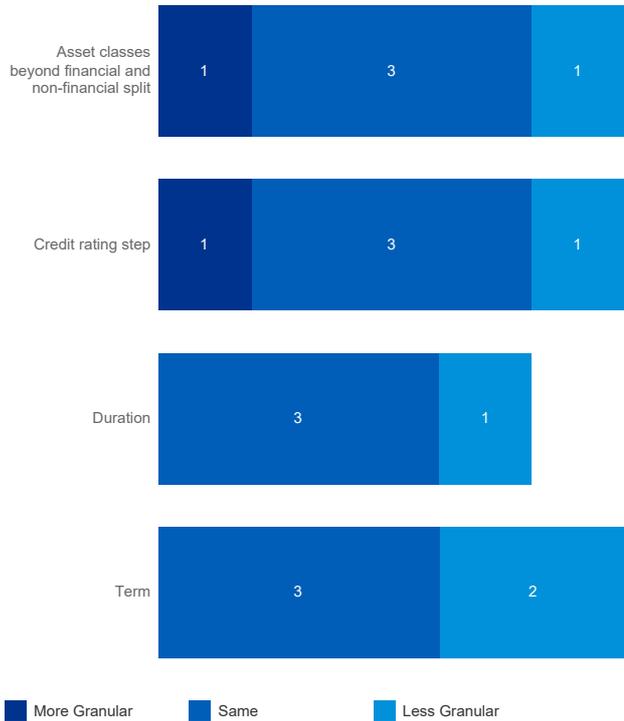
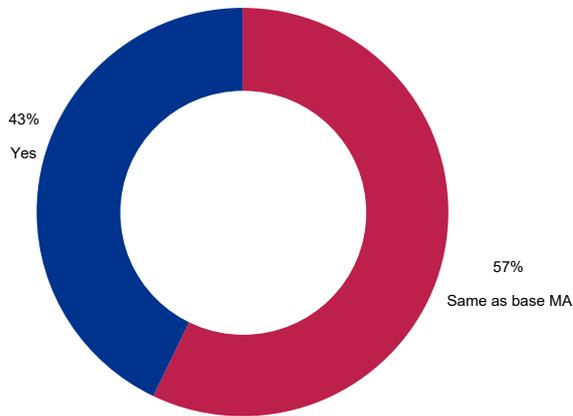
This is a new section this year. We wanted to explore the granularity at which FS under Stress is calibrated for firms.

In reviewing the responses provided by participants, we interpret that some firms replied to these questions as the granularity at which FS under Stress is implemented instead in the proxy model. Some firms might reduce the granularity of the FS under Stress parameter used in the calculation of SCR for practical purposes.

We have summarised the data gathered below which shows that most firms calibrate/implement FS under Stress at the same granularity as base FS. Where this is calibrated/implemented at a different granularity as base FS, this tend to be less granular.

5.8 Do you model stressed Fundamental Spreads (FS) at a different granularity as compared to base FS, e.g. more credit rating steps or asset classes?

5.9 If you answered yes to question 5.4, is this the same, more or less granular than the base FS?



5. Credit Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
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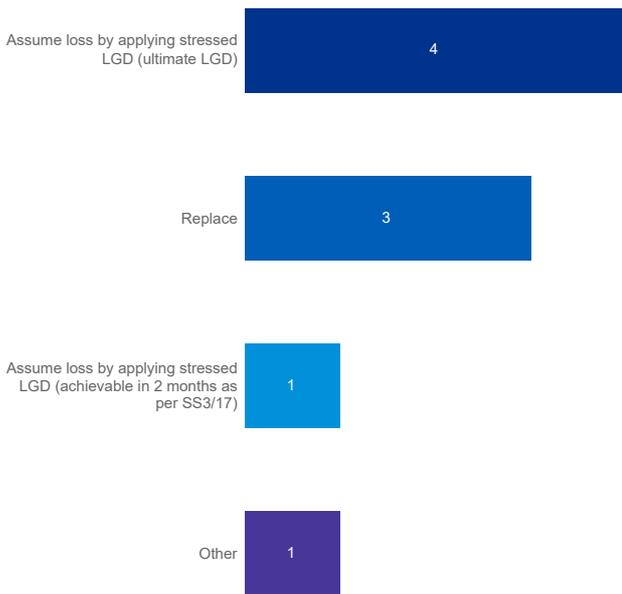
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Matching Adjustment under Stress

This year we have expanded our questions set on MA under Stress to include treatment to include actions assumed in a stressed Matching Adjustment Portfolio.

Of particular interest this year was the LGD in the event of default as there were guidance from the PRA in SS3/17. In spite of this, we continue to see indication that firms are applying the ultimate LGD in question 5.10 below.

5.10 Rebalancing strategy - how are defaults treated within the stressed Matching Adjustment portfolio?



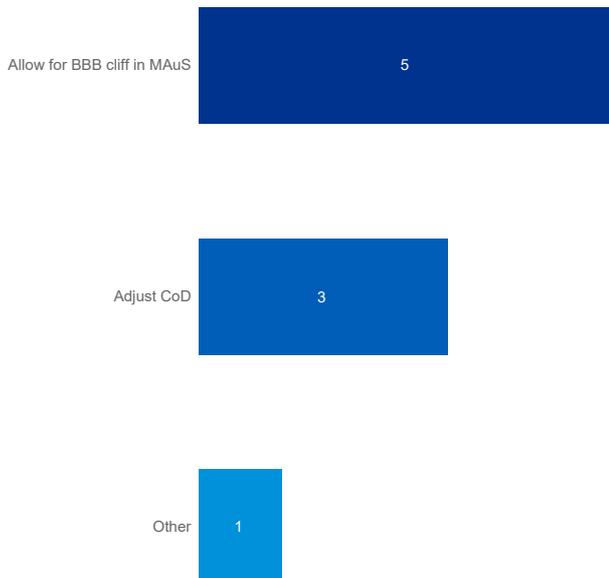
Other includes default losses in the MA portfolio incorporate the LGD assumed within the credit risk methodology.

5.11 Rebalancing strategy - how are downgrades treated within the stressed Matching Adjustment portfolio?



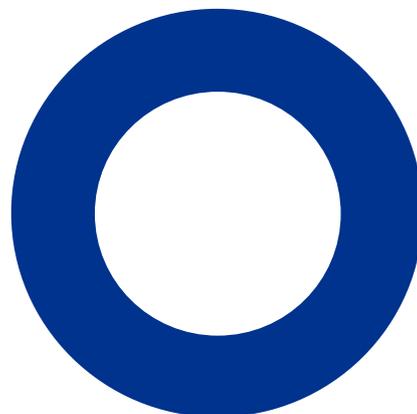
Other includes replacing assets downgraded to sub-IG with assets of the original rating, and no change to the investment strategy i.e. replacement assets assuming the same mix as the existing one.

5.12 How do you treat sub-investment grade bonds?



Other includes bonds that downgrade below sub-IG are expected to be replaced with bonds of the original credit quality.

5.13 Do you allow for a Long Term Average Spread (LTAS) floor under stress?



■ Yes

Technical Practices Survey 2020

5. Credit Risk

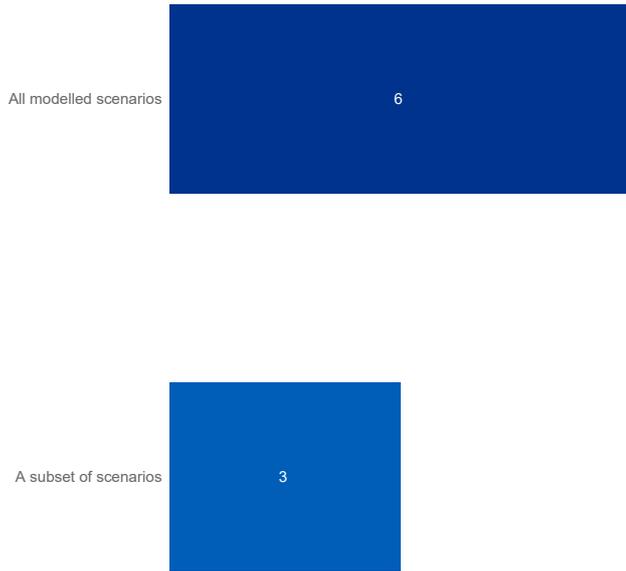
1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
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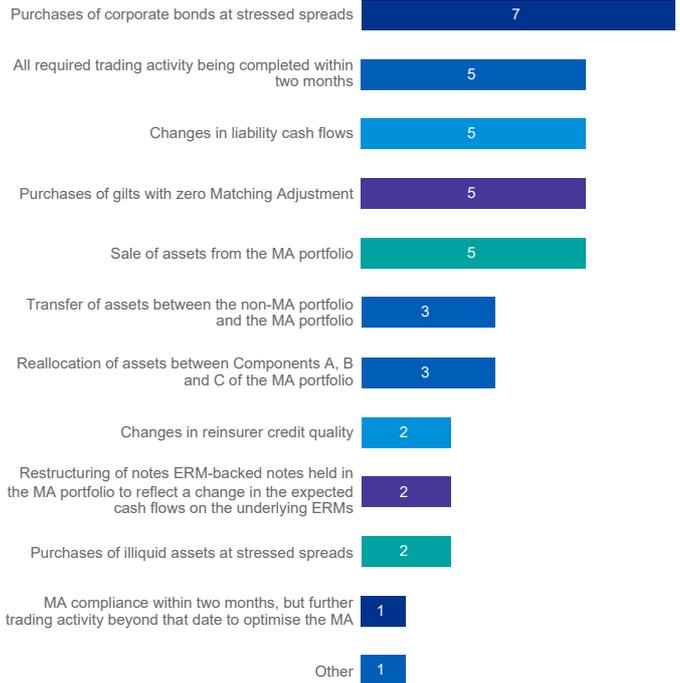
Matching Adjustment under Stress

When calculating SCR, six out of nine firms recalculate the Matching Adjustment in all modelled scenarios.

5.14 When calculating your SCR, in which scenarios do you recalculate your Matching Adjustment?



5.15 In demonstrating compliance with the Matching Adjustment regulations under Stress, which of the following do you allow for?



Other includes applying reinvestment haircut on corporate bonds purchased at stressed spreads.

5. Credit Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

IM

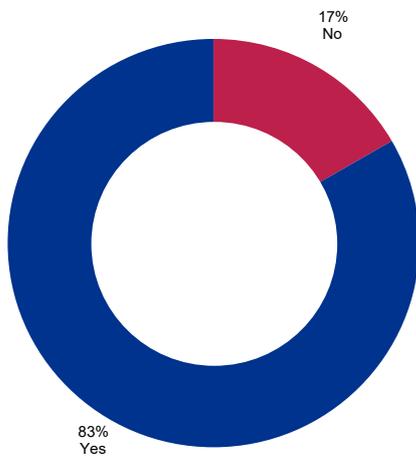
Internal Ratings

We note that there has been no change to firms' responses regarding internal ratings frameworks from YE18.

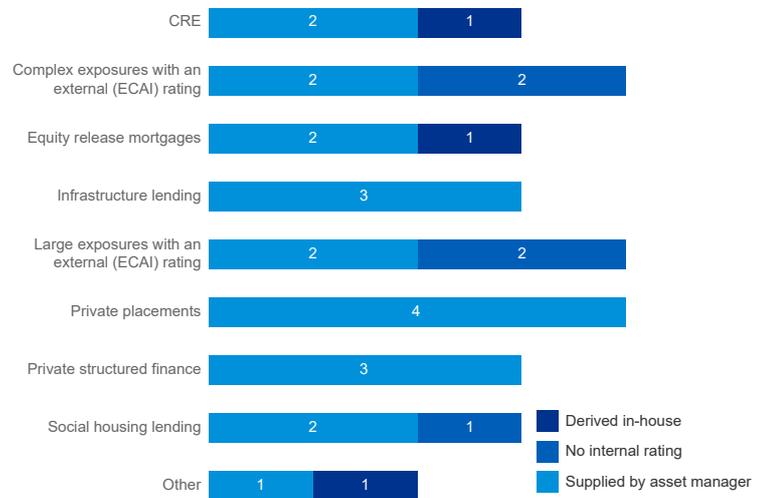
We were interested to understand the latest development on insurers' internal ratings approach. Insurers are increasingly looking at new asset classes to gain yield and in many cases this is leading them to investments without an External Credit Assessment Institution rating. This places even more importance on insurers having their own views of the factors that should be considered in rating assets and how these lead to a rating for use in valuing and stressing the asset.

In question 5.18, it was interesting to see that although the use of rating agency methodologies and scorecards is common, firms still use external sampling of outputs as a method of validation. This is because the application of rating agency methodologies is tailored in places and would not necessarily give direct output comparability due to the qualitative nature of some elements of rating.

5.16 Do you have an internal ratings framework?

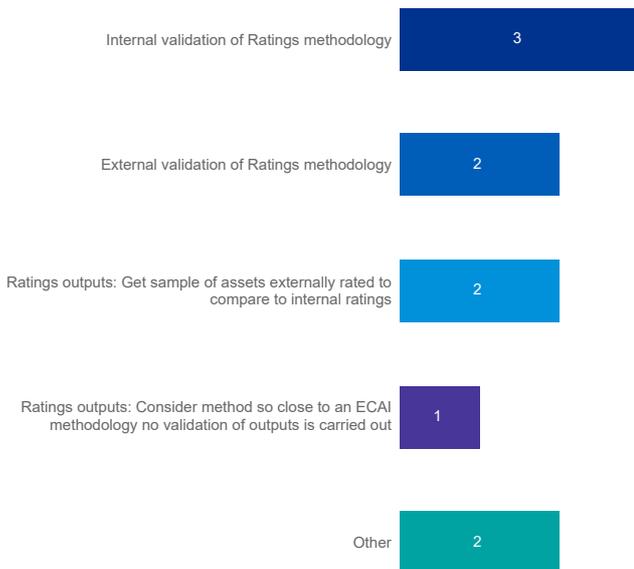


5.17 For which of the following asset types do you use either internal ratings supplied by your asset manager, internal ratings derived in-house, or not use internal ratings?

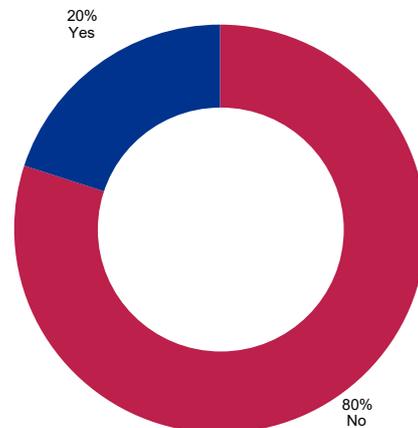


Other includes PFI assets (derived in-house) and other credit risky assets held (supplied by asset manager).

5.18 How do you validate that your internal rating methodology gives comparable ratings to an external methodology (ECAI consistent) as referenced in SS3/17 (April 2020 update)?



5.19 Do you expect to update/develop your aspects of your internal rating process following the release of SS3/17 (April 2020 update)?



For this question we asked respondents to tick all validation approaches used. We saw companies that used more than one validation method.

Technical Practices Survey 2020

5. Credit Risk

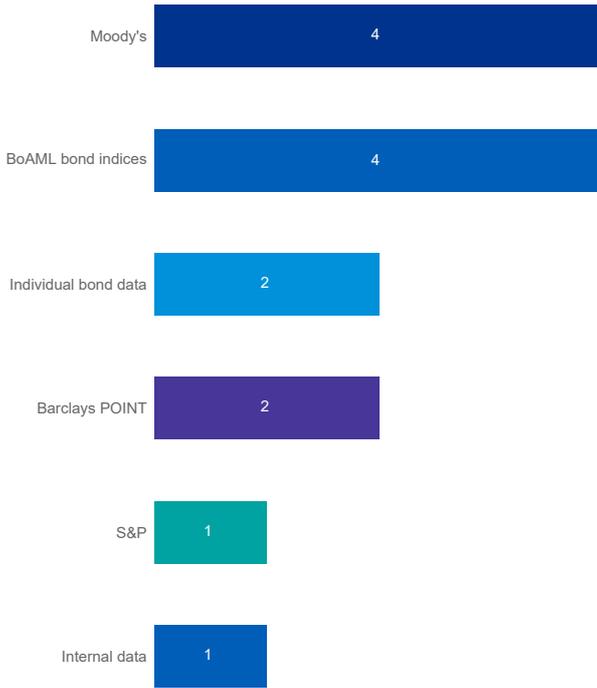
1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

IM

Credit Risk Calibration

There is no real consensus amongst the respondents of the data sources or time periods used to calibrate credit stresses. With credit default downgrade stresses, there is a tendency to move to use a longer historical time period for calibration than with credit spread stresses. Rating and term seem the most influential aspects of a credit holding which impact the credit stress calibration, although there are a very wide range of factors that respondents have indicated will impact this.

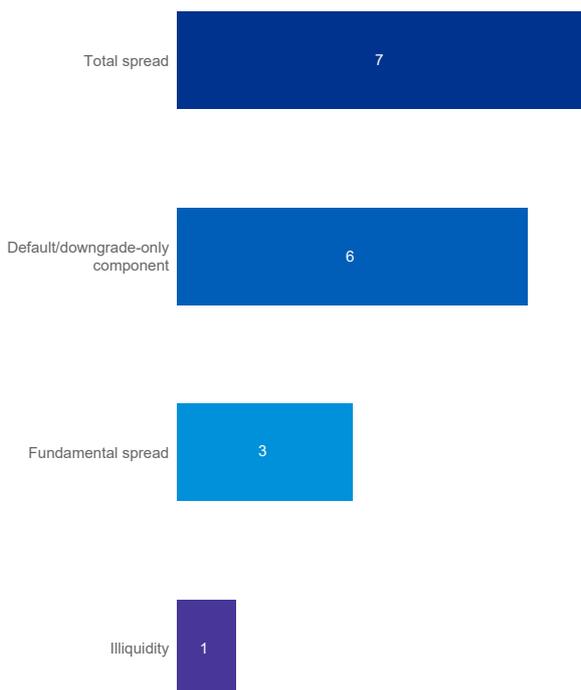
5.20 Which data sources do you use for your primary credit calibration?



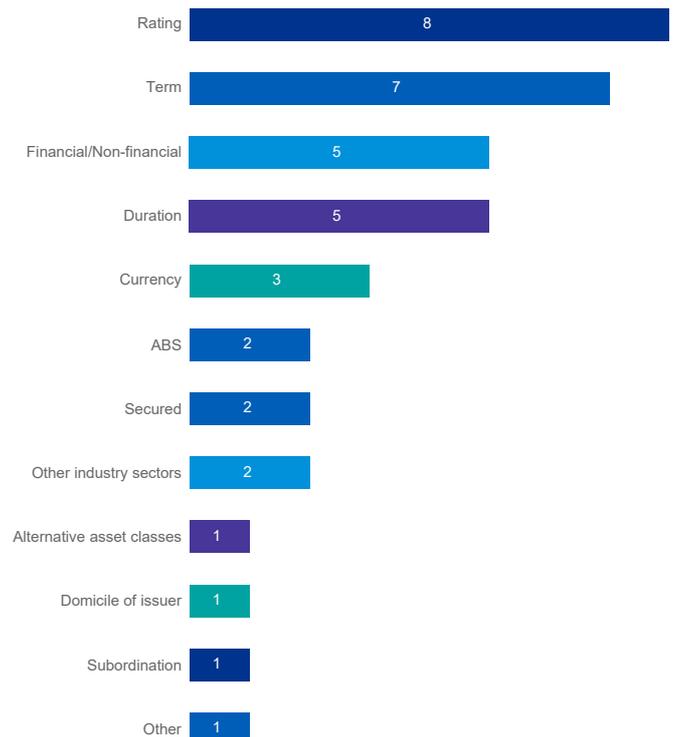
5.21 Length of historical period (in years) to calibrate credit stresses



5.22 Which of the following credit-related stresses do you calibrate?



5.23 In relation to an individual holding in credit, for which of the following factors would a change in the input result in a change in the output stress?



5. Credit Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
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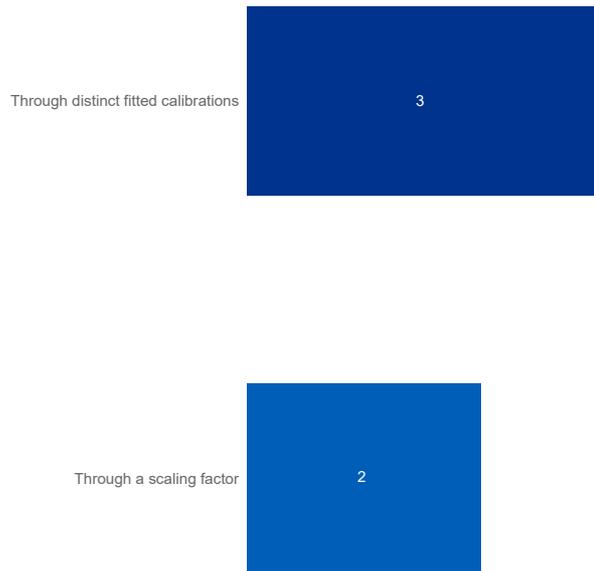
IM

Credit Risk Calibration

There is a wide range of alternative asset classes which have credit stresses calibrated for, which continues the pattern observed last year. In relation to sovereign bonds, many bonds are treated differently than equivalent corporates in relation to credit stresses and capital is held mainly for UK or lower rated non-UK holdings.

Similar to last year, 33% of participants reported having a calibration for credit default swaps (CDS) as distinct from physical credit.

5.24 If calibrating different stresses for financials vs non-financials, how is this captured?

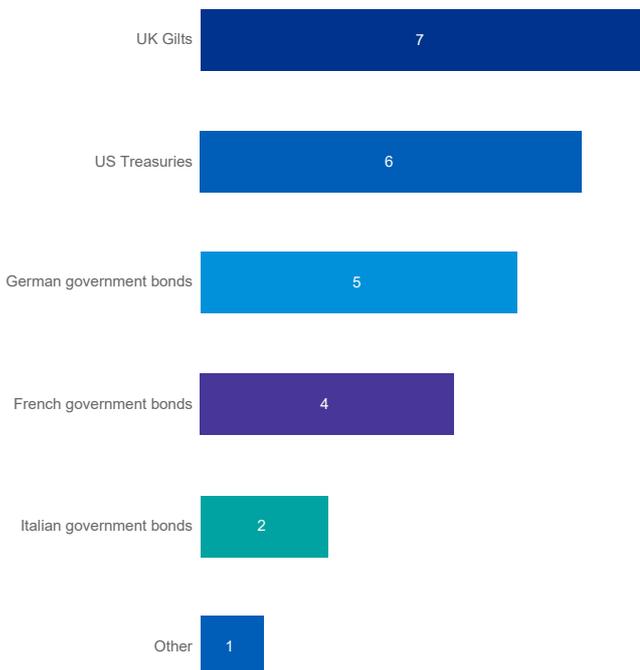


5.25 Which of the following alternative asset classes do you calibrate stresses for as distinct from your primary credit calibration?

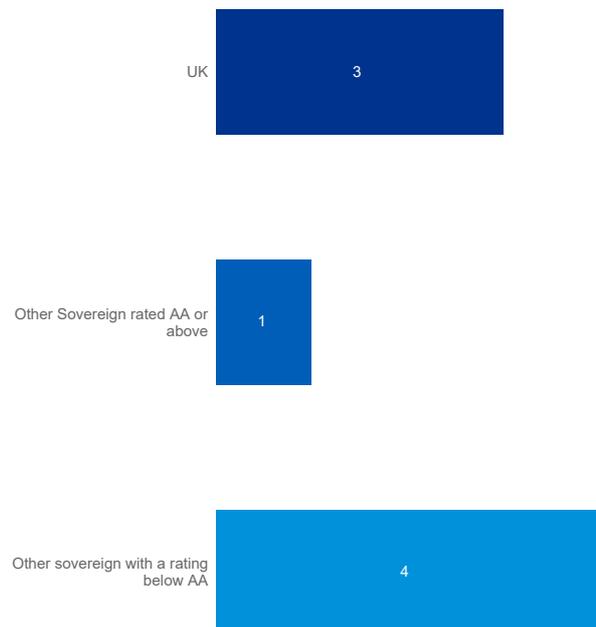


Other includes structured bonds, high yield and alternative investments.

5.26 Which of the following sovereign bonds do you treat differently from equivalently-rated corporate bonds?



5.27 Do you hold any capital for sovereign default risk?



6. Mortality & Longevity Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
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SF/IM

Mortality

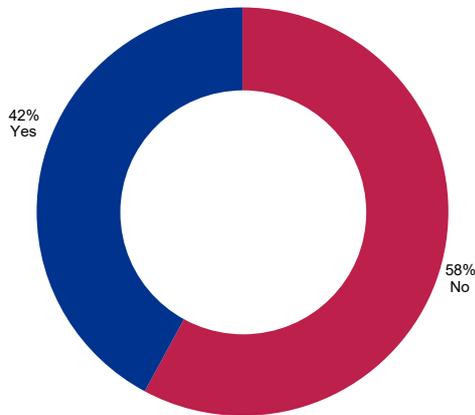
In response to participants' feedback, we have included SF firms' responses within this section. The top left corner of each page also indicates whether the charts on the page include answers submitted by SF, IM/PIM firms, or both.

Mortality continues to be a key risk for life insurers. Different life companies take different approaches to reflecting mortality in their best estimate assumptions and in their stress calibrations.

