Technical Practices Survey 2023

Solvency II

Financial Services

—

September 2023

kpmg.co/uk

Welcome to the 2023 report

It is with the greatest pleasure that we present the 2023 edition of our annual Technical Practices Survey. As ever, the focus of this survey is to enable UK life insurance firms to identify the key technical issues within the industry, and to present the range of methodologies and approaches that have been adopted by their peers.

We are incredibly pleased to see ongoing support for our survey, with 19 participants submitting responses this year, including full submissions from nine IM firms. We aim to continuously evolve the survey so that participants find it insightful and relevant to the issues faced within the industry today.

The executive summary dashboard overleaf provides an overview of how the key stresses and indicators of risk appetite compare to the median responses provided in this and the previous year's survey. As expected, given the significant increase in risk-free rates over 2022, the interest rates stresses have strengthened since 2021. The core market stresses, equity, currency and property have remained relatively stable, as seen in previous years.

On underwriting risk, we observed that lapse and mortality stresses have not moved much compared with 2021. For longevity risk, we have seen a number of the large annuity providers significantly strengthening their calibrations, and therefore the average stress impacts have increased.

On credit risk, there have been limited changes in the overall calibrations, although we have observed greater clustering of transition and default calibrations. This year we have explored some more detailed aspects of the modelling. We have also seen a significant increase in the Matching Adjustment due to widening spreads on Matching Adjustment portfolios.

Under capital management, target solvency cover ratios have reduced since the previous year and we have observed a slight reduction in the capital buffers. For the most part, these changes are refinements, however two firms have updated their risk appetite calibration or approach in the last 12 months. This underlines the fact that the capital buffer remains an area of active review within the industry.

This year's survey provides a more detailed focus on the approach to operational risk calibration. Cyber & Information security risks have now become a more significant component of operational risk, as well as model risk.

In response to market developments, we selected thematic areas to explore in more detail in our report. In this year's report we have focused on the following areas:

- **Interest rate and inflation risk calibration in respect of the 2022 experience:** most respondents consider the highest observed 1-year changes in interest rate and inflation in 2022 equivalent or more severe than a 1-in-200 stress. Moreover, more than half of the participants are planning to change their interest rate calibration to better reflect the 2022 experience as well as to be more sensitive to interest rates. In comparison, the majority of participants consider their inflation methodology to be suitable.

- **Forward looking impact of COVID-19 experience on firms' risk calibrations:** most companies excluded 2020 and 2021 data in their YE22 longevity assumption setting, while for lapse assumptions, the most popular approach was to use the existing process with 2020 and 2021 data. The majority of firms do not include 2022 data directly at YE22, but some indicated they considered emerging experience as part of their expert judgment overlays.

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

How to read the report

For questions which are not included in the IM01, we have included median tables which provide a comparison between this year's responses and those in the 2022 report.

In the spirit of being transparent, particularly where firms can provide multiple responses to the same question, we have indicated the number of respondents included in a specific chart with a grey box, as illustrated below.

X

Box and whisker plots, shown illustratively below, have been used extensively throughout the report. This is read as:

- the minimum and maximum data points are shown by the outer grey vertical lines (whiskers);
- the inter-quartile range is shown by the box where the lower quartile is shown by the dark section and upper quartile is shown by the light section.

In order to provide insight on changes in calibrations from YE21 to YE22, across many areas in this report we have presented both sets of data in adjacent charts. Data represented by the blue charts (as shown above) correspond to YE22 IM01 submissions, and data represented by the green charts (as shown below) correspond to YE21 IM01 submissions for comparison.

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
Partner

Technical Practices Survey 2023

Executive Summary

The executive summary below provides an at a glance view of how the median responses for the key stresses compare to the median responses provided in the previous year's data. As expected, given the significant increase in risk-free rates over 2022, the interest rates stresses have strengthened since the prior year. The core market stresses, equity, currency and property have remained relatively stable, as seen in previous years. There has also been a significant increase in the Matching Adjustment due to widening spreads achieved on Matching Adjustment portfolios. Although the median 1-in-200 longevity stress impacts have reduced relative to YE21, the average stress impacts have increased, driven by the majority of the large annuity providers significantly strengthening their calibrations. For the risk appetite, there are slight reductions in target solvency cover ratios as well as the capital buffers.

	Median Response (YE22)	Median Response (YE21)
Business Profile Under Pillar 1		
TMTPs as a % of Technical Provisions (IM firms only)	2.4%	3.3%
Risk Margin as a % of Technical Provisions	1.3%	1.4%
Overall Matching Adjustment (bps)	139	86
Market Risk (99.5% stress)		
Equity Portfolio Total Annual Return Stress	-45%	-44%
Equity Implied Volatility Stress (10 Years)	12%	14%
Currency Stress – EUR	-21%	-21%
Currency Stress – USD	-27%	-27%
Commercial Property Total Annual Return Stress	-31%	-31%
Residential Property Total Annual Return Stress	-27%	-28%
Interest Rate Risk (10 Years, 99.5% Stress, in bps)		
Interest Rate – Total Stress Up	251	187
Interest Rate – Total Stress Down	-204	-150
Interest Rate Volatility Stress	19	19
Credit Risk – Average Credit Spread Stress (10 years, 99.5% stress)		
Financials – A	397	404
Financial – BBB	595	584
Non-Financials - A	252	257
Non-Financials - BBB	406	406
Longevity Risk (99.5% stress)		
Female (Age 65) – Stress (increase in EOL, years)	2.94	2.96
Male (Age 65) – Stress (increase in EOL, years)	2.83	2.99
Other Insurance Risks (99.5% stress)		
Expenses Level Stress as % of Best estimate	21%	21%
Mass Lapse Stress	28%	30%
Solvency Cover Ratio – Risk Appetite		
Red (Immediate action taken)	120%	123%
Amber (Triggers warning)	135%	138%

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Technical Practices Survey 2023
1. Balance Sheet

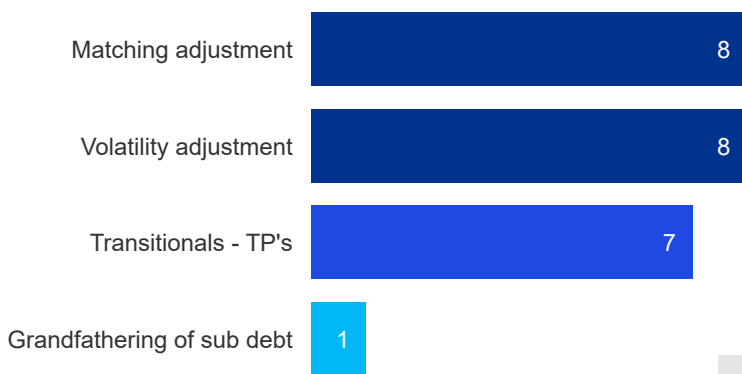| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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SF/IM

Balance Sheet Preparation

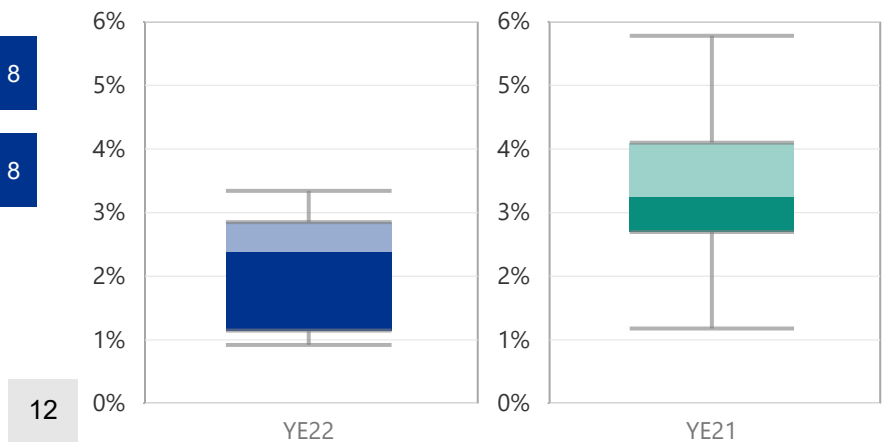This section considers some of the key areas in the preparation of a company's base balance sheet.
The use of Long Term Guarantee Measures (LTGM) continues to be widespread and consistent with last year. Only 4 out of 16 firms reported that they do not make use of any LTGM. While there are some sampling differences, there is a genuine reduction in TMTP as a percentage of Technical Provisions. All firms have recalculated their TMTP during 2022 in response to economic conditions and for one respondent, the recalculation reduced their TMTP to zero.

Key areas of model development remain broadly similar to previous years, with a greater focus now on changes due to merger & acquisition activity and interest rate risk calibrations. Responses were received before the release of the July and September UK Solvency II reform consultations and, therefore, respondents may not have had enough detail on the proposed reforms to include the necessary developments in their responses.
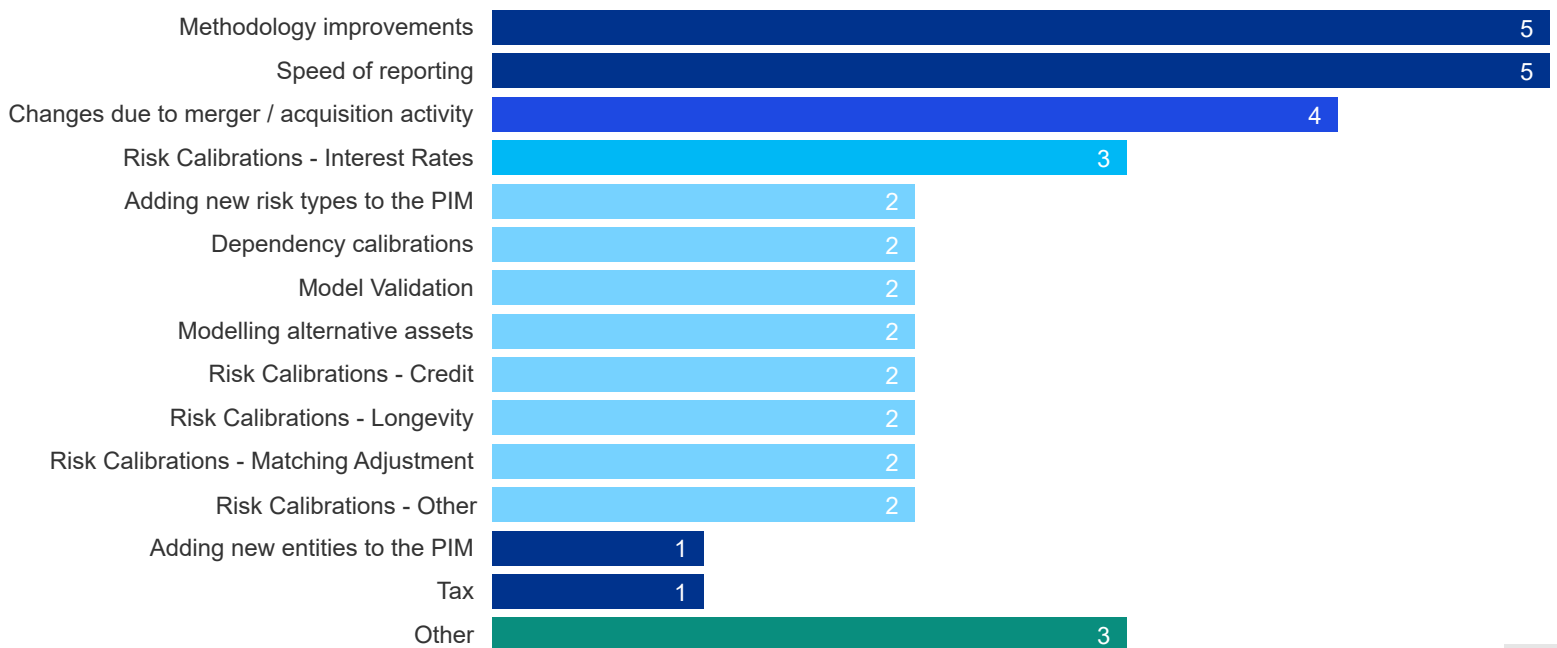
1.1 Which of the following Long Term Guarantee Measures do you use in your balance sheet?

- Matching adjustment: 8
- Volatility adjustment: 8
- Transitionals - TP's: 7
- Grandfathering of sub debt: 1

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1.2 What are the Transitional Measures as a % of your Technical Provisions? (IM firms only)

1.3 What are the key developments or model changes that you will focus on in 2023 & 2024?

- Methodology improvements: 5
- Speed of reporting: 5
- Changes due to merger / acquisition activity: 4
- Risk Calibrations - Interest Rates: 3
- Adding new risk types to the PIM: 2
- Dependency calibrations: 2
- Model Validation: 2
- Modelling alternative assets: 2
- Risk Calibrations - Credit: 2
- Risk Calibrations - Longevity: 2
- Risk Calibrations - Matching Adjustment: 2
- Risk Calibrations - Other: 2
- Adding new entities to the PIM: 1
- Tax: 1
- Other: 3

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'Other' includes regulatory reforms, capital modelling, new product launches, controls, and initiatives to increase automation.

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SF/IM

Management Actions

We have observed that firms have well-established management actions for non-profit business, and there have been no significant changes compared to previous year's results.

As expected for with-profits business, most companies use some combination of bonus setting, market value reductions, and changes to the equity backing ratio.

Firms also have implicit management actions, such as Matching Adjustment rebalancing, that are often not explicitly reported.

1.4a For non-profit business, which management actions are assumed in the capital measures listed at 31st December 2022?

'Other' includes expense reduction under mass lapse stress, profit / losses sharing from non-profit to with-profit policyholders, restoring matching adjustment compliance, reviewable premium rates, changes to equity backing ratio for UL guarantee fund, and deallocation of ERM FRNs.

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1.4b For with-profit business, which management actions are assumed in the capital measures listed at 31 December 2022?
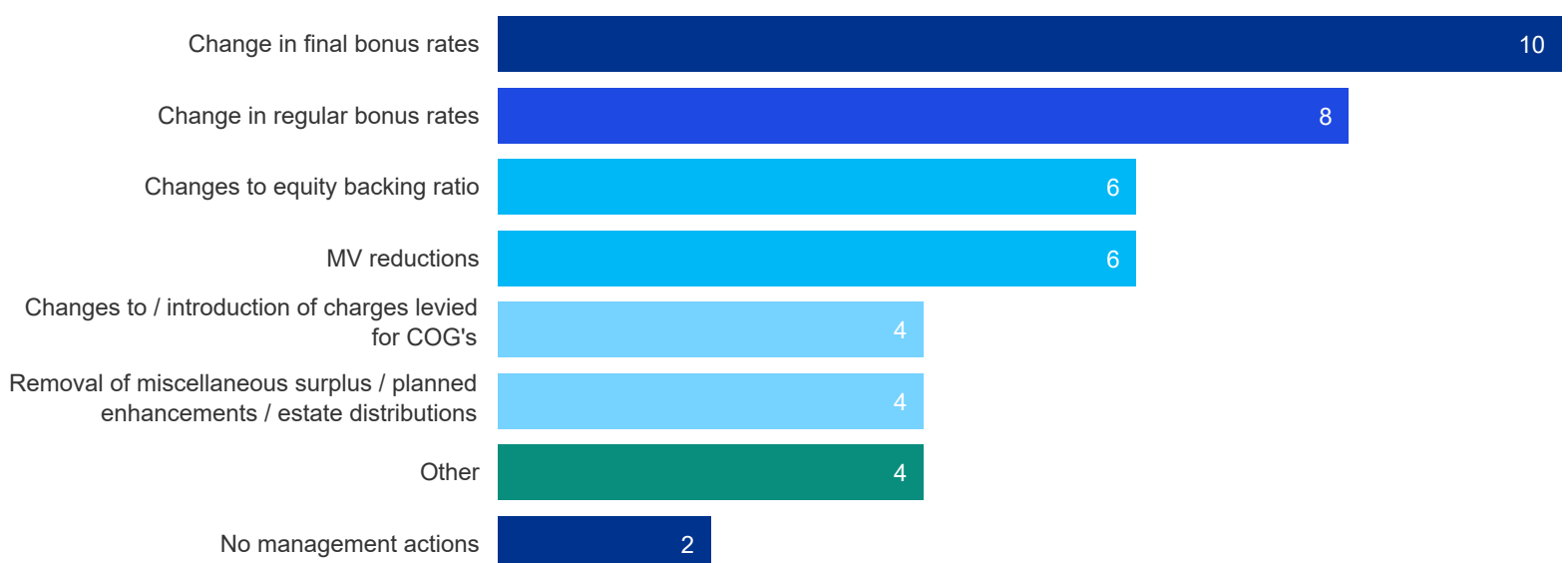
'Other' includes a reduction in level of corporate bonds held, changes in smoothing limits, and dynamic hedge rebalancing including asset share shorting.

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Technical Practices Survey 2023
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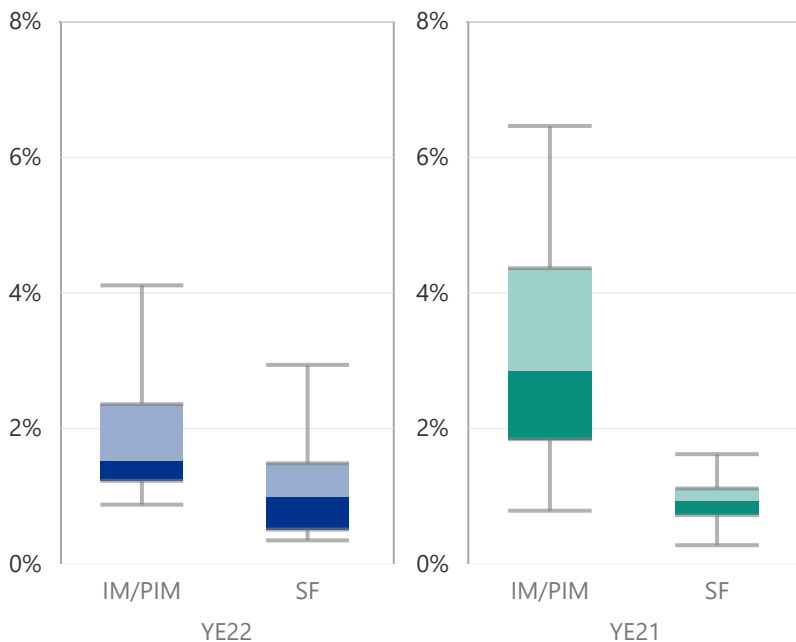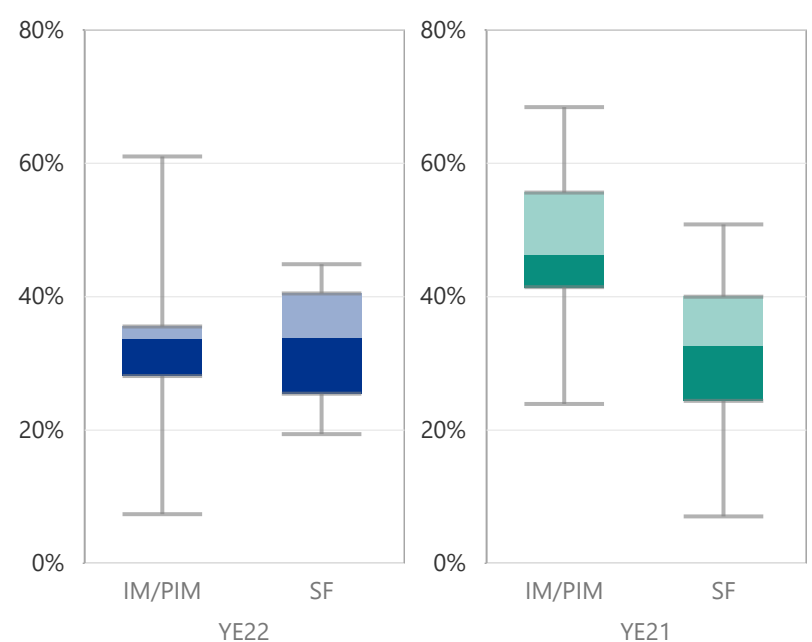| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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SF/IM   **Risk Margin**

The only non-insurance risk to have been considered within the Risk Margin calculation continues to be counterparty default risk, which is included by most respondents. As noted in previous years, we have not observed any changes to Risk Margin projection methodology. This year we have also presented Risk Margin as a percentage of SCR. Risk Margin has reduced this year when compared to the previous year, with a more noticeable decrease for IM firms.

For most respondents, their Risk Margin methodology has been well established for a number of years, but this is expected to significantly change as a result of UK Solvency II reforms. Proposed changes to the Risk Margin are expected to be implemented by the end of YE23, where a reduction in the Risk Margin of c.65% is expected for Life firms and a modified cost of capital method will be introduced.
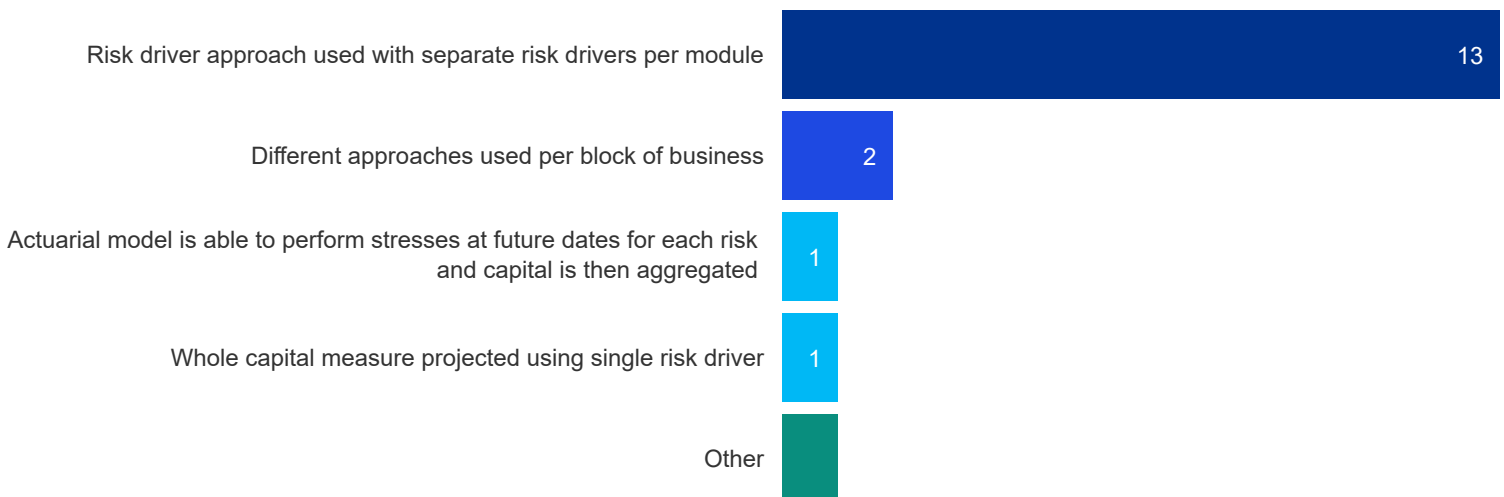
1.5 What is the Risk Margin as a % of your Technical Provisions?

1.6 What is the Risk Margin as a % of your SCR?

1.7 How do you project your capital requirements for the calculation of the Risk Margin?

Risk driver approach used with separate risk drivers per module	13
Different approaches used per block of business	2
Actuarial model is able to perform stresses at future dates for each risk and capital is then aggregated	1
Whole capital measure projected using single risk driver	1
Other	

'Other' includes a combination of full projection and risk driver approach.
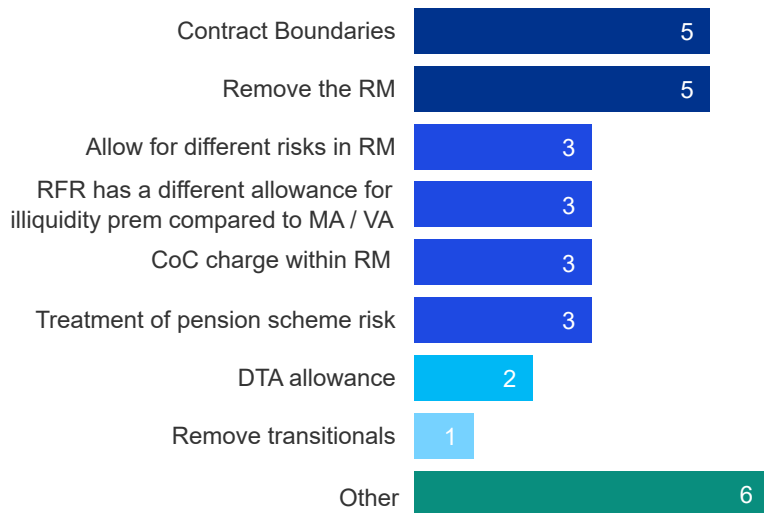
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SF/IM

Pillar 2 and ORSA

The difference in Pillar 1 and Pillar 2 balance sheet and capital methodologies for firms continue to demonstrate similar trends to previous years. Only one of the IM firms commented that there was no difference in treatment between Pillar 1 vs 2.

As we have seen in previous years, the most common differences relate to the Risk Margin, discount rates, and contract boundaries. Changes in the capital methodology are primarily driven by additional risks in scope for SF firms and a more tailored view of operational risks within the business for the IM firms.

1.8a Which of the following areas do you treat differently when performing your Pillar 2 calculations vs Pillar 1 calculations, with regards to Best Estimate Liability / Technical Provisions?

Category	Value
Contract Boundaries	5
Remove the RM	5
Allow for different risks in RM	3
RFR has a different allowance for illiquidity prem compared to MA / VA	3
CoC charge within RM	3
Treatment of pension scheme risk	3
DTA allowance	2
Remove transitionals	1
Other	6

'Other' includes profit enhancements / shareholder transfers, less beneficial MA, longevity calibrations, dynamic TMTP for closed WP funds, allowance for pipeline model changes, and allowance for large amount of group recharges in addition to policy maintenance costs.
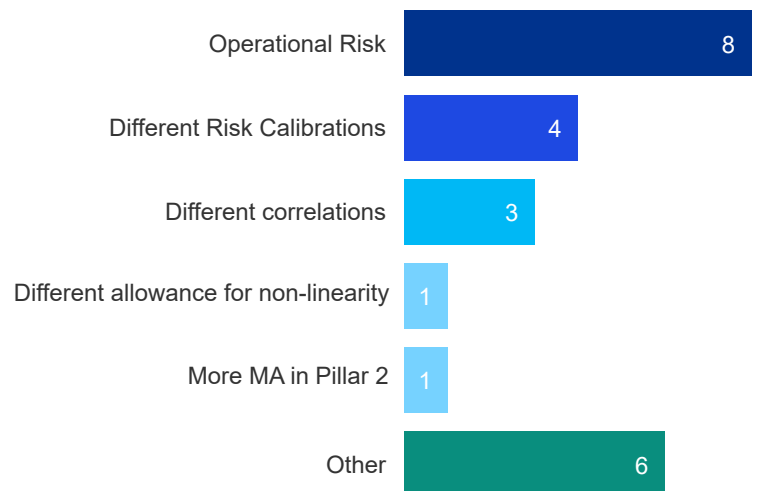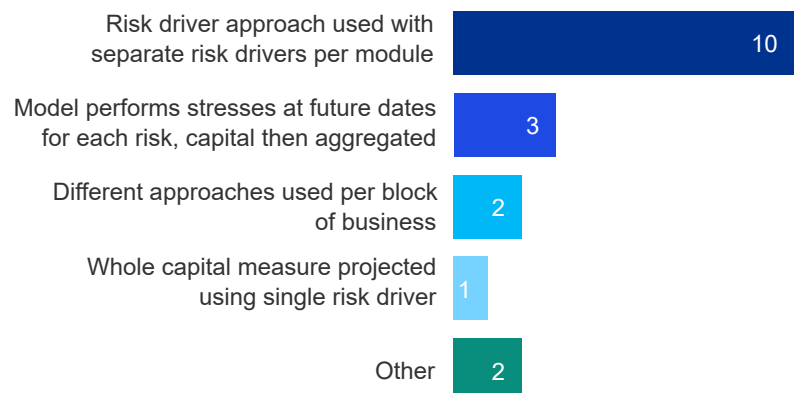
`12`

1.8b Which of the following areas do you treat differently when performing your Pillar 2 calculations vs Pillar 1 calculations, with regards to Pillar 2 - Capital?

Category	Value
Operational Risk	8
Different Risk Calibrations	4
Different correlations	3
Different allowance for non-linearity	1
More MA in Pillar 2	1
Other	6

'Other' includes VA and liquidity premium, own view of Capital for DB pension scheme set using judgement, staff pension scheme contributes to credit spread risk and longevity risk as well as interest rate risk under Pillar 1, mass lapse risk sub-module excluded from Pillar 2, and switch equity risk.

`10`

1.9 For how many years do you project your Pillar 1 Balance Sheet as part of your ORSA?

Category	Value
3 years	3
5 years	8
10 years	6
20 years	1

`18`

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

Category	Value
Risk driver approach used with separate risk drivers per module	10
Model performs stresses at future dates for each risk, capital then aggregated	3
Different approaches used per block of business	2
Whole capital measure projected using single risk driver	1
Other	2

'Other' includes a combination of modelling and risk drivers for each risk, and a capital model used to determine allocated capital requirements which is projected forward using a series of risk drivers and exposure factors.

`18`

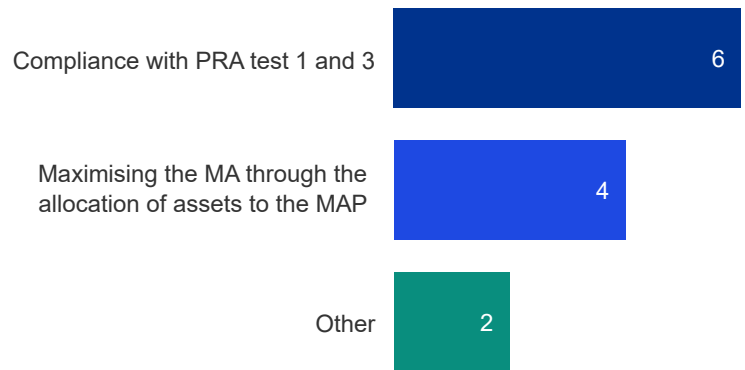| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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SF/IM

Matching Adjustment

Firms allocate assets to the Matching Adjustment Portfolio (MAP) either manually or using a more sophisticated approach through automation. All firms perform their allocation to achieve compliance with PRA Tests 1 & 3. The other objectives of firms range from optimising the size of the MA, optimising the SII coverage ratio, and additional internal matching tests. We found that with the current UK Solvency II reforms, there is only one firm who plans to revisit the decision to use MA, but two plan to expand their assets in the MAP and one plans to expand the liabilities that the MA is applied to. However, these responses were provided prior to the release of the PRA's consultation papers.

1.11 As part of the calculation of the matching adjustment, how are assets hypothecated within the MAP?

3 — 3

● Automatic allocation of assets ● Manual allocation of assets
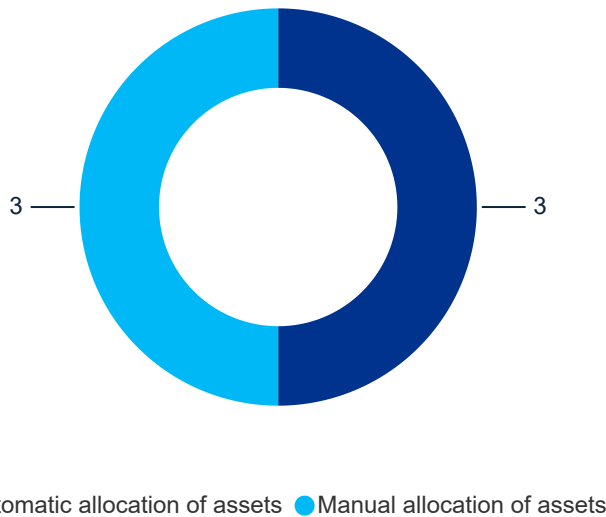
1.12 What is your objective when allocating assets to the MAP?

Compliance with PRA test 1 and 3	6
Maximising the MA through the allocation of assets to the MAP	4
Other	2

Other includes compliance with internal tests, DMT of assets and liabilities, impact of independent stresses on capital requirements, and maximisation of Solvency ratio.

6

1.13 Given the current Solvency II reforms, do you plan to revisit your decision not to use the MA?

1

8

● No, would not use MA even with the potential reforms ● Yes, potentially expanded types of liabilities and assets that qualify

1.14 Considering that Solvency II reforms might expand the types of liabilities and assets covered by the MA, where are you likely to extend the scope of your current MA?

| Assets | 3 | 2 |
| Liabilities | 4 | 1 |

●No ●Yes

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IM

Matching Adjustment

Since last year, one firm has brought property rental strips from planning to apply MA to it, into actually having it in the MAP. There continues to be a range of assets where firms plan to make use of them in the future but developing the required internal processes and achieving regulatory approval is a long process.

Responses were received before the release of the July and September UK Solvency II reform consultations and, therefore, respondents may not have had enough detail on the proposed reforms to include the necessary developments in their responses. However, with the release of September consultations and UK Solvency II Matching Adjustment reforms by half year 2024, we expect to see some changes in the asset mix for the Matching Adjustment portfolios for firms.

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

The majority (>50%) of respondents currently include the following asset classes in their MA portfolio	A few (minority) of the respondents also include the following asset classes in their MA portfolio
Cash	Residential mortgage backed securities
Inflation linked bonds	Sale and leaseback
Non-callable fixed interest	Educational loans
Cross currency swaps	Structured & unstructured ground rent assets
Infrastructure debt	Structured & unstructured Property rental strips
Supranational	Secured financing
Unstructured callable bonds	Structured callable bonds
Commercial mortgages	Student loans
Inflation swaps	FX forwards/futures
Interest rate swaps	Inflation options
Structured equity release mortgages	Interest rate swaptions
Social housing loans	Property reversionary assets
Private finance initiative loans	Uncollateralised inflation

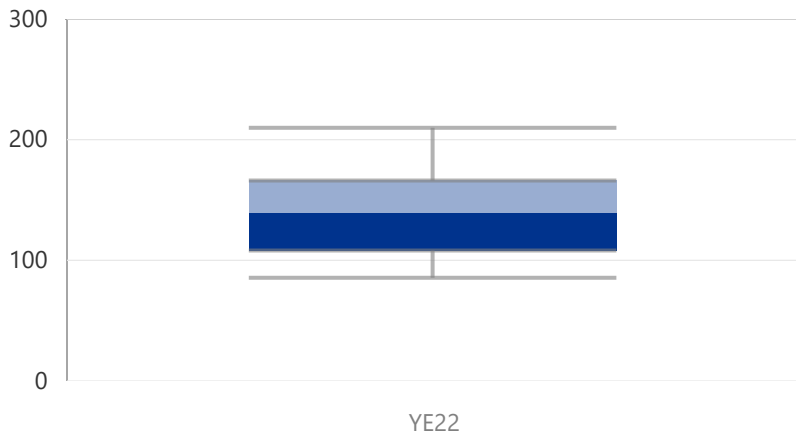| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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SF/IM   **Matching Adjustment**

This section considers the calculation of the Matching Adjustment (MA). The first chart shows the overall MA achieved by firms. There has been a significant increase due to widening credit spreads on MA portfolios. We can supplement this chart with additional publicly available benchmarks from some of the large Bulk Purchase Annuity providers. The median MA excluding this additional benchmarking is 139bps. Including this additional data raises the median MA to 158bps.

MA Comparison		
Matching Adjustment (in bps)	**2021**	**2022**
M&G	106	176
Aviva	81	114
PIC	104	164
LBG	89	162
Rothesay	98	155
Just Group	163	210

The second chart shows the percentage of the annual effective rate which is achieved in the MA once deductions have been made for the Fundamental Spread. Excluding sampling differences, all participants who responded in for YE22 and YE21 have seen a slight increase in this percentage.

1.16 Matching Adjustment (bps)
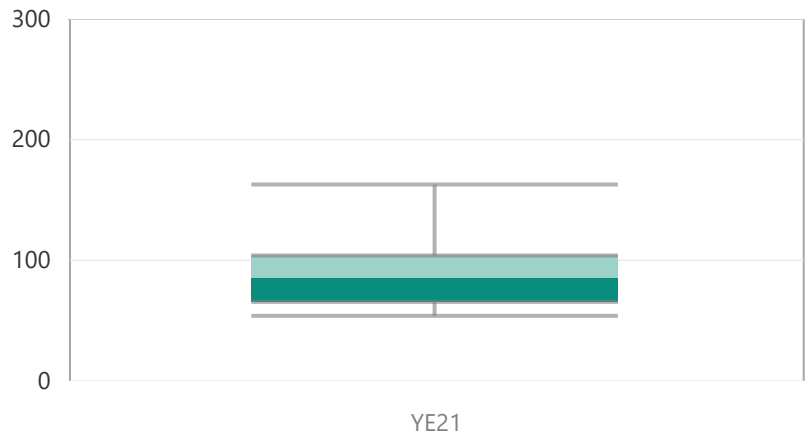
1.17 Percentage of Total Spread Achieved in MA
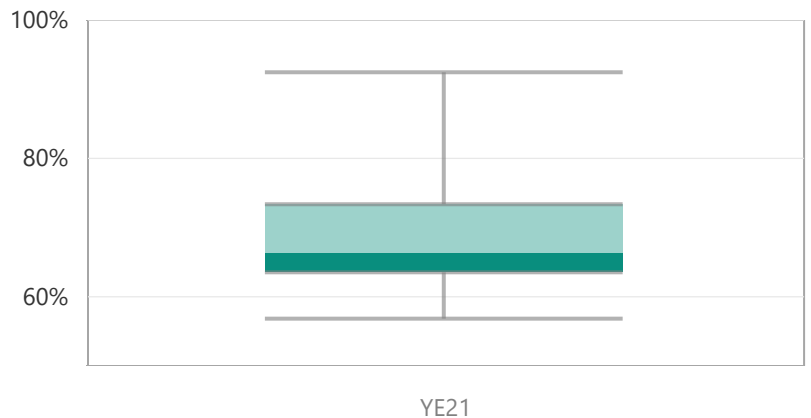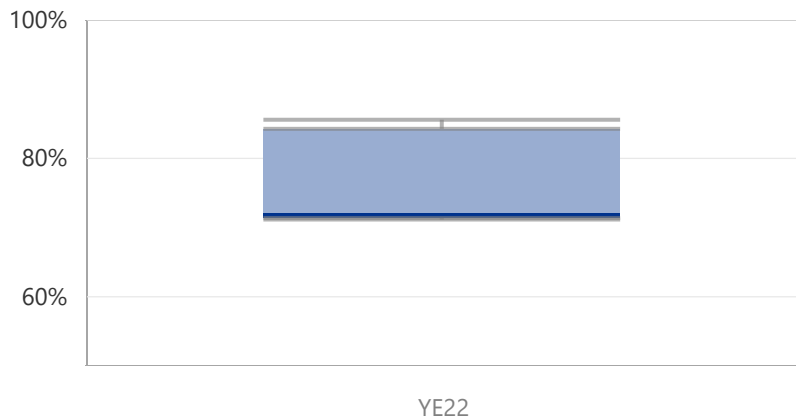
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SF

Lapse and Expense Risk

For the majority of respondents mass lapse is the biting scenario out of the three lapse stresses. Only one respondent find the lapse down stress to be the most onerous. In the mass lapse scenario, some respondents continue to assume that expenses vary with policy numbers. Management actions provide the main justification for this assumption; other reasons include expense agreements and a combination of fixed expenses reducing in line with policy run off after a number of years.

As seen in previous years, all firms stress overhead and variable expenses, and the majority of firms also stress investment expenses. Where investment expenses are not stressed, they are generally defined as a percentage of funds under management. Furthermore, there is a variety of responses in respect of stressing fixed outsourcing expenses which depends on the contractual agreements in place. For example, some firms do not stress the expenses for inflation while some only stress at the end of the outsourcing term.

2.1 Which of the lapse stresses is the biting scenario for your capital requirement?

● Mass Lapse ● Lapse down
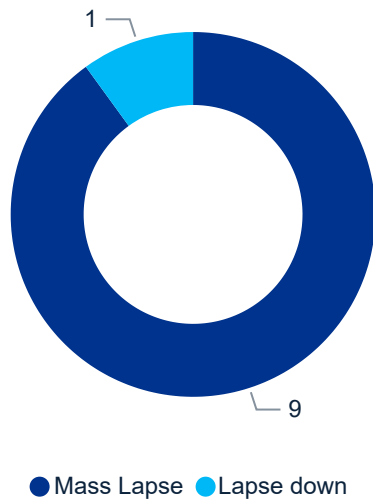
2.2 What assumption do you make about expenses in each of the lapse stresses?

● Expenses vary with policy numbers
● Some expenses are fixed overheads
● Some expenses are fixed overheads that run-off over time
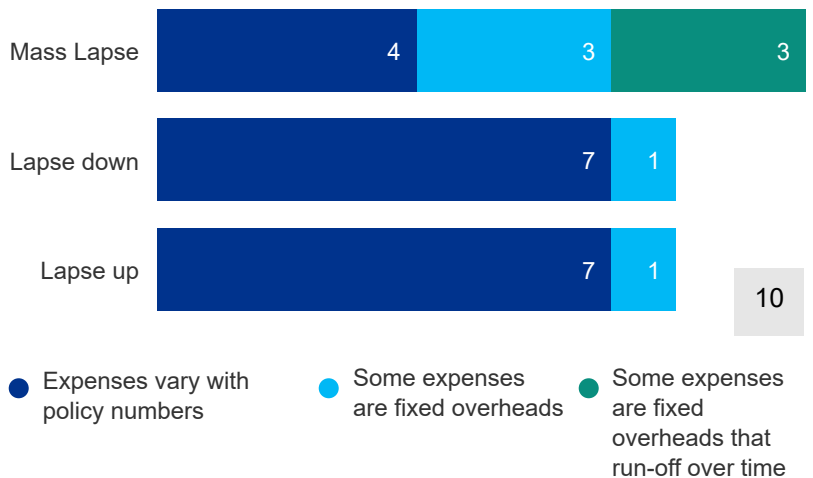
2.3 Within the mass lapse stress do you assume any further management actions to reduce costs on a permanent basis or while volumes recover?

Direct actions on staff e.g. headcount reductions, actions relating to other fixed expenditure e.g. property/equipment costs, indirect actions on staff e.g. reward changes / headcount freezes, actions to reduce costs e.g. reduction in project spend, contingent actions e.g. change in strategy / sales plans etc, rebalance of costs e.g. outsourcing cost cut.

2.4 Which of your expenses are subject to the expense stress?
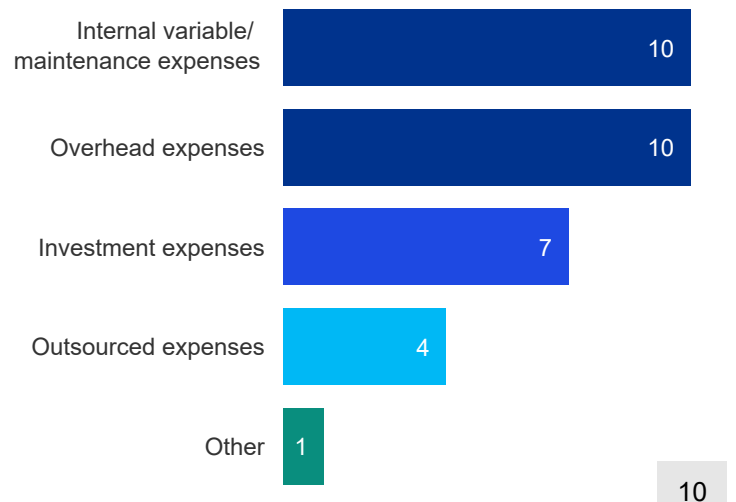
'Other' includes project expenses and certain outsourced expenses for which inflation protection exists in the relevant contract are stressed for level only, not for inflation
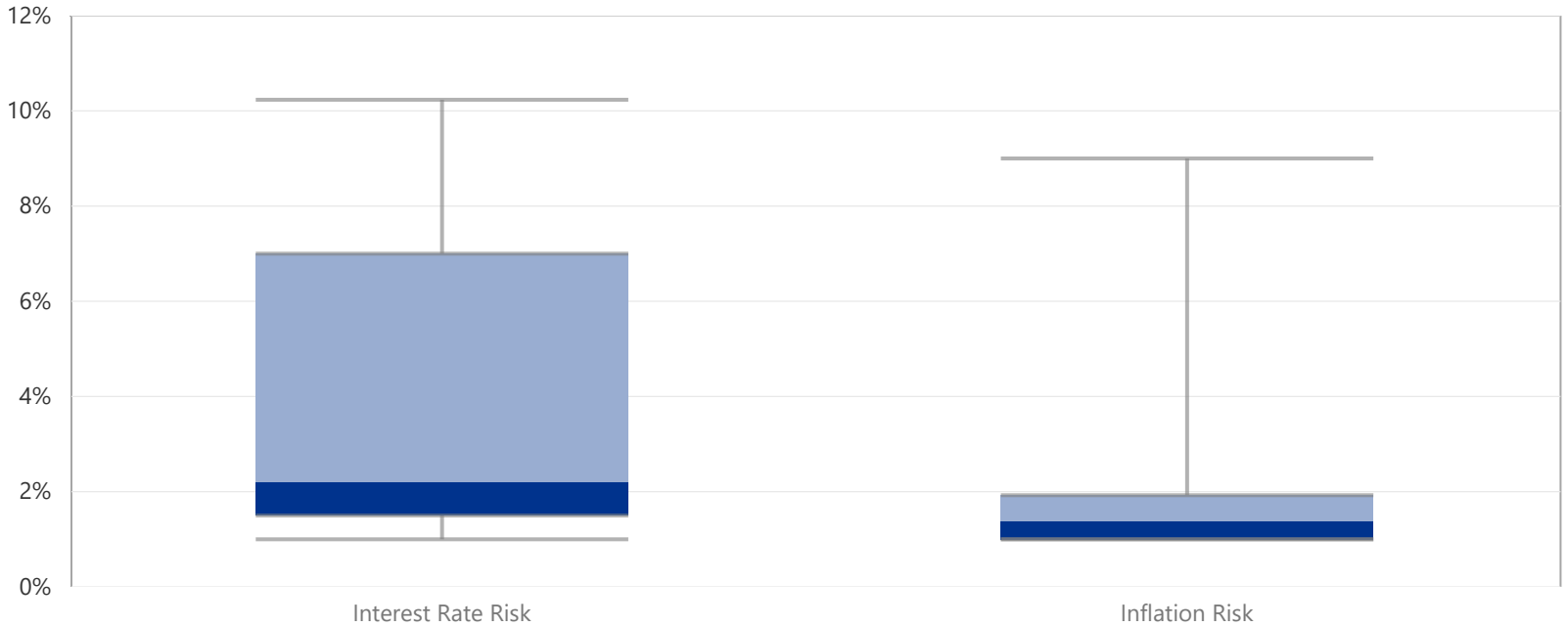
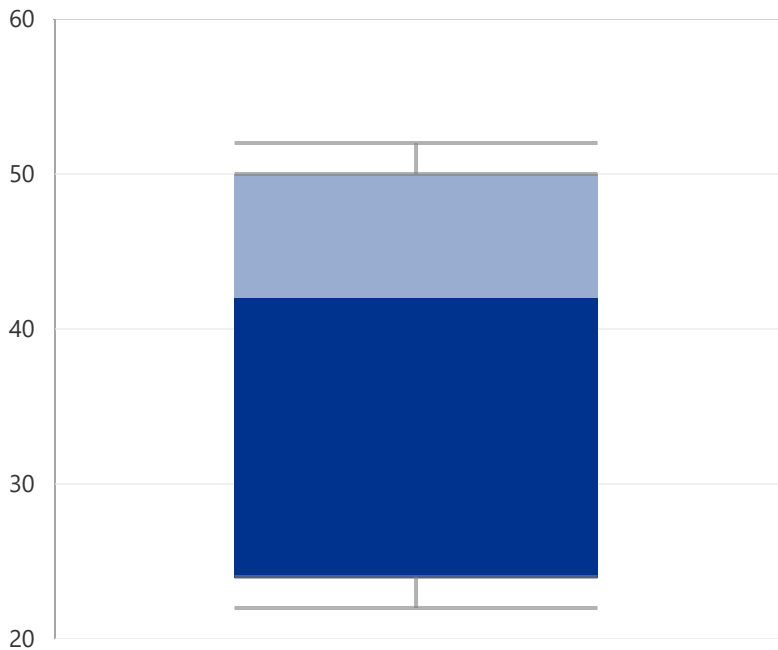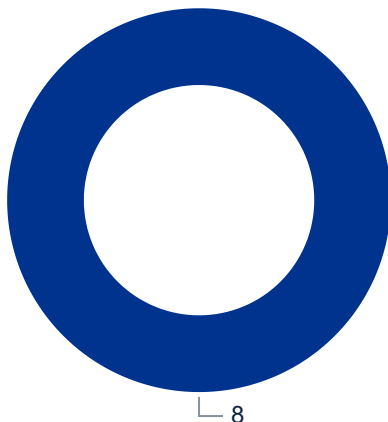| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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IM

Interest Rate Risk

Inflation and interest rate risks are a small proportion of diversified SCR for most participants given their matching/hedging strategy. Most respondents use the last 20-40 years of data to calibrate the interest rate risk. There is an even split between multiplicative and additive stress for interest rate shocks, and two participants use a hybrid model.

3.1 What is the % of diversified SCR for the following market risks?

3.2 How many years of data did you use to calibrate your interest rate stresses for YE22?

3.3 How are shocks applied to interest rates?
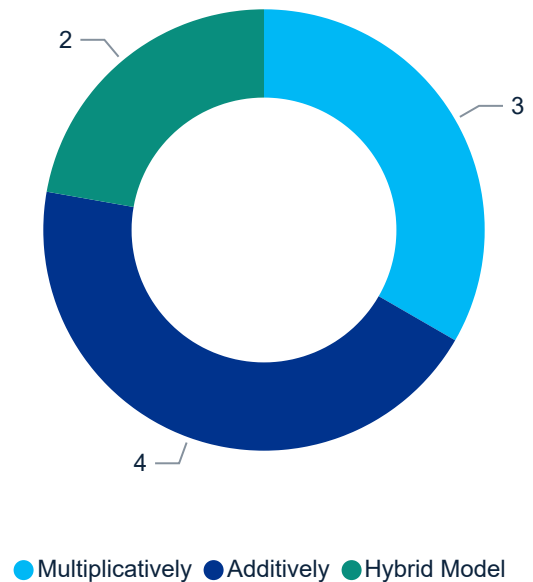
● Multiplicatively ● Additively ● Hybrid Model

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IM

Interest Rate Risk

Most respondents consider the highest observed one-year changes in interest rate in 2022 to be either equivalent to, or more severe than, a 1-in-200 stress for interest rate risk. We note that simply including 2022 data in the calibration model would not be expected to produce 1-in-200 up stresses as high as the changes observed over 2022. Most respondents indicated that they observed their 1-in-200 up stresses increasing to be in line with the highest observed one-year change in interest rate over 2022 after allowing for 2022 data. However, we note that most companies' 1-in-200 stresses remain lower than the observed one-year changes, particularly when considering the September to September changes observed in chart 3.8a.

3.4a Do you consider the largest interest rate stresses observed over 2022 to be equivalent, less severe, or more severe than a 1-in-200 stress?

● More Severe ● Equivalent ● Less Severe
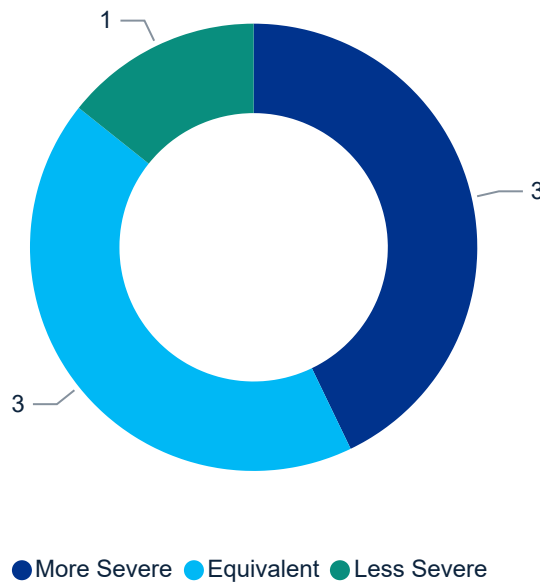
3.4b How did the 1-in-200 stresses produced by your model compare with the highest observed one-year changes in the interest rate (year-on-year) over 2022?
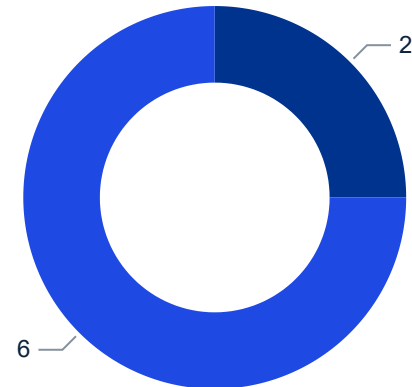
Before allowing for 2022 data

After allowing for 2022 data

● Materially Lower ● In line

Document Classification: KPMG Public

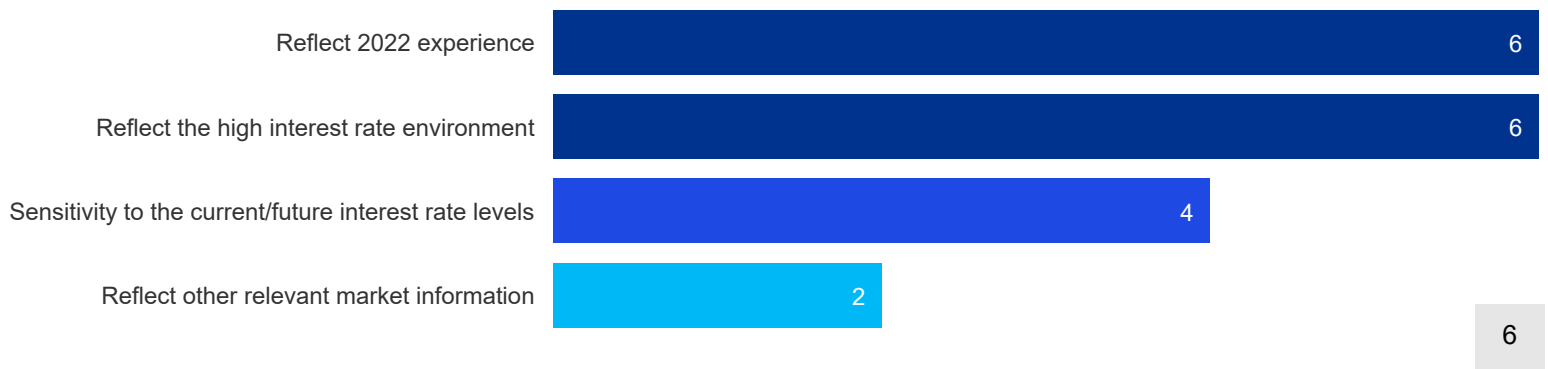| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Interest Rate Risk

While most companies indicated that the stresses produced by their models after allowing for 2022 data were in line with their view of a 1-in-200 event, the majority of companies still planned to review their interest rate modelling. The model change is largely to ensure that their models are more appropriate in the different interest rate environment, and also sensitive to the interest rate level. Companies are exploring various methods to achieve these aims, with most companies looking to review their expert judgements and consider alternative data sources, while a significant minority were considering regime-switching models.

3.5 Do you consider your existing interest rate stress methodology to be suited to modelling interest rate risk in a high interest rate environment? Is there any plan for developments or changes to interest rate risk calibration?
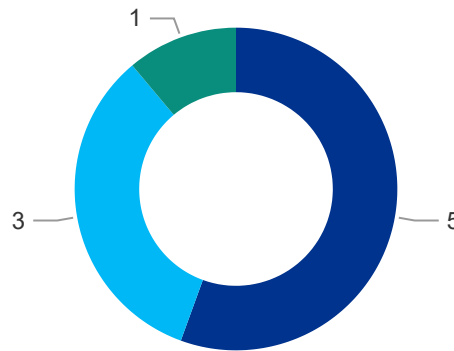
● Plan to change the model ● Suitable Existing Methodology ● Undetermined

3.6 If you plan to change your model to reflect 2022 experience, what features do you consider to be important to reflect in your revised model?