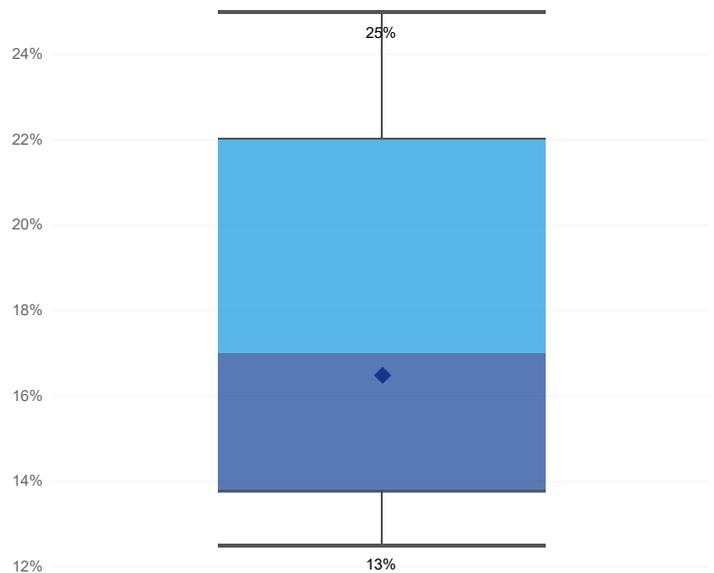
Companies' responses for best estimate and stress mortality are largely similar to YE18.

There is considerable uncertainty on the appropriate nature of the adjustments that companies might consider to reflect COVID-19 impact on the expected future mortality experience.

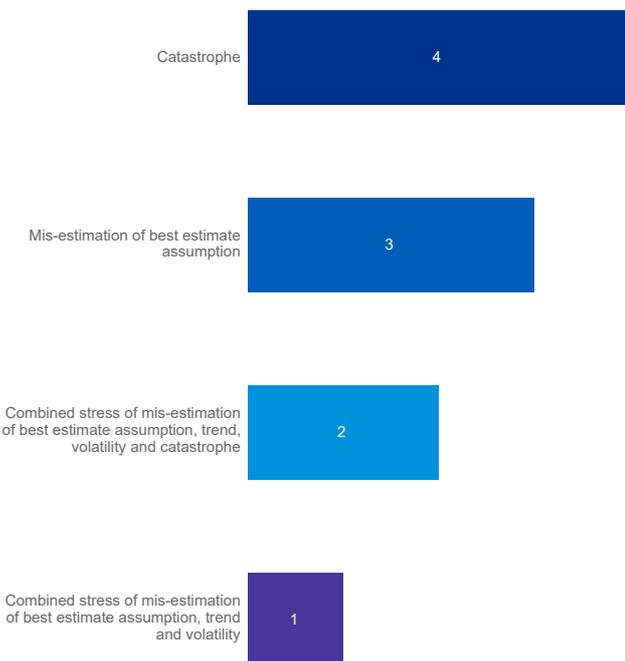
6.1 Do you allow for mortality improvements for protection business in your BEL?



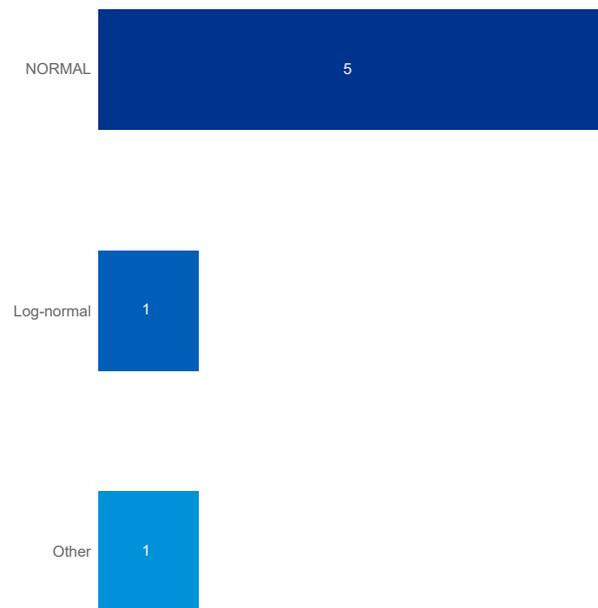
6.2 For your protection business, as at YE19, please provide the 1-in-200 mortality stress.



6.3 Which of the following 1-in-200 mortality stresses do you apply (mortality exposed products)?



6.4 What model or statistical distribution do you use for mortality risk?



Other includes normal distribution for combined mis-estimation of best estimate assumption, trend and volatility; and empirical loss distribution for catastrophe.

Technical Practices Survey 2020

6. Mortality & Longevity Risk

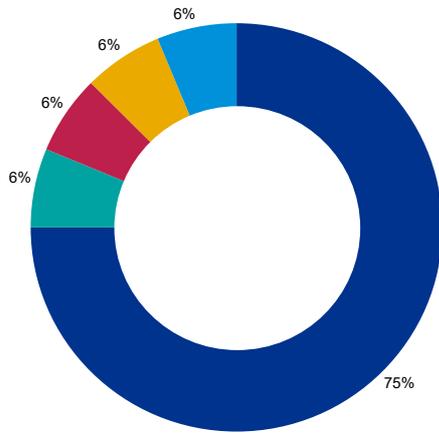
1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
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SF/IM

Longevity Modelling

Most companies set their base mortality assumption by graduating against a standard table, typically using an 08 series table. A significant proportion of companies also apply adjustments to the base mortality assumptions to reflect risk features relevant to their portfolios, such as anti-selection or postcode rating factors.

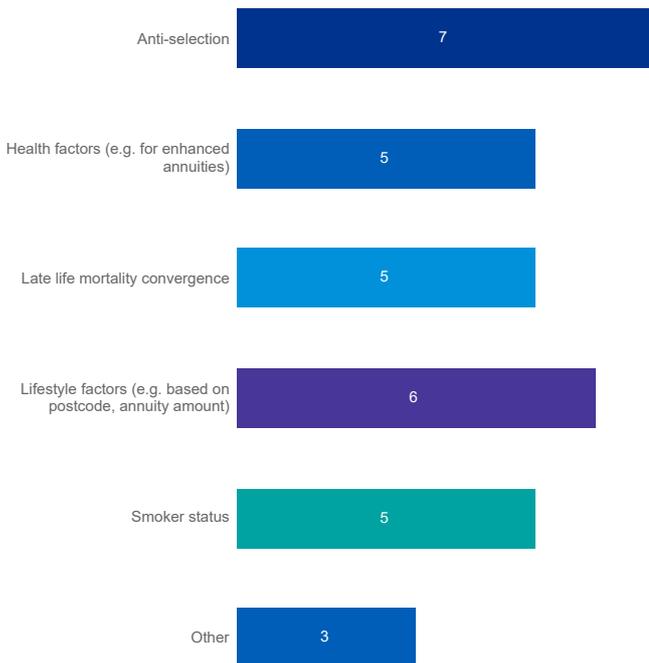
6.5 Which of the following best describes the method used to set your base mortality assumptions?



- Graduation against standard table
- Graduation of table directly based on internal experience
- Using a generalised linear model
- Survival models approach
- Other

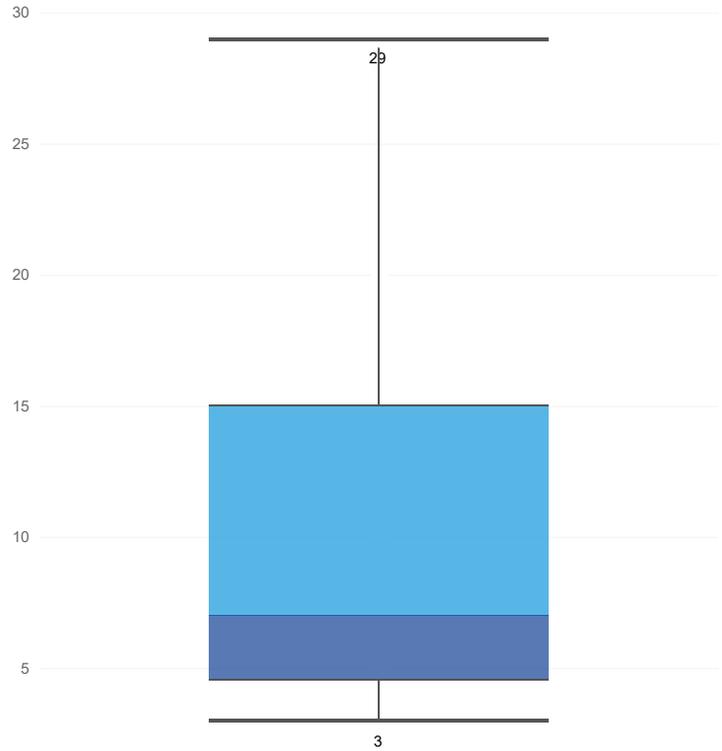
Other includes theoretical model based on individual mortality characteristics, calibrated to portfolio experience

6.7 Which adjustments do you allow for in your base mortality assumptions?

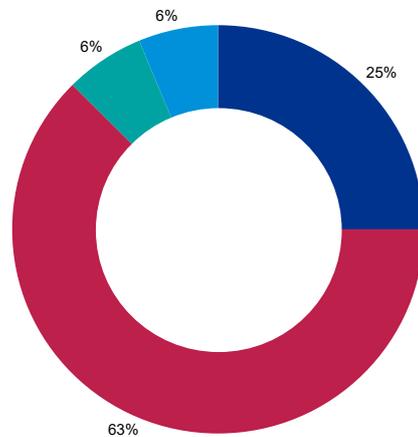


Other includes marital status and temporary selection to first lives for 25 years.

6.6 How many years of historical data do you use to set base mortality assumptions?



6.8 Which base mortality tables are your annuitant mortality assumptions based on?



- 00 Series (e.g. PCMA00 / PCFA00)
- 08 series (e.g. PMA08 / PFA08)
- S3 Series (e.g. S3PMA / S3PFA)
- Other

Other includes E&W General Population.

Technical Practices Survey 2020

6. Mortality & Longevity Risk

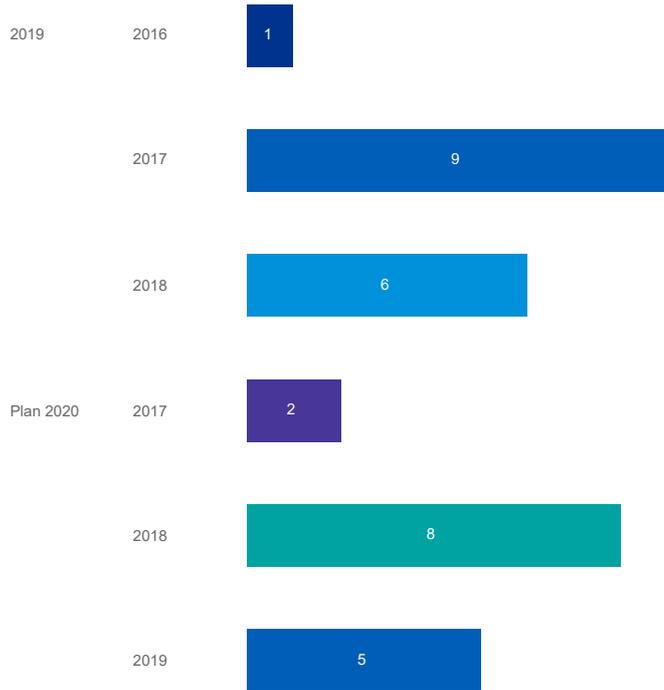
1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
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SF/IM

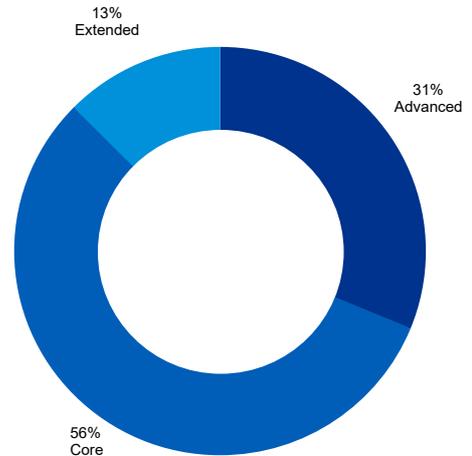
Longevity - CMI Model

A third of respondents are planning to adopt the CMI 2019 model for YE20 reporting. We would expect the use of the CMI 2019 model to result in an increase in mortality improvement assumptions driven by the level of improvements experienced in 2019. However, we note that this will depend on the CMI 2019 calibrations choices made by those companies.

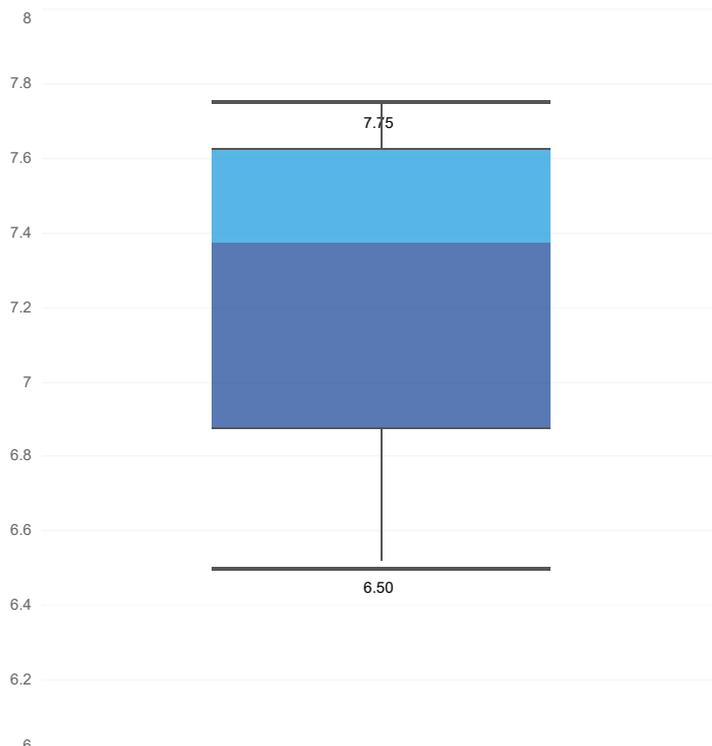
6.9 Which version of the CMI model do you currently use (and plan to use for YE20) for best estimate mortality improvements?



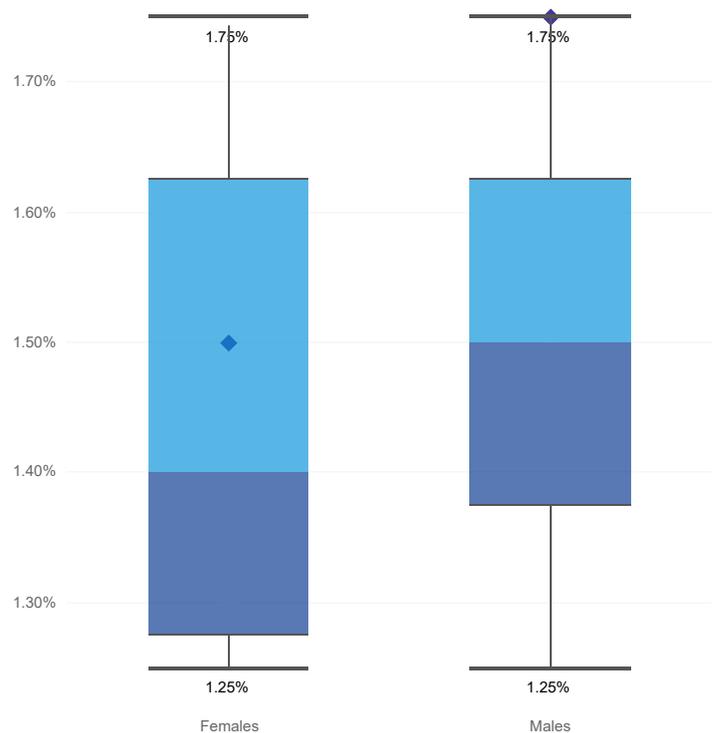
6.10a Do you use core, extended or advanced calibration in your longevity improvement basis?



6.10b If you use the Extended or Advanced parameterisation of the CMI 2016 model or later, what value of the period smoothing parameter do you use?



6.10c Long term rate of improvement



Technical Practices Survey 2020

6. Mortality & Longevity Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
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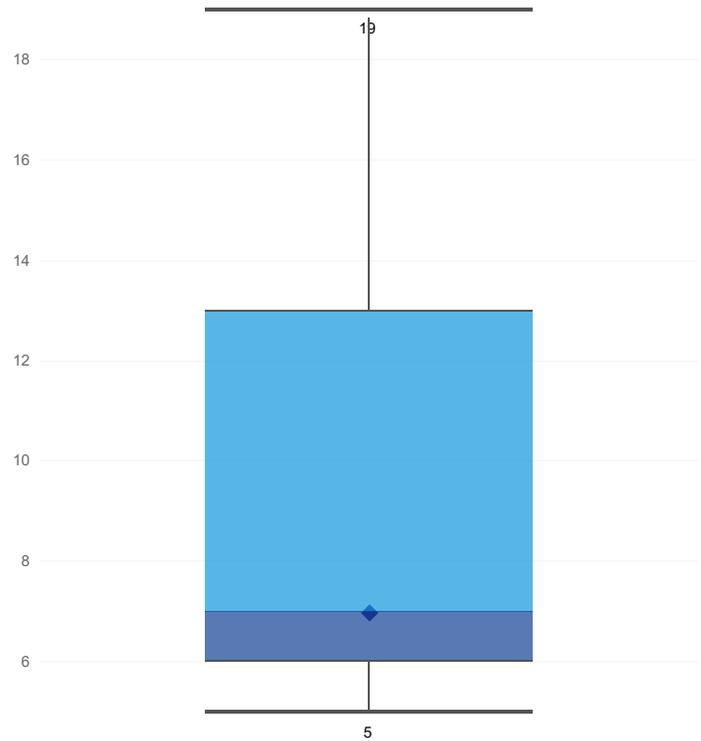
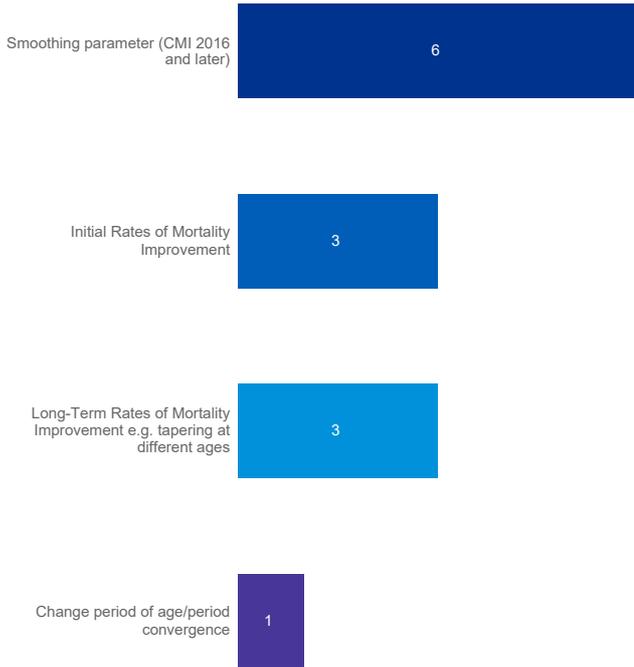
SF/IM

Longevity - CMI Model

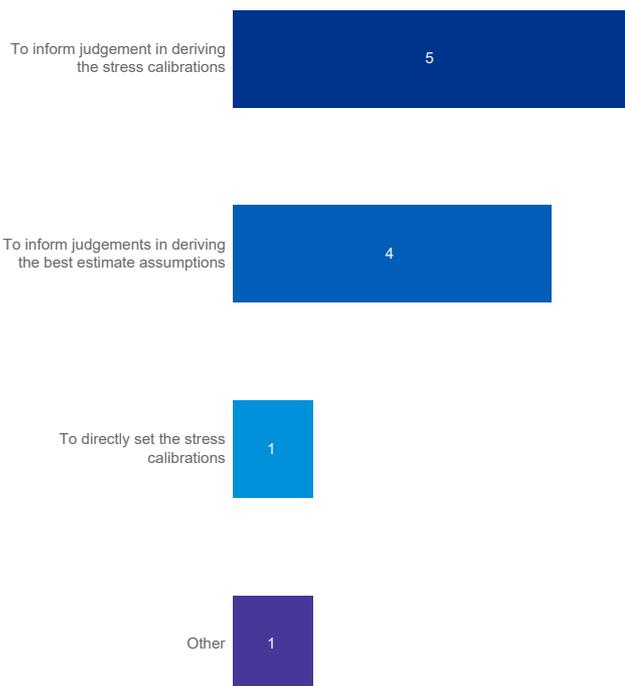
The most common adjustment from the CMI Core calibration is to change the period smoothing parameter. As seen previously, where survey respondents adjust the smoothing parameter, they increase it from the Core parameter value.

6.11 If you use an Extended or Advanced calibration for CMI model, what calibration changes do you make?

6.12 How many years of data are used for the calibration of mortality risk?



6.13 If you use cause of death models what do you use them for?



Technical Practices Survey 2020

6. Mortality & Longevity Risk

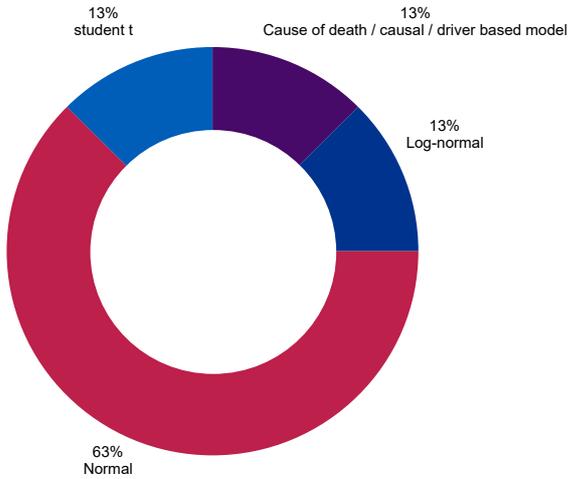
1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
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IM

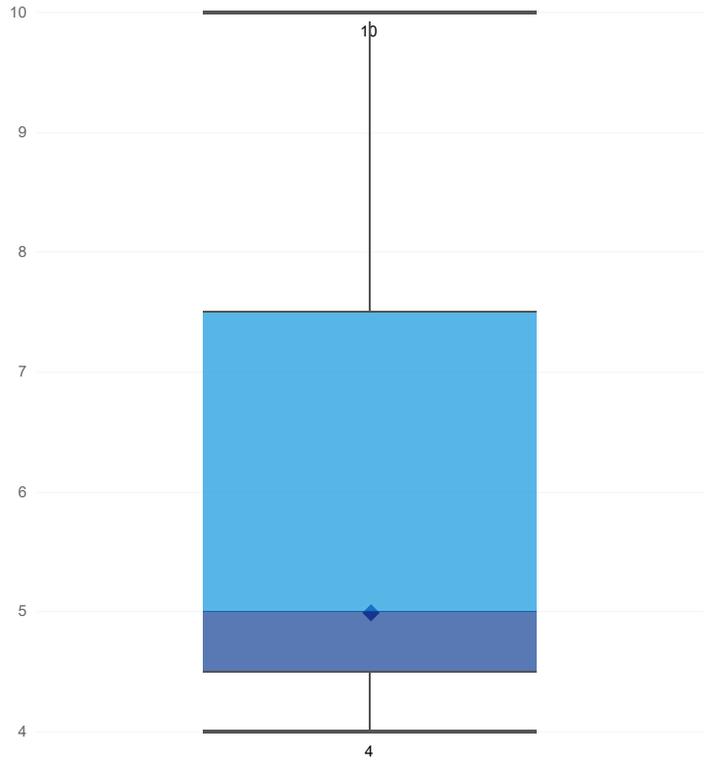
Longevity - Modelling

The approaches to modelling longevity risk are largely unchanged from YE18, with the majority of firms continuing to use a normal model.

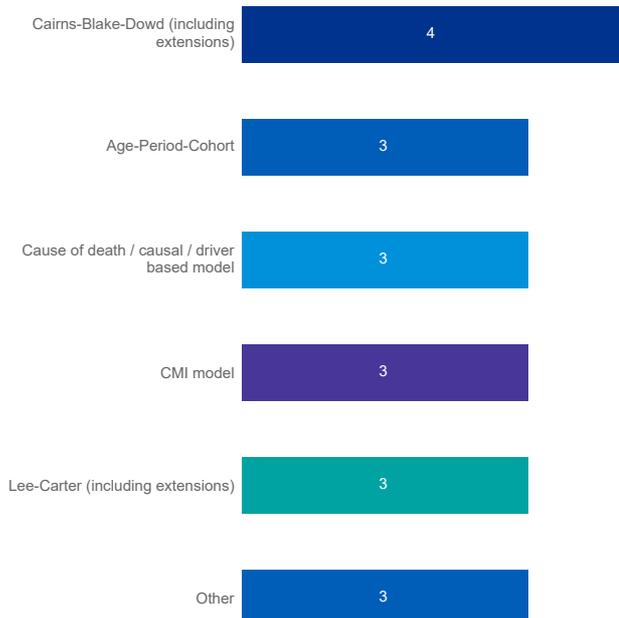
6.14 Which of the following models do you use for modelling longevity base mortality stresses?



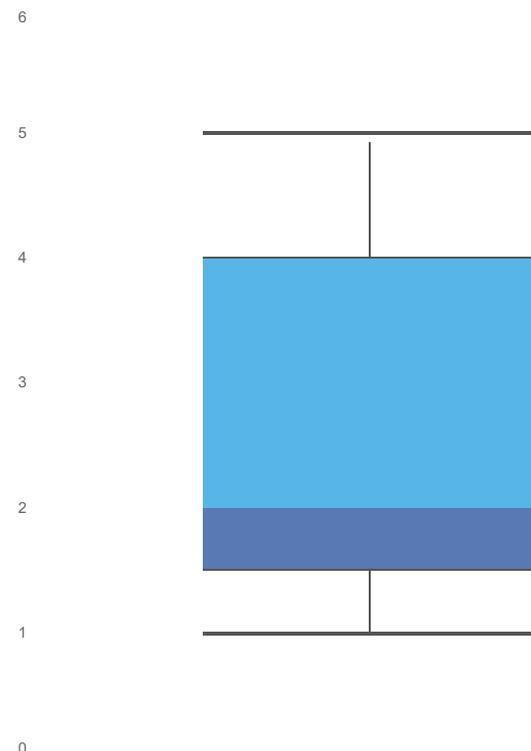
6.15 How many years of data is used for the calibration of longevity base mortality risk?