Reflect 2022 experience	6
Reflect the high interest rate environment	6
Sensitivity to the current/future interest rate levels	4
Reflect other relevant market information	2

6

3.7 What model changes are you considering as part of your interest rate model change?

Add / amend expert judgement	5
Data choices	5
Allow regime switching in the model	3
Change model type	2

6

Document Classification: KPMG Public

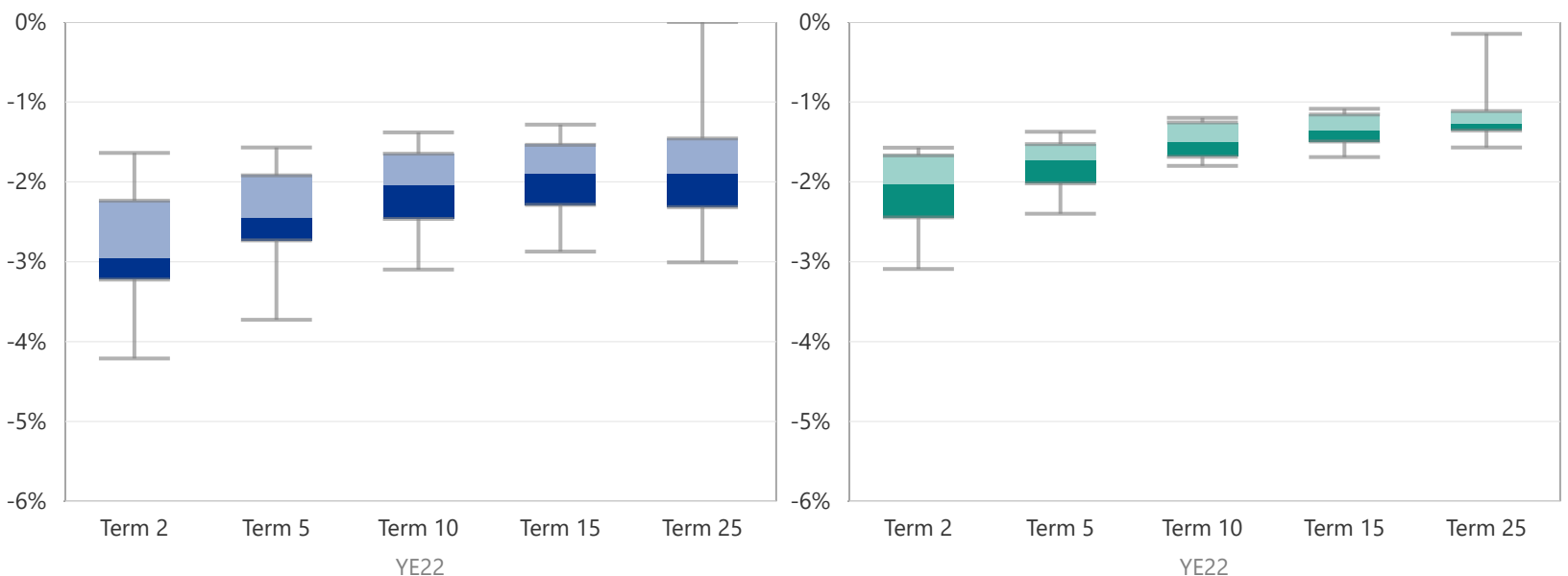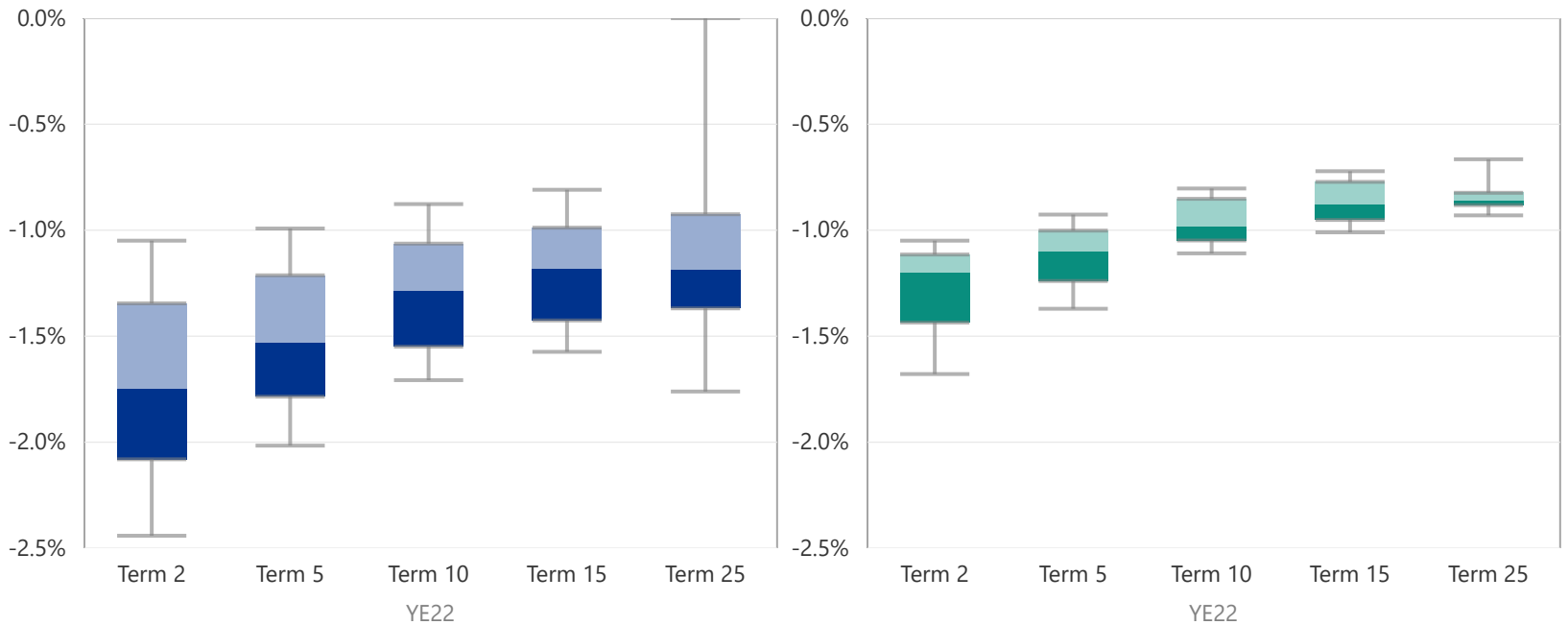| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Interest Rate Risk - Calibrations

The charts below show the magnitude of the interest rate stresses at the 1-in-200 level. Firms' interest rate risk calibrations have strengthened over 2022, for both interest rate "up" and "down" stresses, largely reflecting the impact of incorporating 2022 data into their calibrations. There is also a wider variation in the shocks produced compared to YE21, particularly for the 1-in-200 up shocks. We have also overlaid two lines representing the largest one year movement in interest rates (Sep 21 to Sep 22) as well the Dec 21 to Dec 22 interest rate movements. We note that only one company's calibration produced 1-in-200 up shocks that were larger than the largest observed (Sep 21 to Sep 22) interest rate movements, while other companies' calibrations produced shocks closer to the Dec 21 to Dec 22 movements, albeit with most companies still producing weaker interest rate up stresses than the observed Dec 21 to Dec 22 change.

3.8a Interest Rate - 1-in-200 up shocks

Sep 21 to Sep 22 Movement ● Dec 21 to Dec 22 ●
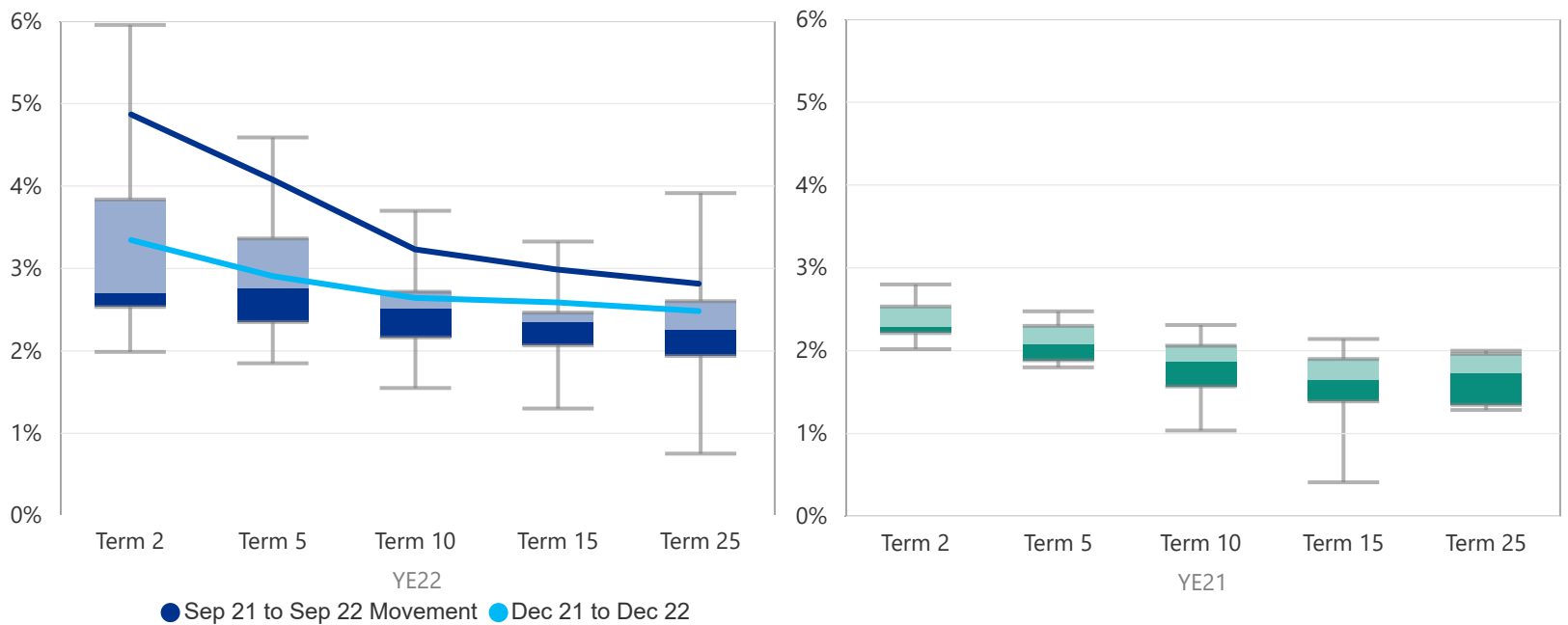
3.8b Interest Rate - 1-in-200 down shocks

1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Interest Rate Risk - Calibrations

The charts below show the magnitude of the interest rate stresses at the 1-in-20 level. Firms' interest rate risk calibrations have strengthened over 2022, for both interest rate "up" and "down" stresses, largely reflecting the impact of incorporating 2022 data into their calibrations. There is also a wider variation in the shocks produced compared to YE21.

3.8c Interest Rate - 1-in-20 up shocks

YE22 | YE21
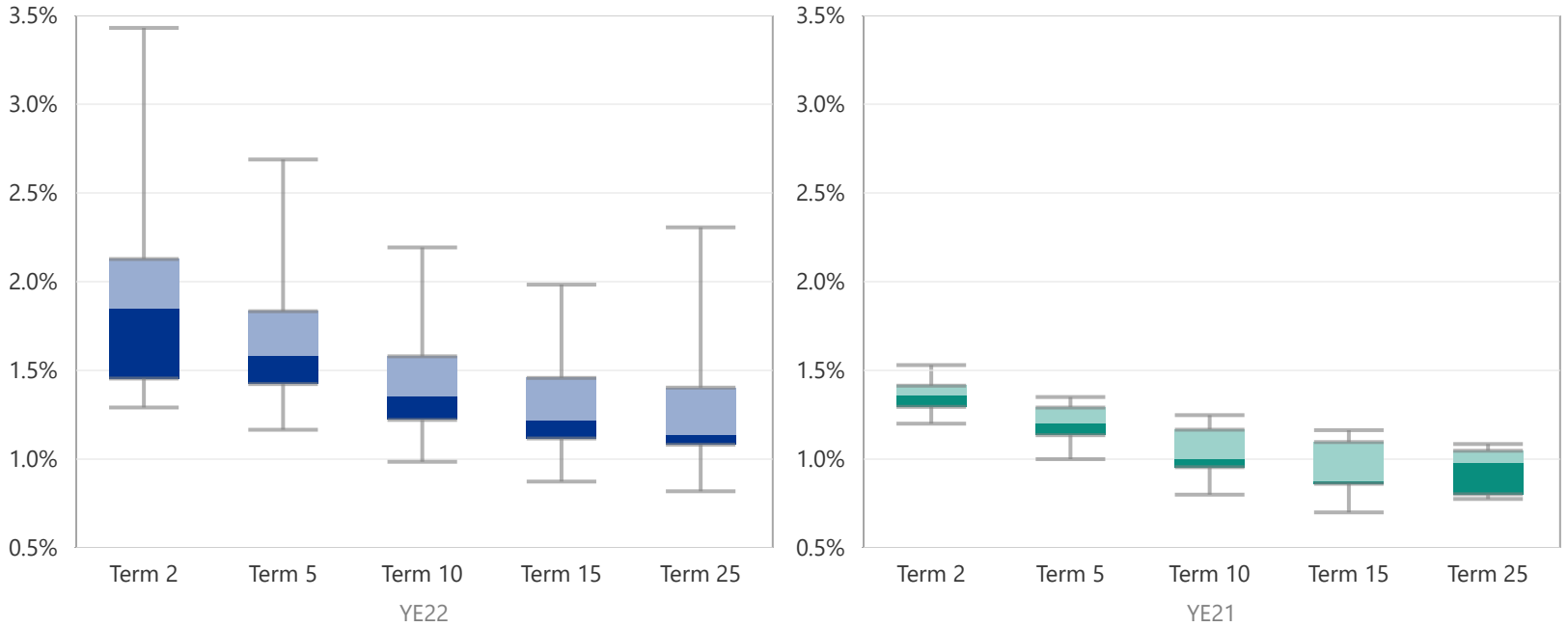
3.8d Interest Rate - 1-in-20 down shocks

YE22 | YE22

Document Classification: KPMG Public

1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Interest Rate Risk - Calibrations

The charts below show the interest rate implied volatility stresses. The distributions are similar for both years, with most firms' stresses only marginally changed at YE22 compared to YE21.

3.8e Interest Rate Volatility
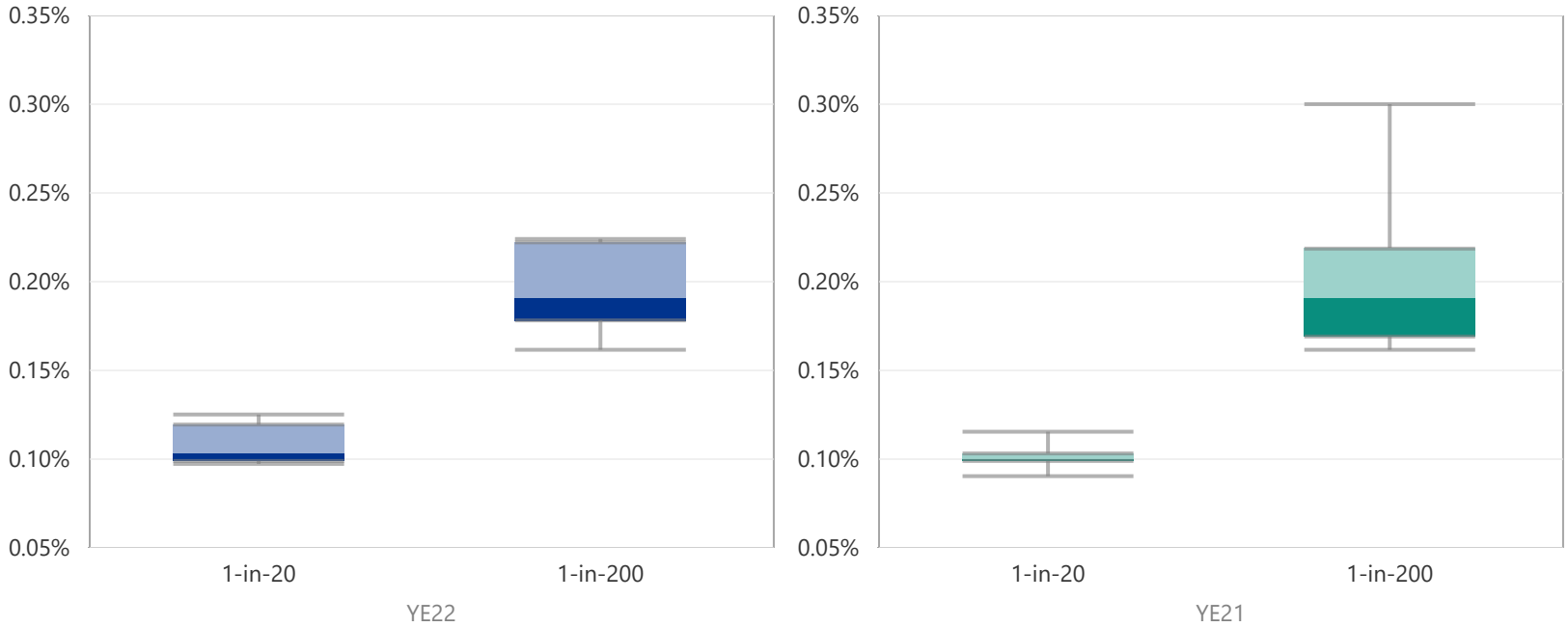
1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Inflation Risk

Most participants calibrated inflation stresses based on the last 30-40 years' data. Most companies model their inflation risks based on RPI and no company models LPI risks directly.

3.9 What historical period of data did you use to calibrate your inflation stresses for YE22? (years)
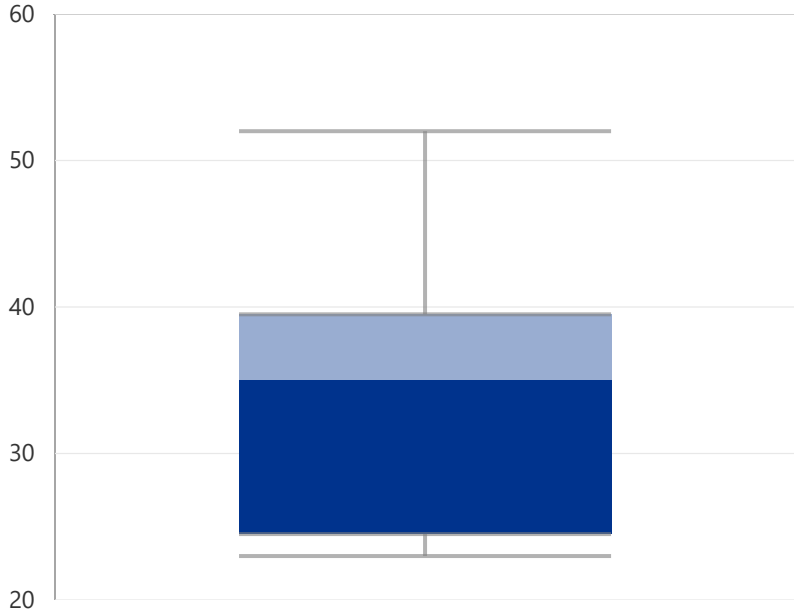
3.10 What is the nature of your inflation exposure?

8

3.11 What is the nature of your modelled inflation risk?
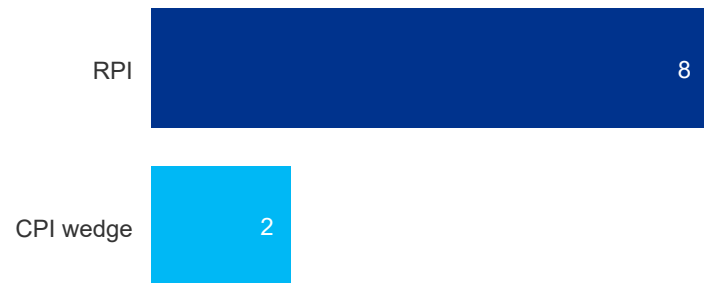
3.12 What is your approach to modelling inflation risks for measures other than RPI?

CPI

'Bespoke' includes additive stress calculated by a PCA approach, and performing a separate calibration for RPI-CPI wedge.

8

7

Document Classification: KPMG Public

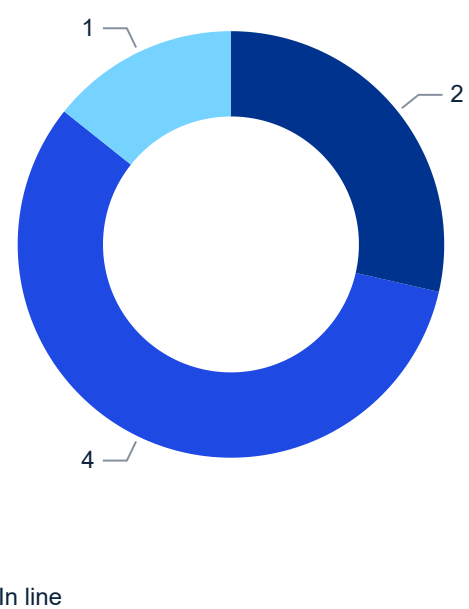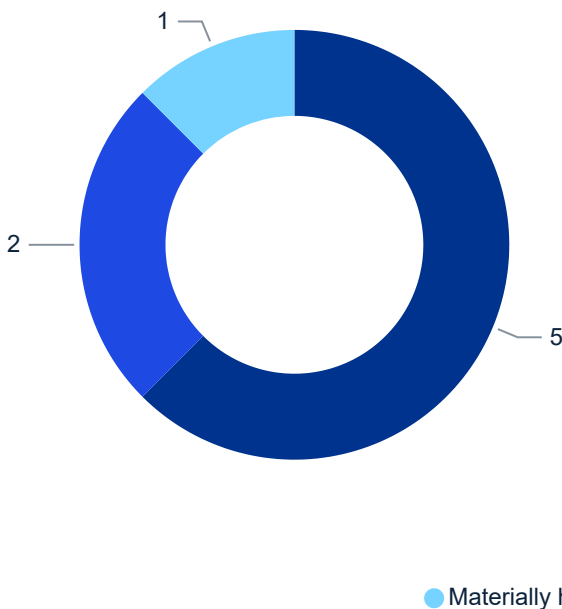| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Inflation Risk

The majority of participants consider the largest inflation spot rate changes observed over 2022 to be equivalent or more severe than the 1-in-200 stress. Most participants noted the 1-in-200 stress for inflation risk has increased after allowing 2022 data and is more consistent with the highest observed changes in inflation over 2022.

3.13a Do you consider the largest inflation spot rate stresses observed over 2022 to be equivalent, less severe or more severe than a 1-in-200 stress?

● More Severe ● Equivalent ● Less Severe
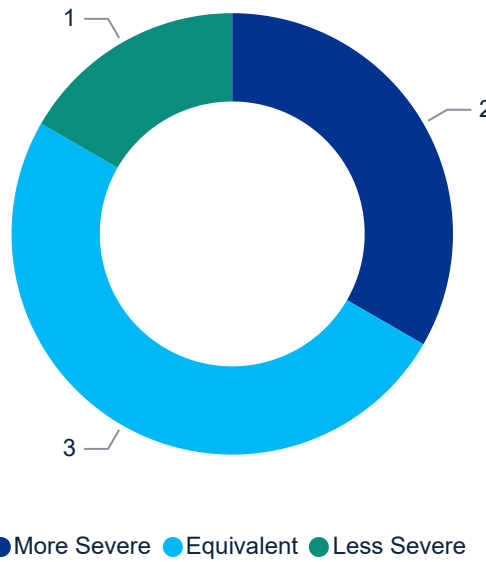
3.13b How did the 1-in-200 stresses produced by your model compare with the highest observed one-year changes in inflation (year-on-year) over 2022?

Before allowing for 2022 data   **After allowing for 2022 data**

● Materially higher ● Materially Lower ● In line

Document Classification: KPMG Public

1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Inflation Risk

More than half of respondents consider the existing inflation risk model to be appropriate to reflect 2022 experience. One company considers their methodology to be suitable, however they plan to revisit their calibration.

Companies are considering different approaches to reflect 2022 experiences and the high inflation environment and to be more sensitive to the inflation levels, mostly through expert judgement and data choice.

3.14 Do you consider your existing inflation risk stress methodology to be suited to modelling inflation risk in a higher inflation environment, and is there any plan to change your current inflation risk model in response to 2022 experience?
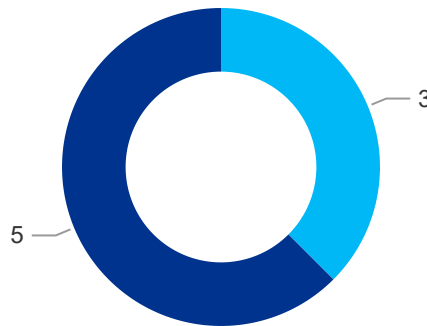
● Plan to change the model ● Suitable Existing Methodology

3.15 If you plan to change your inflation risk model to reflect 2022 experience, what features do you consider to be important to reflect in your revised model?

Reflect 2022 experience	4
Reflect higher inflation environment	3
Sensitivity to the current/future inflation levels	3
Update "shapes" of inflation stresses	3

4

3.16 What model changes are you considering as part of your inflation risk model change?

Add / amend expert judgement	4
Data choice	4
Change model type	3
Regime switching in the model	2

4

Document Classification: KPMG Public

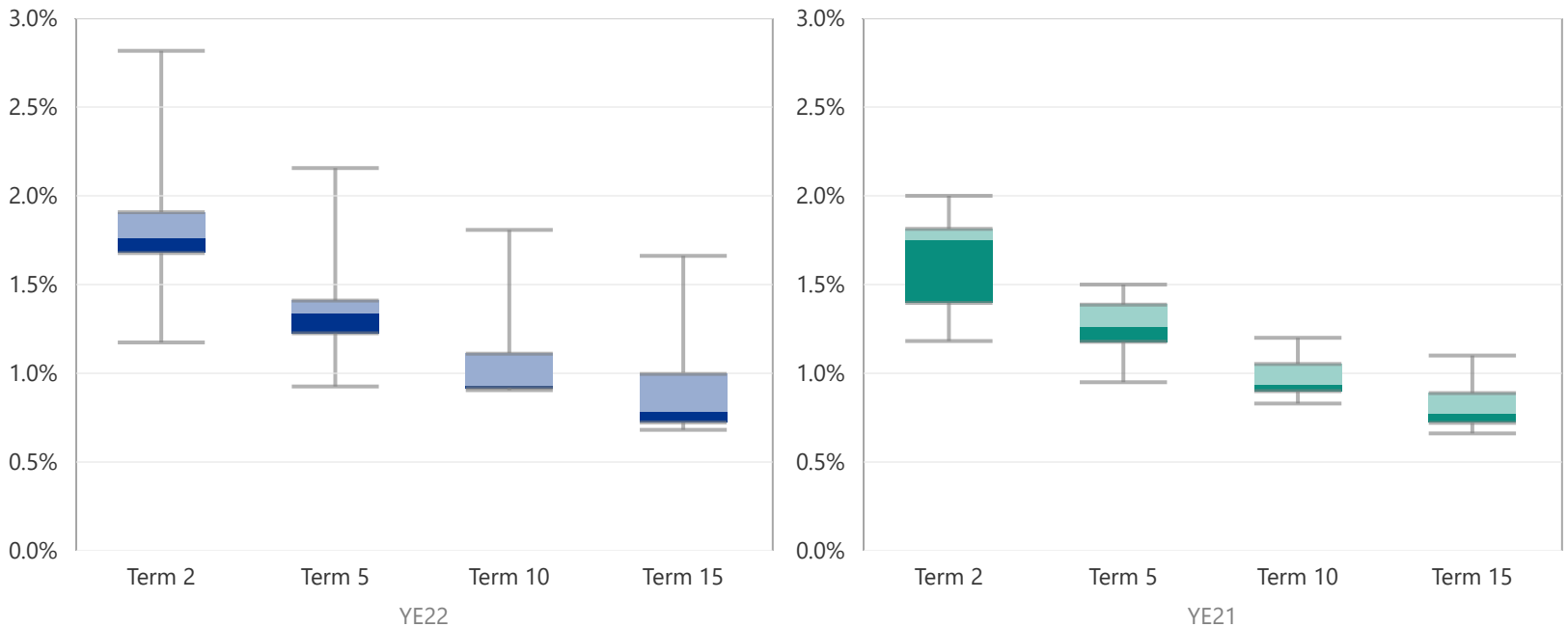| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Inflation Risk - Calibrations

The charts below show the implied inflation stresses. Firms' inflation risk calibrations have strengthened over 2022, particularly at the shorter durations.