6.16 Which of the following models do you use for modelling longevity trend stresses?



6.17 How many models do you use for longevity trend stresses?



Other includes internal calibration represented by a log-normal distribution, quadratic CBD model with cohort effects, and Mx model.

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6. Mortality & Longevity Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
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SF/IM

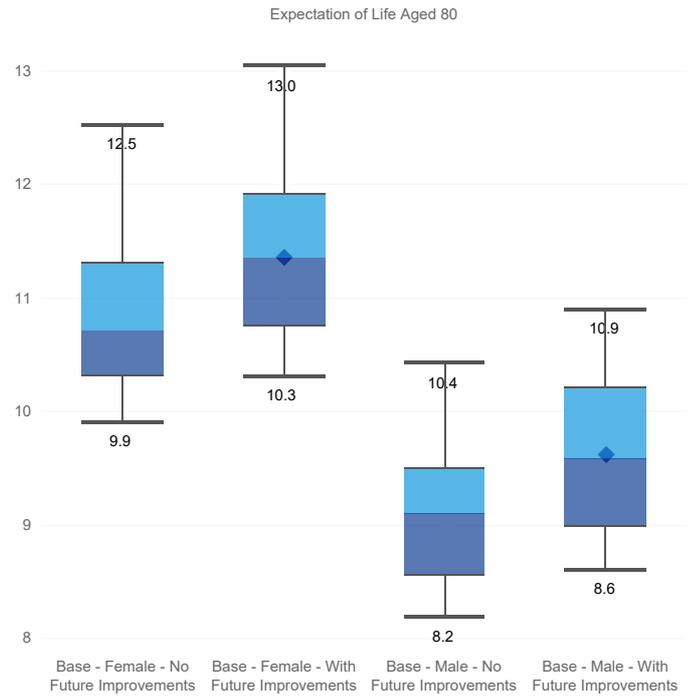
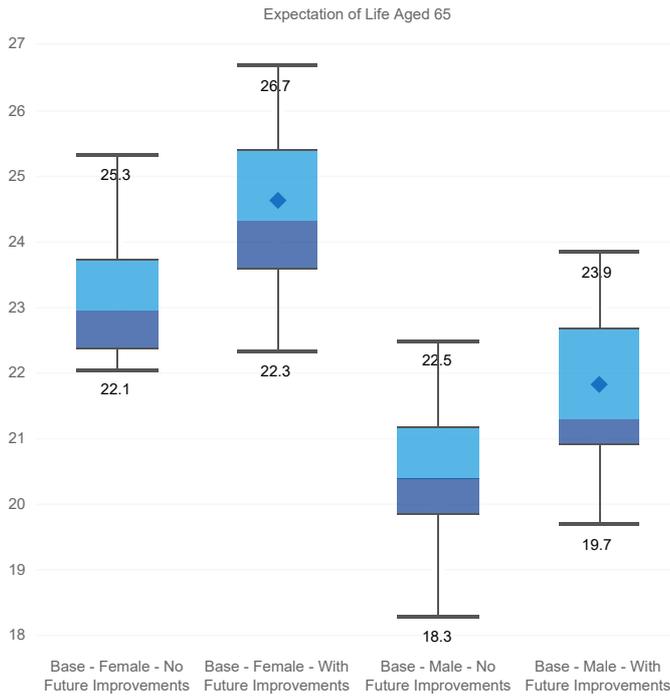
Longevity Calibrations

The charts below show that the median best estimate expectations of life for SF and IM firms at YE19 were reduced compared to YE18 for both males and females.

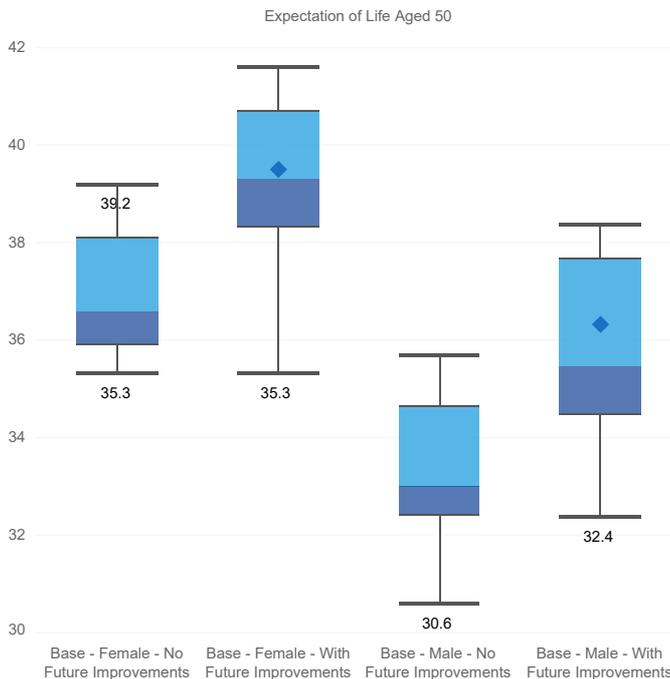
We would generally expect expectations of life to increase from one year to the next to reflect the lower mortality rates for younger cohorts, although this would have been dampened by the reductions in allowances for improvements compared to the previous year.

6.18a For the base and 1-in-200 scenarios at YE19, please set out the life expectancy for your most material annuity business (lives age 65).

6.18b For the base and 1-in-200 scenarios at YE19, please set out the life expectancy for your most material annuity business (lives age 80).



6.18c For the base and 1-in-200 scenarios at YE19, please set out the life expectancy for your most material annuity business (lives age 50).



Technical Practices Survey 2020

6. Mortality & Longevity Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
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IM

Longevity Calibrations - Internal Model

The tables below set out, for each age and gender:

- Best estimate expectation of life without allowance for mortality improvements
- Best estimate allowance for mortality improvements, as an increase in absolute expectation of life
- Overall stress allowance, as an increase in absolute expectation of life
- Increase in stressed expectation of life, as a percentage of the base without improvements

We note that the average Internal Model calibration for longevity risk is significantly stronger than that produced by the Standard Formula, particularly at younger ages.

We also note that the stress impact for males is generally larger than for females.

Age 50

Female

Male

Market Average

Base Mortality	36.7	33.4
BE Improvements	2.7	2.5
1-in-200 Stress Impact (EoL)	5.0	5.3
1-in-200 Stress Impact (%)	15.0%	15.0%

Age 65

Female

Male

Base Mortality	23.2	20.5
BE Improvements	1.4	1.3
1-in-200 Stress Impact (EoL)	3.2	3.3
1-in-200 Stress Impact (%)	13.2%	15.1%

Age 80

Female

Male

Base Mortality	11.0	9.2
BE Improvements	0.5	0.4
1-in-200 Stress Impact (EoL)	1.6	1.5
1-in-200 Stress Impact (%)	14.1%	15.8%

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7. Underwriting Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

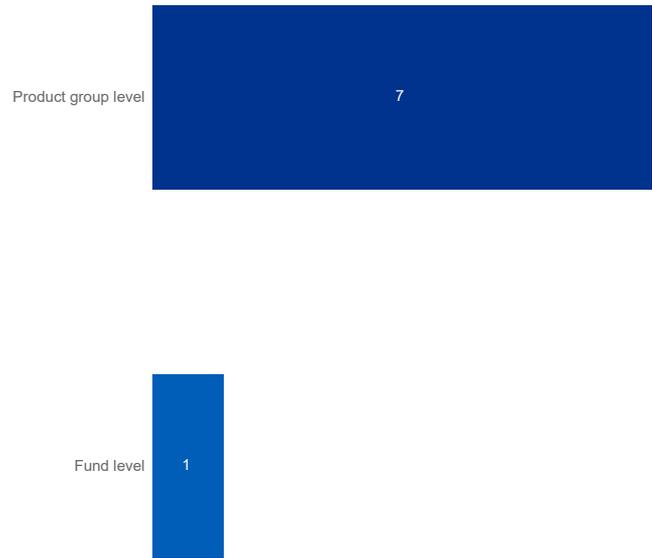
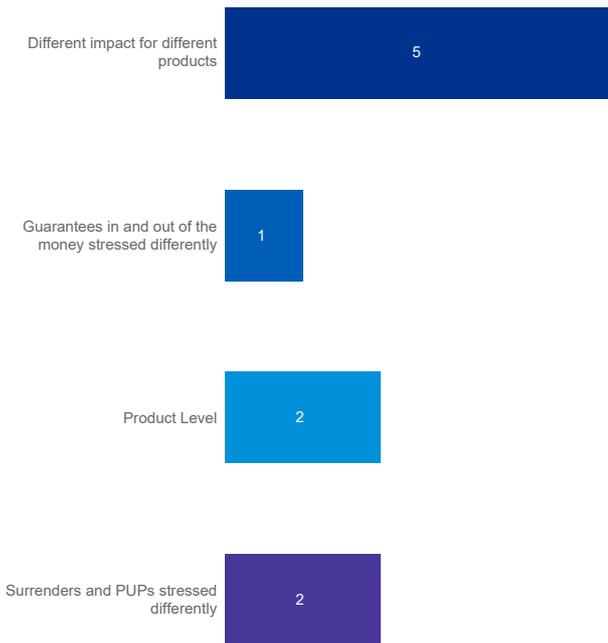
IM

Persistency and Lapse Stress

Firms continue to set persistency assumptions using historic data, applying an overlay for expert judgement where required. Firms typically apply a level persistency stress at all durations, but apply different stresses for different products, and also determine the direction of the most onerous stress at a product group level. The majority of firms allow for diversification between components when aggregating lapse stresses. No firms indicated any change in the model or statistical distributions used for persistency risk since YE18.

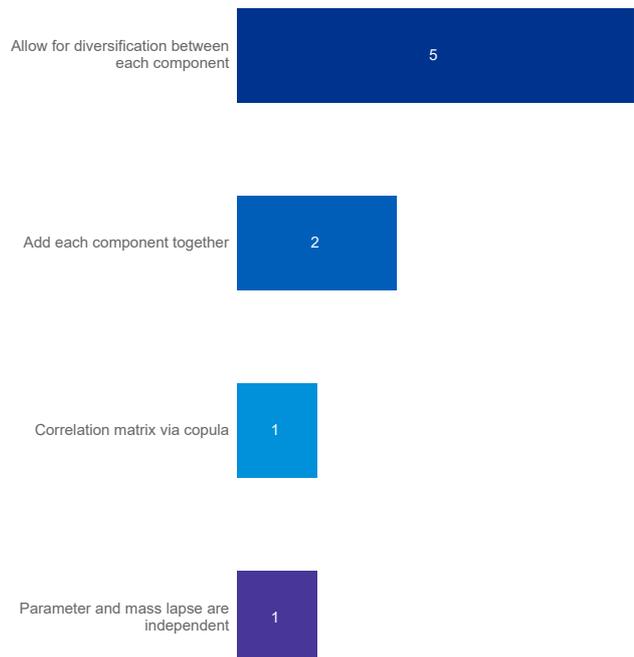
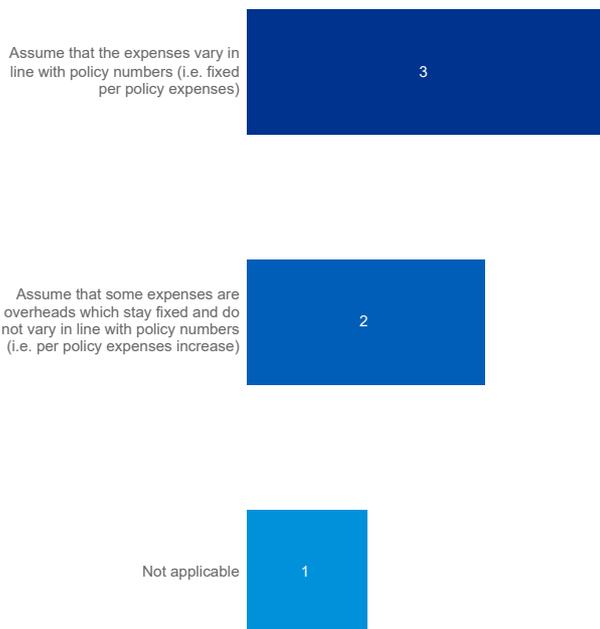
7.1 At which level of granularity do you apply your level persistency stress tests?

7.2 At what level do you determine which direction is the most onerous policyholder behaviour stress for level persistency stress?



7.3 What assumption do you make about expenses in your mass lapse stress?

7.4 What method do you use to aggregate the lapse stresses?



Technical Practices Survey 2020

7. Underwriting Risk

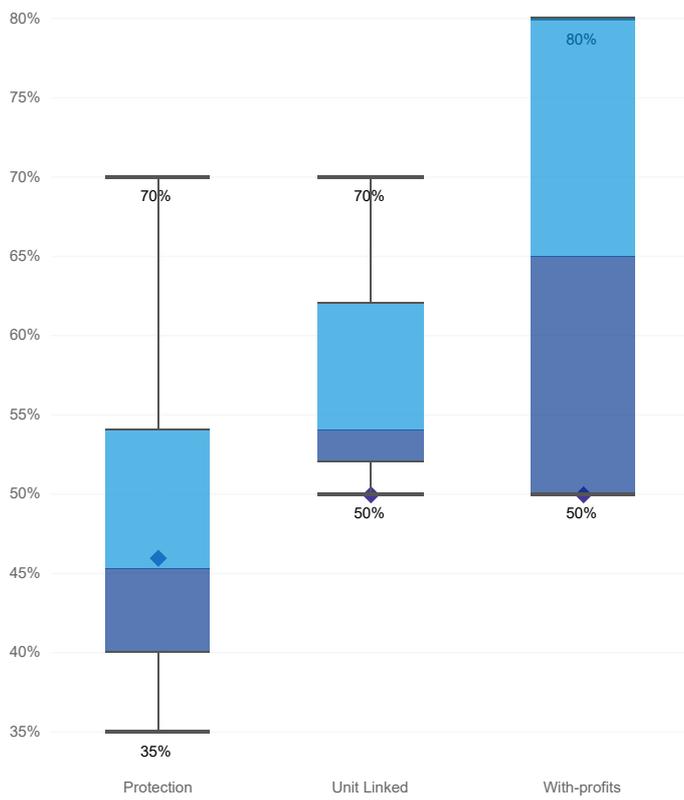
1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
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IM

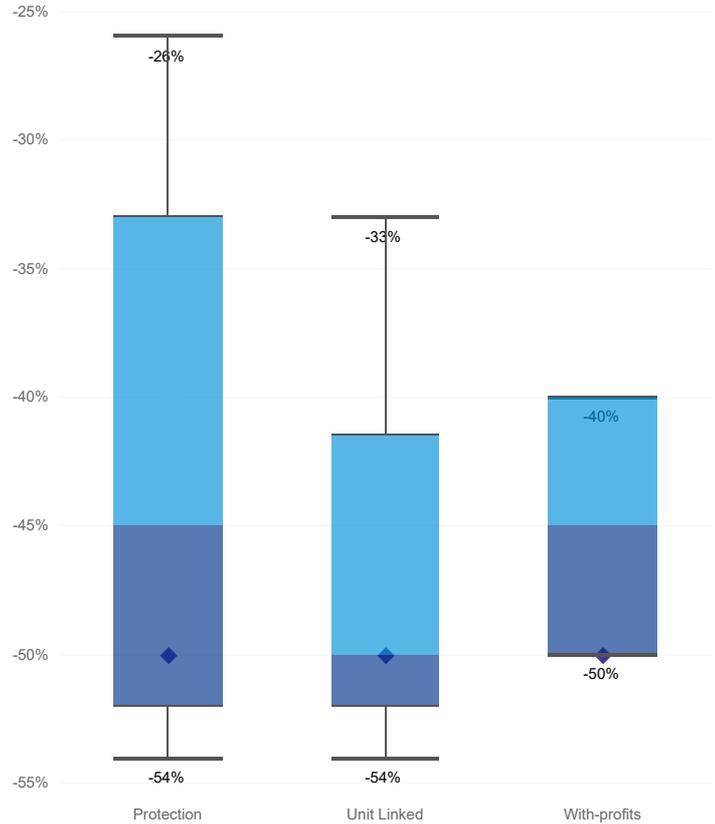
Lapse Stress

The values for the lapse and mass lapse stresses have not changed much from last year, with similar medians and range of responses observed

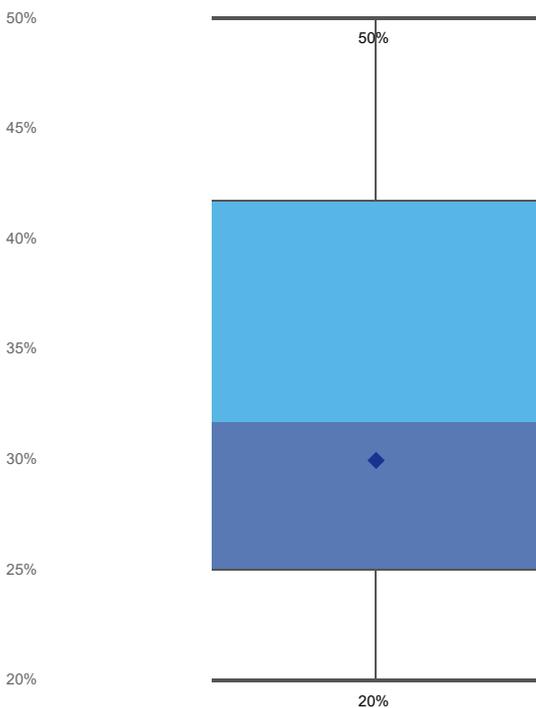
7.5 Lapse Assumptions - 1-in-200 multiplicative stress up



7.6 Lapse Assumptions - 1-in-200 multiplicative stress down



7.7 Mass Lapse - 1-in-200 stress



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7. Underwriting Risk

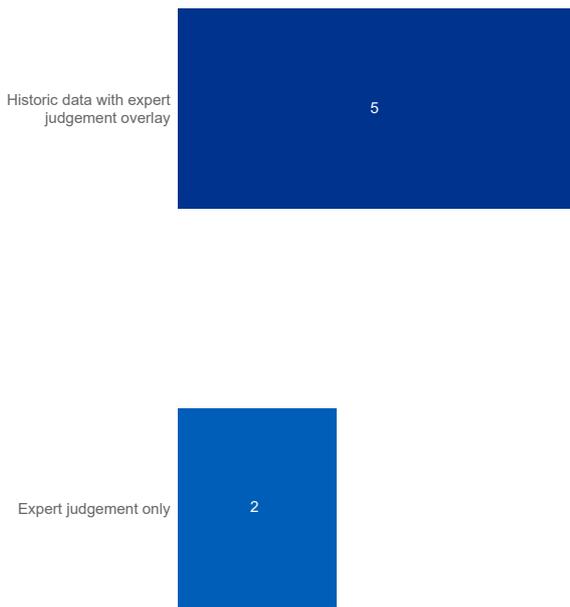
1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
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IM

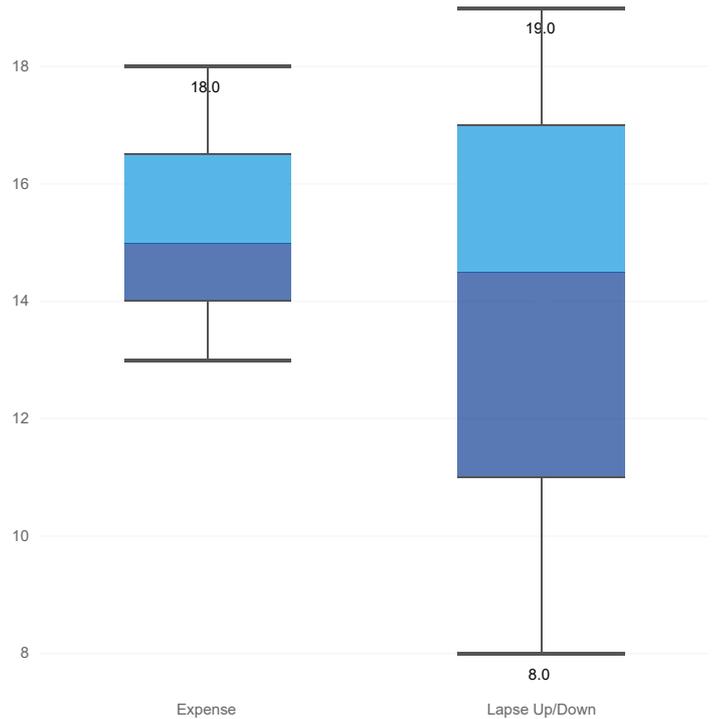
Expense Stress

Nearly all firms apply stress to variable expenses and maintenance expenses, while only three firms apply a stress to investment expenses. The median expense stress is 21% of the best estimate assumption, which is unchanged from last year, although the range of values has reduced. The median expense inflation stress is 120bps, which is a slight increase from last year at 110bps.

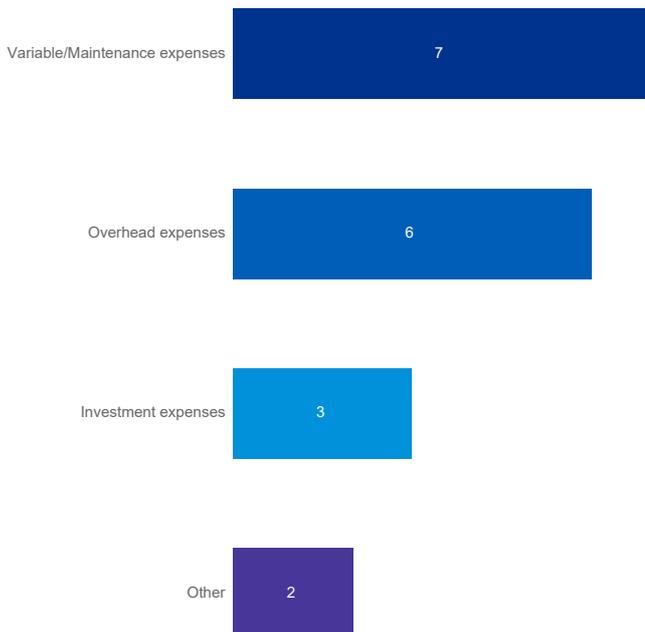
7.8 Expense experience analysis



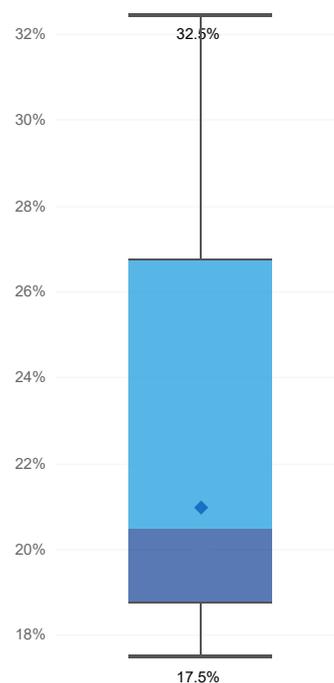
7.9 How many years of data is used for the calibration of the following risks?



7.10 Which of your expenses are subject to the stressed expense stress?



7.11a Expenses level (as a % of best estimate assumption)



7.11b Expense inflation (bps above best estimate assumptions)



Other includes internal expenses and non-mandatory project expenses.

8. Operational Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

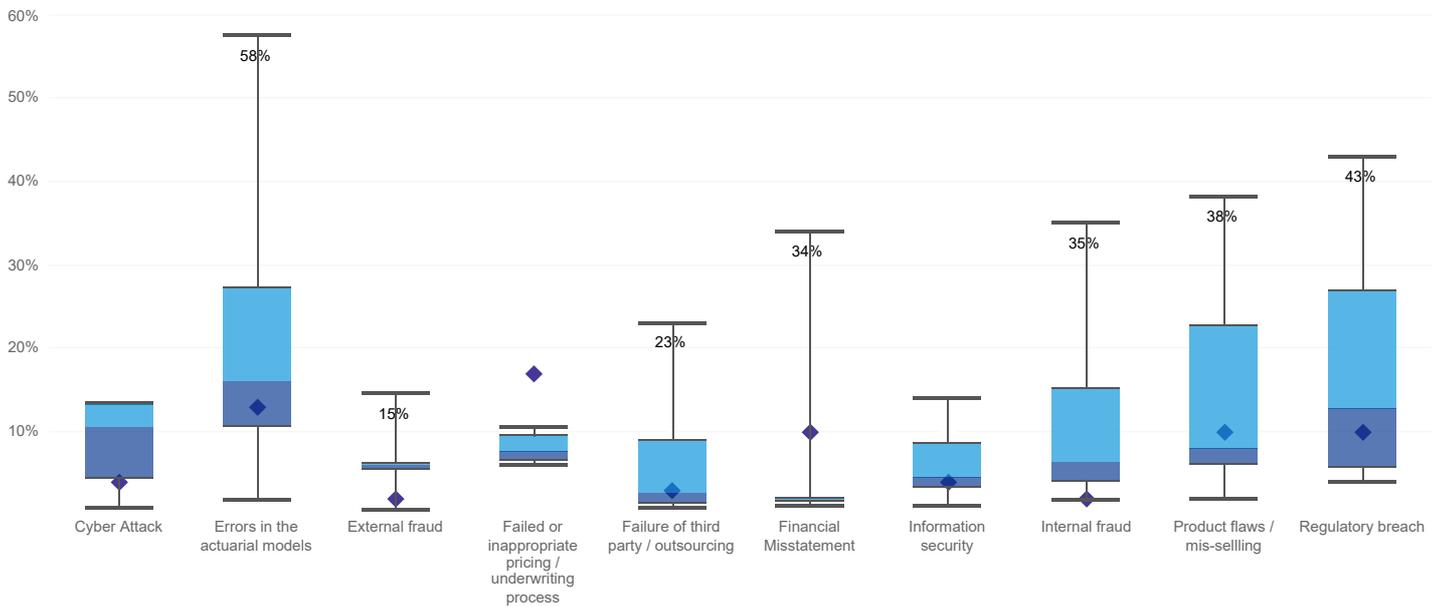
SF/IM

Operational Risk Capital

Firms model many different operational scenarios. To understand market practice we asked firms to estimate the capital arising from certain scenarios that are frequently modelled. For companies that were able to answer question 8.1 the set of scenarios in the question covered around three quarters of the overall operational risk capital. From the chart below it can be seen that for some companies particular scenarios contribute very heavily to capital with a number of firms generating 30% or more of capital from a single scenario. The most commonly modelled scenarios were regulatory breaches, product flaws/mis-selling and outsourcer failure.