3.17a Change in Implied Inflation - 1-in-200

YE22

YE21
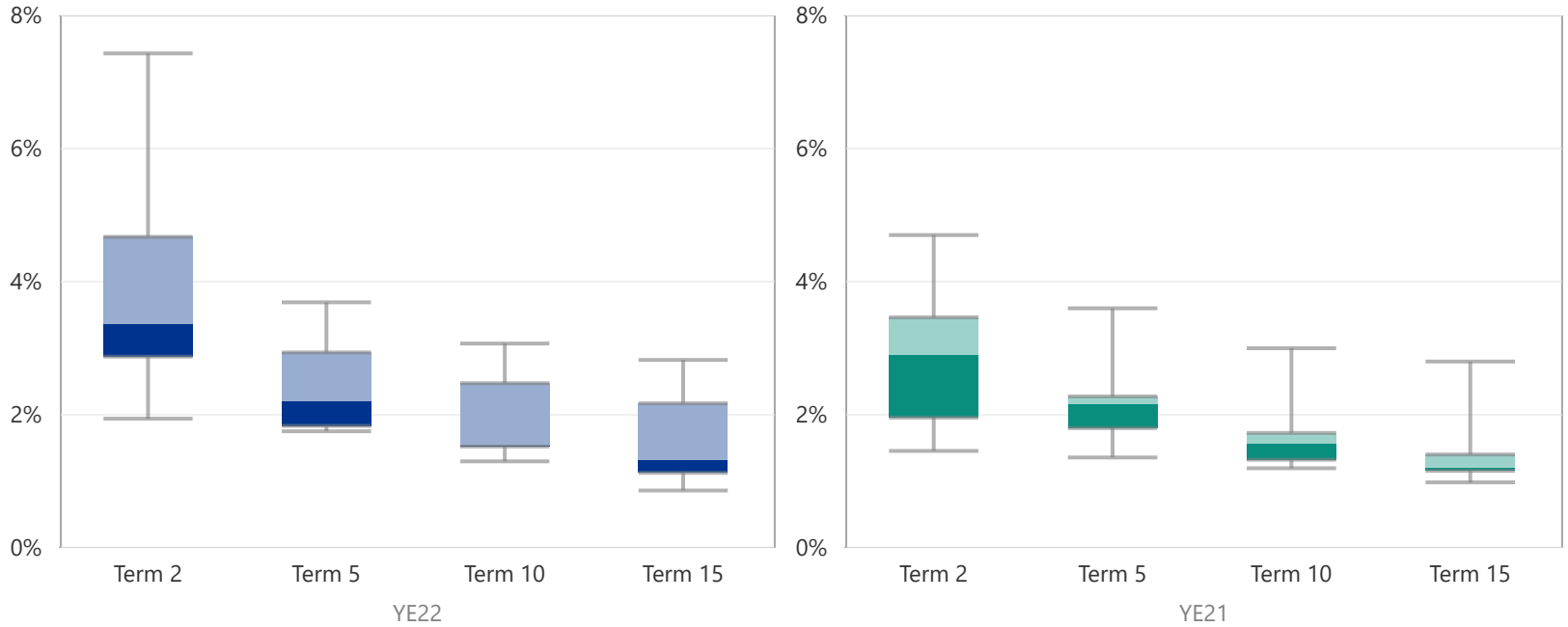
3.17b Change in Implied Inflation - 1-in-20

YE22

YE21

Document Classification: KPMG Public

1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Equity Risk - Calibrations

The charts below show the equity return and implied volatility stresses. The total equity stress charts display the magnitude of the 1-in-20 and 1-in-200 down shocks. Equity risk calibrations at YE22 are broadly similar to YE21, with marginal changes to most firms' individual calibration outcomes for both total return and implied volatility stresses.

3.18 Total Equity Stress
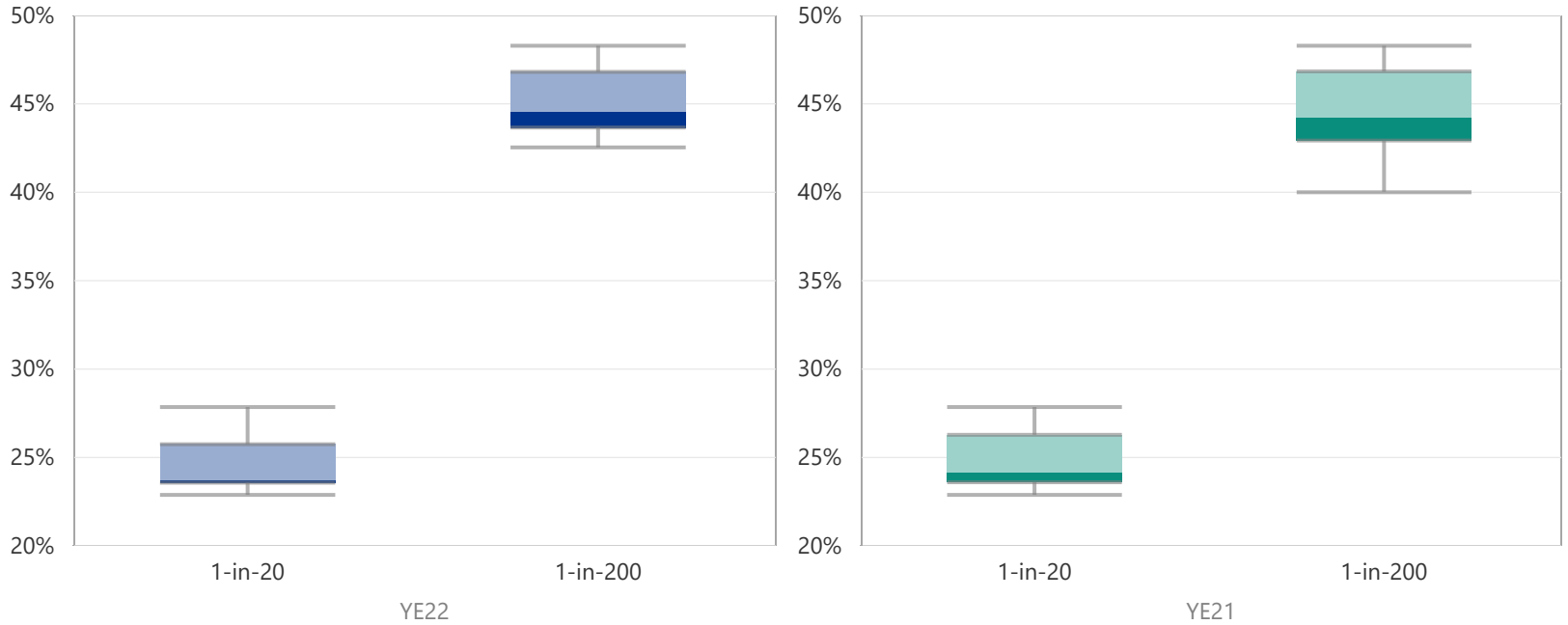
3.19 Equity Volatility Stress (Term 10)

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1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Property Risk - Calibrations

The charts below show the magnitude of the 1-in-20 and 1-in-200 down shock for commercial and residential property return stresses. Property return stresses, in particular at the 1-in-200 level, are similar to the YE21 stresses. There have been marginal changes to most firms' individual calibration outcomes for both commercial and residential return stresses.

3.20a Total Property Annual Return Stress - Commercial
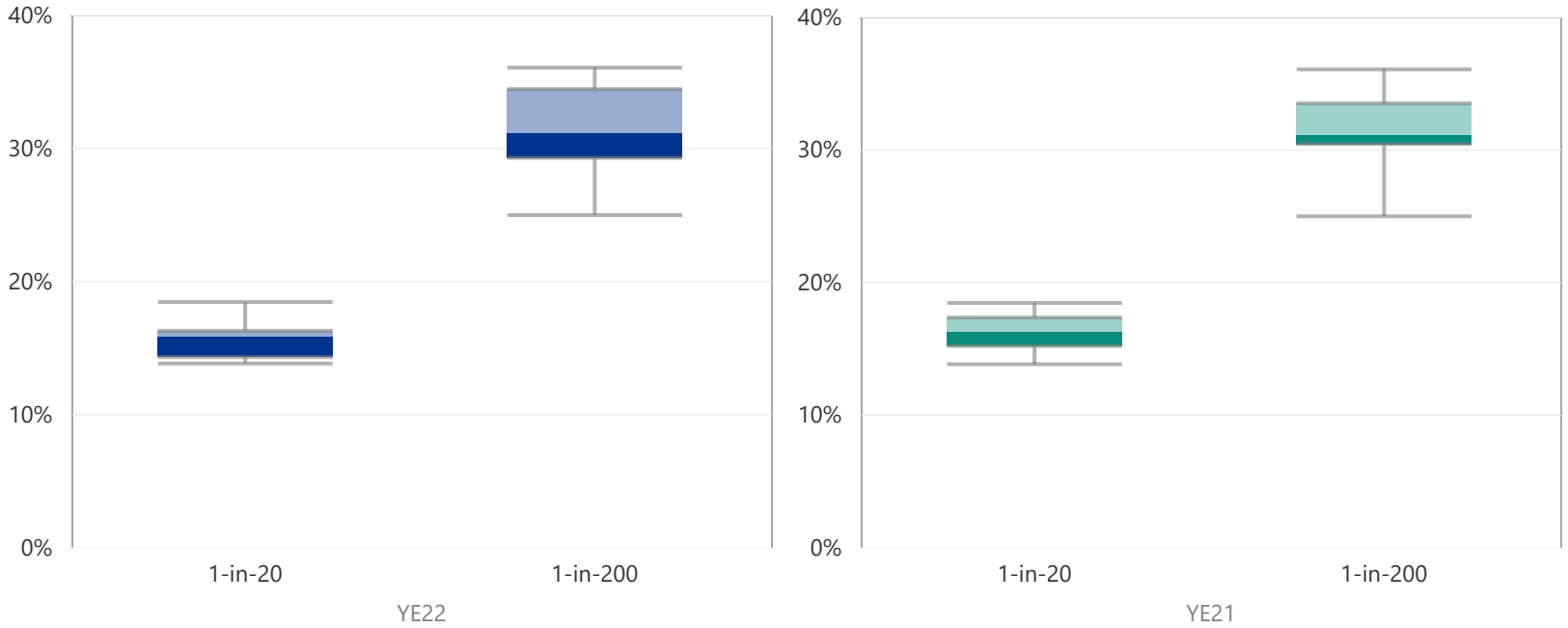
3.20b Total Property Annual Return Stress - Residential
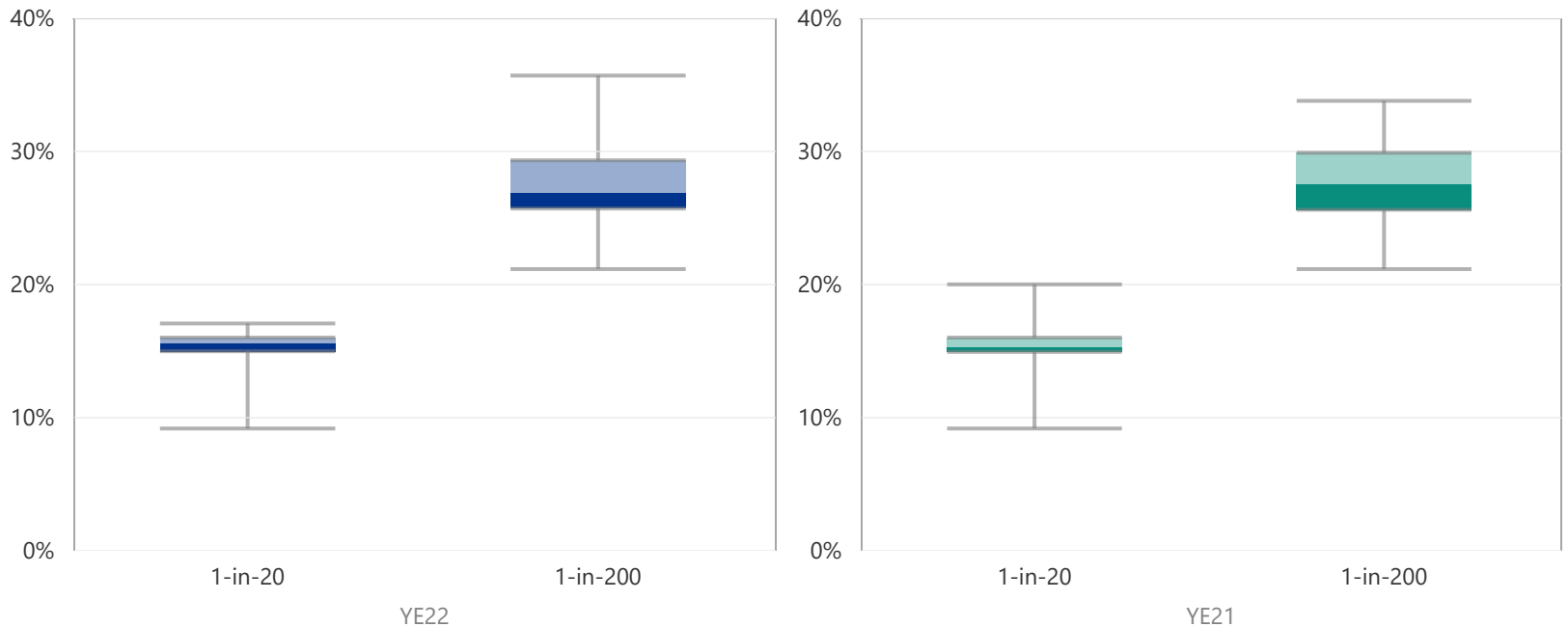
1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Property Risk - Calibrations

The charts below show the property volatility stresses. Property volatility stresses, in particular at the 1-in-200 level, are similar to the YE21 stresses. There have been minimal changes to companies' individual calibration outcomes for property volatility stresses.

3.21 Property Rate Volatility Stress (Term 10)
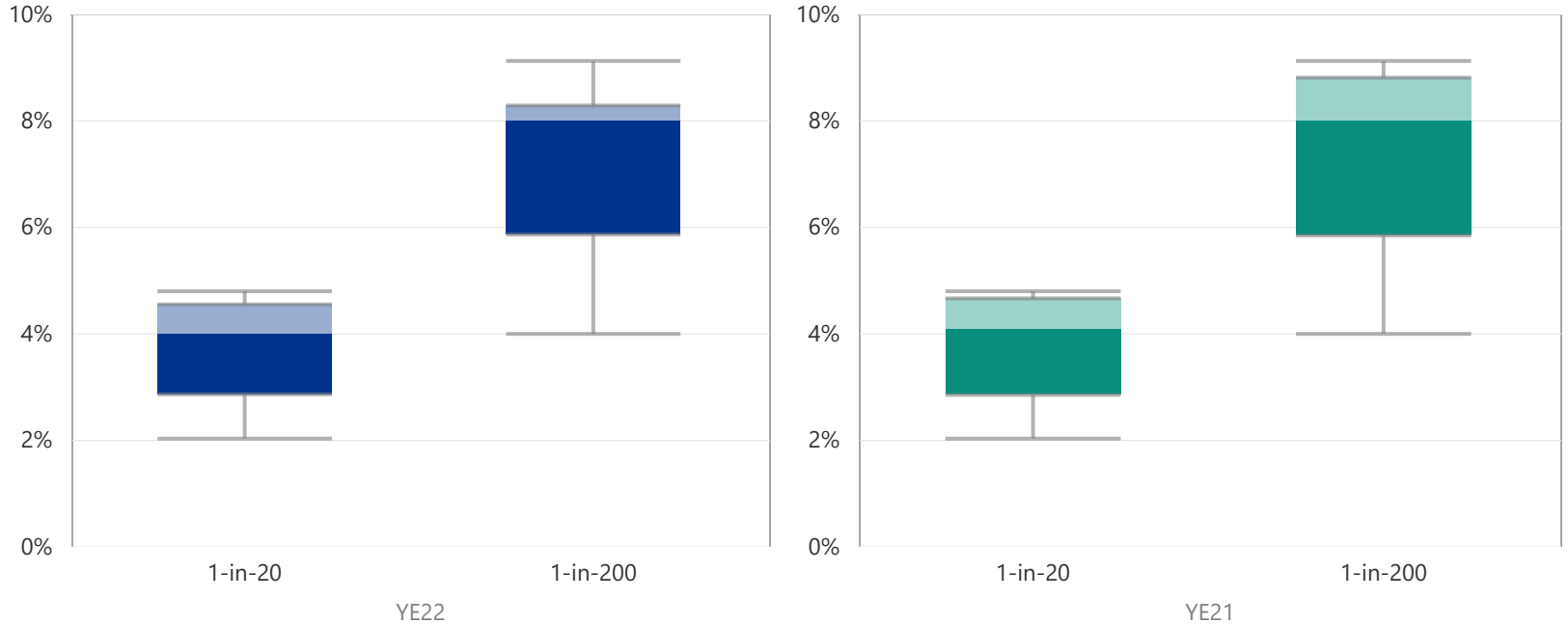
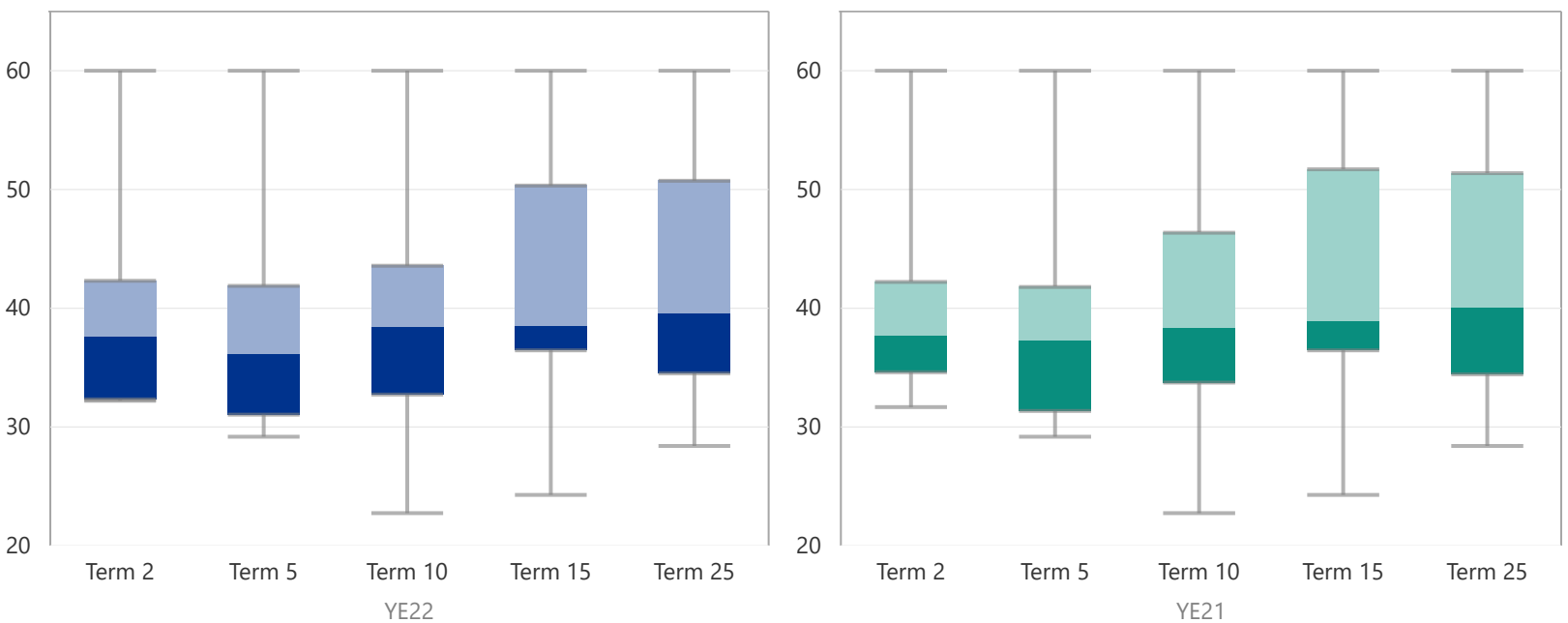| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Sovereign Swap Spreads - Calibrations

The charts below show the sovereign swap spread stresses. Most firms have similar stresses to YE21. However, one company has increased stresses compared to YE21, while another has reduced them compared to YE21, resulting in a wider distribution of stressed outcomes at YE22 compared to YE21.

3.22a Sovereign Swap Spreads - 1-in-200 (bps)
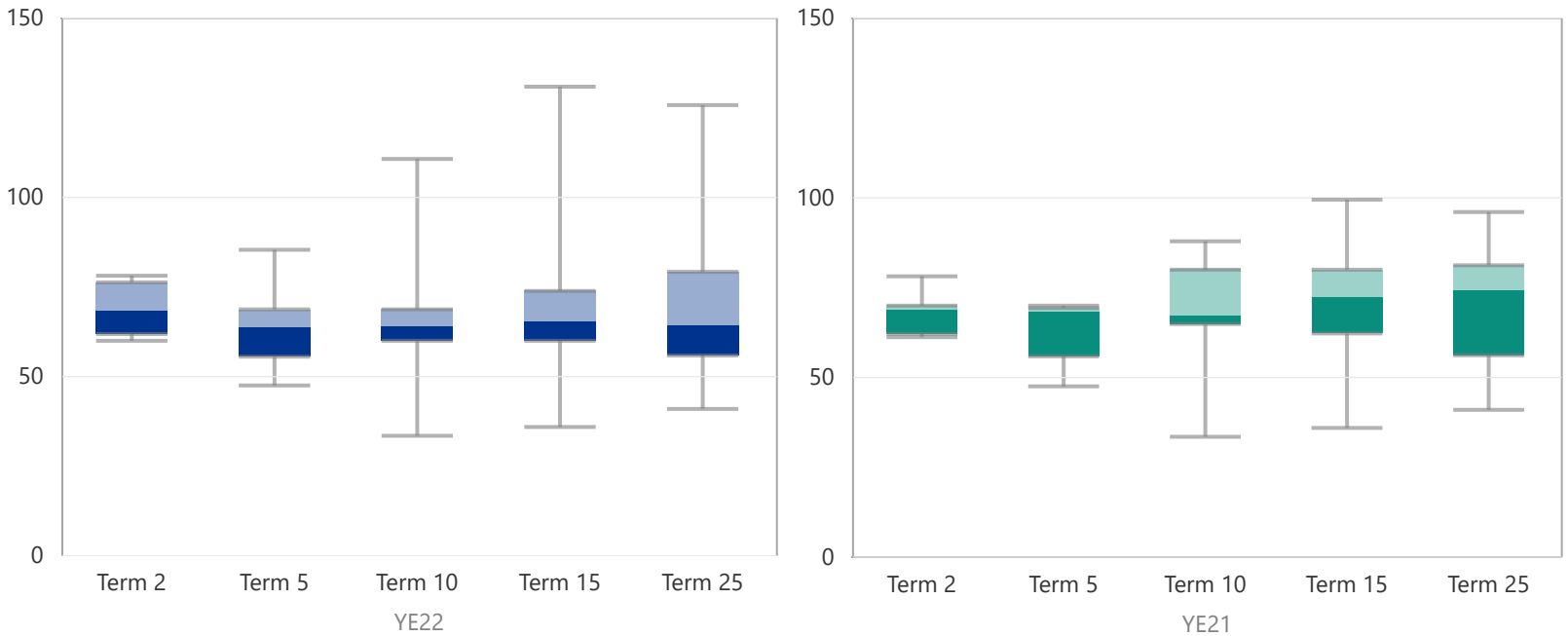
3.22b Sovereign Swap Spreads - 1-in-20 (bps)

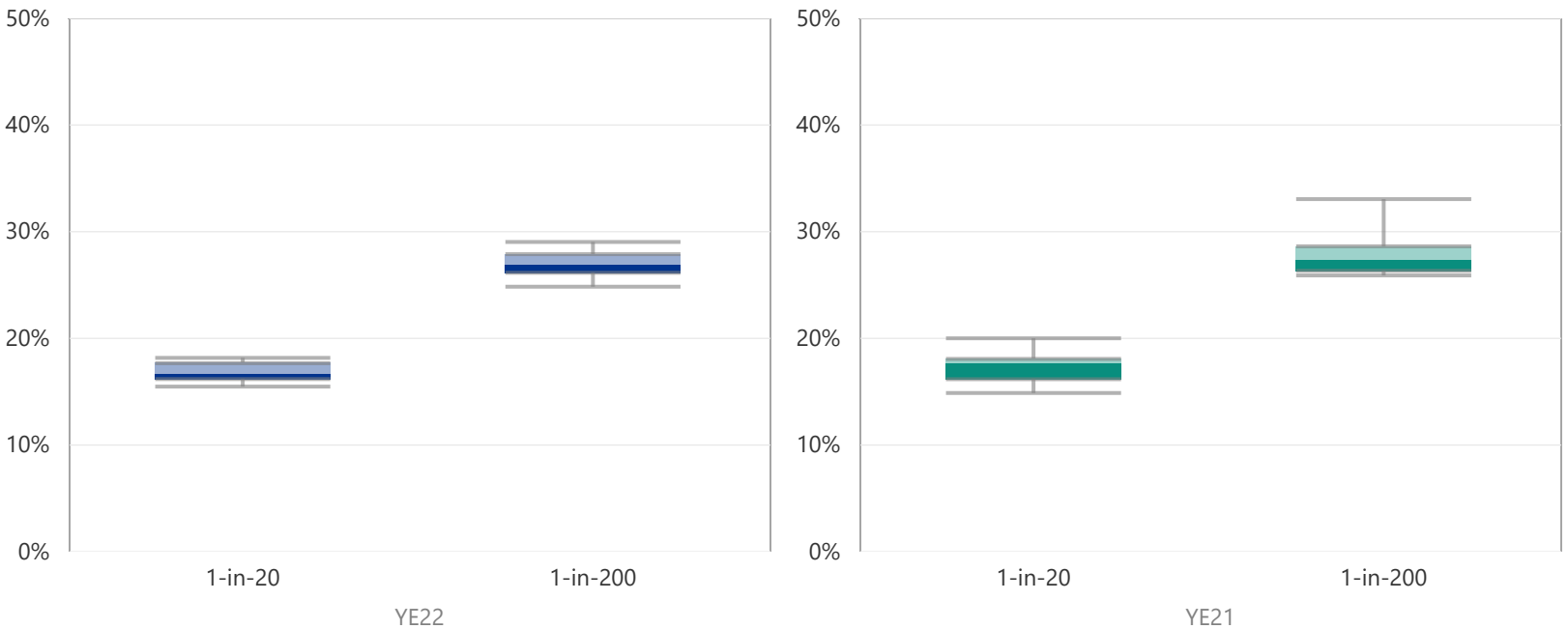| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Currency Risk - Calibrations

The charts below show the magnitude of the 1-in-20 and 1-in-200 down shock for the currency stresses. Most firms' stresses are largely unchanged compared to YE21. However, one firm has materially weakened and two have materially strengthened their stresses at YE22 compared to YE21.