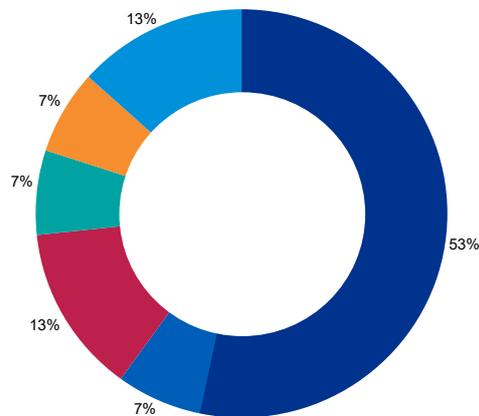
Operational Risk is the one area in which Standard Formula firms often do their own modelling and therefore this section is relevant to both Internal Model and Standard Formula firms. Overall we noticed that the Internal Model firms in our survey use more bespoke methods with all using Monte Carlo methodologies or equivalently sophisticated approaches. Practice amongst Standard Formula firms is more varied with some using more straightforward estimation techniques. Among Internal Model firms there is more use of loss data whether internally generated or gathered from external sources. Both types of firms are considering updating the approach given Covid-19 with almost all considering some sort of change from updating of scenarios to the revision of correlations.

8.1 What proportion of the your total operational risk capital do each of the following scenarios contribute (as %)?



We have excluded the scenarios "inadequate reserving process" and "regulatory mandated reduction in product charges", due to their small contribution to total operational risk capital, or limited respondents classifying them as significant.

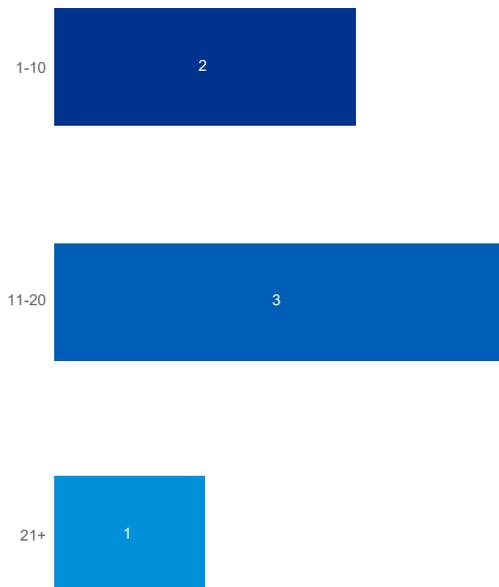
8.2 What type of methodology does your firm use for estimating its operational risk capital requirement?



- A Monte Carlo/statistical frequency/severity model taking account of multiple op risk scenarios
- A Monte Carlo/statistical model taking account of only actual loss data
- A simple estimation approach (e.g. x% of premiums or best estimate liabilities)
- A statistical model that uses conditional dependencies (e.g. Bayesian Network)
- Multiple scenarios with each using a deterministic approach
- Other

The internal models in our survey all use Monte Carlo methodologies or similarly sophisticated approaches. Practice amongst Standard Formula firms is more varied with some using more straightforward estimation techniques.

8.3 If you use multiple scenarios, how many scenarios are considered?



8. Operational Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

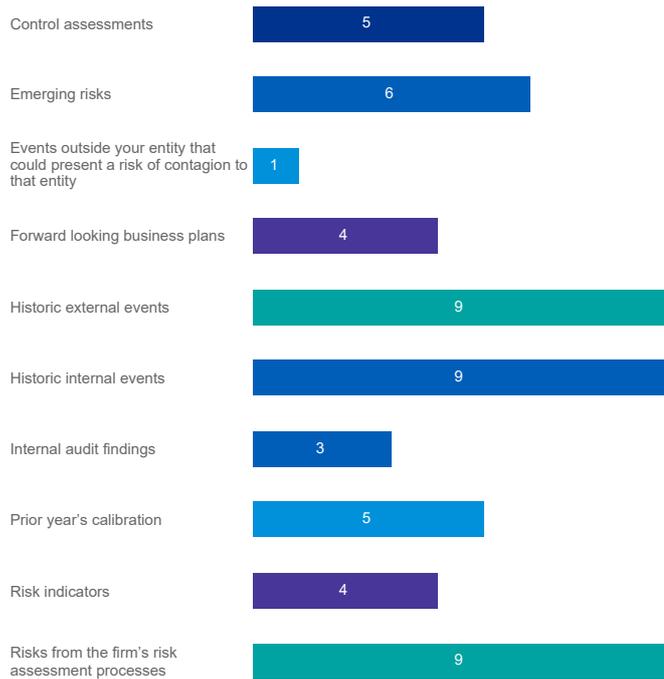
SF/IM

Operational Risk Calibration

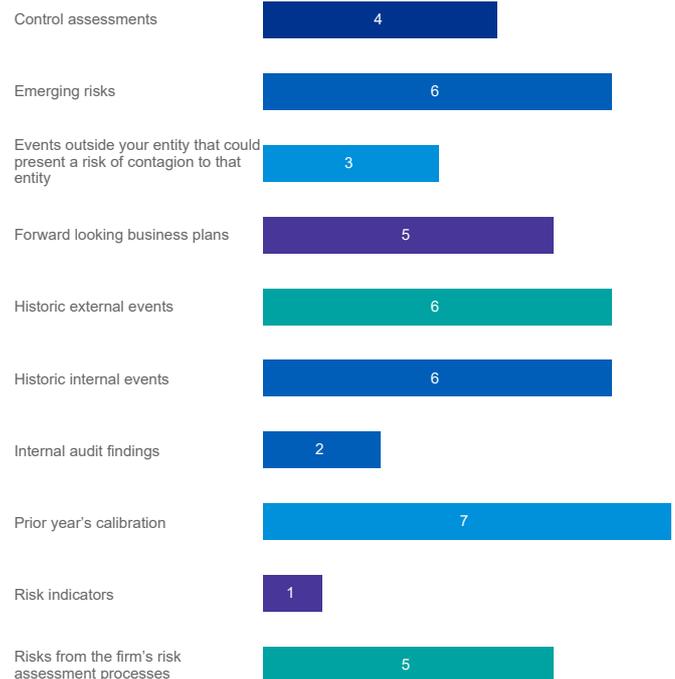
We are seeing increased use of internal data and loss events for calibrating both the SCR and the stress and scenario tests (SSTs) for operational risk. From the charts below we can see that loss data is more likely to be used when calibrating the SCR than for the SST process. There has been feedback given to firms that there should be more use of internal data so this trend is not surprising but there remain challenges around the volumes and reliability of internal data.

We observed more use of historic data, both internal and external, from Internal Model firms than Standard Formula firms

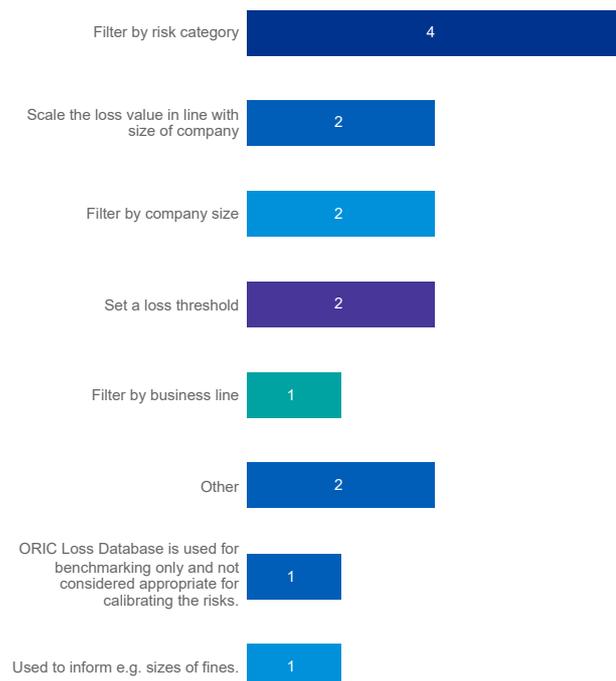
8.4a What data do you use in your calibration of the operational risk SCR?



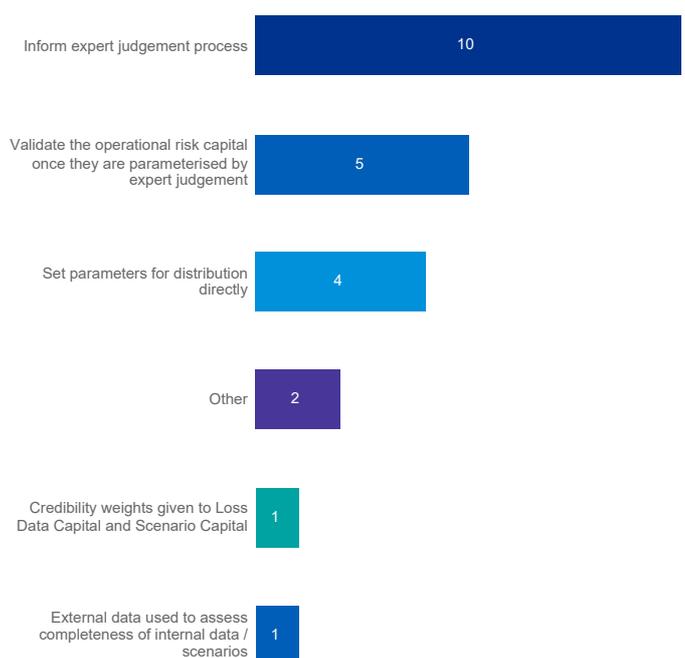
8.4a What data do you use in your calibration of SSTs for operational risk?



8.5 If you answered external data in question 8.4, how do you ensure the relevance of the data?



8.6 Please explain how internal/external data is used in your operational risk model.



Other includes using the external data only to inform or benchmark, rather than calibrating risks.

Other includes using external data to assess completeness of the internal data and scenarios, and giving credibility weights to Loss Data Capital and Scenario Capital.

8. Operational Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk	
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					13. Tax	14. Correlation

SF/IM

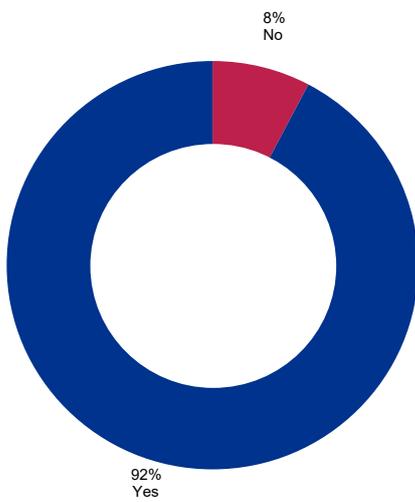
Operational Risk Distributions

The Lognormal distribution is the most commonly used distribution for severity across both Internal Model and Standard Formula firms, amongst Internal Model firms however there was a wider set of distributions used overall.

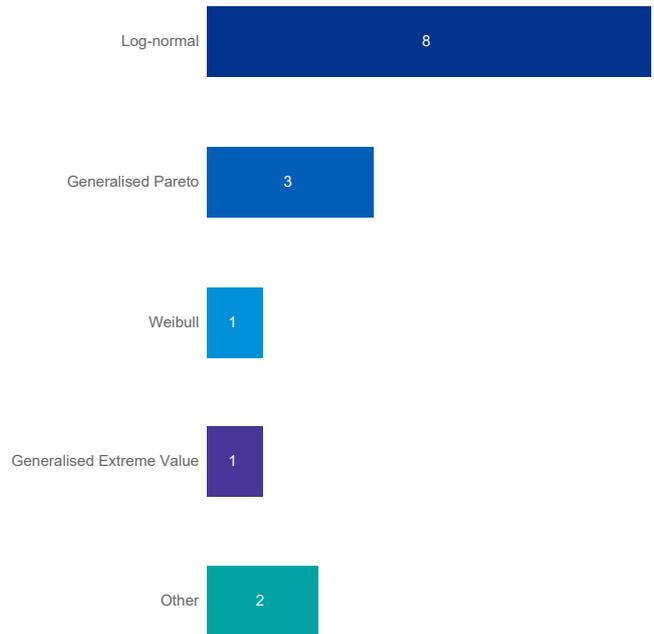
A Gaussian Copula was the most common aggregation method among Internal Model Firms, Standard Formula firms were more mixed with almost half still relying on a correlation matrix approach.

All respondents indicated that there had been no changes to the statistical distributions used to model the frequency of the operational risk scenarios in the last 12 months.

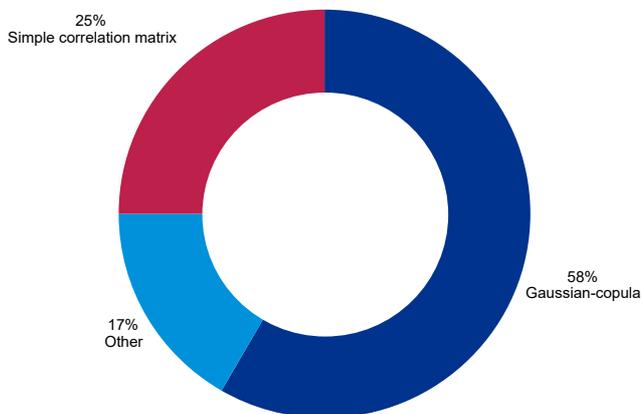
8.7 Do you model your frequency and severity distribution separately?



8.8 What statistical distributions are used to model the severity of your operational risk scenarios?



8.9 What approach does your firm take in assessing the impact of diversification benefit between risk scenarios?



8. Operational Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
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SF/IM

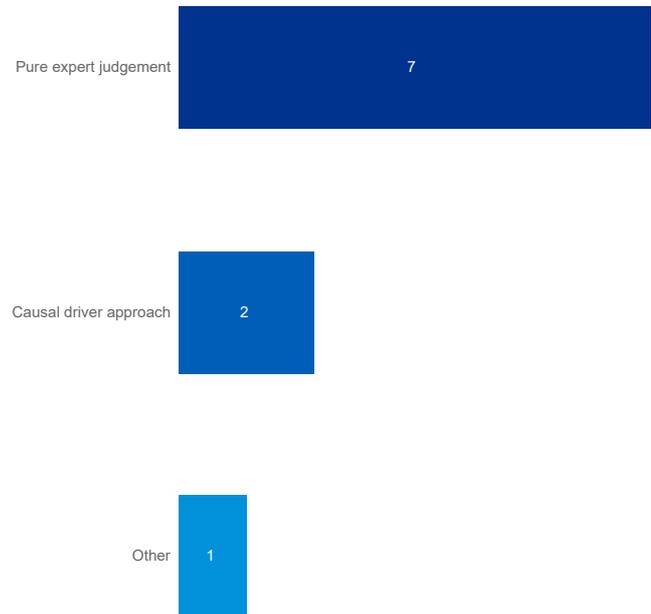
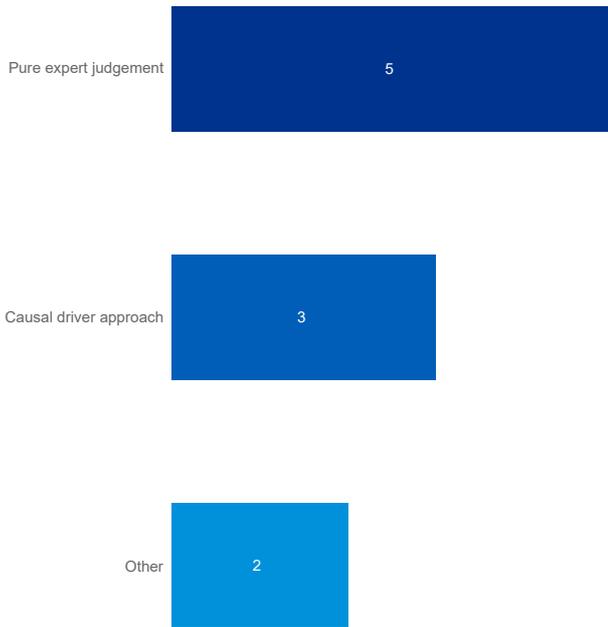
Correlations and Diversification

Expert Judgement still plays a dominant role in setting correlation assumptions. For correlations between operational risks one of the firms using Expert Judgement also used causal drivers to some extent. Of the two companies using other methodologies, one more closely aligned to Expert Judgement and one more closely to causal risk drivers. For the correlations between operational risk and other risks Expert Judgement plays an even greater role.

Companies are still gaining very large diversification benefits between operational risks and between operational risk as a whole and other risks. Covid 19 has proven that there can be considerable connectivity between risks so it will be interesting to see if this remains the case going forward. Given the materiality of diversification and its reliance on Expert Judgement firms need to make sure its processes and validation of Expert Judgement is robust.

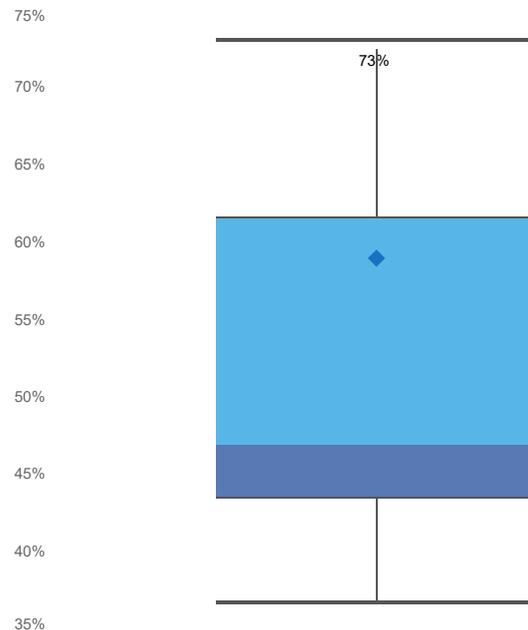
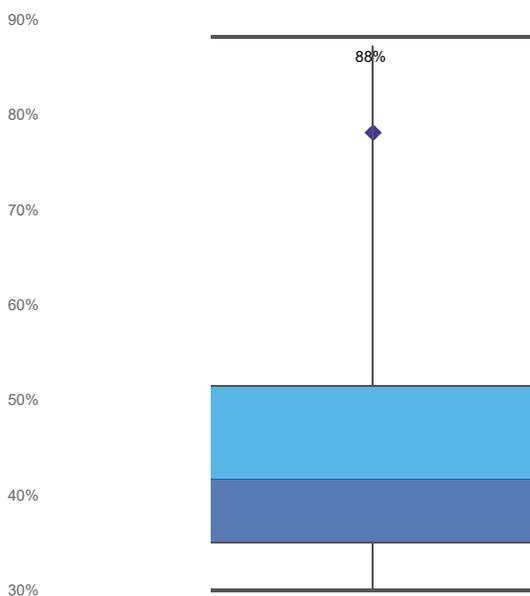
8.10 On what basis are correlations set between operational risk scenarios?

8.11 On what basis are correlations set between operational risk and other risks?



8.12 As a percentage of undiversified operational risk capital (before diversification within operational risk scenarios), what is the diversification benefit that you are able to realise from the correlation between all of your operational risk scenarios (as %)?

8.13 As a percentage of undiversified operational risk capital (after diversification within operational risk scenarios), what is the diversification benefit that you are able to realise from the correlation between operational risk and other risks (as %)?



8. Operational Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

SF/IM

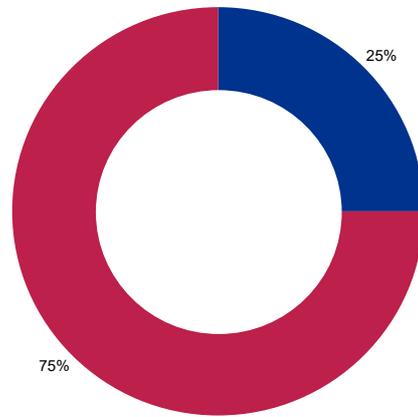
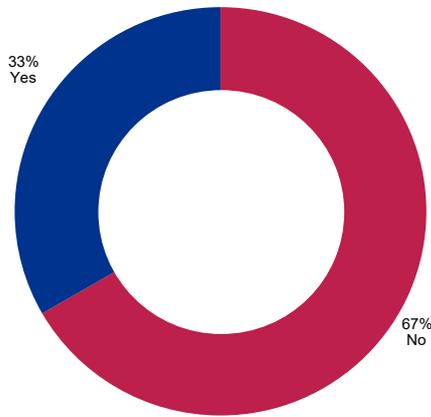
Recoveries

Allowance for insurance recoveries is often identified as an area which firms want to improve, therefore it was interesting that we now see a number of firms allowing for this in the modelling. For most firms it is allowed for within scenario parameterisation and therefore considered within scenario workshops. See 8.16 for more information about the factors considered.

The data showed that Internal Model firms were more likely than Standard Formula firms to allow for insurance recoveries in their approach.

8.14 Do you allow for recoveries from corporate insurances on your operational risk scenarios?

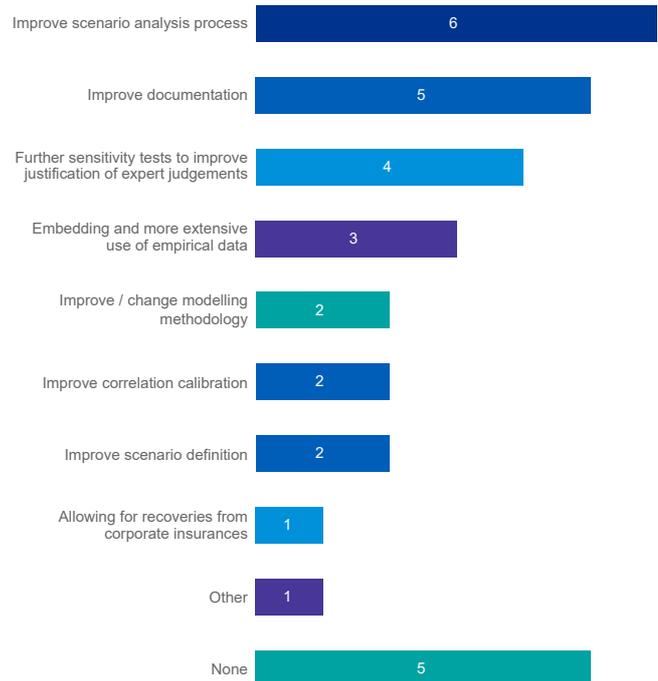
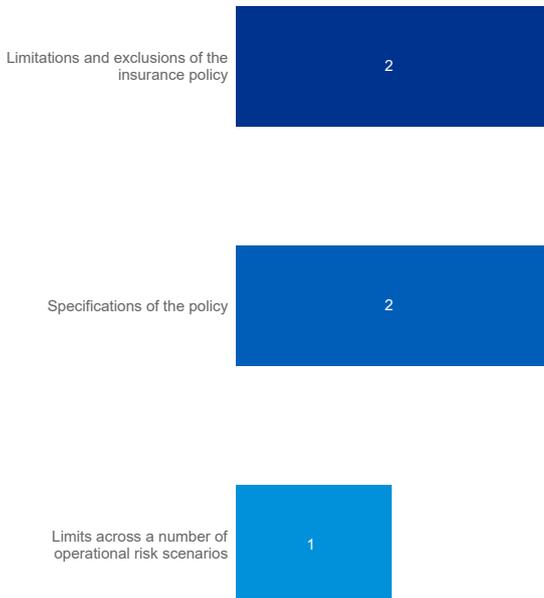
8.15 If you answered yes to Question 8.14, please specify how you allow for this.



■ Take a hair cut from the total operational risk SCR
■ Taken into account when parameterising individual scenarios

8.16 What do you consider when determining the level of recoveries from corporate insurances?

8.17 What further improvements/enhancements are you planning to make to your operational risk model in the next 12 months?



8. Operational Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
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SF/IM

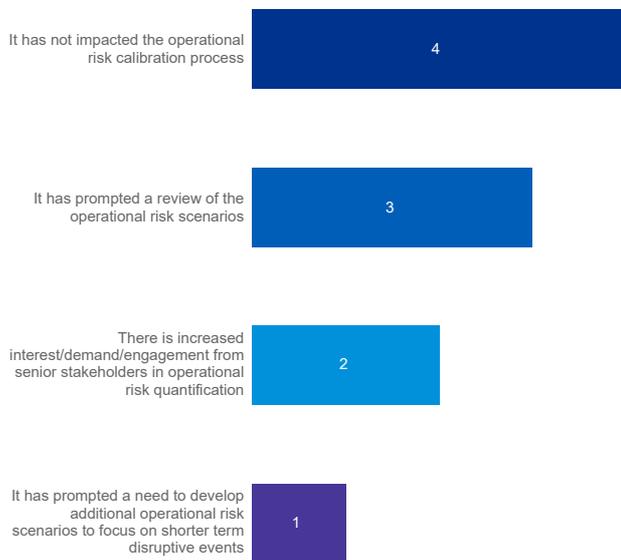
Operational Resilience

Operational Risk modelling remains an area of focus and development and therefore we were keen to understand how recent events such as the focus on operational resilience and the emergence of Covid-19 had impacted the approach. The results show that these issues are on the radar of insurers with both leading to changes to the scenarios and the calibration. It can be seen from Section 12 that climate change is getting a lot of attention and firms are investigating its potential impact but so far there is limited evidence of firms making direct allowances in the SCR. We expect this situation to change in future years.

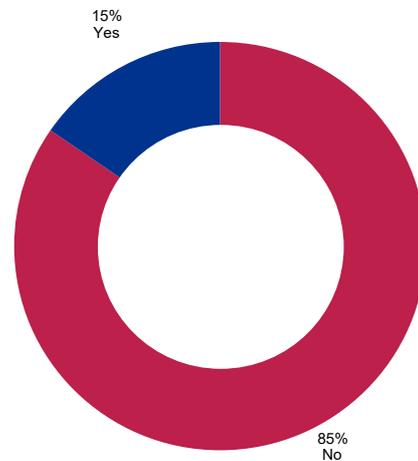
Only a few firms have received regulatory feedback on their operational risk model in the last 12 months. Most of the feedback is about modelling methodology rather than the scenario process, however correlations were also mentioned.