3.23a EUR-GBP Currency Stress
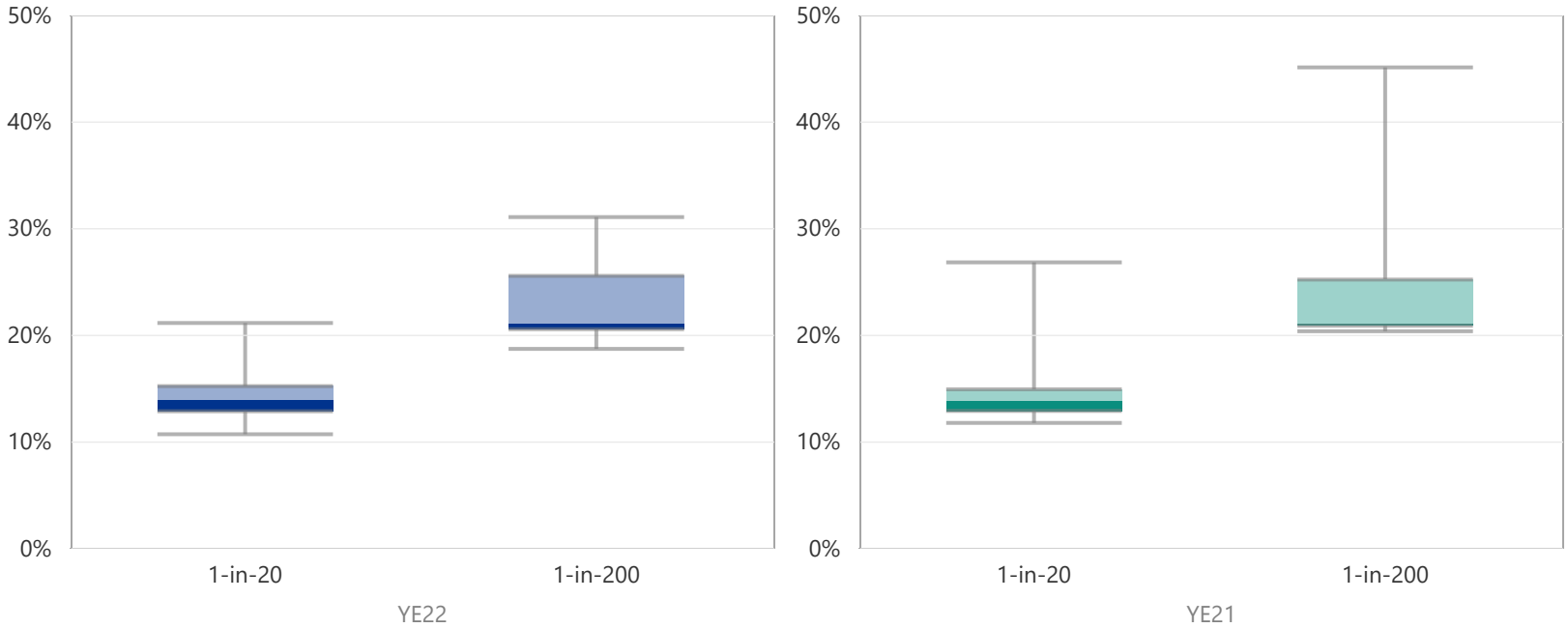
3.23b USD-GBP Currency Stress

Document Classification: KPMG Public

| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Asset-Side Calibration - Credit Stress

The following charts show total credit risk capital expressed as a spread widening under a 1-in-200 stress. We have not observed significant movements in calibrations compared to last year. Most of the change in the medians shown below is due to sampling.

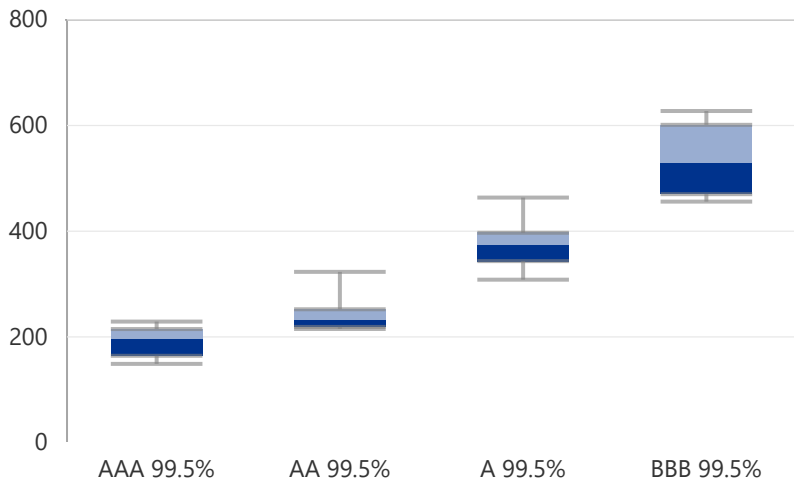**4.1a** Change in Total Corporate Bond Spreads - Financials 10 years (YE22, bps)
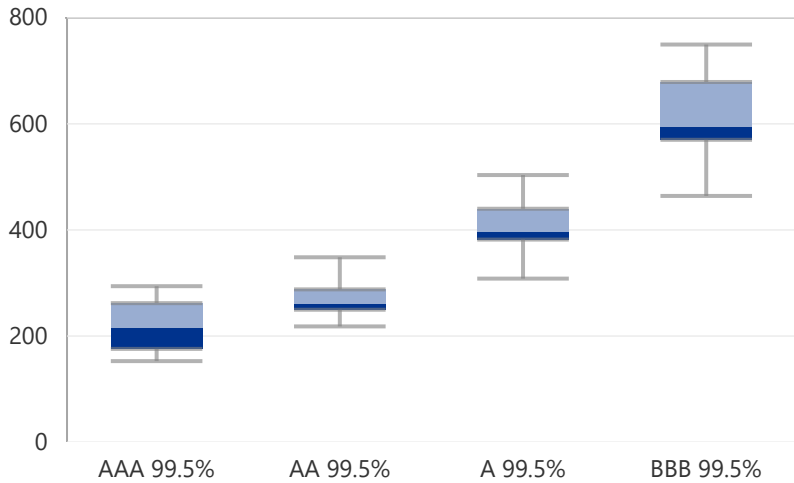
Market Median	AAA 99.5%	AA 99.5%	A 99.5%	BBB 99.5%
YE22	216	261	397	595
YE21	242	279	404	584

4.1b Change in Total Corporate Bond Spreads - Non-Financials 10 years (YE22, bps)
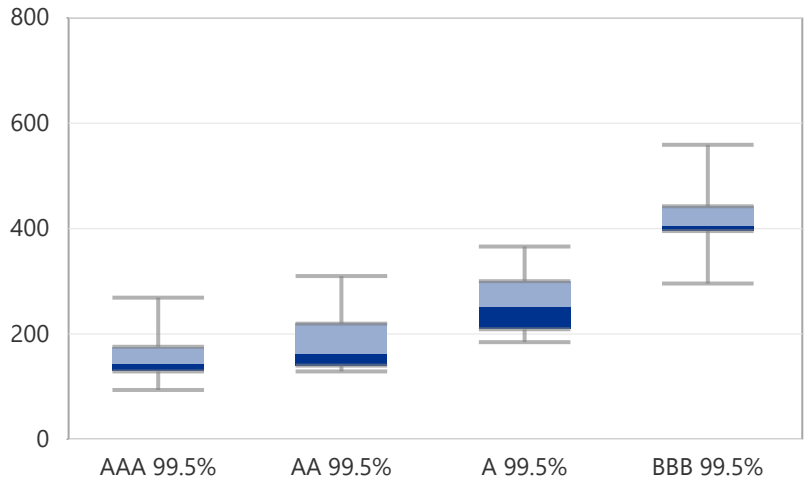
Market Median	AAA 99.5%	AA 99.5%	A 99.5%	BBB 99.5%
YE22	144	162	252	406
YE21	153	179	257	406

4.1c Change in Total Corporate Bond Spreads - Financials 15 years (YE22, bps)

Market Median	AAA 99.5%	AA 99.5%	A 99.5%	BBB 99.5%
YE22	197	233	374	530
YE21	213	235	349	510

4.1d Change in Total Corporate Bond Spreads - Non-Financials 15 years (YE22, bps)
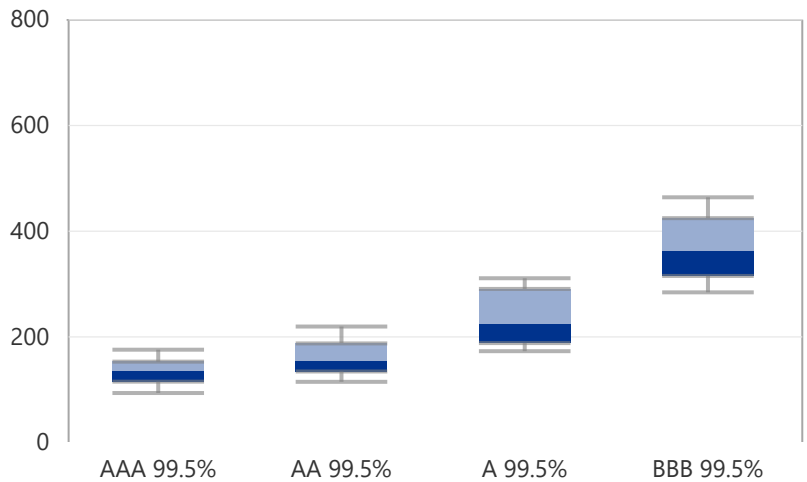
Market Median	AAA 99.5%	AA 99.5%	A 99.5%	BBB 99.5%
YE22	135	154	225	362
YE21	143	162	232	358

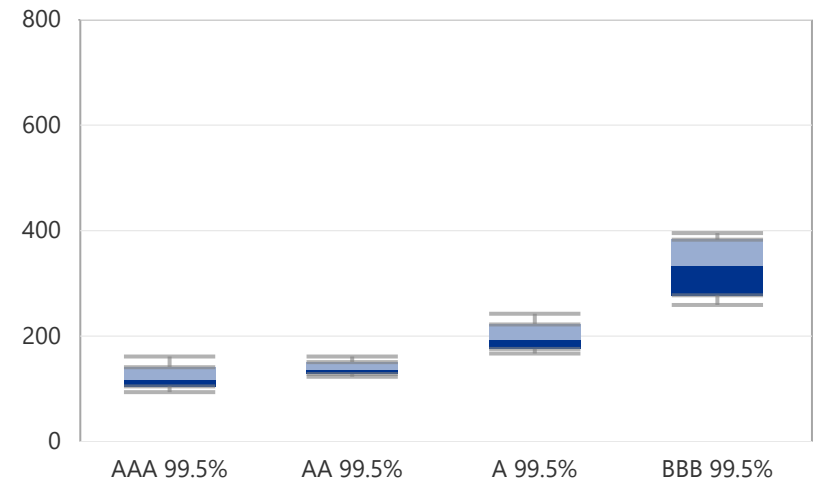| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Asset-Side Calibration - Credit Stress

The following charts show total credit risk capital expressed as a spread widening under a 1-in-200 stress. The range of responses for Commercial Real Estate Lending (CREL) is fairly large as one firm maps its calibration for Financials onto CREL, and one firm maps its calibration for Non-Financials onto CREL. There appears to be some increase in the spread widening for CREL across all ratings and both durations, although this is likely to be due to a refinement rather than a recalibration given the movements are fairly modest.

4.2a Change in Total Credit Spreads - Commercial Real Estate Lending 10 years (YE22, bps)
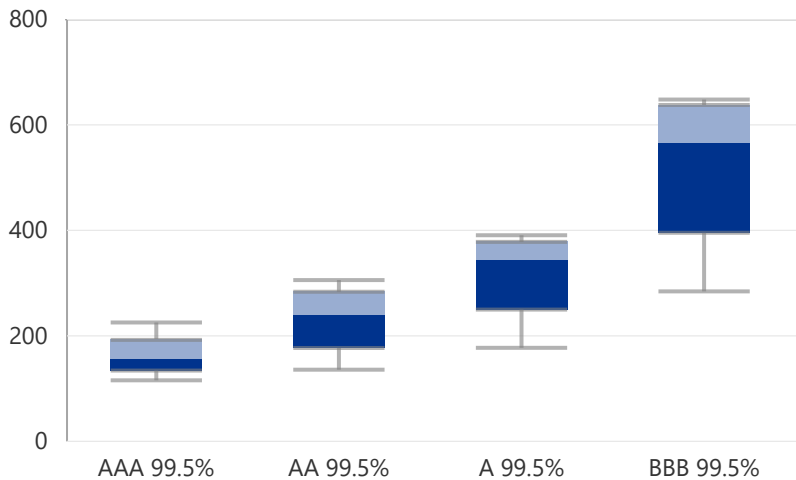

Market Median ▼	AAA 99.5%	AA 99.5%	A 99.5%	BBB 99.5%
YE22	160	251	377	623
YE21	154	237	346	569
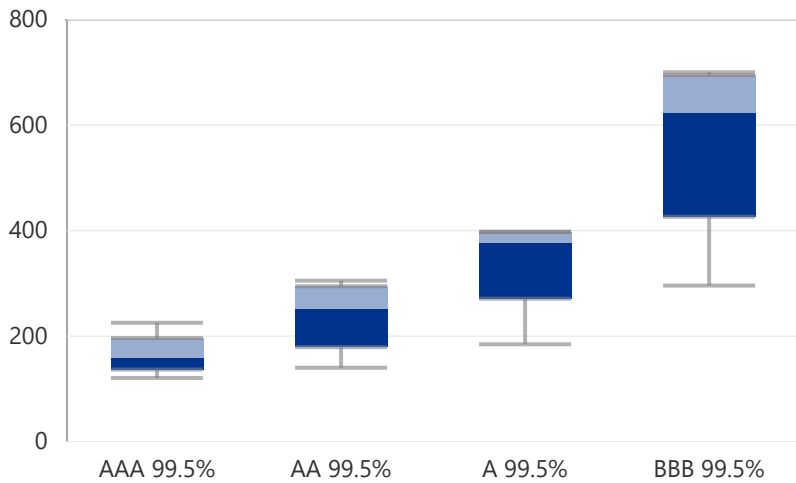
4.2b Change in Total Credit Spreads - Infrastructure Lending 10 years (YE22, bps)

Market Median ▼	AAA 99.5%	AA 99.5%	A 99.5%	BBB 99.5%
YE22	118	137	193	333
YE21	106	142	204	343

4.2c Change in Total Credit Spreads - Commercial Real Estate Lending 15 years (YE22, bps)

Market Median ▼	AAA 99.5%	AA 99.5%	A 99.5%	BBB 99.5%
YE22	156	240	344	567
YE21	150	225	326	515

4.2d Change in Total Credit Spreads - Infrastructure Lending 15 years (YE22, bps)

Market Median ▼	AAA 99.5%	AA 99.5%	A 99.5%	BBB 99.5%
YE22	109	135	188	314
YE21	107	127	193	317

Document Classification: KPMG Public

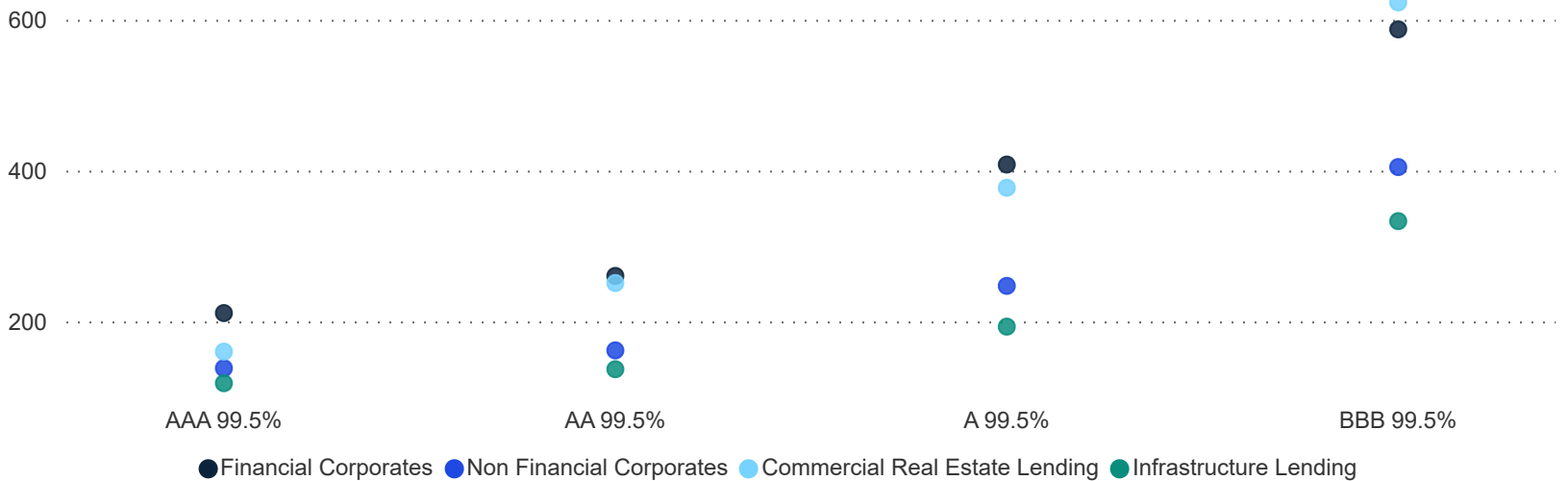| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

## Asset-Side Calibration - Credit Stress

The charts below show a comparison of the change in total credit capital spreads for investment grade assets for terms 10 and 15 years, where each dot represents the median response. It should be noted that there are fewer responses to Commercial Real Estate Lending (CREL) and Infrastructure Lending (Infra) compared to Corporate Bonds, although removing any sampling effects does not change the overall message shown below.

Out of the firms who have exposure to CREL and Corporate Bonds, the median change in spreads for Financials is higher than that for CREL at each credit rating. Some firms perform unique calibrations, although one firm maps its calibration for Financials and one firm maps its calibration for Non-Financials onto CREL. Most firms map calibrations for Non-Financials onto Infrastructure Lending. Only one firm uses a bespoke calibration for infrastructure.

4.3a Comparison of median change in total credit capital spreads across different asset classes - 10 years (YE22, bps)

4.3b Comparison of median change in total credit capital spreads across different asset classes - 15 years (YE22, bps)
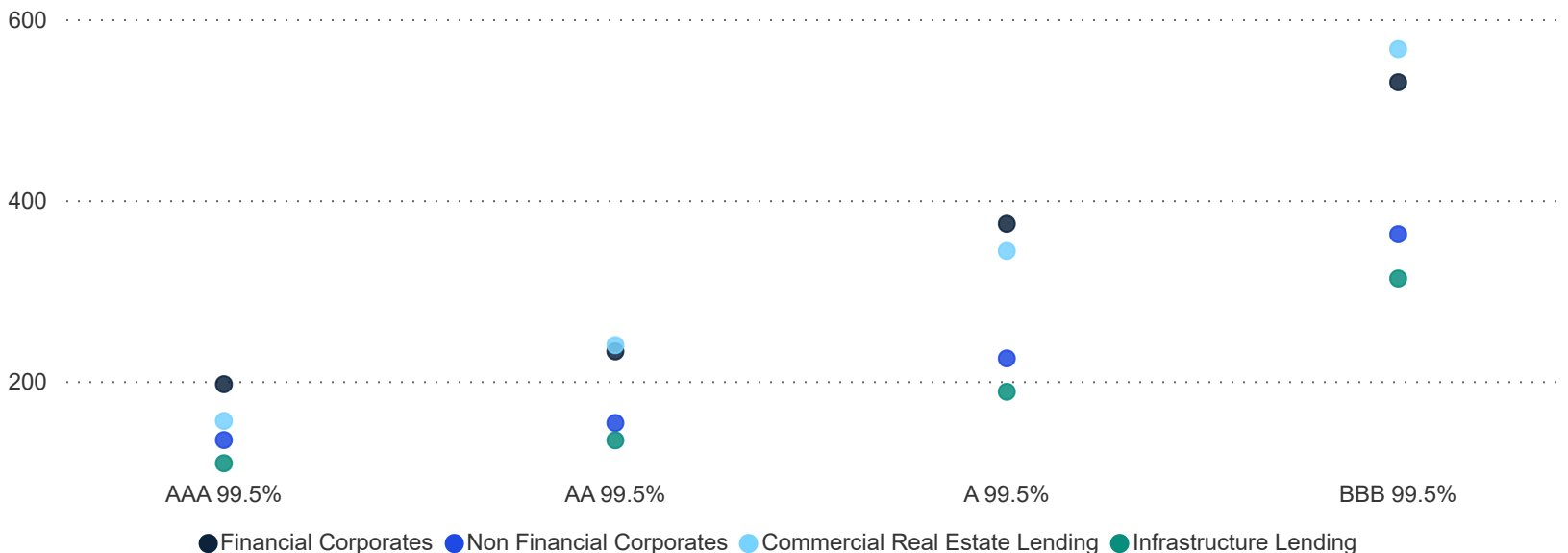
Document Classification: KPMG Public

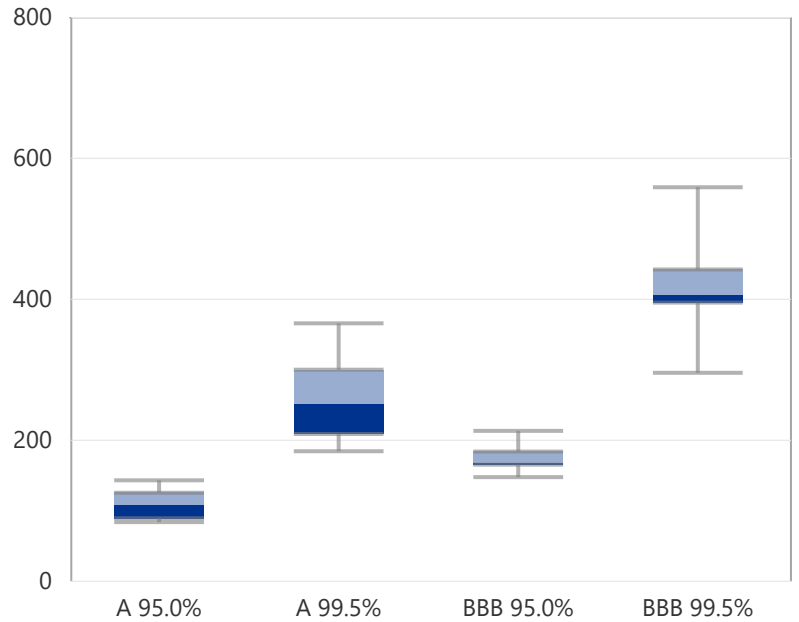| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Asset-Side Calibration - Credit Risk

The following charts show a comparison of total credit capital expressed as a spread widening under a 1-in-200 and a 1-in-20 stress for A and BBB rated bonds.
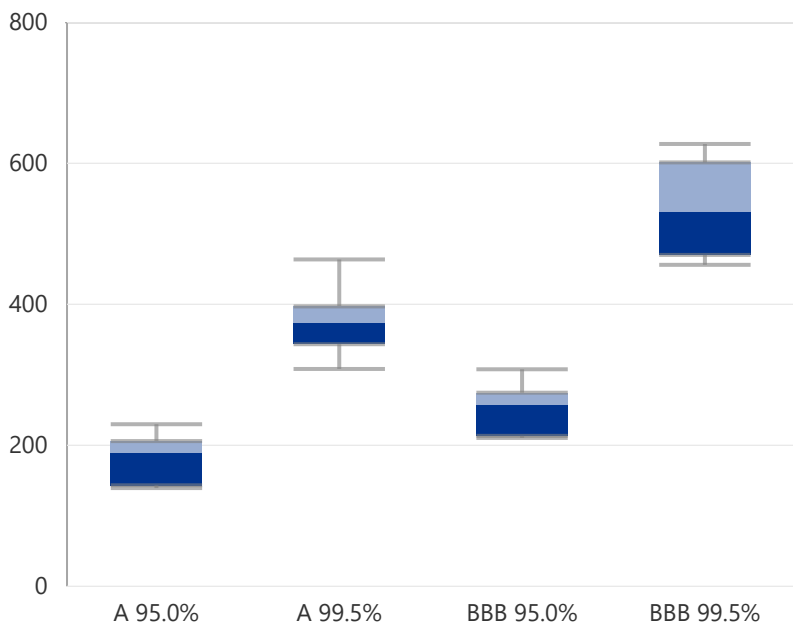
4.4a Change in Total Corporate Bond Spreads - Financials
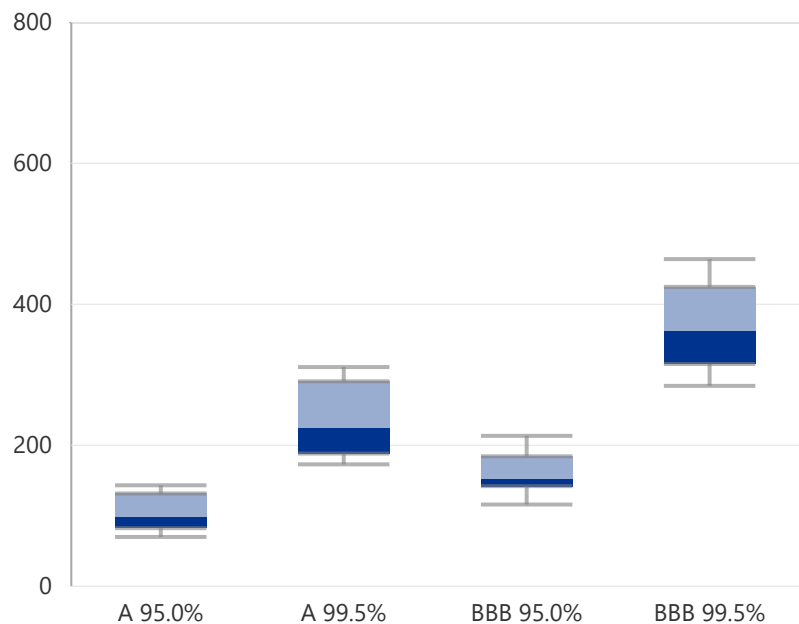10 years (bps)
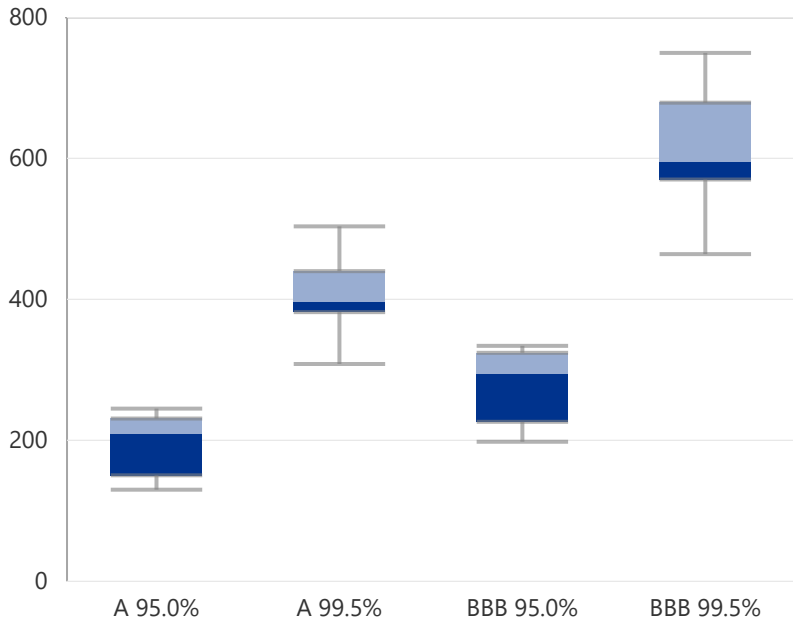
4.4b Change in Total Corporate Bond Spreads - Non Financials
10 years (bps)

4.4c Change in Total Corporate Bond Spreads - Financials
15 years (bps)

4.4d Change in Total Corporate Bond Spreads - Non Financials
15 years (bps)

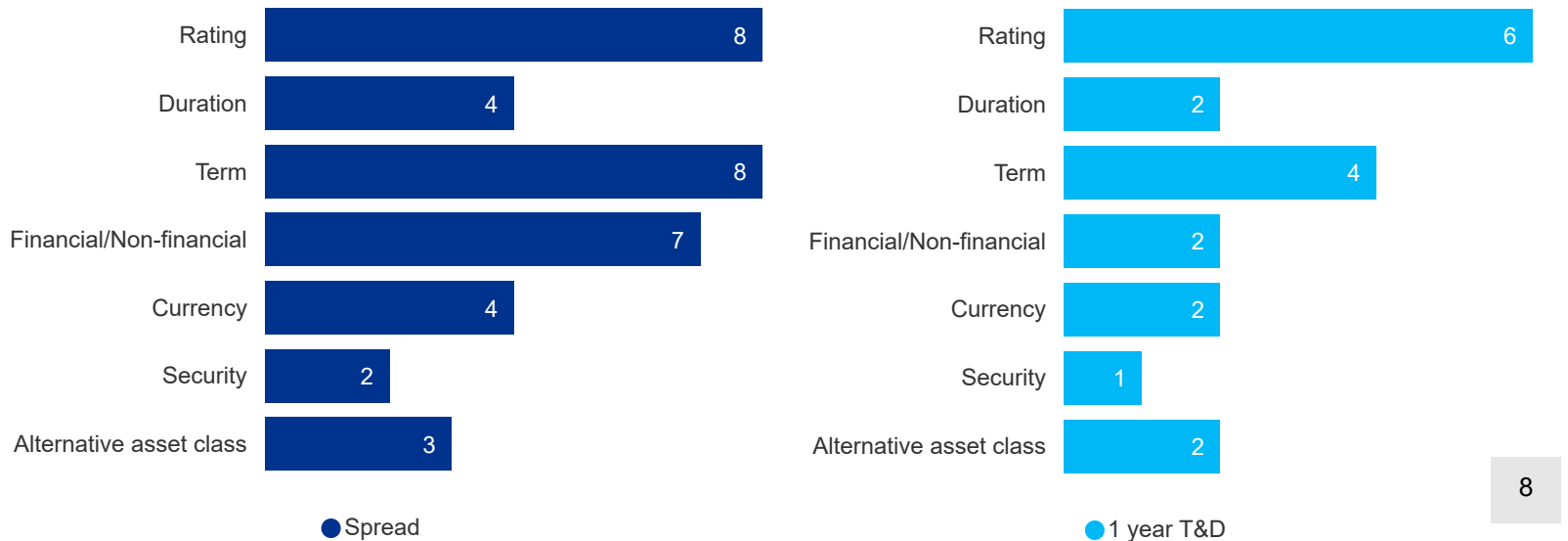| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

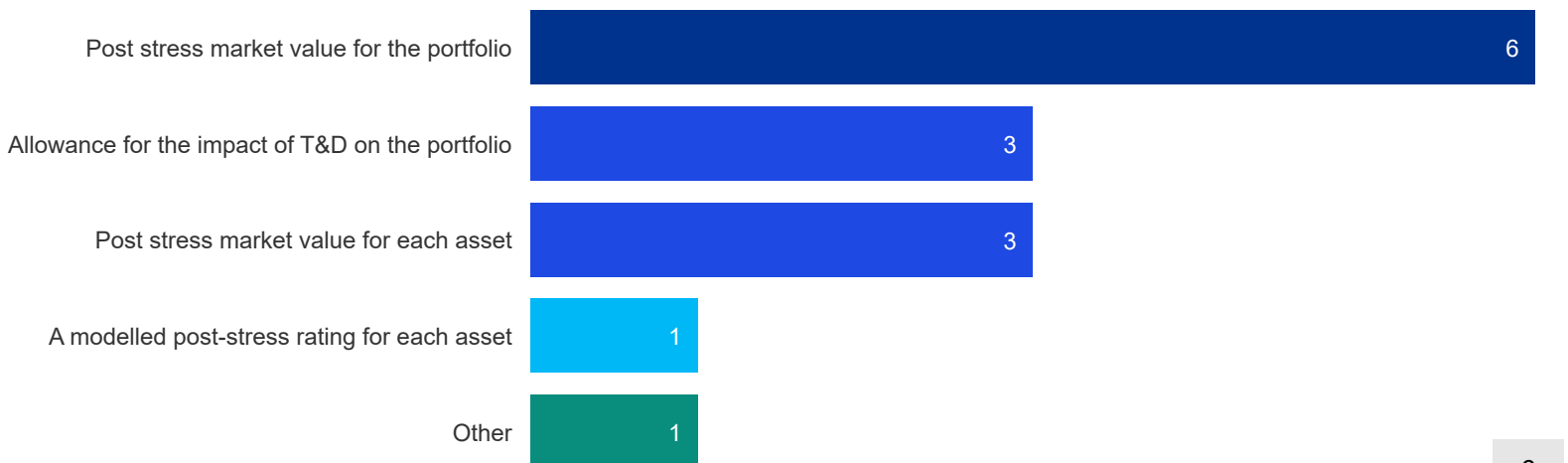## Asset-Side Calibration - Credit Stress

Rating and term continue to be the most influential aspects of a credit holding which impact the credit stress calibration. This year we have extended the breakdown to cover spread, one year transition and default (T&D) and stressed Fundamental Spread (FS). Although the sample of responses to stressed FS was too small to present in a chart, it did show a different set of factors driving the final results between one year T&D and stressed FS, with only one firm having the exact same factors underpinning the model.

Most respondents are able to achieve the post stress market value for the portfolio for the largest asset class when modelling assets in each simulation. To understand the scope of credit modelling we also asked whether this level of information was achieved for a single asset class (e.g. corporates) or on a wider set of classes. Most respondents were able to achieve this level of output on multiple asset classes including CREL, Infra, LTM and Social housing showing that where credit models have been developed they are applied widely across asset types.

4.5 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 resulting credit calibration?

Rating: 8
Duration: 4
Term: 8
Financial/Non-financial: 7
Currency: 4
Security: 2
Alternative asset class: 3

● Spread

Rating: 6
Duration: 2
Term: 4
Financial/Non-financial: 2
Currency: 2
Security: 1
Alternative asset class: 2

● 1 year T&D

8

4.6 What level of information do you achieve on your largest asset class in your modelling of assets in each simulation?

Post stress market value for the portfolio: 6
Allowance for the impact of T&D on the portfolio: 3
Post stress market value for each asset: 3
A modelled post-stress rating for each asset: 1
Other: 1

6

Document Classification: KPMG Public

1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Asset-Side Calibration - Credit Risk Drivers

All companies use risk drivers specific to most, if not all, credit components. However two companies use another modelled driver for some credit components. Most companies are able to allow for all drivers used in the calibration within the proxy modelling performed. Only one respondent had to use a simplified set of drivers for its proxy model.

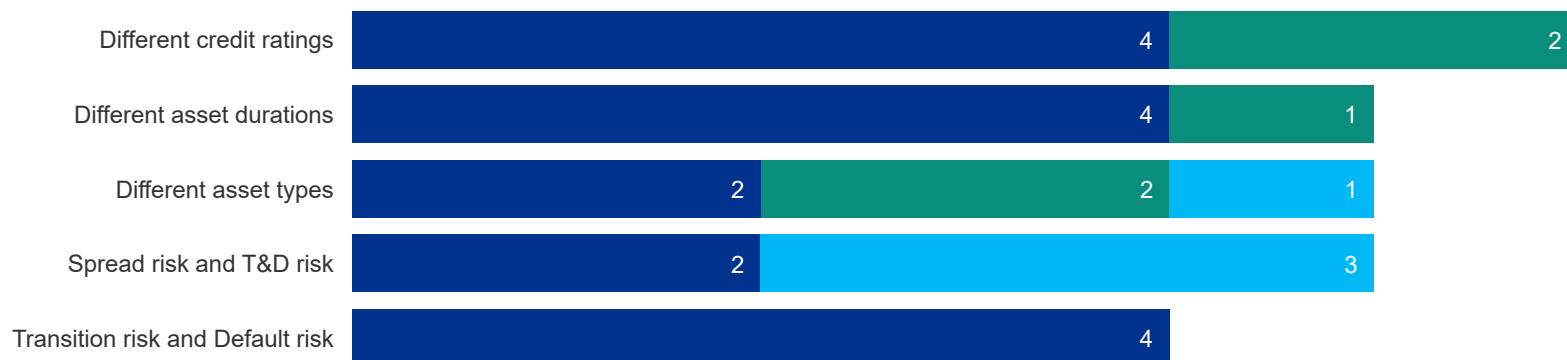**4.7** What specific credit components have a risk driver in your calibration?

	1	2	3	4	5	6	7
Net credit risk			✓				
Gross credit risk			✓		✓	✓	
Spread risk	✓	✓	✓	✓	✓		✓
T&D risk	✓		✓		✓		✓
Transition risk		✓	✓				✓
Default risk		✓	✓			✓	
Fundamental spread				✓	✓		✓
MA offset	✓		✓				
Other		✓	✓				
Common to all in scope asset classes?	Y	Y	N	Y	Y	Y	Y

Other credit components that have a risk driver include: Company 2 - Gilt-swap spreads, Company 3 - Property level, Property volatility, net rental income, cost of liquidity, cost of capital (applicable to CREL).

4.8 What diversification do you allow for in calculating the credit spreads SCR?

For the purpose of this question we consider:
- Perfect correlation: +/-100%
- Strong correlation: absolute value of correlation is greater than 70%
- Medium correlation: absolute value of correlation between 30 and 70%
- Weak correlations: absolute value of correlation is less than 30%.

	Perfect	Strong	Medium
Different credit ratings	4	2	
Different asset durations	4	1	
Different asset types	2	2	1
Spread risk and T&D risk	2		3
Transition risk and Default risk	4		

● Perfect ● Strong ● Medium

6

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Technical Practices Survey 2023
4. Credit Risk

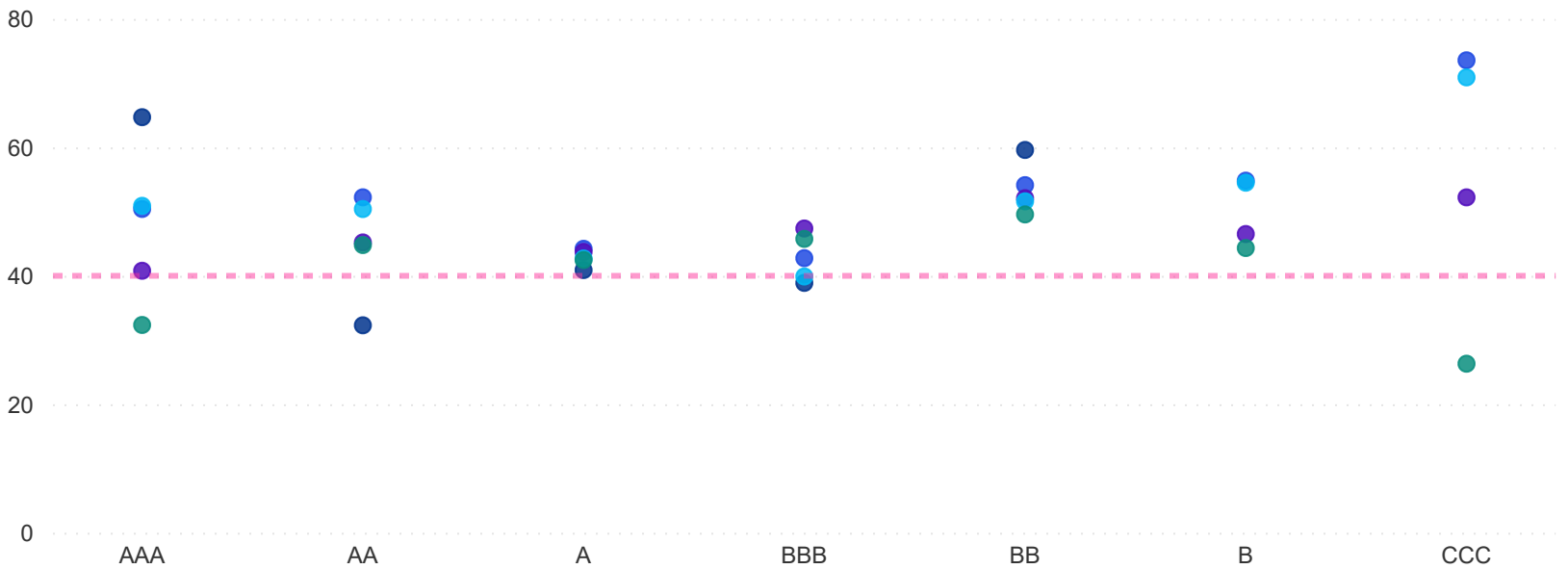| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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IM

Asset-Side Calibration - Transition and Default Stress

The charts below show each respondent's 1-in-200 probability of downgrade and default by credit rating for both Financials and Non Financials, which can be compared against a 40% rate of transition and default which is shown by the red dotted line below. This is broadly comparable to the most severe historic events that insurers consider in their assessment. Each dot colour in the chart below represents the response of a particular firm.

Two out of the five firms that responded differentiate their transition probabilities between Financial and Non-Financial Corporate Bonds. Most portfolios have significant proportions of A and BBB ratings, therefore any comparison to an industry standard will be heavily dependent on these points. It is therefore understandable that we see a trend towards the given benchmark for these calibrations.

4.9a 1-in-200 probability of downgrade and default for Financial Corporates (%)

4.9b 1-in-200 probability of downgrade and default for Non-Financial Corporates (%)
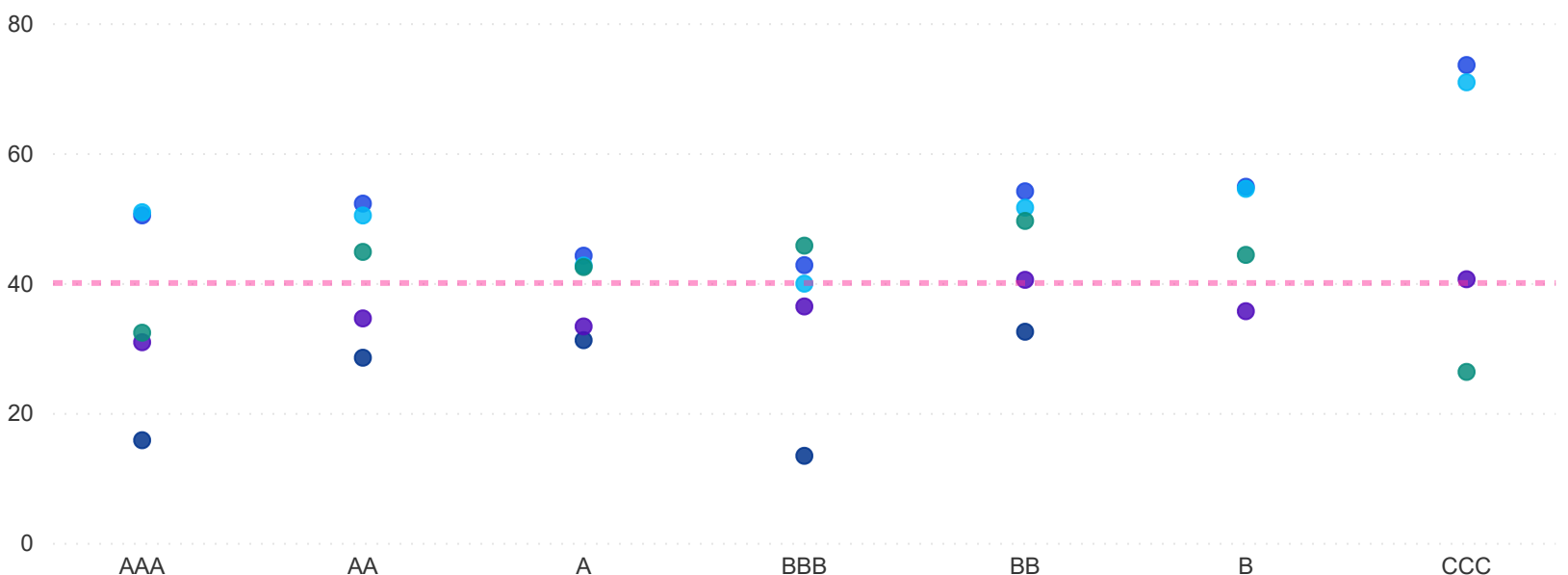
1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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IM

## Liability Side Credit Risk - Fundamental Spreads under stress

We were interested in the way that respondents modelled the stressed FS and the charts below set out information about some key methodology points. Given the complexity of modelling the stressed FS we know that not all firms are able to perform an accurate calculation across the entire distribution. Therefore, we also asked how for many percentile points on the loss distribution an accurate calibration of the stressed FS is performed. We had a mixed response with some companies only fitting to a few key points but others fitting across the entire distribution.

4.10 Which of the following most closely explains your overall philosophy to the Stressed Fundamental Spread?
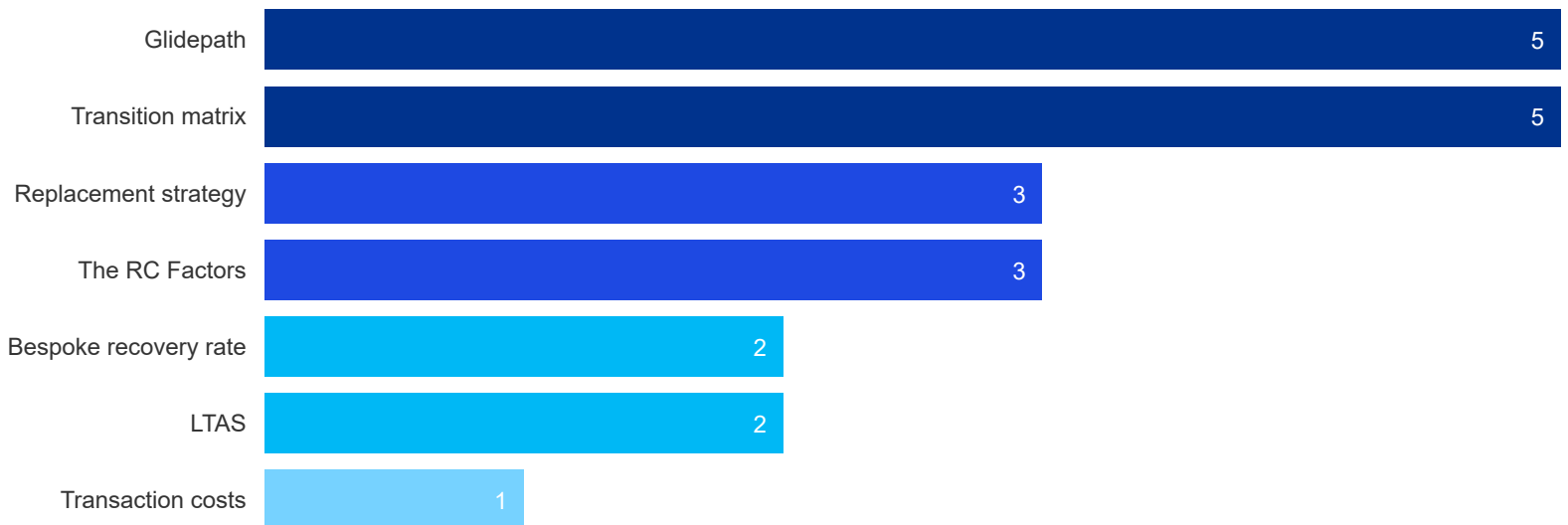
4.11 Is your modelling of the Fundamental Spread based on a multi-year version of your one-year T&D approach performed with the same level of sophistication?
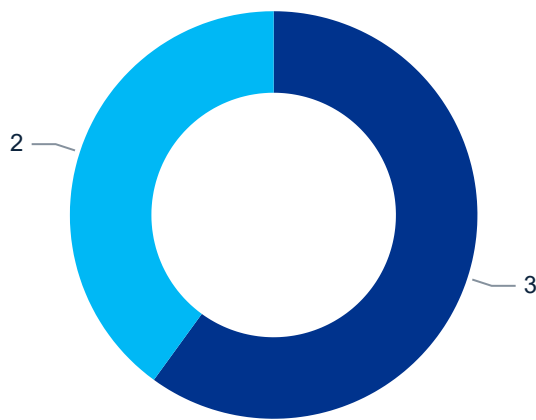
● Economic view transitioning to EIOPA view ● EIOPA view
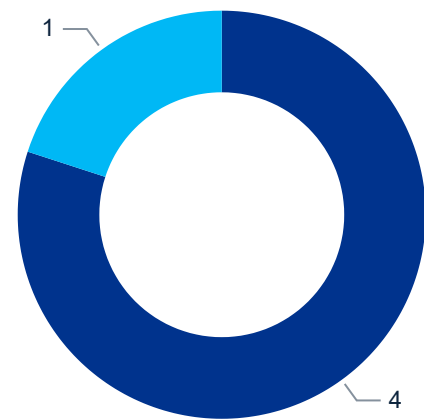
● Yes ● No

4.12 Compared to the EIOPA methodology what changes are made in your internal methodology for the stressed FS?

Glidepath	5
Transition matrix	5
Replacement strategy	3
The RC Factors	3
Bespoke recovery rate	2
LTAS	2
Transaction costs	1

5

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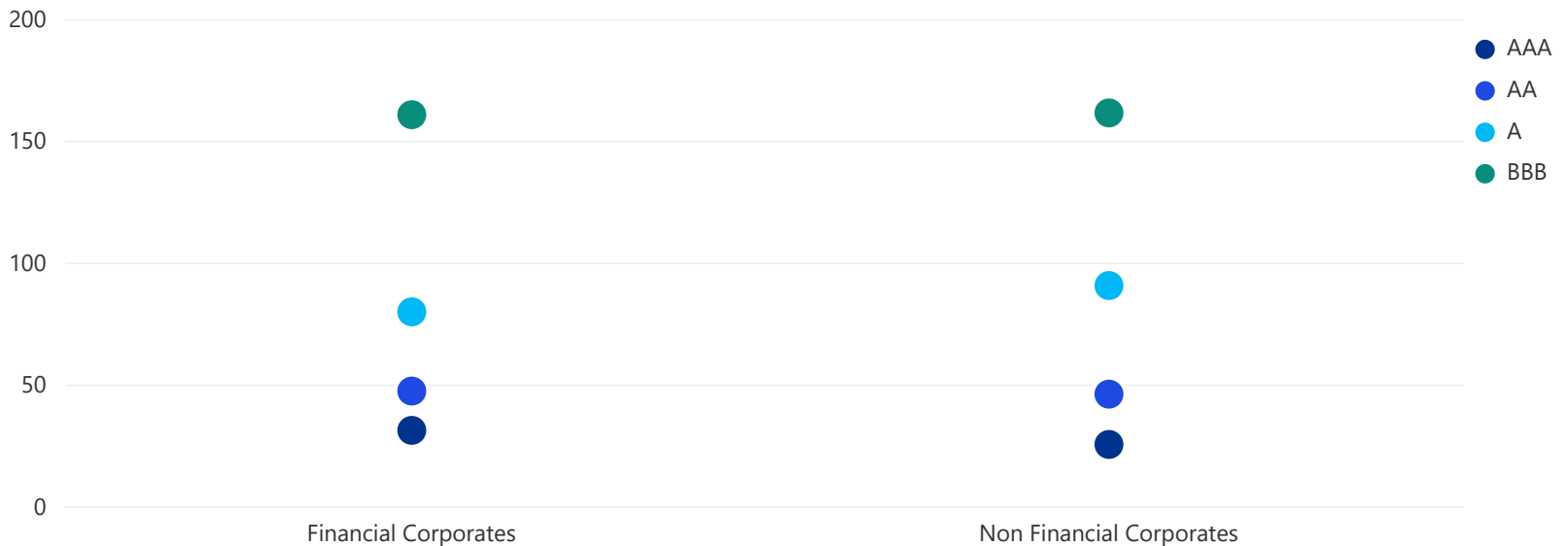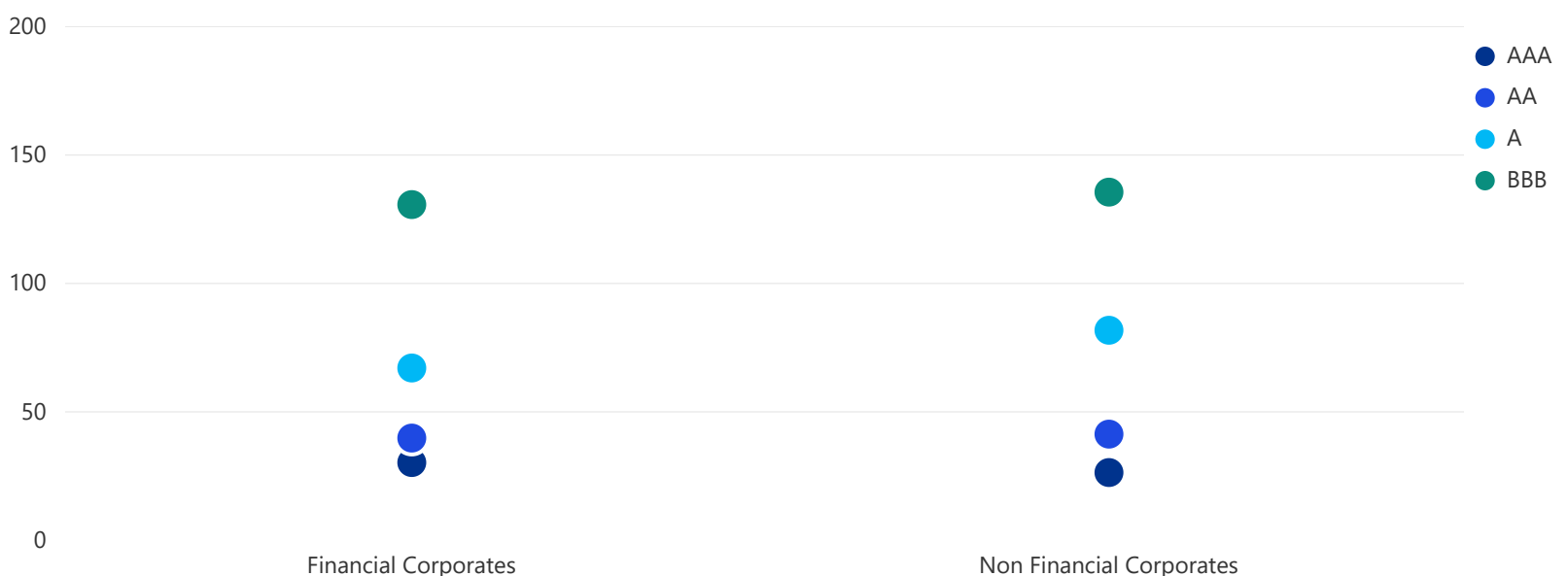| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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IM

Liability Side Credit Risk - Calibration

The following charts show the change in Fundamental Spreads (FS) prior to rebalancing, under a 1-in-200 stress for Financial and Non-Financial Corporates. We have observed a wide range of responses due to firms using different methodologies and assumptions. However, each of the models used have been approved and therefore produce outputs that meet an accepted standard. As set out in chart 4.10, there are different philosophical approaches to the Stressed FS. The 35% Long Term Average Spread (LTAS) floor is applied when calculating the stress, which results in a wide range of outcomes that contribute to the average set out below.

We also asked firms to detail their average assumed 1-in-200 recovery rate, and the most common approach is to use a rate of 30%. However there is some variation, for example for 1 year cost of default one firm assumes a 1-in-200 recovery rate of 20%. All firms use the same recovery rate for Financial and Non-Financial Corporates, whereas for some other asset classes there are a range of recovery rates used.

4.13a Average change in Fundamental Spreads prior to rebalancing, 1-in-200 stress for 10 years (GBP) (bps)

4.13b Average change in Fundamental Spreads prior to rebalancing, 1-in-200 stress for 15 years (GBP) (bps)

Document Classification: KPMG Public

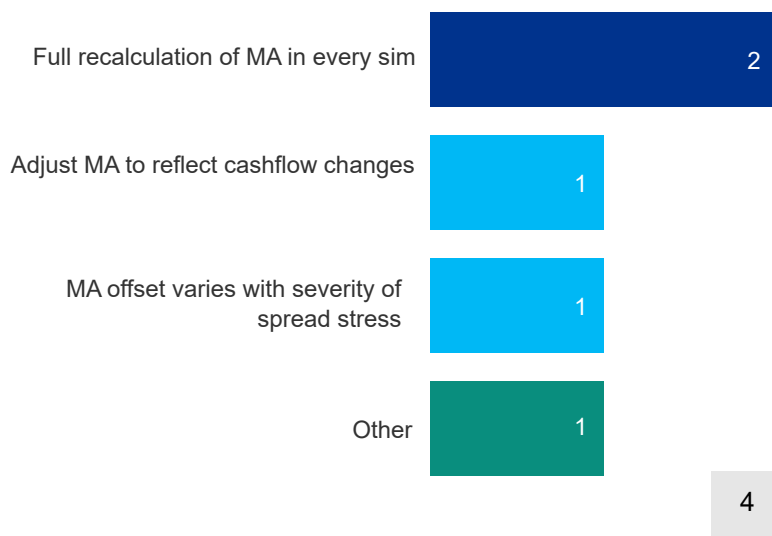| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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IM

Matching Adjustment under Stress

In demonstrating compliance with the Matching Adjustment under Stress (MAuS) regulations, all firms allow for transfer of assets between the non-MA Portfolio and the MA Portfolio, and changes in liability cashflows. We note that more firms are now allowing for all of the required trading activity within two months.