A number of firms commented that they already allow for the potential impact of climate change when calibrating longer term assumptions such as longevity and house price inflation.

8.18 How has the requirements for operational resilience impacted your operational risk calibration process?

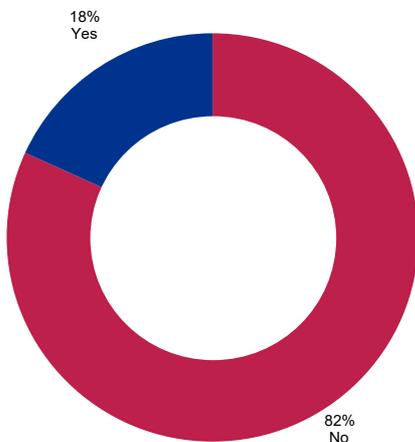


8.19 Have you received regulatory feedback on your operational risk model in the last 12 months?

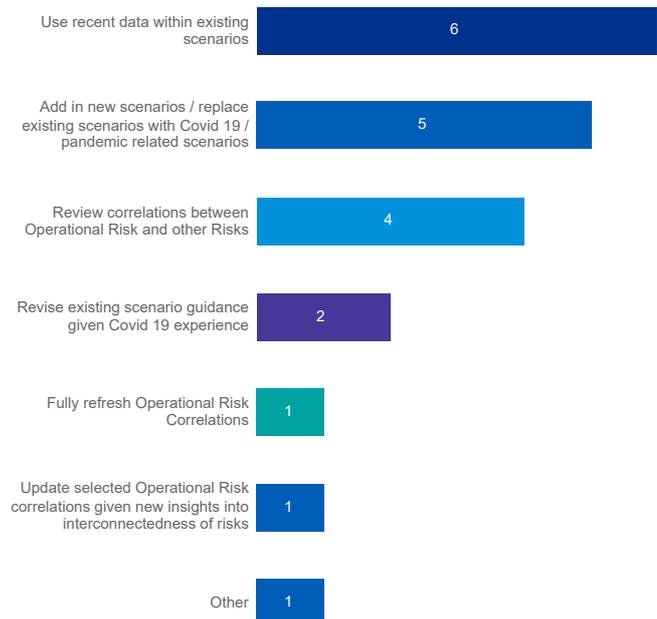


Few firms have received PRA feedback but those that have are as expected the Internal Model firms.

8.20 Do you intend to hold SCR for emerging risks such as climate change?



8.21 What is your expectation of how Covid 19 experience will impact the approach to Operational Risk?



Both Internal Model and Standard Formula firms are taking a similar approach to Covid-19 when it comes to operational risk with revising of scenarios and correlations both among the options being considered.

9. Aggregation

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk	
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	
					13. Tax	14. Correlation

IM

Proxy Models

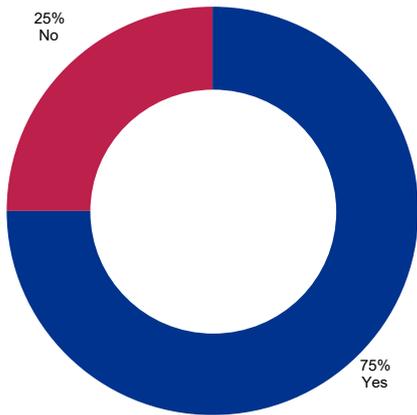
Proxy models remain commonly used for both SCR calculations, and to assist in solvency monitoring and stress and scenario testing.

Effort is continuing to be made in enhancing the proxy model calibrations, to achieve both increased accuracy and faster fitting, through the use of more automated data selection and fitting routines. Wider computing improvements also permit larger fitting and validation data sets, and more regular calibration of the model, addressing areas raised in PRA's thematic review of proxy models. Usage of more advanced machine learning techniques may provide further accuracy and efficiency benefits. These methods are not widely used at the moment, though such techniques are becoming more common with insurers in Europe for other purposes such as experience analysis.

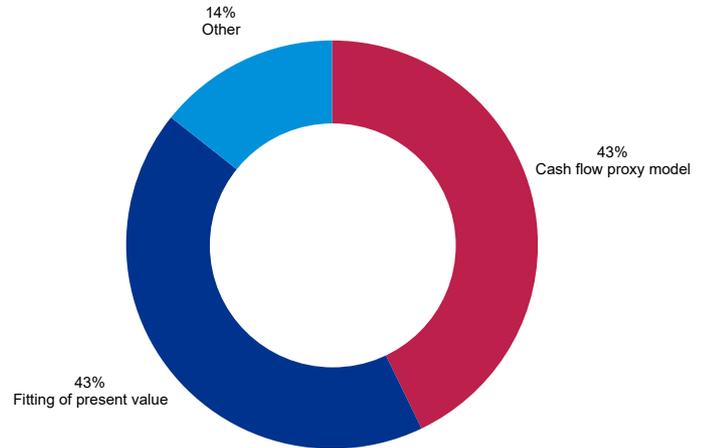
The main challenges in firms' response to the PRA thematic review of proxy models were around the quantity and quality of fitting and validation data, and ensuring the model is tested for its full range of uses. As such we are seeing focus on these areas by firms.

Since the introduction of Solvency II, we have seen a number of firms moving to fitting proxy models to annual cash flows rather than present values. This means that discounting can be performed directly for each capital simulation, avoiding the tricky process of fitting of polynomials to discount rates.

9.1a Are proxy functions used in the capital or solvency monitoring process?

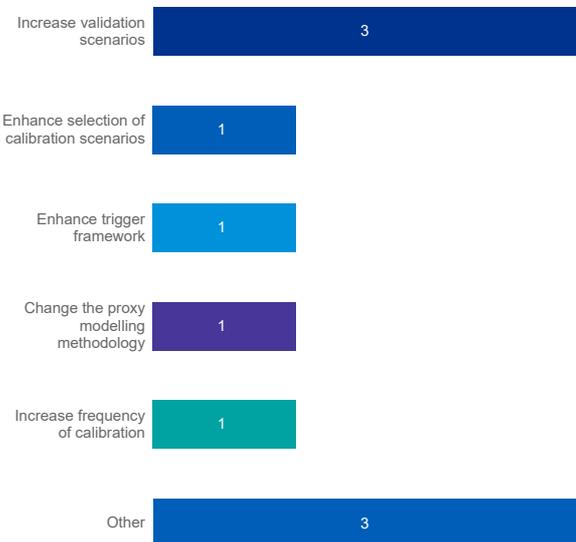


9.1b What form does the proxy model take?



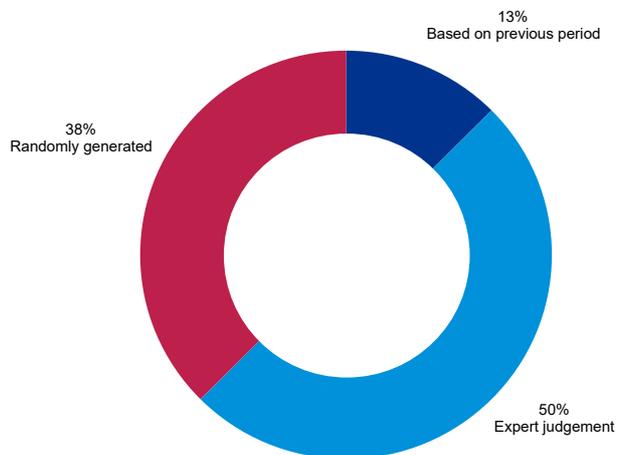
Other includes using a sensitivity approach, which utilises closed form proxies for certain liabilities.

9.2 What have you planned to be the main response to the PRA thematic review of proxy models?



Other includes documentation improvements and further validation of results.

9.3 How are the fitting scenarios chosen?



Technical Practices Survey 2020

9. Aggregation

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

IM

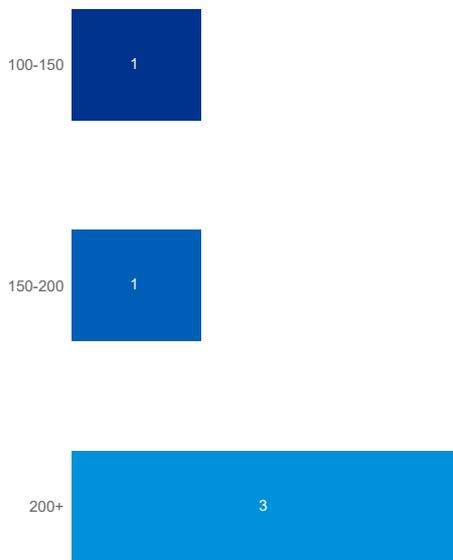
Proxy Models

Since Solvency II implementation, there has been a trend towards accelerating the proxy model process to enable more frequent and on-cycle calibration. A key aim of this is to avoid using roll-forward techniques, which are subject to significant model risk in the event of volatile markets or business driven changes to risk exposures.

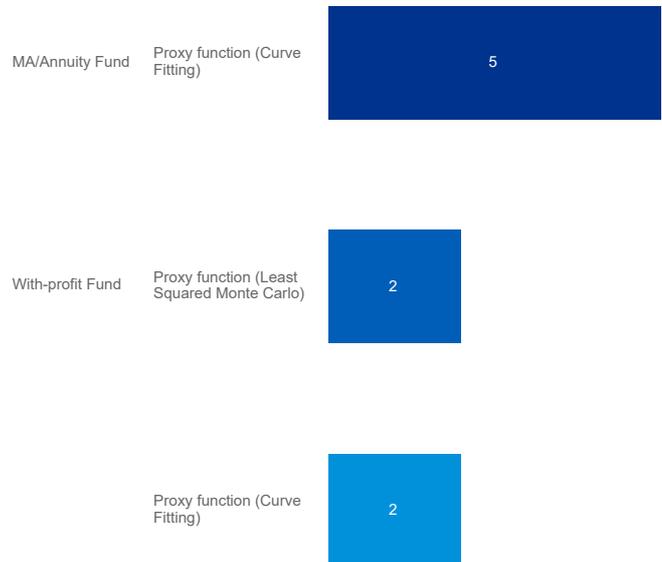
For most firms with with-profits business, Least Squares Monte Carlo (LSMC) has now become the favoured method. LSMC is a particular curve fitting approach that uses statistical techniques to maximise the information contained in fitting scenarios.

We have seen a number of firms who are planning to use their Internal Models as the basis for risk adjustment calculations under IFRS17. This seems a sensible approach, as it provides the risk-based measurement required for IFRS17, however it will potentially bring the Internal Model into the scope for external audit.

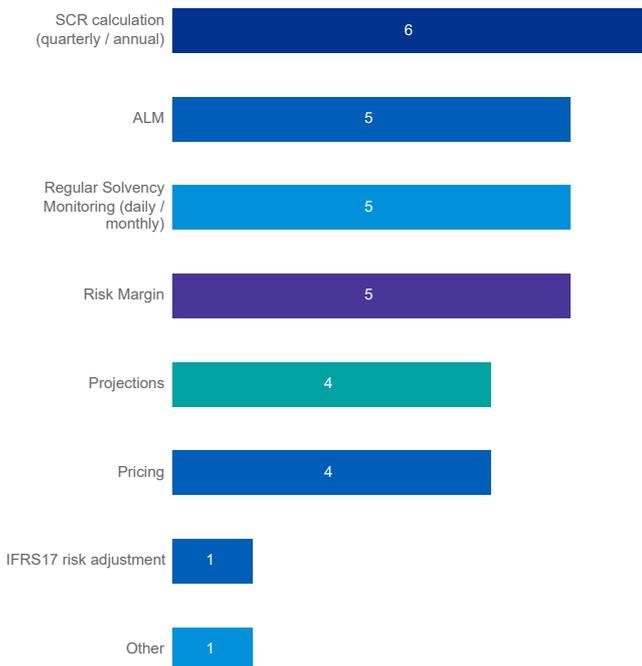
9.4 How many coefficients are fitted in the proxy model?



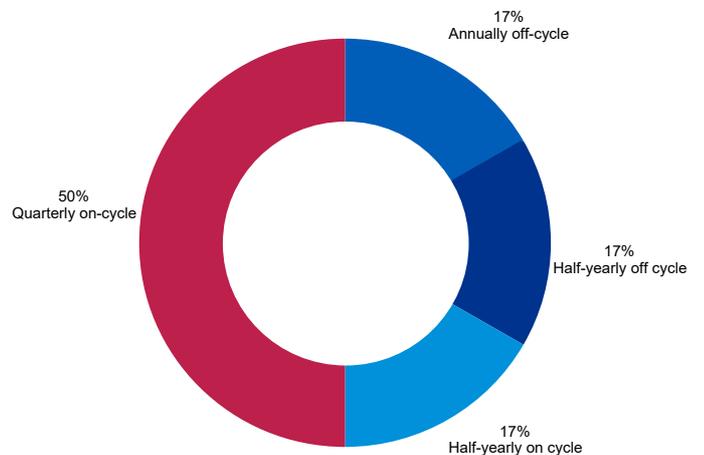
9.5 Which proxy model do you use for your SCR calculation?



9.6 For what purposes do you use your proxy model?



9.7 How frequently do you calibrate your proxy model?



Other includes risk appetite framework and management of WP business.

9. Aggregation

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

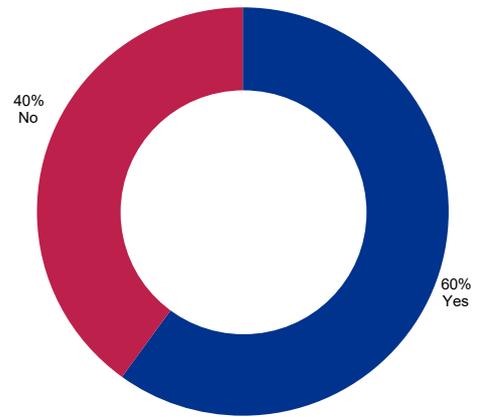
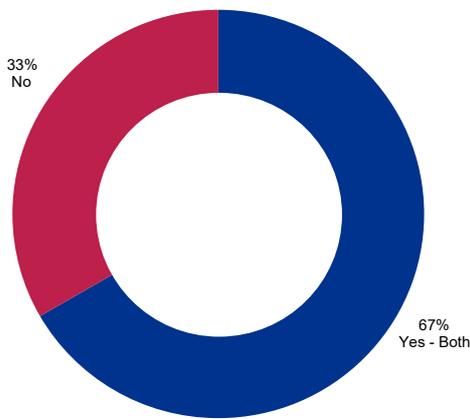
IM

Proxy Models

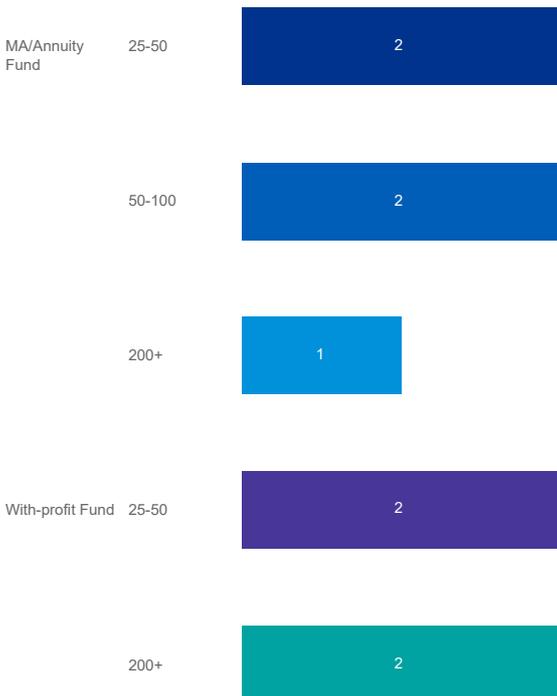
The majority of companies would use a capital adjustment in the event of inadequate proxy model fit. A regular point of contention is whether negative adjustments to the SCR would be applied if the proxy model was shown to overstate losses. We have seen a variety of approaches here, from disallowance of negative adjustments, to limited negative adjustments, and is an area of significant challenge internally and through the regulator.

9.8 Do you hold additional capital to address / compensate for limitations in your proxy modelling approach?

9.9 Can the adjustment in question 9.8 be negative (i.e. reduce SCR)?



9.10 How many validation scenarios do you perform when testing the goodness-of-fit?



Technical Practices Survey 2020

9. Aggregation

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

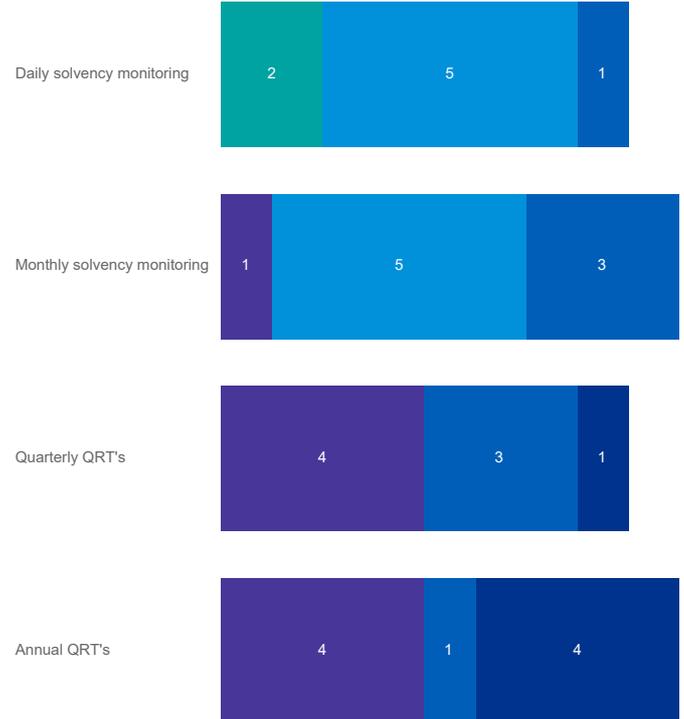
IM

Reporting approaches

All firms surveyed are able to hard-close their SII balance sheet for each quarter, for QRT reporting of the BEL. However, for quarterly reporting of the SCR, a large number of firms are required to use a roll-forward method to complete their QRTs on time.

9.11a How do you calculate the following for BEL, when performing frequent solvency monitoring?

9.11b How do you calculate the following for SCR, when performing frequent solvency monitoring?



- Full re-calculation (heavy model run)
- Use the proxy model to estimate OF / BEL
- Use sensitivities to estimate OF / BEL
- Do not monitor solvency at this frequency

- Run recalibrated proxy model
- Use prior period proxy model to estimate SCR
- Use sensitivities to estimate SCR
- Run a biting scenario through the heavy model to estimate the SCR
- Do not monitor solvency at this frequency

9.12 How frequently do you calibrate each of your risks?



Technical Practices Survey 2020

9. Aggregation

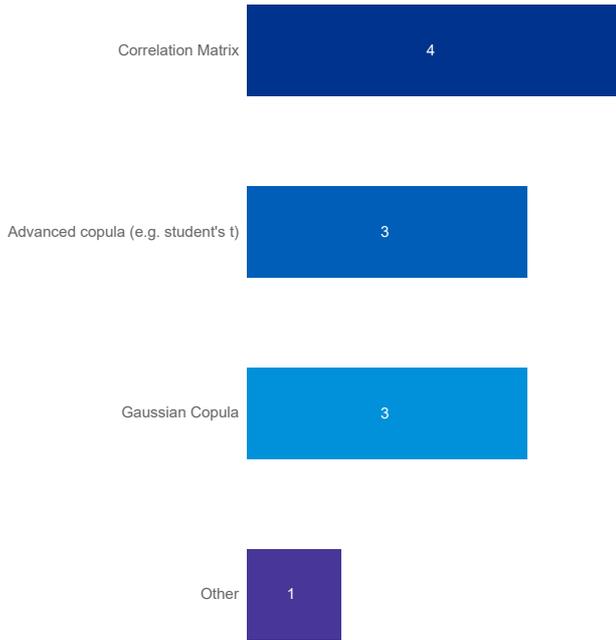
1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

IM

Aggregation

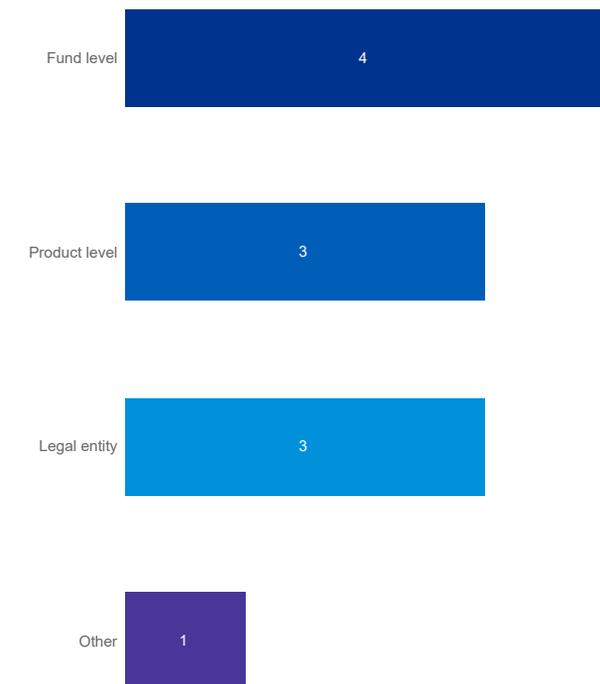
We are aware of some firms that have moved from correlation matrix to copula approaches since Solvency II was implemented. However, in general we have not seen significant changes in how firms are aggregating risks in their internal models.

9.13 What is your approach to risk aggregation?



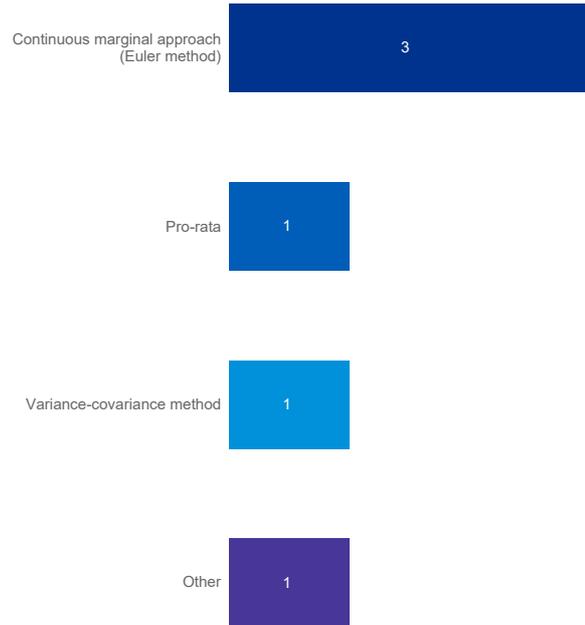
Other includes using a range of aggregation methods for each module separately.

9.15 At what level of business do you allocate risk capital?



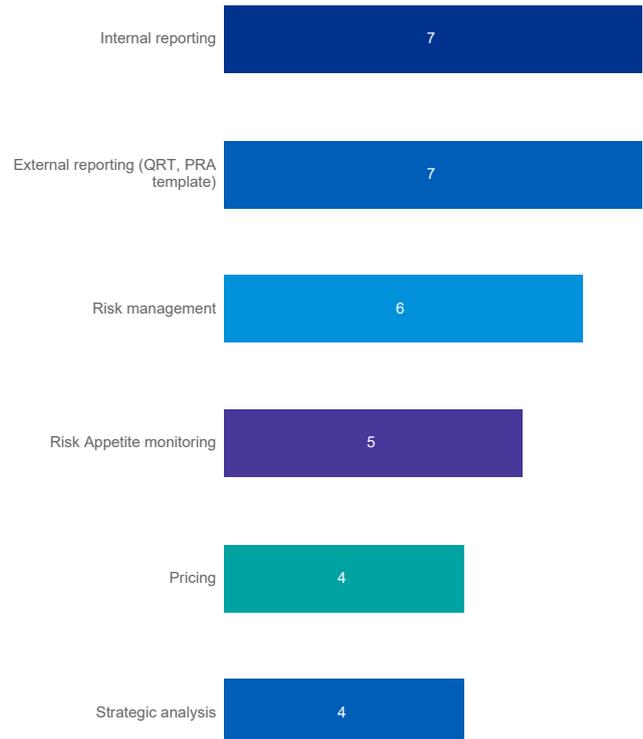
Other includes split by product basis.

9.14 What approach is used to allocate the capital diversification benefit to lower levels of granularity?



Other includes the Bodoff method.