4.14 In modelling the Matching Adjustment regulations under stress, which of the following do you allow for?


- Changes in liability cashflows — 4 / 6
- Transfer of assets between the non-MAP and the MAP — 4 / 5
- All required trading activity within two months — 3 / 5
- Purchases of corporate bonds at stressed spreads — 3 / 4
- Changes to asset values for non-credit risks — 3 / 3
- Purchases of gilts with zero MA — 2 / 2
- Reallocations between Components A, B and C of the MAP — 1 / 3
- Sale of assets from the MA portfolio — 2 / 2
- Changes in reinsurer credit quality — 1 / 1
- Purchases of illiquid assets at stressed spreads — 1 / 1
- Restructuring of ERM-backed notes held in the MAP — 1

● In each individual simulation ● In the overall calibration

6

4.15 What is your approach to modelling Matching Adjustment under stress in calculating your SCR?

- Full recalculation of MA in every sim — 2
- Adjust MA to reflect cashflow changes — 1
- MA offset varies with severity of spread stress — 1
- Other — 1

4

4.16 When calculating your SCR, how do you validate that the Matching Adjustment under stress passes the PRA tests?

- Off-cycle validation performed — 2
- Tested or proved in a sample of the scenarios used to calculate the SCR — 1
- Tested or proved in every scenarios used to calculate the SCR — 1
- Tested or proved in every scenarios used to calibrate the proxy model — 1
- Other — 1

5

'Other' refers to a full recalculation of all MA components with the MAuS being the same for every simulation.
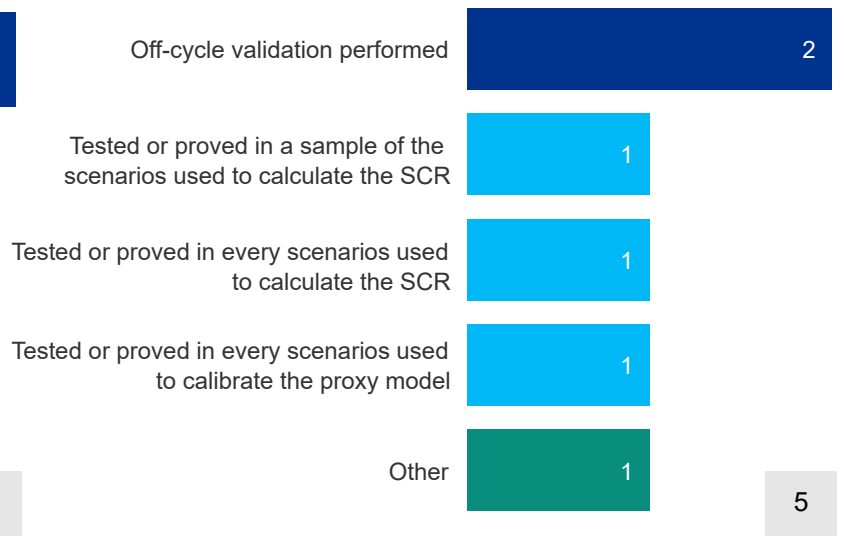
'Other' refers to methodology constructed to ensure that tests are always passed post stress provided they were pass pre-test.

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Technical Practices Survey 2023
4. Credit Risk

| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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IM

Matching Adjustment under Stress

A range of treatments is used in the event of downgrades and defaults within the stressed Matching Adjustment portfolio.

In respect of the treatment of sub-investment grade bonds, the majority of respondents noted they allow for the BBB cliff in the calculation of their MAuS.

4.17 Rebalancing strategy - how are downgrades treated within the stressed Matching Adjustment portfolio?
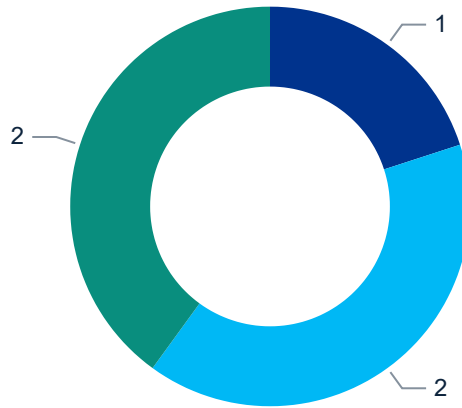
● Replace with assets of higher rating ● No action assumed as using buy-and-hold strategy ● Other

'Other' includes additional capital injected into the MAP to cover the cost of increased FS, and assuming no action for assets that continue to be investment grade but otherwise replacing with assets of the original rating prior to downgrade.

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

Replace Defaulted Bonds	2
Remove defaulted assets from MAP	1
Replace defaulted assets with risk-free assets	1
Stressed LGD assuming fire-sale	1
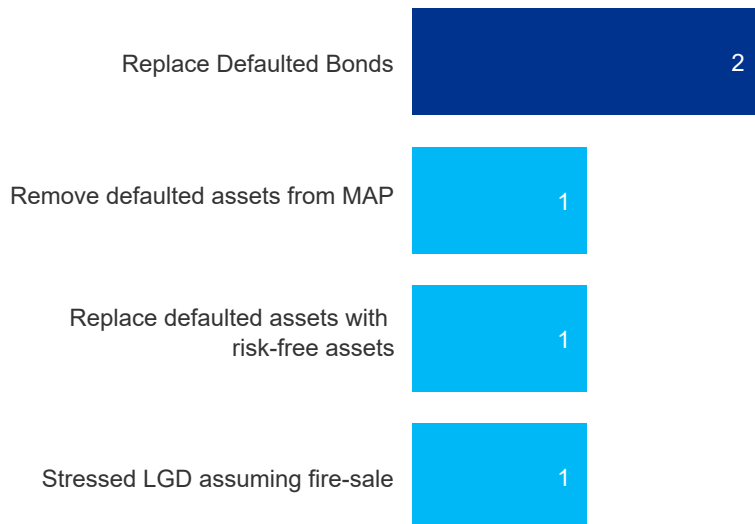
4.19 How do you treat sub-investment grade bonds, i.e. below BBB rating?

Allow for BBB cliff in MAuS	4
Adjust CoD	1
Other	2
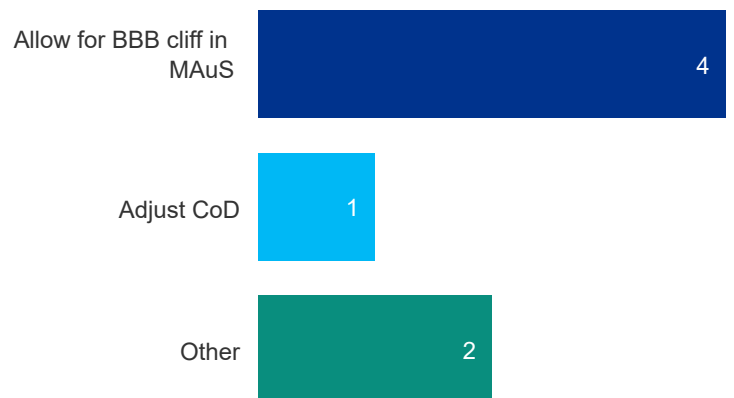
'Other' responses include adjustment to PoD and LTAS, and that bonds are assumed to be replaced with investment grade.

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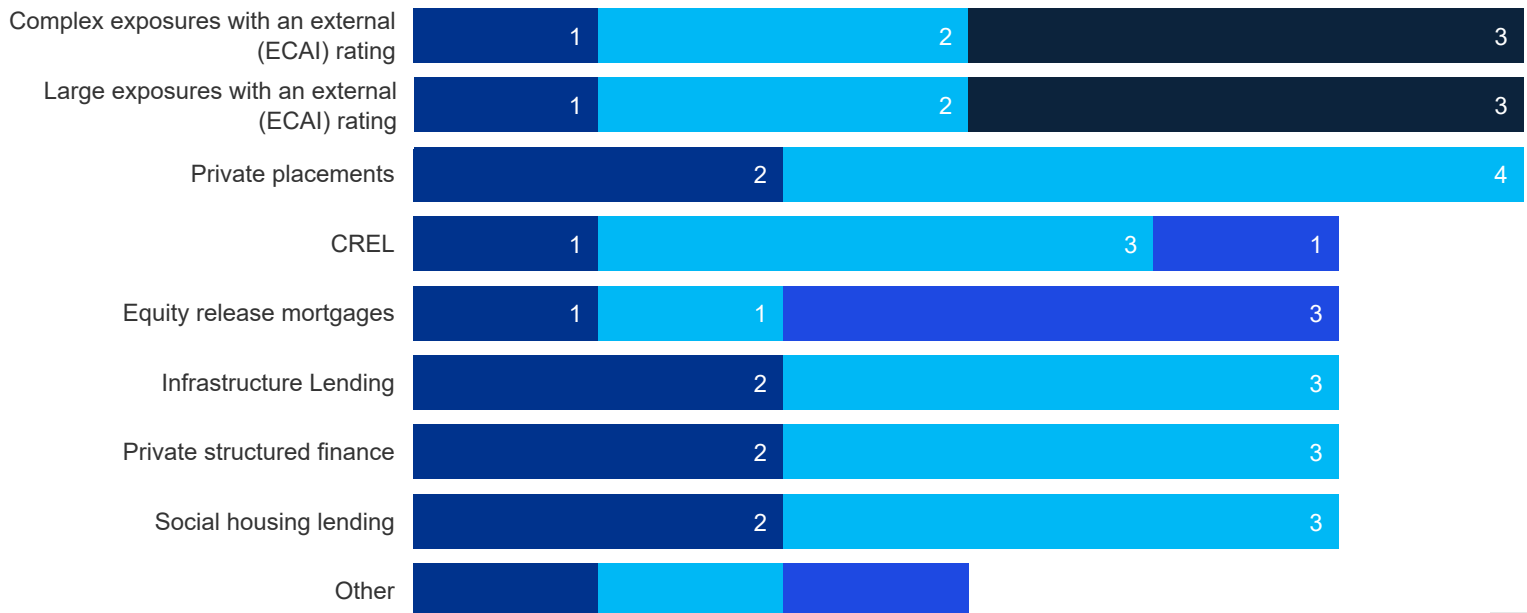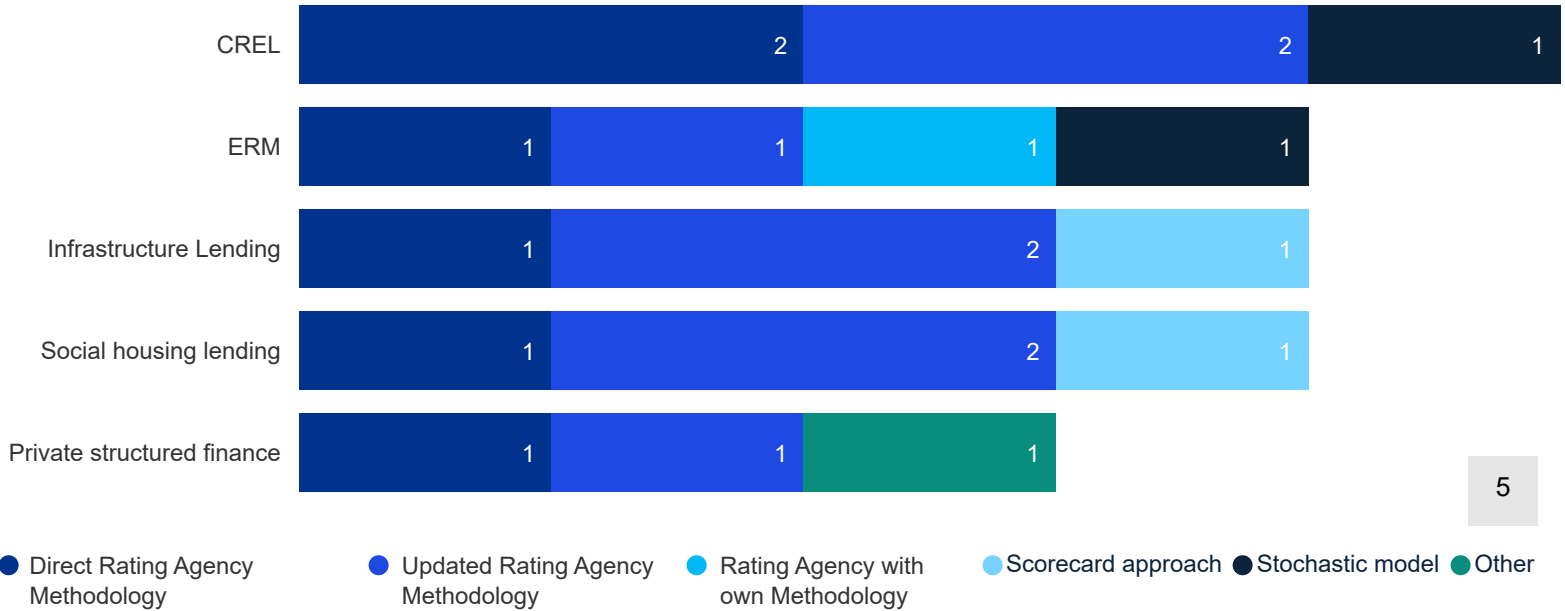| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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IM

Internal Ratings

Almost all Internal Model companies maintain an internal credit rating approach, at least for some asset classes. Although we noted there is also large reliance on external asset managers to provide internal ratings for many asset types.

4.20 Do you have an internal ratings framework?

● Yes ● No
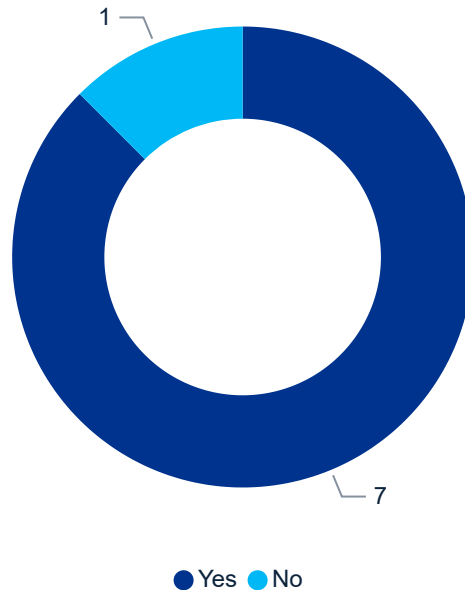
4.21 For which of the following asset types do you use either internal ratings supplied by your asset manager, internal ratings derived in-house, or not use internal ratings?

● An asset manager within the group ● An external asset manager ● Derived in-house ● Internal rating not used

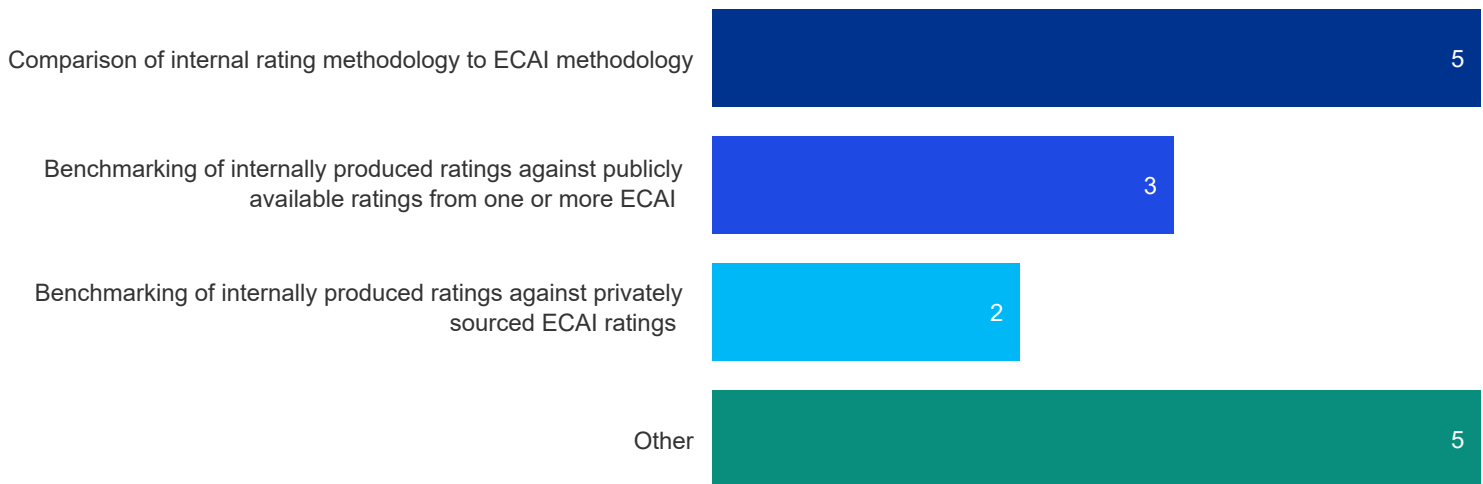| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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IM

Internal Ratings

We noted the majority of respondents rely on a rating agency methodology to rate different asset classes. This is either directly applied or adjusted in some way.

4.22 Which of the following approaches do you use for internal ratings?

- ● Direct Rating Agency Methodology
- ● Updated Rating Agency Methodology
- ● Rating Agency with own Methodology
- ● Scorecard approach
- ● Stochastic model
- ● Other

5

'Other' represents a variety of approaches

4.23 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?

Comparison of internal rating methodology to ECAI methodology	5
Benchmarking of internally produced ratings against publicly available ratings from one or more ECAI	3
Benchmarking of internally produced ratings against privately sourced ECAI ratings	2
Other	5

Multiple 'Other' responses include comparing internal ratings for a sample of assets to their external rating. Other responses include validation of methodology using a variety of techniques, and checking ratings against those from other regulatory regimes.

6

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| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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IM   **Methodology and Approach**

There have been no large changes in how firms are approaching the Matching Adjustment for YE22, but with the UK Solvency II reforms upcoming there will be large changes from HY24. Firms are moving towards the more advanced testing of the PRA Effective Value Tests (EVT) .

Average spread over Solvency II risk-free rate of LTMs has increased from YE21 to YE22, implying an improvement in the profitability of LTMs for some participants.

5.1 Please describe your approach to stressing your LTM's and LTM restructure

5.2 What is your calculation approach for PRA's EVT?
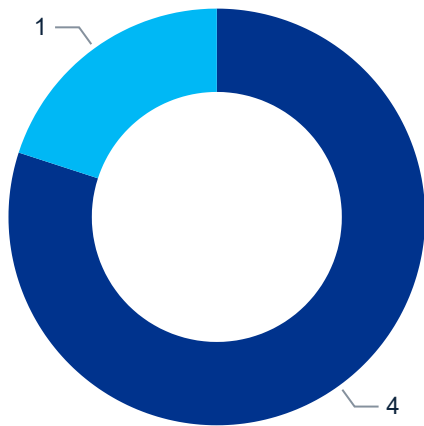
● Look through to underlying assets   ● Treat like an equivalent corporate bond
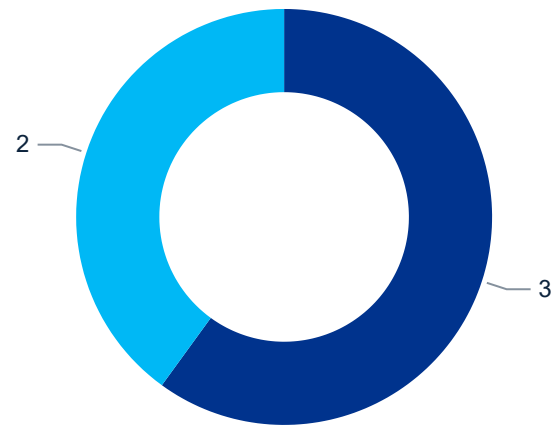
● Tested under all scenarios in the IM   ● Testing a range of scenarios outside the IM

5.3 Average spread over Solvency II risk-free rate by credit rating (bps)
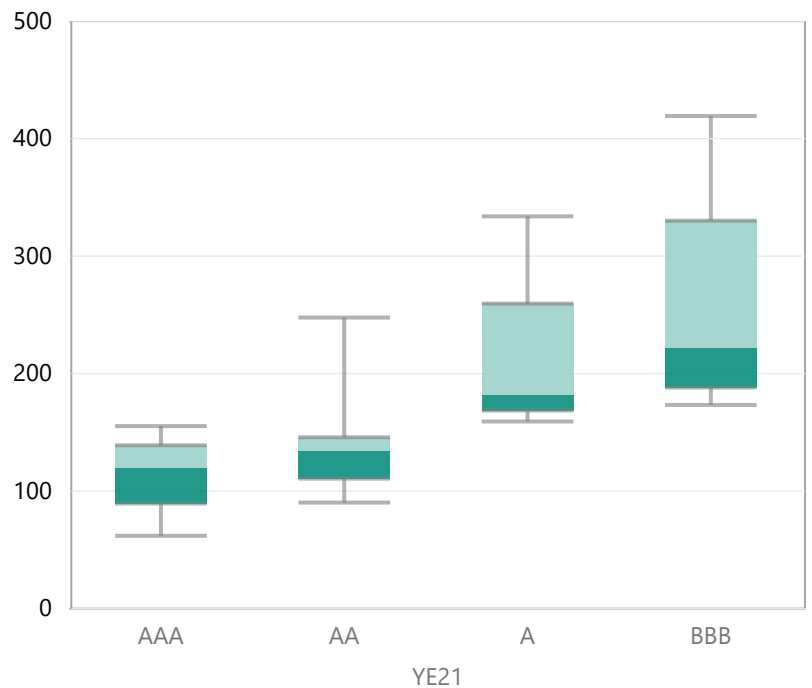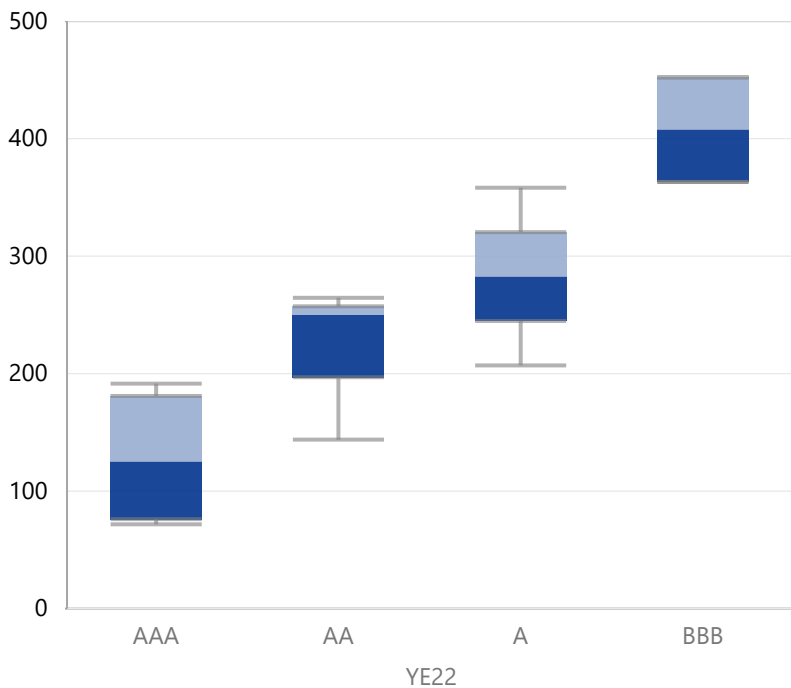
YE22

YE21

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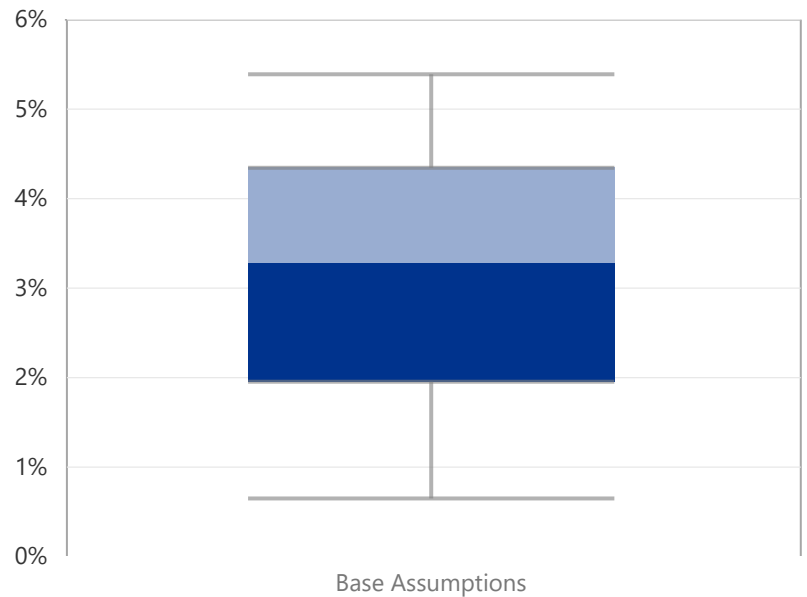| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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IM **Assumption Calibration - HPI Assumptions**

For underlying LTM assumptions the house price growth (HPI, prior to all deductions) assumption is between 3.2% and 4.4% (reducing to between 0.9% and 3.3% under stress). When looking at the assumption, post all adjustments, the range is significantly larger going from 0.7% to 5.4%. The house price volatility assumption is between 12.0% and 13.5% (increasing to between 16.0% and 21.0% under stress).