9.16 For what purposes do you use the capital allocation?



Technical Practices Survey 2020

9. Aggregation

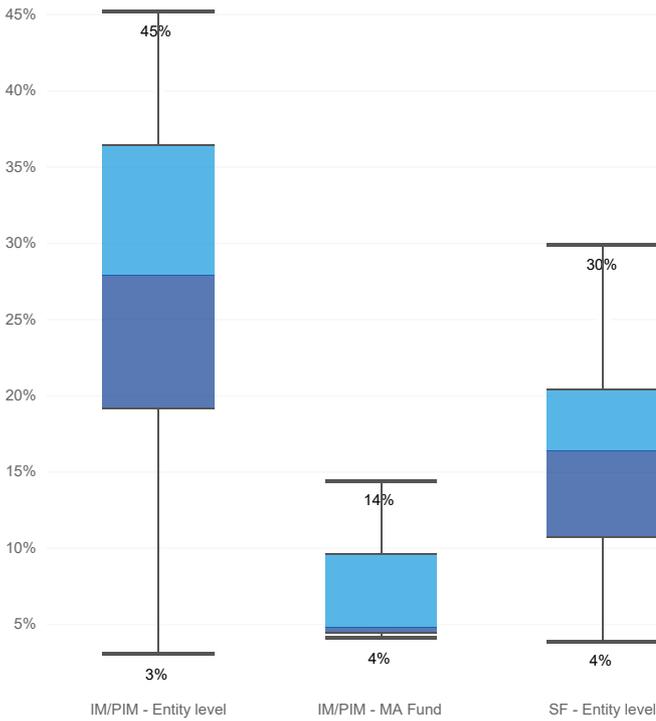
1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk
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13. Tax	14. Correlation				

SF/IM

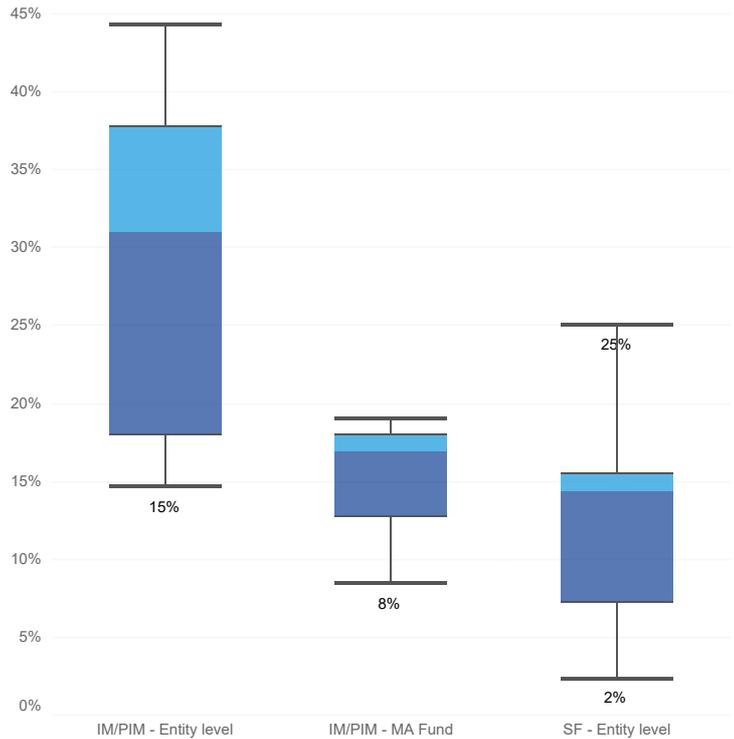
Aggregation

Diversification benefits are larger within IM firms than SF firms. This can be attributed to SF correlations being generally more prudent than those adopted by IM firms.

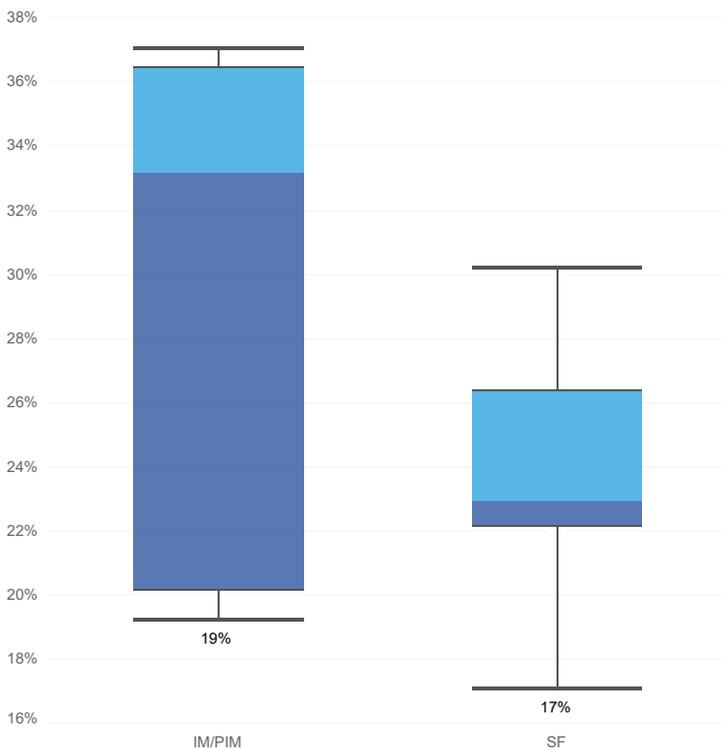
9.17 Diversification - Amongst life risks



9.18 Diversification - Amongst market risks



9.19 Total Diversification



10. SST / RRP

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk	
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	
					13. Tax	14. Correlation

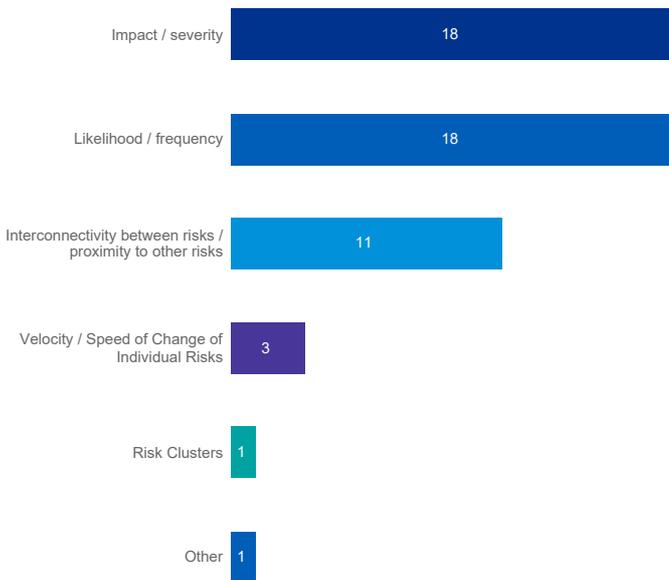
SF/IM

Stress and Scenario Testing

Over time ORSA documentation has evolved, generally moving from the more simplistic impact/severity mapping to encompass more sophisticated techniques which analyse interaction and feedback between risks. This evolution has continued, with 94% of respondents having changed the scenarios considered in their ORSA in the last 12 months.

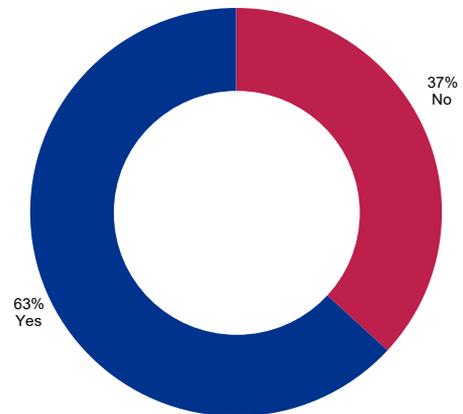
For companies which carry out tail risk analysis, cyberattack and pandemic scenarios are the most common to have been modelled. As part of the 2020 ORSA preparation it will be interesting to see those companies which modelled a pandemic to reflect on whether the scenarios captured the range of risks which have transpired as part of the COVID crisis.

10.1 Which of the following do you consider within your qualitative assessment of risks (either within the ORSA or regular risk reporting)?

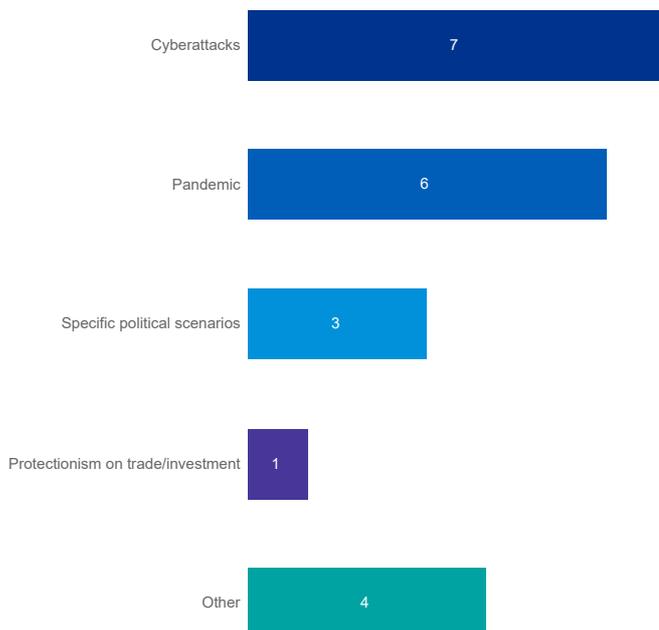


Other includes management actions.

10.2 Do you carry out any tail risk scenario modelling as part of your Stress and Scenario Testing?

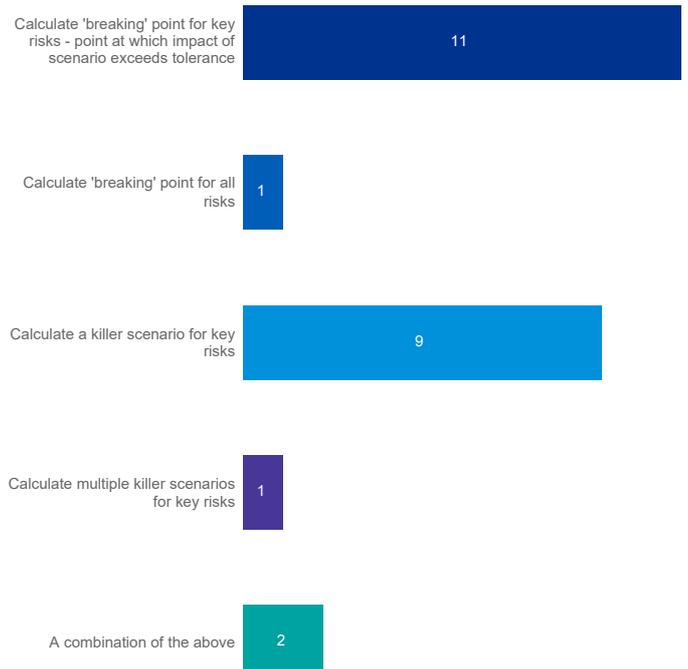


10.3 If you carry out tail risk scenario modelling as part of your Stress and Scenario Testing, which of the following scenarios are included?



Other includes Covid-19, extreme economic downturns, climate change, and reputational scenario.

10.4 What is your approach for carrying out Reverse Stress Testing?



10. SST / RRP

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

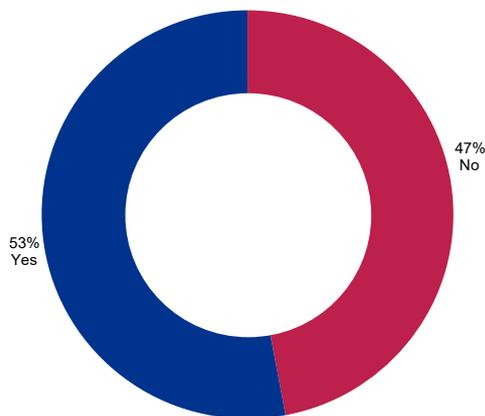
SF/IM

Recovery and Resolution Plans

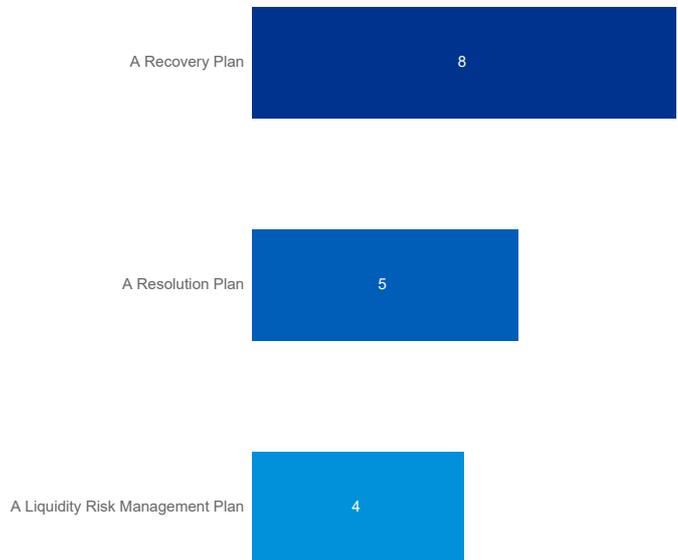
For the first time in our survey we have included questions on recovery and resolution planning as this is an area of increased focus for regulators, and one which was brought into sharp focus by the reaction of financial markets to the COVID crisis. The only direct requirement for insurers around recovery and resolution planning comes from PRA Fundamental Rule 8 "A firm must prepare for resolution so, if the need arises, it can be resolved in an orderly manner with a minimum disruption of critical services." Recovery and resolution planning has also been required by large firms under the G-SII regime. Requirements for recovery and resolution plans for insurers more widely are not explicit, but expectations have been set by PRA SS9/17 which sets out the expectation for recovery planning for banks and building societies.

Generally large UK insurance firms for which failure of the firm could cause systemic risk to the UK economy have been expected by the PRA to develop recovery and resolutions plans to assist with the PRA's regulatory objectives and, if necessary, an orderly resolution process. Whether or not firms have developed a recovery and resolution plan is reflective of the profile of participants of our survey. It is interesting to note that there is no clear consensus among firms about the point at which a recovery scenario is triggered with a range of solvency, liquidity and operational triggers in use.

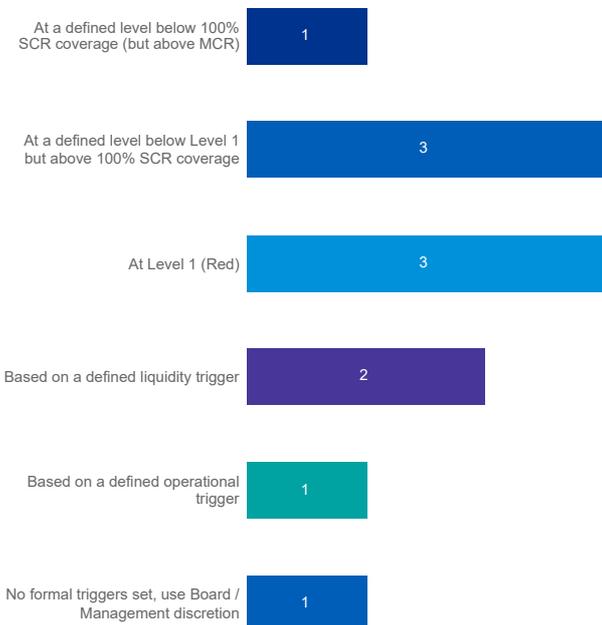
10.5 Have you prepared a formal Recovery and Resolution Plan?



10.6 What does this plan include?



10.7 How have you defined the point at which your Recovery Plan is initiated?



Technical Practices Survey 2020

11. Capital and Liquidity Management

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk	
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	
					13. Tax	14. Correlation

SF/IM

Liquidity Risk

In 2019 the PRA increased regulatory focus on insurers' management of liquidity risk and issued SS5/19 which increase the focus on the development of robust liquidity risk management policies, controls and risk management supplemented through scenario analysis, stress testing and contingency planning. The responses to our survey show that there are a variety of approaches in the market for measuring and stress testing liquidity risk, which is reflective of the fact that each firm's liquidity risk profile is likely to be highly specific, depending on business mix and financing arrangements. New in the 2020 survey we have asked firms to comment on the level of solvency coverage risk appetite, we note a range of practices here which are generally correlated to the resilience of firms' Solvency II balance sheets and capital generation.

Some companies have a more comprehensive framework that assesses liquidity for many different time horizons rather than just focusing on particular periods. Some companies responded that they test on a monthly basis within the time horizon. Most companies consider 1 or 3 months as the immediate liquidity horizon.

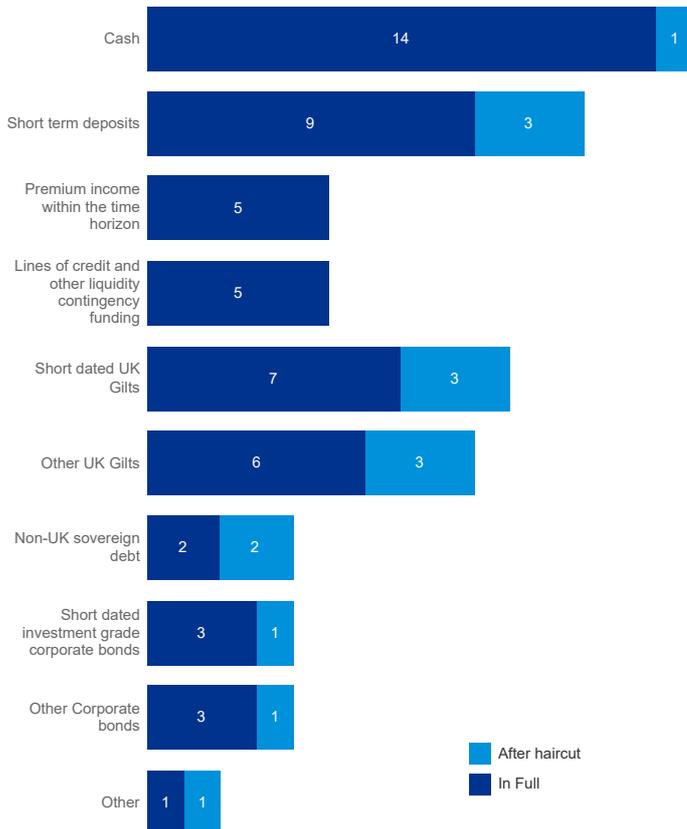
11.1a How many time horizons do you consider as part of your Liquidity Framework?

Number of time horizons considered	Number of companies
One time horizon	3
Two time horizons	4
Three or more time horizons	7

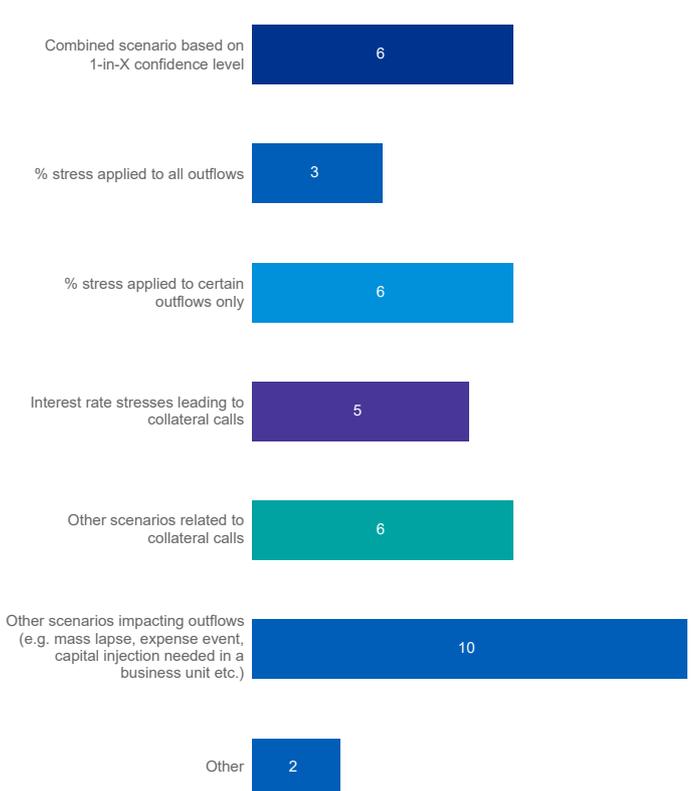
11.1b Length of time horizons considered

Time horizon considered (in months)	Number of companies
1	7
2	1
3	9
6	5
12	7
60	2
120	1

11.2 When considering Liquidity Risk which assets do you regard as available for liquidity purposes for your shortest time horizon assessment?



11.3 When considering Liquidity Risk do you apply any sort of stress to the liability outflows considered for your shortest time horizon assessment?



Other includes sourcing liquidity support from intra-group arrangements.

Other includes large claims, reinsurance payment delays, default of brokers - and using the worst period in the previous 3 years as a reference point.

Technical Practices Survey 2020

11. Capital and Liquidity Management

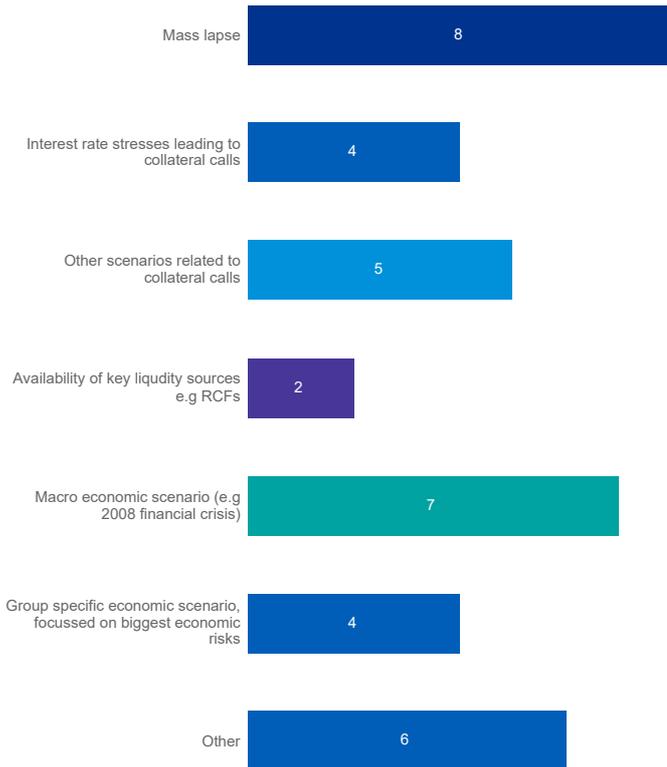
1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk	
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SF/IM

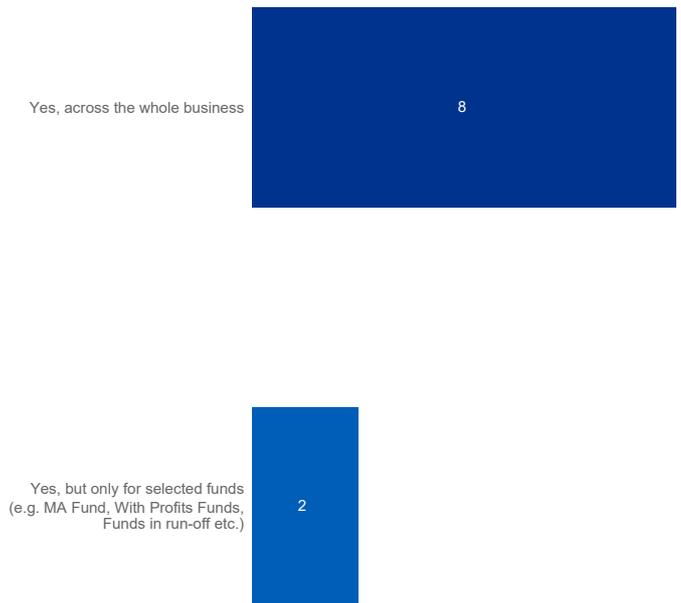
Liquidity Risk

The sort of events that are likely to create liquidity issues will vary widely between companies and this is reflected in the wide range of responses received. As well as the options set out in question 11.4 we also saw companies that stressed new business volumes, operational events, expense increases, delays in receipts from reinsurers or more general catastrophe type events. Some companies noted that the answers given were in respect of the liquidity framework as a whole rather than within the ORSA.

11.4 What liquidity scenarios do you test as part of your ORSA?



11.5 Do you monitor the level of highly illiquid assets and how they are expected to evolve over a longer timeframe?



Technical Practices Survey 2020

11. Capital and Liquidity Management

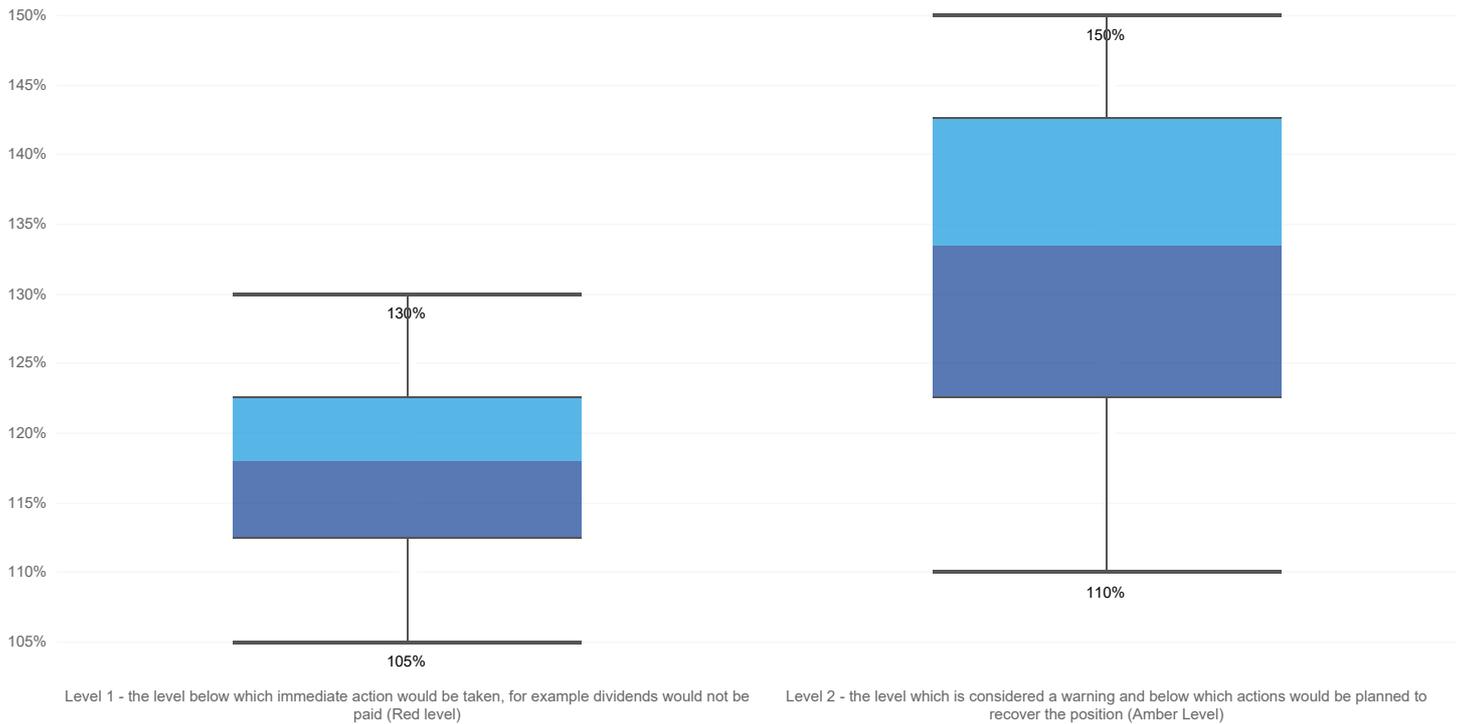
1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk	
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SF/IM

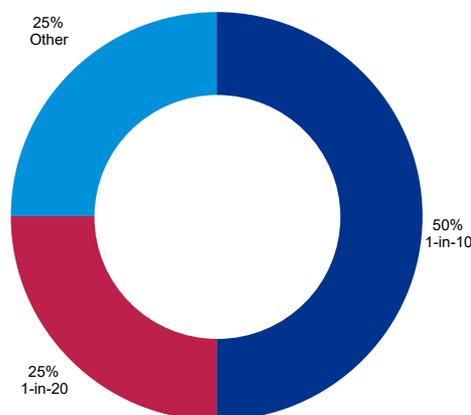
Capital Management

There is an increasing focus on the solvency coverage risk appetite that firms set. As part of the ORSA process firms should establish a capital buffer and consider why it is regarded as appropriate. The PRA has set out that specifying a 1 in X level which a firm should be able to withstand before breaching the SCR is an approach that could be used. We were keen to investigate practice on both areas. The buffers set show wide variation both in the move to the "red level" and to the "amber level". There is a strong relationship between the level of buffer and the confidence level with those operating to a 1-in-10 level showing higher buffers than those operating to 1-in-20. However, there is additional variability arising from the mix of risks faced and the ownership structure of the company. The respondents are generally the operating life insurance entity within a group and some would operate to a higher buffer at a group level.

11.6 At the operating company level what coverage ratio for SCR do you set as the Risk Appetite?



11.7 For Risk Appetite level 1 as defined above, what is the underlying confidence level?



Other approaches include other confidence levels as well as firms who take a more approximate approach to setting the buffer.

12. Climate Change Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
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SF/IM

Resources

This is the first year that we included climate change risk in the technical practices survey. This recognises the growing importance of the topic to actuaries, risk, finance and strategy teams as investors, lenders, regulators and the public expect firms to understand better the physical and transitional risk exposures on insurers' business models and balance sheets.

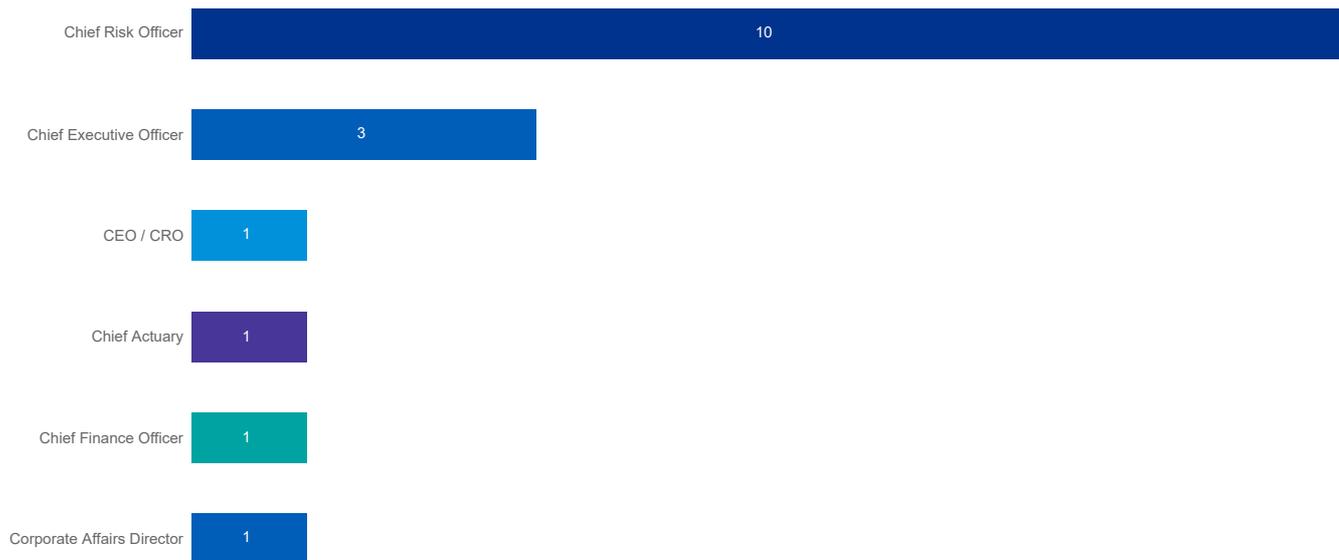
In April 2019, the PRA introduced through its supervisory statement, SS3/19, a number of new expectation on firms to enhance the management of financial risks arising from climate change. One such expectation was that firms should allocate the responsibility for identifying and assessing the firm's climate change risks by 15 October 2019.

We noticed a wide variation in the number of resources are involved in climate risk. The PRA commented in its feedback letter on the Insurance Stress Test 2019, that it was evident that the climate transition exercise was carried out by the risk function. The PRA considers that in order to understand the longer-term impacts of climate scenarios firms will need to involve and include input from other parts of the business. We therefore expect the number of resources to grow in the future.

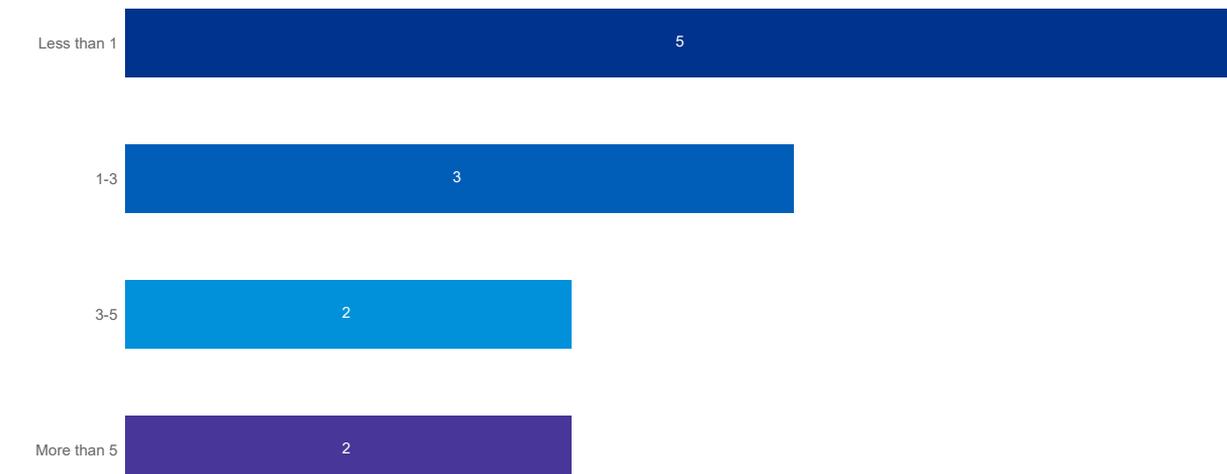
Benchmark survey responses indicated that the majority of firms had allocated the responsibility for identifying and assessing climate change risk to either the CRO or the CEO. There were however a number of other choices including Chief Actuary, CFO and Corporate Affairs Director. One firm had allocated the role between the CEO and the CRO. A number of respondents also identified that other functions were also involved.

Firms interpreted question 12.2 in different ways and thus, based on further validation with each respondent, we have summarised the number of FTEs as the total involved across all activities: identification and assessment of risks, development and execution of strategy, stress and scenario testing, development of risk management policies, and reporting (internal and external). There were also a number of additional firms that either didn't respond, or responded that the resources they had to perform these activities were either "negligible" or "difficult to estimate".

12.1 Which Senior Manager Function(s) is/(are) responsible for identifying and assessing climate change risks in your firm?



12.2 How many FTEs are involved in (not necessarily dedicated to) the identification, assessment, management and reporting of climate change risks by activity?



12. Climate Change Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
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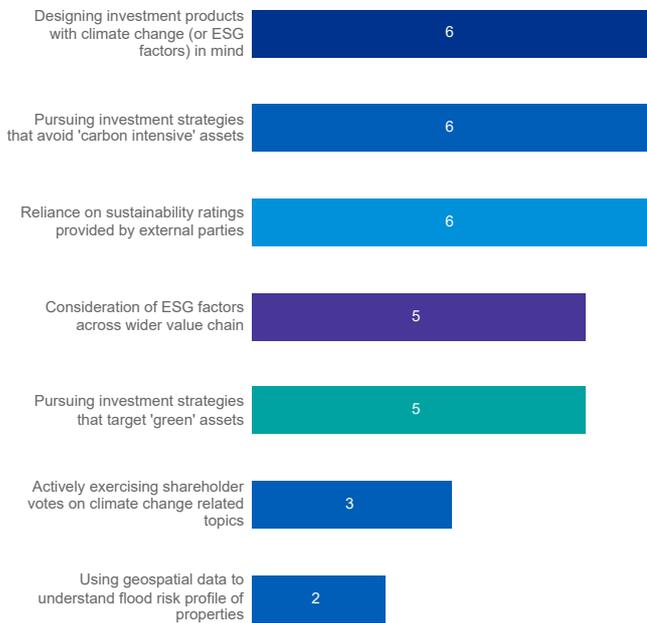
Climate Change Scenarios

The PRA Insurance Stress Test 2019 included three climate change transition scenarios. The respondents appear to have conducted their stress testing in line with those scenarios. However regulatory expectations are already moving on. Firms that have not already started to develop and adapt their capabilities for climate risk modelling are likely to find it challenging to respond to the increased complexity of data and modelling requirements expected for the completion of the Biennial Exploratory Scenario (BES)'s climate change scenarios in 2021.

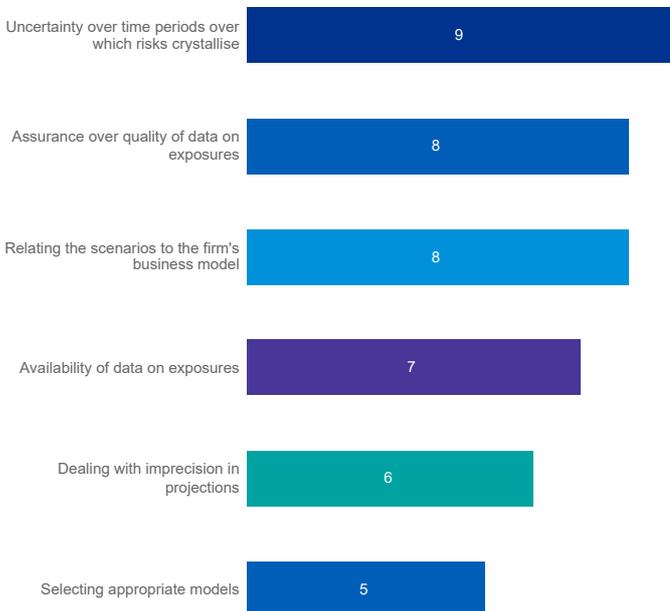
Firms identified challenges in responding to the stress tests that were consistent with the PRA's feedback, namely gaps in available quality data and adapting models to take account of longer time horizons.

A number of respondents are beginning to think about the journey of moving on from initial scenario analysis, to considering how this translates into embedding climate risk in the firms' risk management framework and developing. We see this transition as critical to meeting not just the letter of regulatory requirements around climate risk, but also the spirit of those requirements as well.

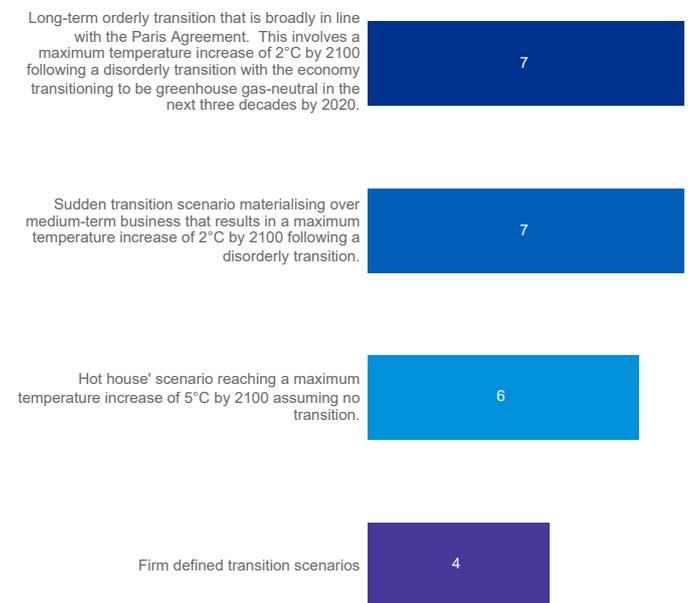
12.3 Which risk mitigation strategies is your firm employing to reduce or mitigate climate change risks?



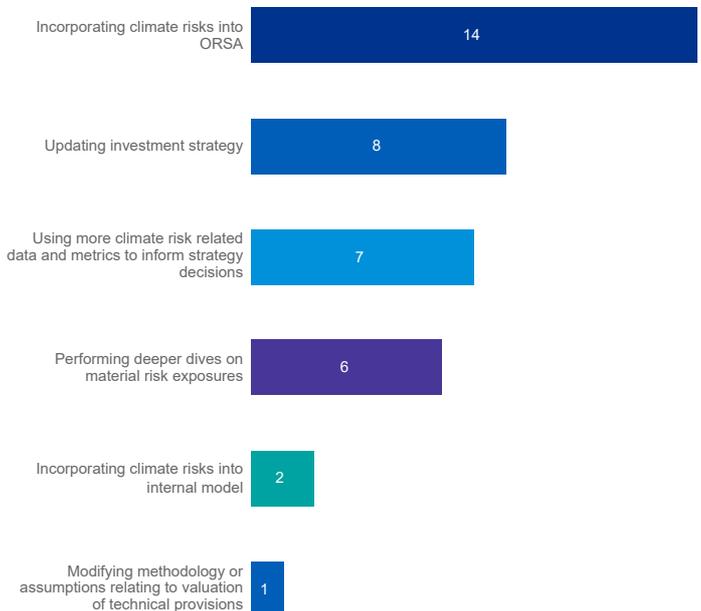
12.5 What challenges has the firm identified in running climate change risk related scenarios?



12.4 What scenarios has the firm already used to consider the impact of climate change risks on the firm?



12.6 What actions is the firm taking following its climate change risk related scenarios?



12. Climate Change Risk

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
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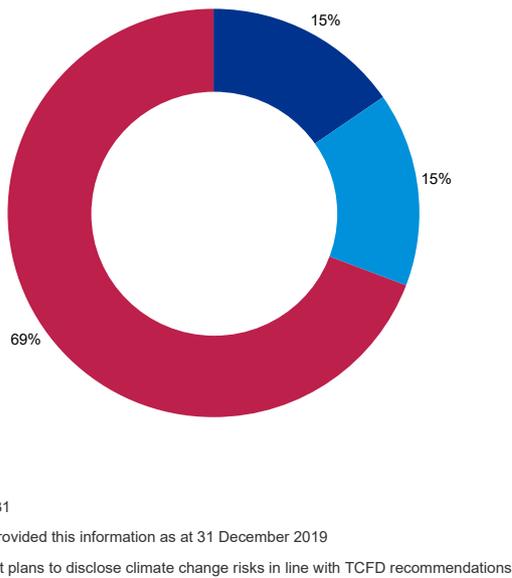
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Task Force on Climate-Related Financial Disclosures

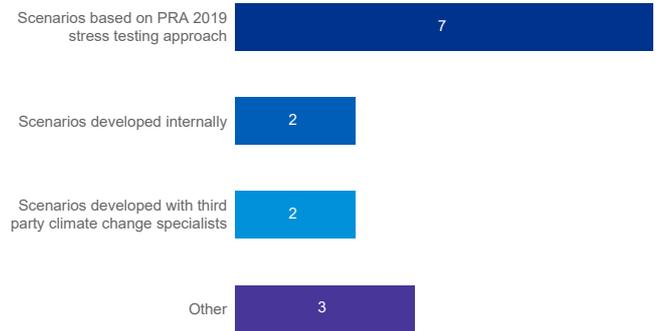
The majority of respondents had no current plans to disclose climate change risks in line with the TCFD recommendations. This was somewhat surprising given the expectation the UK Government's expectation that all listed companies and large asset owners will need to disclose in line with the TCFD recommendations by 2022. A number of respondents are however making preparations through gap analyses, maturity assessments and board training and planning to conduct additional scenario analysis to support the development towards the implementation of TCFD within their business.

The responses to question 12.10 suggest that there is a gap between the PRA's expectation of resources which should be dedicated within firms to understanding and managing climate risk and the reality of resource allocation. Firms may need to consider their allocation of resources to meet the PRA's expectation that "Firms should have fully embedded their approaches to managing climate-related financial risks by the end of 2021". Source: Sam Woods (PRA CEO) Dear CEO letter 1 July 2020.

12.7 By which financial reporting date does the firm expect to disclose climate change risks in accordance with the Task Force on Climate-related Financial Disclosures (TCFD) recommendations?

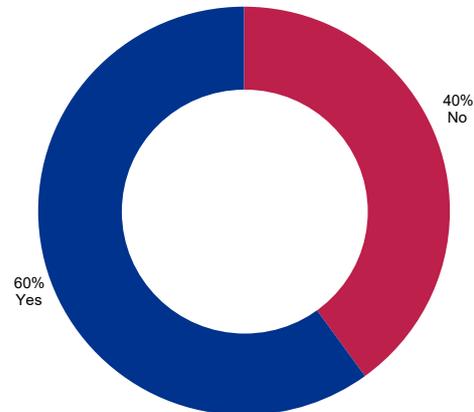


12.8 What scenarios do you run to meet TCFD requirements?



Other includes the Dutch National Bank scenarios

12.9 Does the approach capture movements in liabilities as well as assets?



12.10 What preparations has the firm undertaken to date to implement disclosures in line with the TCFD framework?

	No current plans	Planned	Underway	Completed
High level maturity assessment	1	2	3	4
Gap analysis	2	1	4	3
Board and senior management training	3		5	2
Consideration of relevant scenarios and their impact on organisation's strategy	1	5	2	2
Evaluating existing climate-related risk indicators to select key metrics and targets	3	4	1	2
Set vision and framework for embedding climate change risks and opportunities into the business	2	3	4	1
Assessing whether new or changed reporting systems and controls are necessary to identify and report metrics	5	3	2	

13. Tax

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
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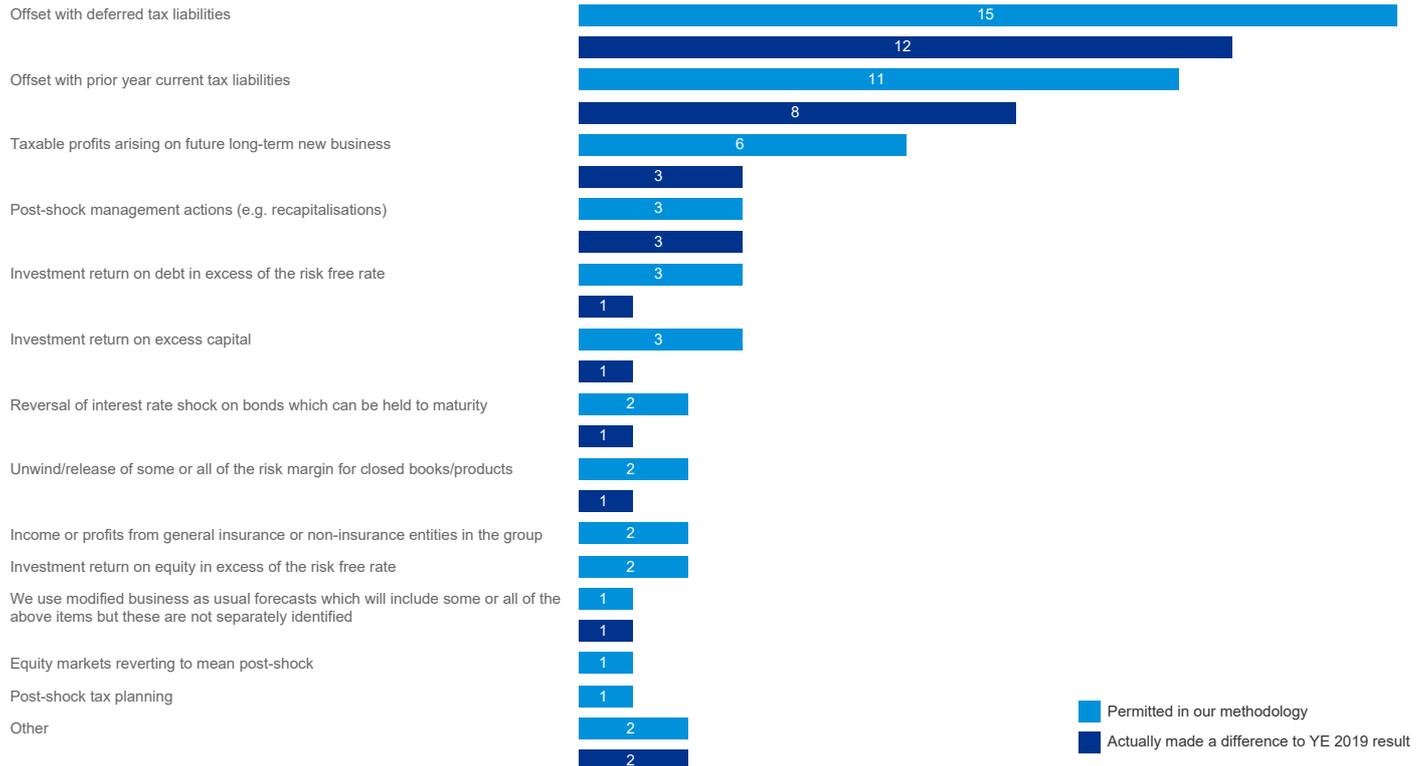
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Loss Absorbing Capacity of Deferred Tax (LACDT)

In this section we consider the extent to which the Solvency Capital Requirement (SCR) is mitigated by the LACDT.

Offsetting with deferred tax liabilities and prior year tax liabilities remains the most common basis to support firms' LACDT. In addition, three firms indicated that they have relied on future profits from future new business to support their YE 2019 LACDT. Only one respondent relied on risk margin releases (though one other permitted this in their methodology). Both of these firms are understood to be closed to new business.

13.1 Which of the following sources of future income or profits support your 31 December 2019 LACDT?



13.2 Which types of UK tax are included in the reported LACDT figure (as opposed to being implicit in other parts of the SCR)?

In this question we sought to understand whether the reported LACDT included or excluded policyholder taxes. The results need to be interpreted cautiously as there were 8 non-responses. 6 respondents indicated that they include only shareholder tax in reported LACDT (with policyholder tax being implicitly included elsewhere in the SCR). However, we believe that some, but not all, of these 6 respondents pay little or no policyholder tax in any case (given their mix of business or tax profile). 4 respondents include both policyholder and shareholder tax in reported LACDT. 3 respondents include only I-E policyholder tax in reported LACDT.



13. Tax

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

SF/IM

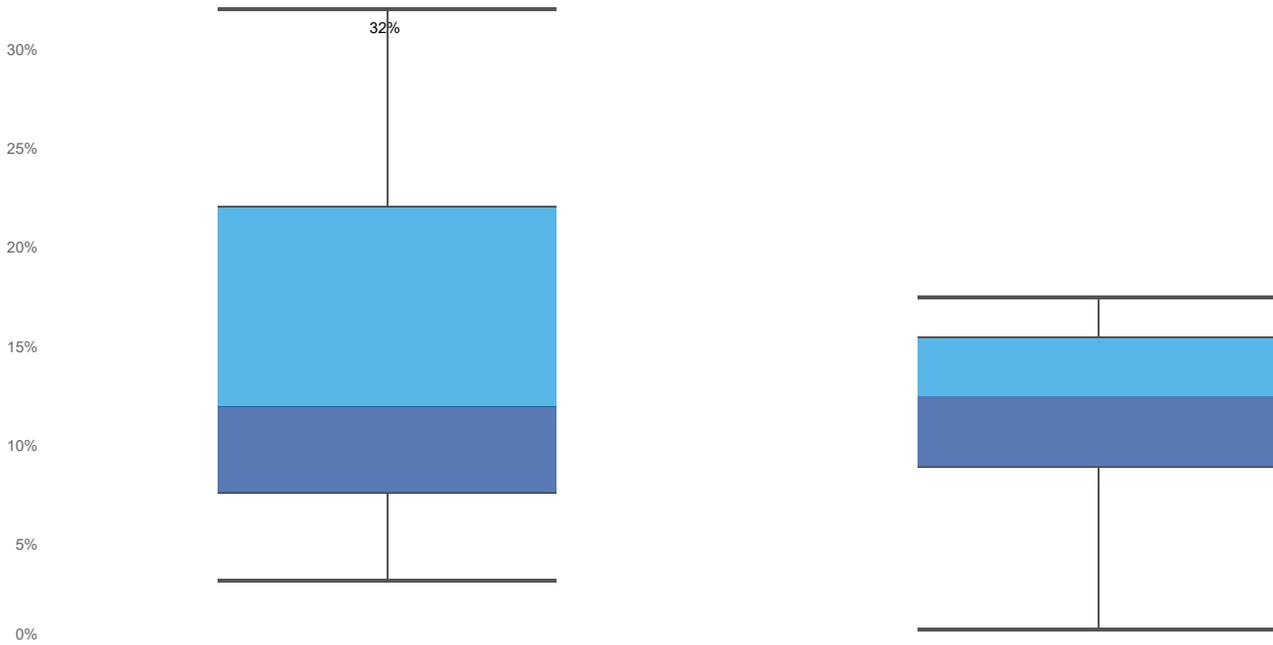
Loss Absorbing Capacity of Deferred Tax (LACDT)

The chart below shows reported LACDT as percentage of pre-tax SCR. For mutuals the rate of tax relief ranges up to 32%. However, only two mutuals who responded had more than a 4% reduction in the pre-tax SCR. This may reflect the fact that often only a small proportion of the business is taxable I-E business. For proprietary companies, the rate ranges up to 17% (which is equal to the main rate of corporation tax from April 2020). It appears that only one proprietary company was able to fully recognise their potential LACDT.

13.3 LACDT as a % of pre-tax SCR

Mutuals

Non-mutuals



14. Correlation

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

IM

Correlation parameters

Due to the slightly reduced response rate in this section of this year's survey, we noted that variation in the average correlations was being driven by sampling differences. When conducting analysis on respondents which had provided correlations across both years, we noted there is no material difference between responses, and consider the pattern observed last year concerning correlations is a suitable indication of this year's position. As a result, we have opted to replicate the average correlations using the responses provide as part of the YE18 Technical Practices Survey, including for specific company responses.

Historically, correlation parameters have been a difficult area to benchmark due to the lack of consistency in responses received. For example, we received responses indicating positive and negative dependency between equity and equity volatility risk where we would expect a negative dependency for this risk pair. Where this is clear, we have inverted the signage of the assumptions. These risk pairs are marked * from page 14.3 onwards where more granular data is shown.

The three tables below show average correlation for market to market risks, market to non-market risks and non-market to non-market risks. The colour of each cell indicate the level of correlation between each risk pairs. For example, a dark green cell indicates strong positive correlation between risk pairs.

14.1 Correlation Matrix - Market to Market (Averages)

	Equity	Equity volatility	Property	Property volatility	Interest rates	Interest rate volatility	Inflation rate level	Credit spread	Credit default	Sovereign/Swap spread
Equity volatility	-45.1%									
Property	38.8%	-25.9%								
Property volatility	-13.4%	17.9%	-26.1%							
Interest rates	6.1%	-1.1%	11.1%	-0.6%						
Interest rate volatility	6.2%	12.5%	-1.5%	8.1%	0.8%					
Inflation rate level	-3.0%	2.2%	-9.6%	-8.8%	11.6%	-6.0%				
Credit spread	-46.4%	41.2%	-32.9%	16.9%	-9.8%	-4.6%	-4.2%			
Credit default	-39.3%	32.7%	-27.4%	14.7%	-4.4%	13.4%	8.4%	32.1%		
Sovereign/Swap spread	-13.7%	7.8%	-10.7%	2.0%	-1.0%	5.9%	-2.0%	10.6%	19.2%	
Currency	-3.8%	-2.8%	-2.7%	12.8%	-2.8%	-2.7%	-11.6%	-3.3%	5.6%	0.1%

Technical Practices Survey 2020

14. Correlation

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

IM

Correlation parameters

14.2 Correlation Matrix - Market to Non-Market (Averages)

	Equity	Equity volatility	Property	Property volatility	Interest rates	Interest rate volatility	Inflation rate level	Credit spread	Credit default	Sovereign/ Swap spread	Currency
Longevity level	-1.2%	1.2%	0.1%	1.3%	12.5%	1.5%	-2.3%	6.8%	4.5%	-0.7%	-5.9%
Longevity trend	3.1%	0.0%	0.3%	0.0%	1.4%	0.0%	-8.7%	2.9%	4.7%	0.0%	0.5%
Mortality	-0.7%	0.8%	-1.3%	0.1%	8.4%	7.9%	8.8%	0.1%	-1.9%	1.2%	0.1%
Mortality Catastrophe	-2.5%	6.9%	-1.6%	4.3%	1.8%	2.0%	3.2%	4.2%	9.7%	2.6%	1.0%
Persistency	-14.0%	12.2%	-7.3%	12.0%	-10.2%	2.8%	7.2%	10.0%	9.4%	-2.0%	4.2%
Mass lapse	-23.6%	23.5%	-13.7%	7.0%	1.5%	5.1%	13.7%	24.1%	17.9%	5.0%	-9.4%
Expenses	-8.1%	9.0%	-14.2%	3.1%	-9.6%	1.2%	13.8%	3.3%	2.8%	-3.8%	-2.4%
Operational	-15.1%	15.8%	-11.2%	6.4%	-10.7%	7.5%	-4.6%	21.5%	12.1%	2.5%	3.4%

14.3 Correlation Matrix - Non-Market to Non-Market (Averages)

	Longevity level	Longevity trend	Mortality	Mortality Catastrophe	Persistency	Mass lapse	Expenses
Longevity trend	7.5%						
Mortality	-9.6%	-12.6%					
Mortality Catastrophe	4.3%	-4.4%	13.0%				
Persistency	10.6%	2.3%	5.3%	1.8%			
Mass lapse	2.1%	9.4%	7.3%	10.2%	27.4%		
Expenses	3.8%	3.4%	-2.2%	6.1%	15.7%	13.5%	
Operational	2.2%	10.5%	2.0%	7.1%	16.8%	28.2%	18.3%



Technical Practices Survey 2020

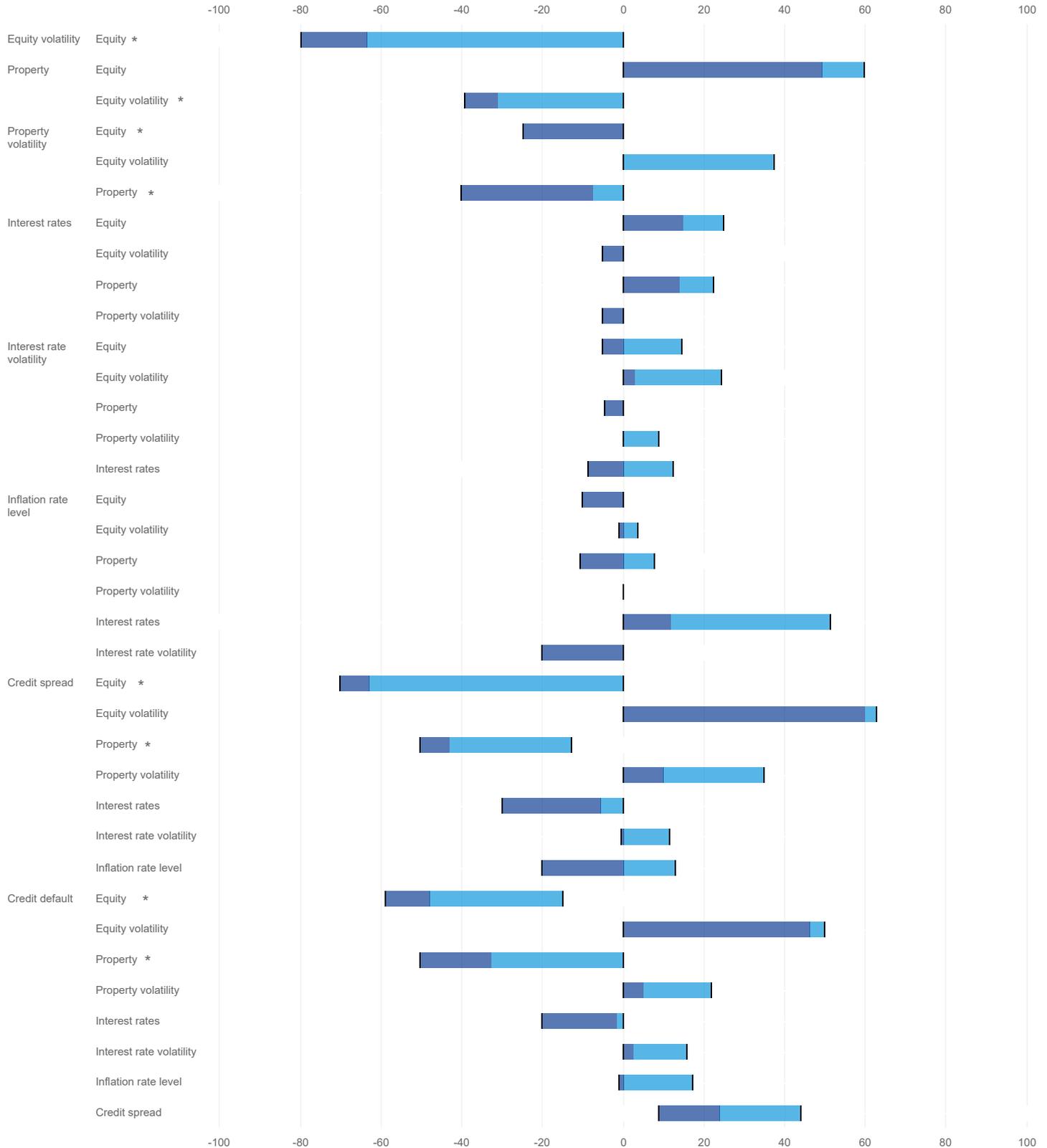
14. Correlation

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

IM

Correlation parameters

In order to facilitate better comparability for the correlation pairs, data submitted for risk pairs marked * has been amended to allow for directional change. We have also removed the whiskers to better show the range of correlation parameters.



Technical Practices Survey 2020

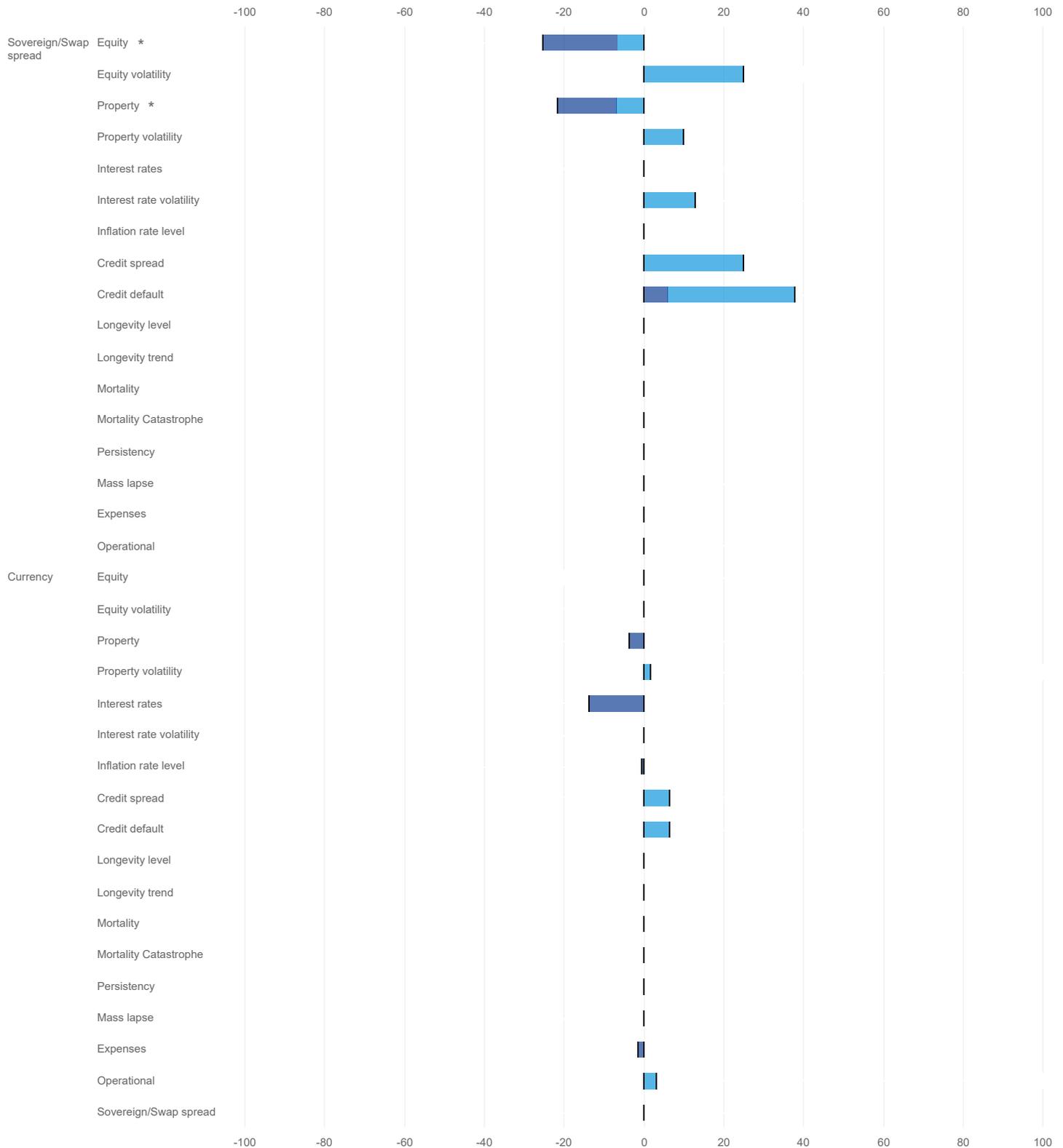
14. Correlation

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Technical Practices Survey 2020

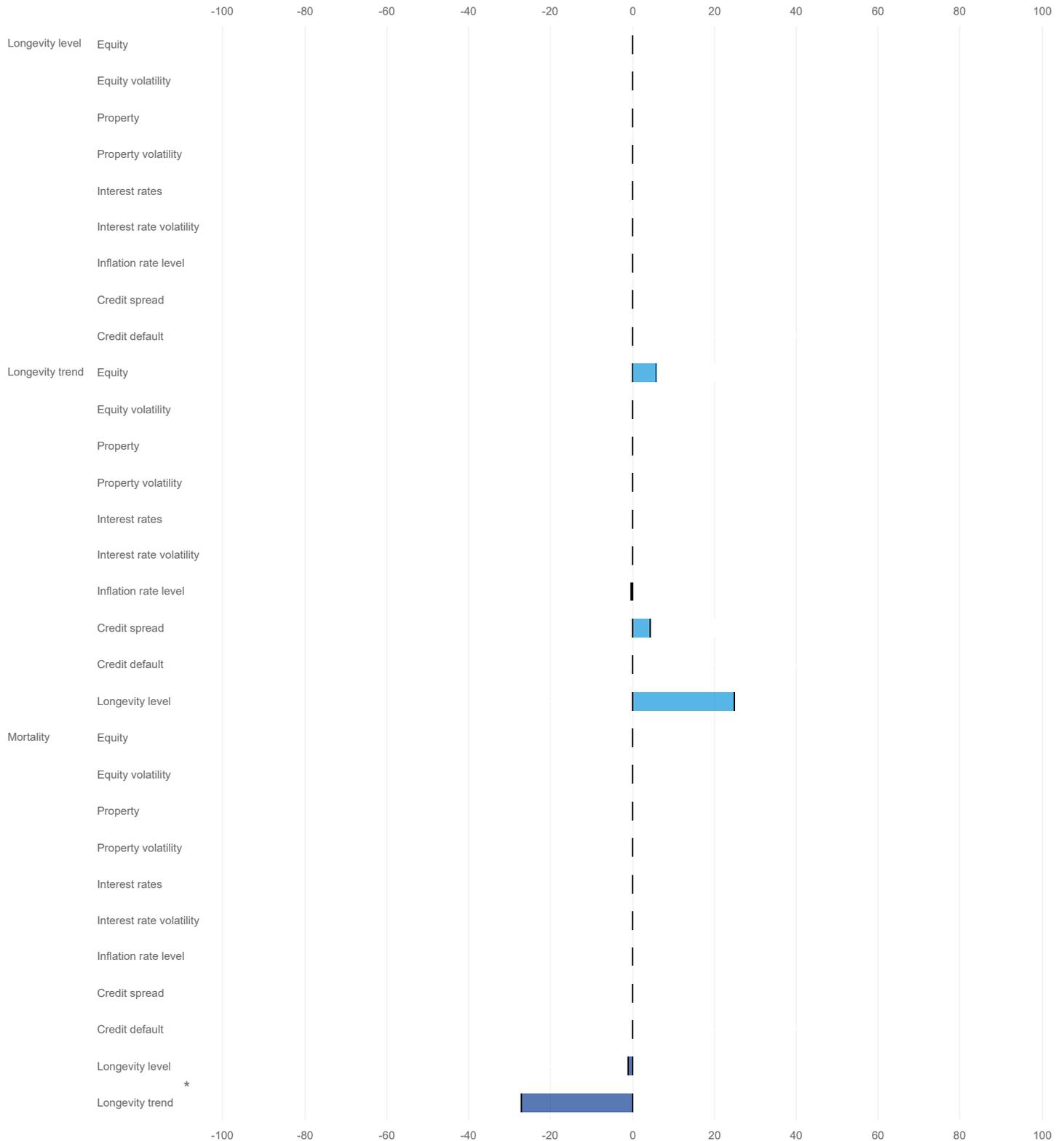
14. Correlation

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Correlation parameters

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Technical Practices Survey 2020

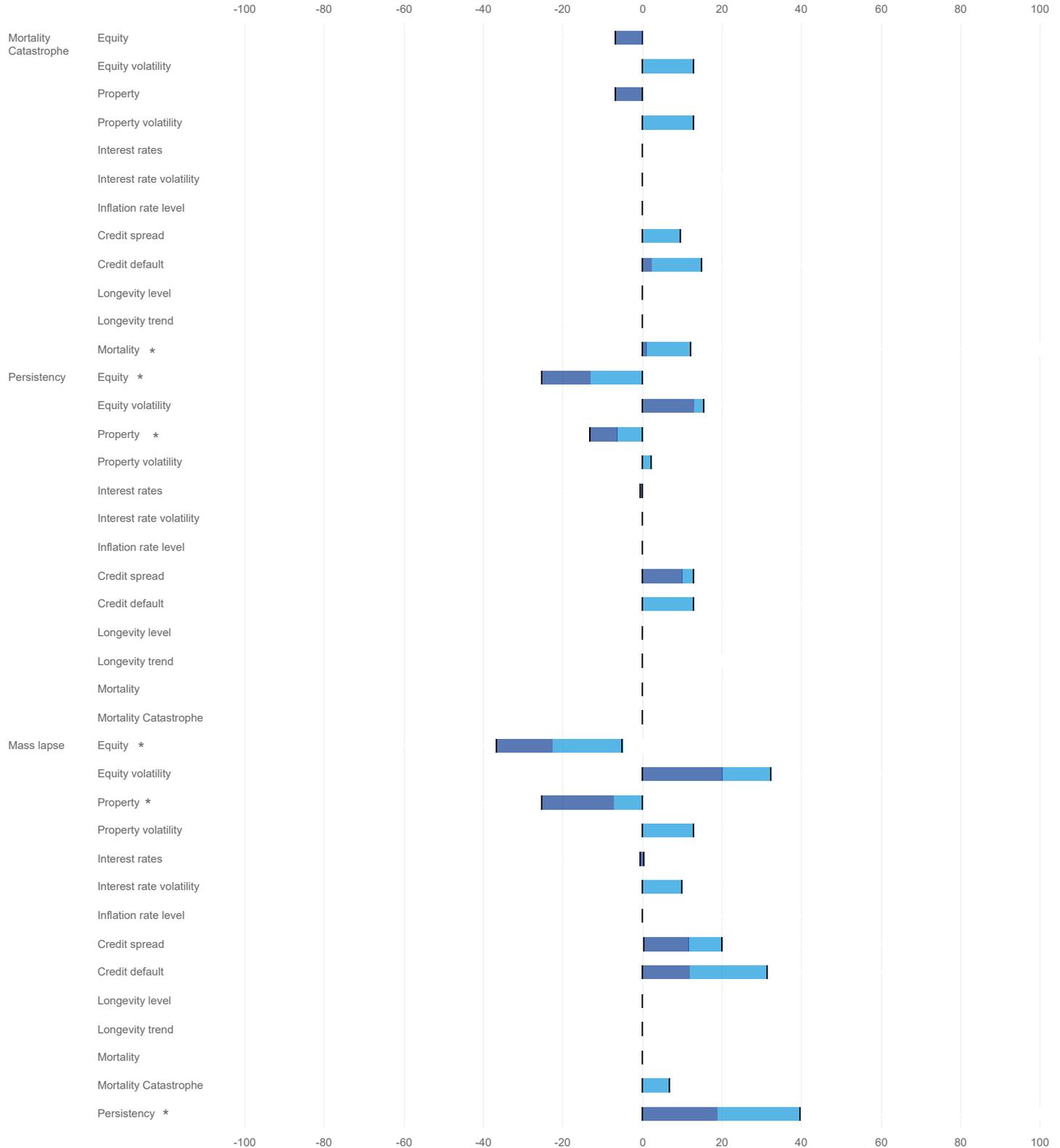
14. Correlation

1. Balance Sheet	2. SF Specific Risks	3. Market Risk (excl. Credit)	4. Interest Rate Risk	5. Credit Risk	6. Mortality & Longevity Risk		
7. Underwriting Risk	8. Op Risk	9. Aggregation	10. SST/RRP	11. Cap Management	12. Climate Change Risk	13. Tax	14. Correlation

IM

Correlation parameters

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Technical Practices Survey 2020

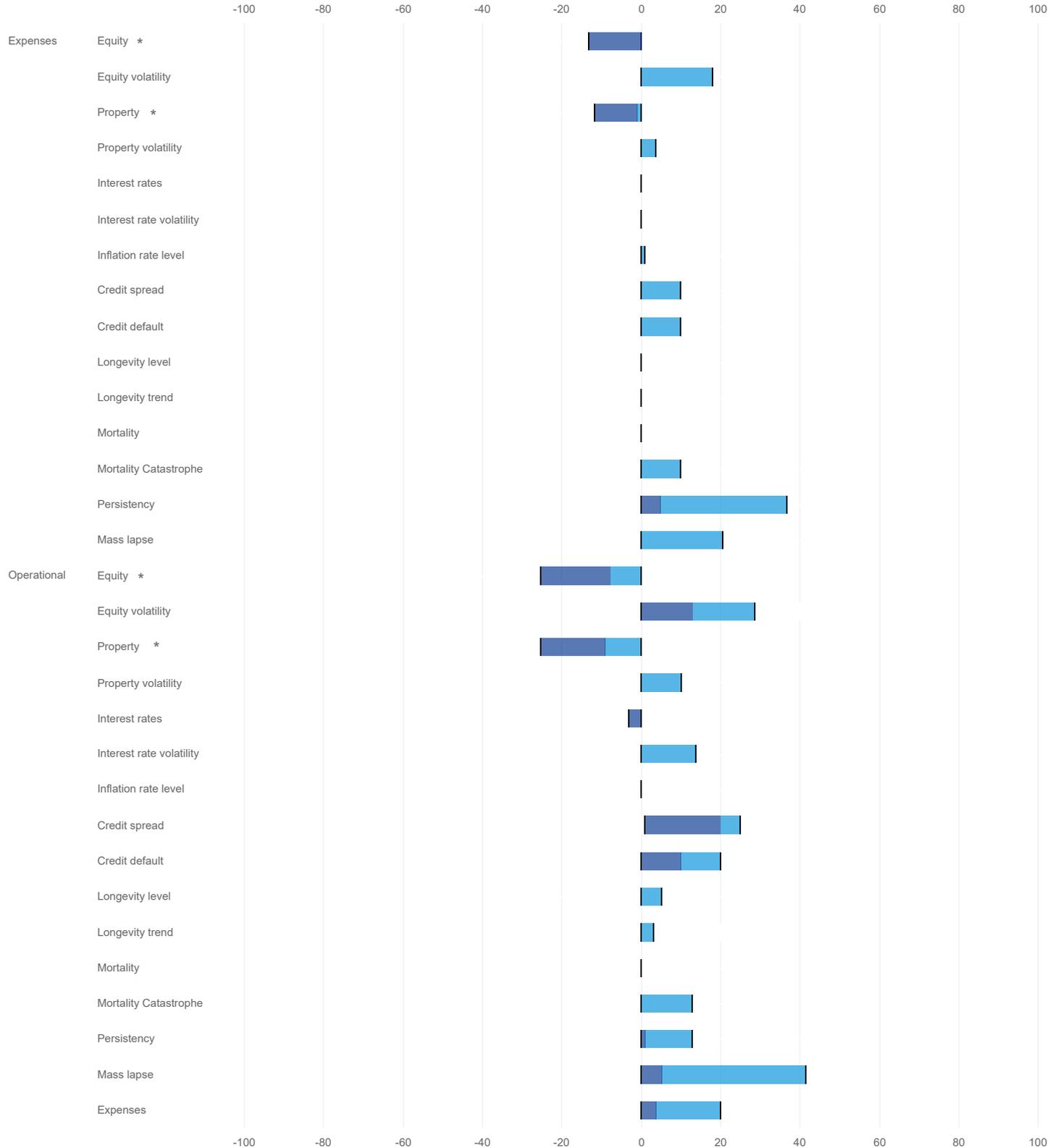
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The survey requires a large investment of resources on our part, in particular the analysis and interpretation of the data. We are grateful to all the respondents who found the time in their busy schedules to take part and would like to extend our thanks to all of you once again. The differences in the profile of the 24 respondents who have contributed to this survey showcases the usefulness of the benchmarking and set out an excellent indication of the UK life industry's approach to Solvency II.

I would like to extend a very special thank you to all my colleagues for their hard work in carrying out the survey and compiling this report whilst at the same time carrying out their client service responsibilities. I would also like to extend particular thanks to Benedict Shim, David Bebb and Juliana Villegas Suarez for their hard work in managing the survey.

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We value your contribution and hope that you find the report useful and interesting. We would like to extend a very special thank you to all those who participated in the survey:

- AIG Life
- Aviva Life & Pensions
- Countrywide Assured
- Forester Life
- HSBC Life
- Irish Life Assurance
- Just Retirement (Section 5 only)
- Legal & General
- M&G
- NFU Mutual
- Phoenix (Section 5 only)
- Pensions Insurance Corporation (Section 5 only)
- Quilter
- ReAssure Group
- Royal London Mutual
- Sanlam Life and Pensions
- Scottish Equitable
- Scottish Friendly
- Sun Life Assurance Company of Canada
- St. James's Place
- Unum
- Vitality Life
- Wesleyan Assurance Society
- Zurich Assurance





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