5.4 House price growth (pre-dilapidation or any other deductions)
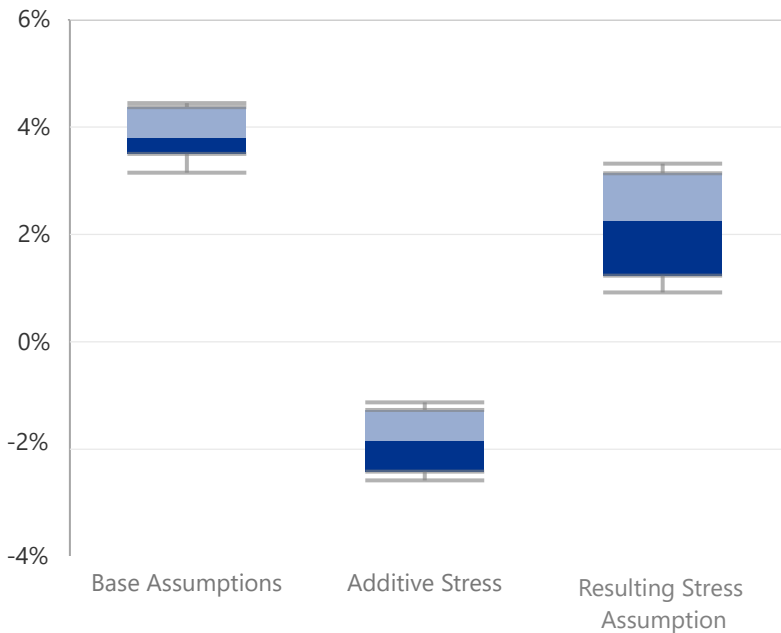
5.5 House price growth (net of all adjustments)

5.6 House price growth volatility
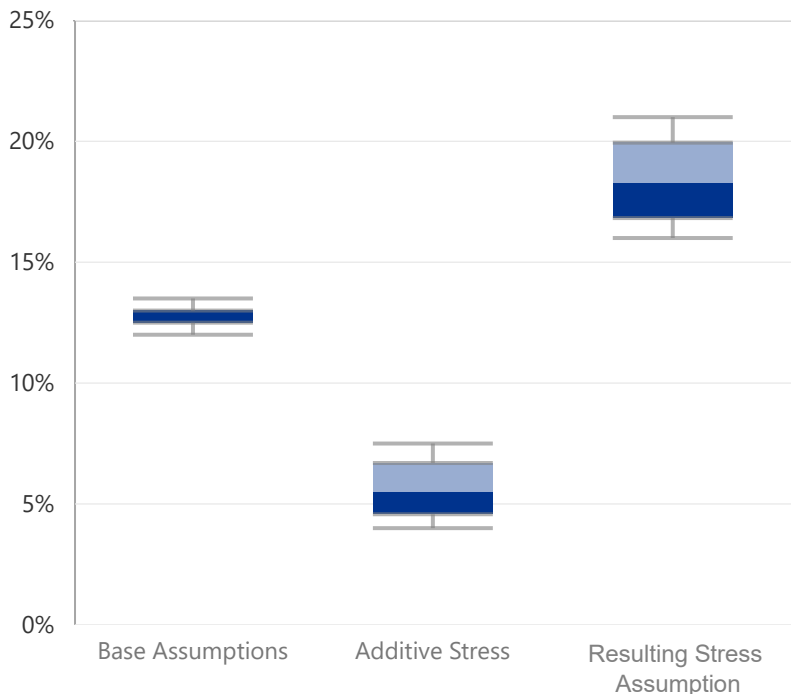
5.7 Deferment rate used in EVT
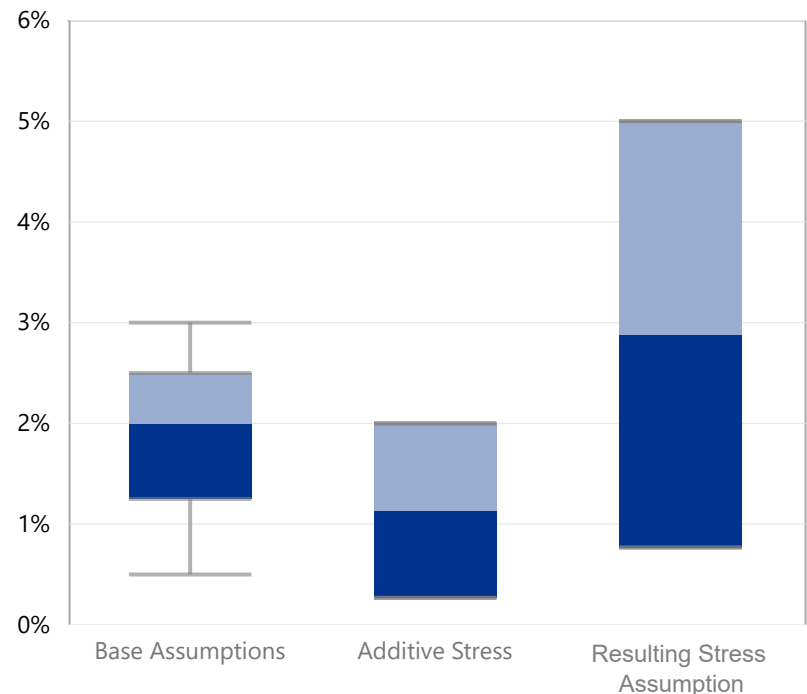
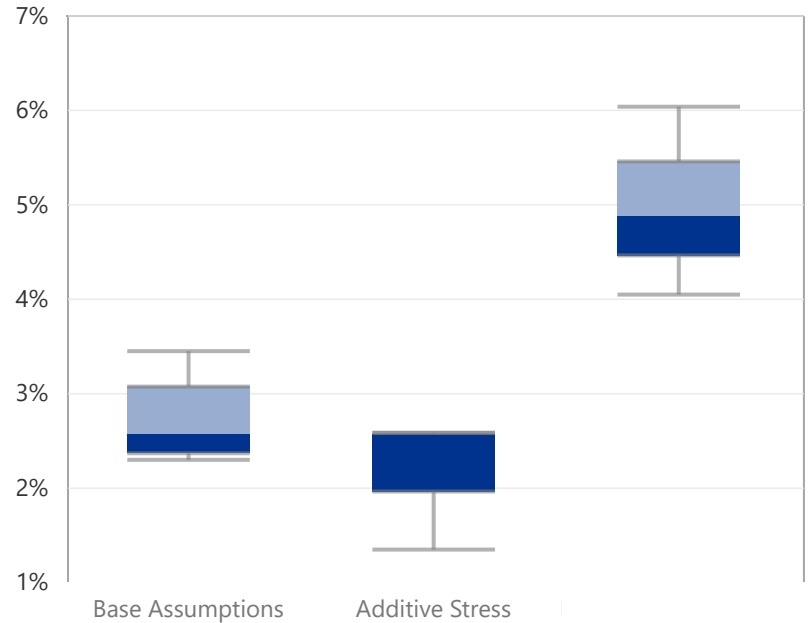| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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IM

Assumption Calibration - Other Assumptions

The average sale cost assumption is normally very static over time, one firm increased their assumption slightly from YE21 to YE22. The base voluntary redemption assumptions are typically reviewed regularly and we see most firms refreshed the assumption, but there was no consistency in the direction of the change.
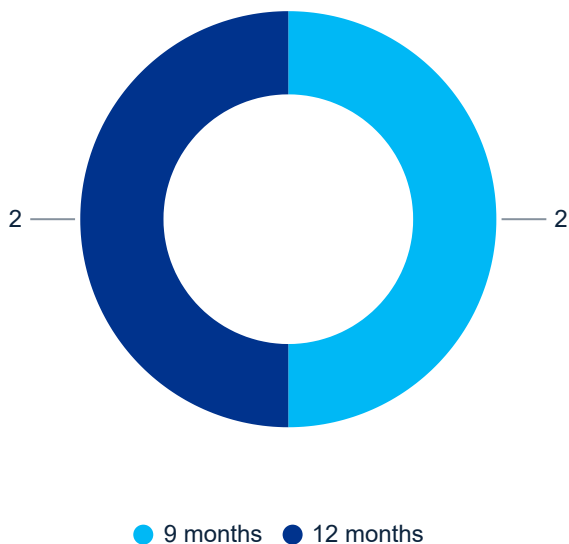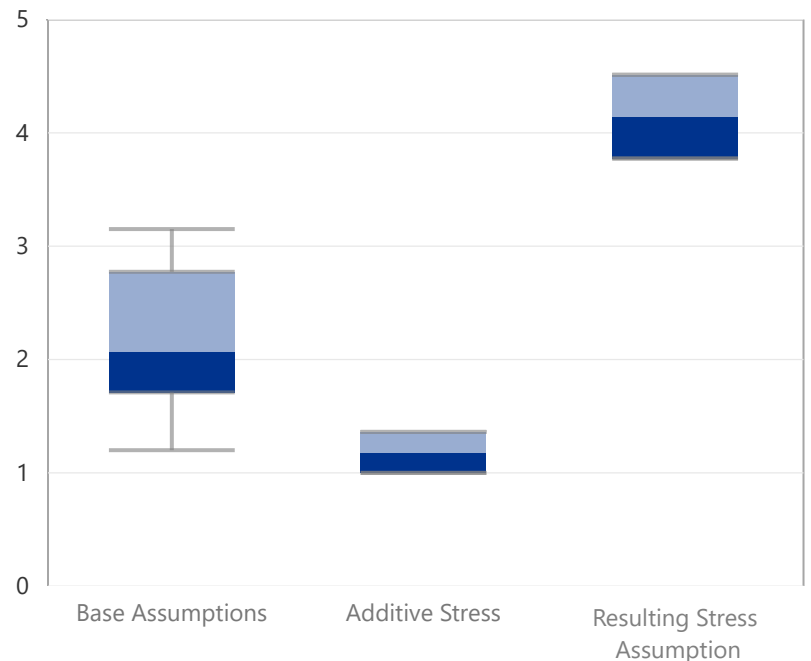
5.8 Average base sale cost
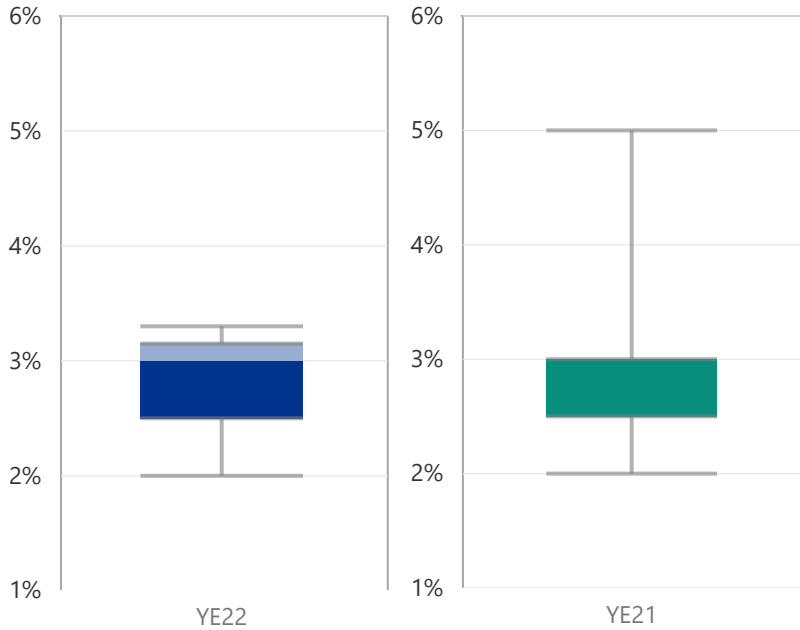
5.9 Average voluntary redemption rates for a single life policy, policy year 10 (per annum)

5.10 What is your property sale delay assumption? (months)

- 9 months
- 12 months

5.11 Average liquidity premium over the Solvency II risk-free rate (bps)

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1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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SF/IM

Annuitant Base Mortality

More than half of the respondents use 08 series and 16 series base mortality tables. A significant proportion of companies also apply adjustments to their base mortality assumptions to reflect risk features relevant to their portfolios, such as lifestyle factors and late life mortality convergence.

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

Legend: ● 00 Series ● 08 series ● 16 Series ● S3 Series ● Other
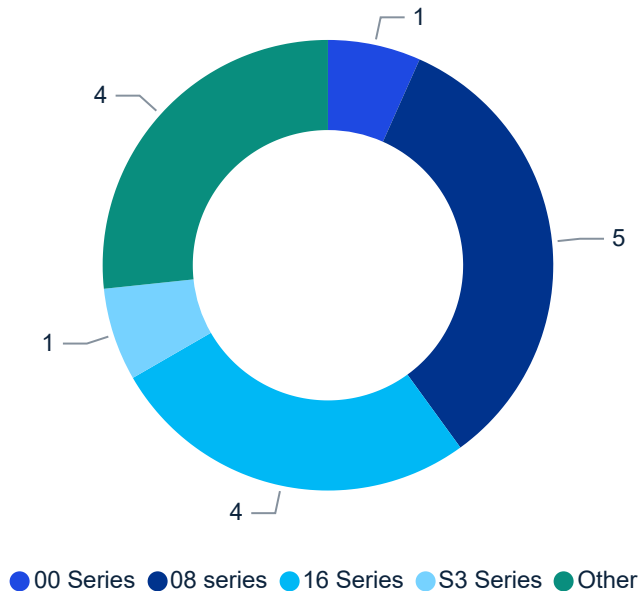
'Other' includes use of the E&W population mortality from CMI_2017 projections model, PCXA00, England and wales and England & Wales population tables.

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

Adjustment	Count
Lifestyle factors	7
Late life mortality convergence	6
Anti-selection	5
No adjustments	5
Health factors	5
Smoker status	3
Other	5

'Other' includes adjustments based on socioeconomic factors, temporary selection loadings, IBNR adjustments, and credibility adjustments.

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1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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**SF/IM**

Longevity - Annuitant Mortality Improvements

Over half of companies plan to adopt the CMI_2022 model for reporting at YE23, with one third planning to use CMI_2021. Only one firm indicated they plan to use CMI_2019. We note that the Core calibration of the CMI 2022 model does not allow for 2020 or 2021 experience, but allows for 25% of 2022 data ,which has reduced longevity mortality improvements. The cohort life expectancies have decreased by c.6 months compared with CMI_2021 (based on LTR = 1.5%). Most respondents use an advanced calibration for the CMI model with the median of the period smoothing parameter (S_k) being 7.

6.3 Which version of the CMI model do you currently use (and plan to use for YE23) for best estimate mortality improvements?
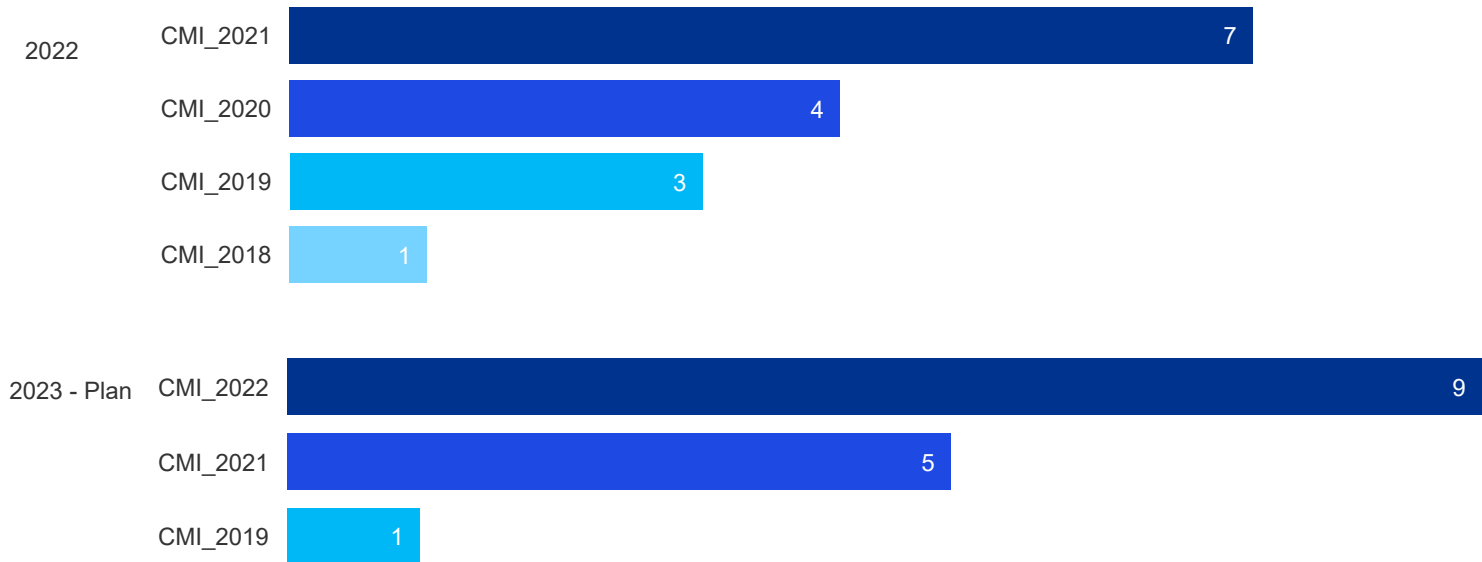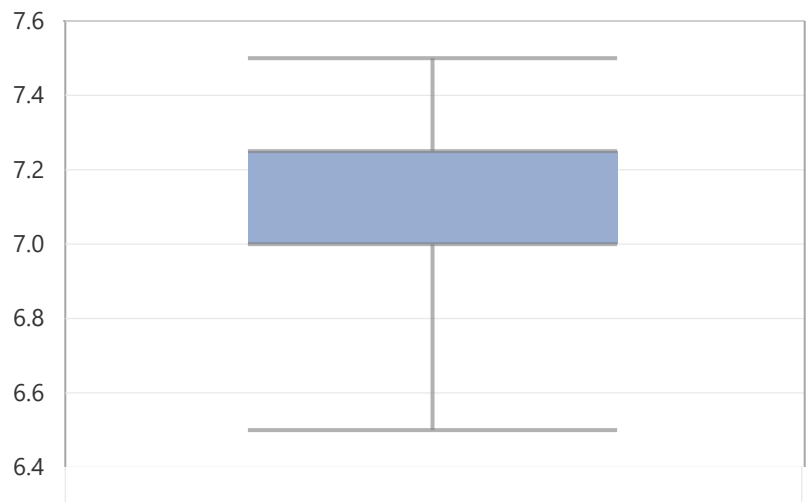

6.4a Do you use core, extended or advanced calibration in your longevity improvement basis?
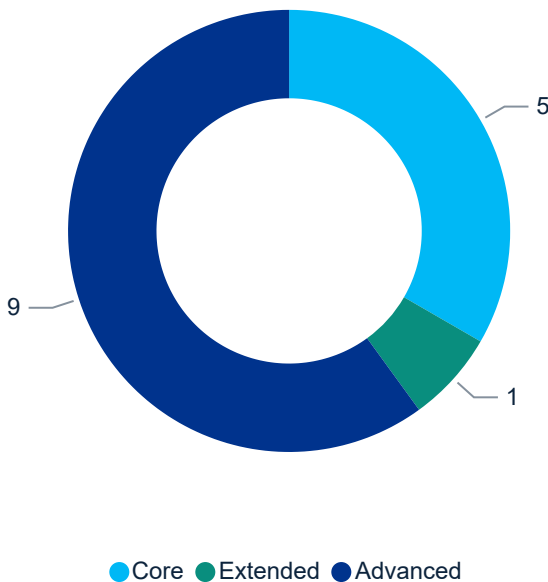
6.4b If you use the Extended or Advanced parameterisation of the CMI 2016 model or later, what value of the period smoothing parameter do you use?

	S_k value
YE22 Median	7.0
YE21 Median	7.0

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SF/IM

Longevity - Annuitant Mortality Improvements

The long-term rates of mortality improvement assumptions are generally higher for males than for females, although the median assumption is 1.5% for both males and females in the survey. The most common adjustments from the CMI Core calibration is to adjust the Long-Term Improvement Rates, the A parameter (Initial Addition to improvements) and the S_k (smoothing parameter).
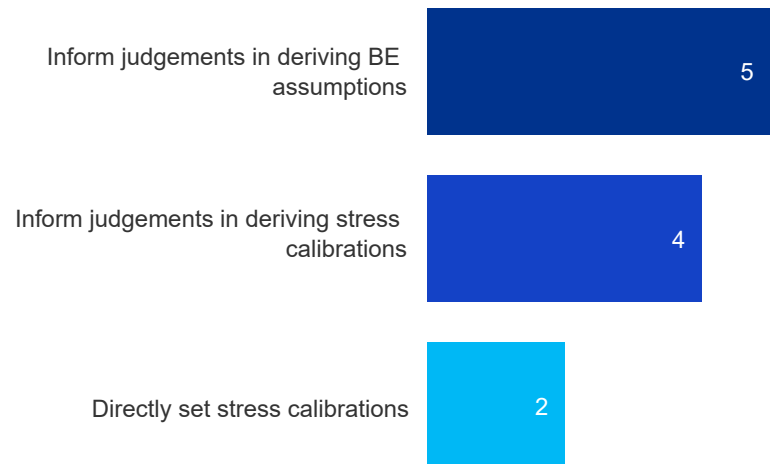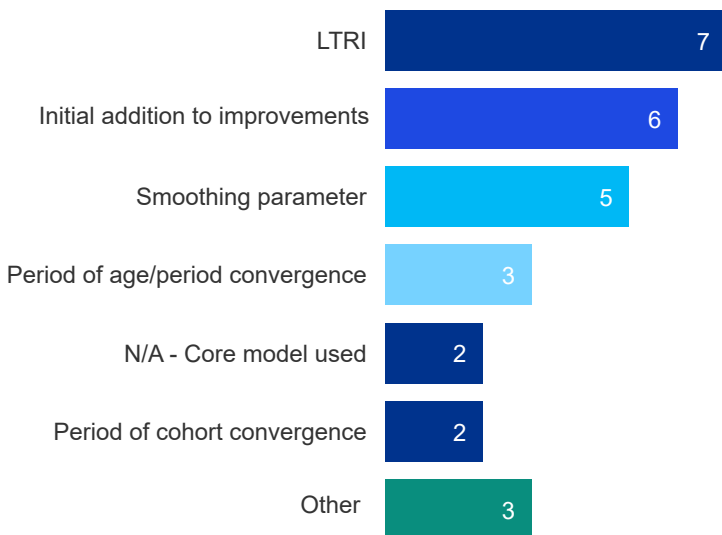
6.4c What long term rates of mortality improvements (LTRI) do you use?
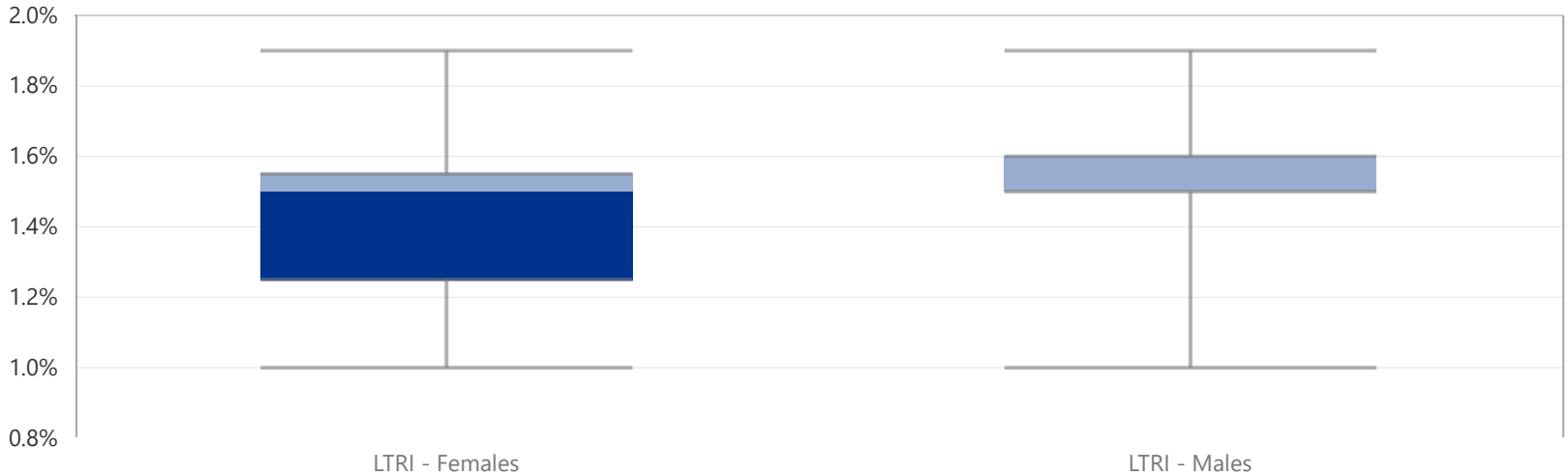
	LTRI - Females	LTRI - Males
YE22 Median	1.50%	1.50%
YE21 Median	1.50%	1.50%

6.4d If you use an Extended or Advanced calibration for the CMI model, what calibration changes do you make?

- LTRI: 7
- Initial addition to improvements: 6
- Smoothing parameter: 5
- Period of age/period convergence: 3
- N/A - Core model used: 2
- Period of cohort convergence: 2
- Other: 3

'Other' includes setting a minimum cohort age and using a set calibration age range.

13

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

- Inform judgements in deriving BE assumptions: 5
- Inform judgements in deriving stress calibrations: 4
- Directly set stress calibrations: 2

9

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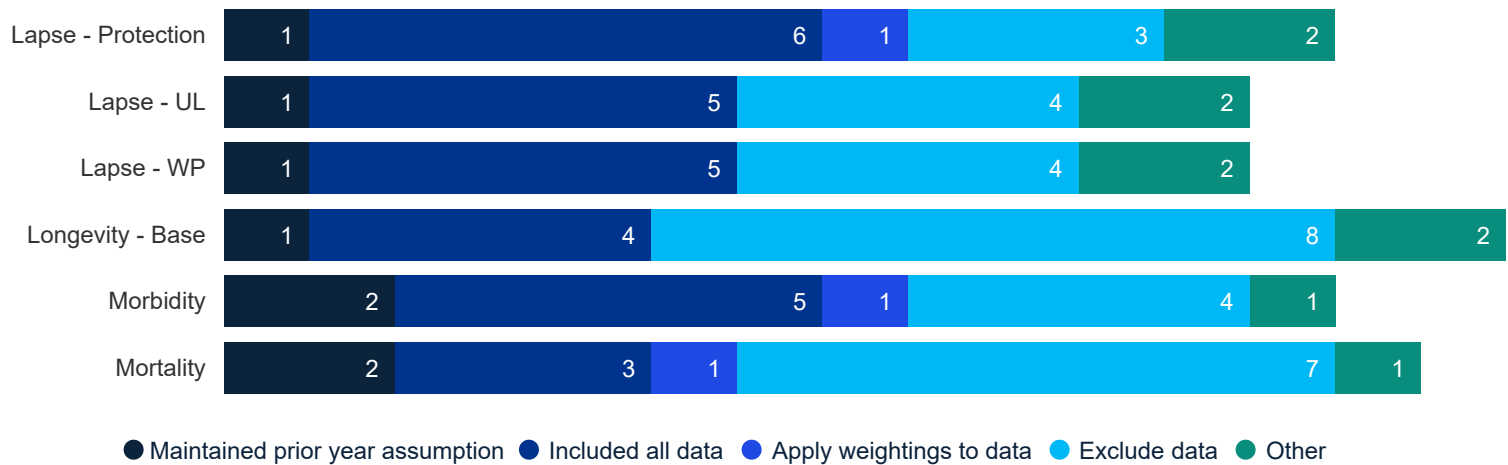| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

SF/IM

Impact of Covid-19 - Underwriting Assumptions

The majority of firms excluded 2020 and 2021 data in their longevity base assumptions setting at YE22 in light of the experience data observed since the start of the Covid-19 pandemic. The most popular approach for lapse bases was to make no change to existing processes and to include 2020 and 2021 data. Whilst most firms do not include 2022 data directly in their assumption setting process, some firms indicated they consider emerging experience as part of their expert judgement overlays.

6.6 Considering experience data from the years 2020, 2021 and 2022, what was your approach to using this "Covid-19 affected" data in your assumption setting process at YE22?

Responses showed that firms applied consistent approaches for data from 2020 and 2021, hence the top chart shows the approach for these years combined.

2020 and 2021 data

● Maintained prior year assumption ● Included all data ● Apply weightings to data ● Exclude data ● Other

'Other' includes excluding data that showed evidence of material impacts from Covid-19 but including data where experience was less impacted, and including all data but with use of a longer rolling period.

2022 data

● Maintained prior year assumption ● Included all 2022 data ● Exclude 2022 data ● Other
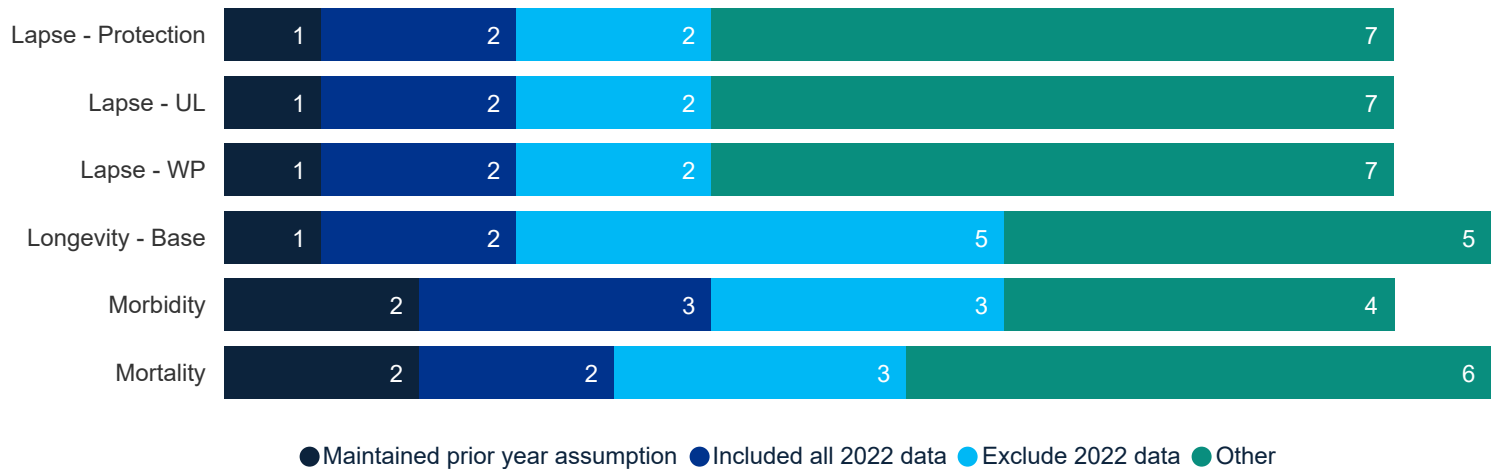
'Other' includes using all data but with use of a longer rolling period, and taking into account how the excess mortality as seen in 2022 data may change over time.

15

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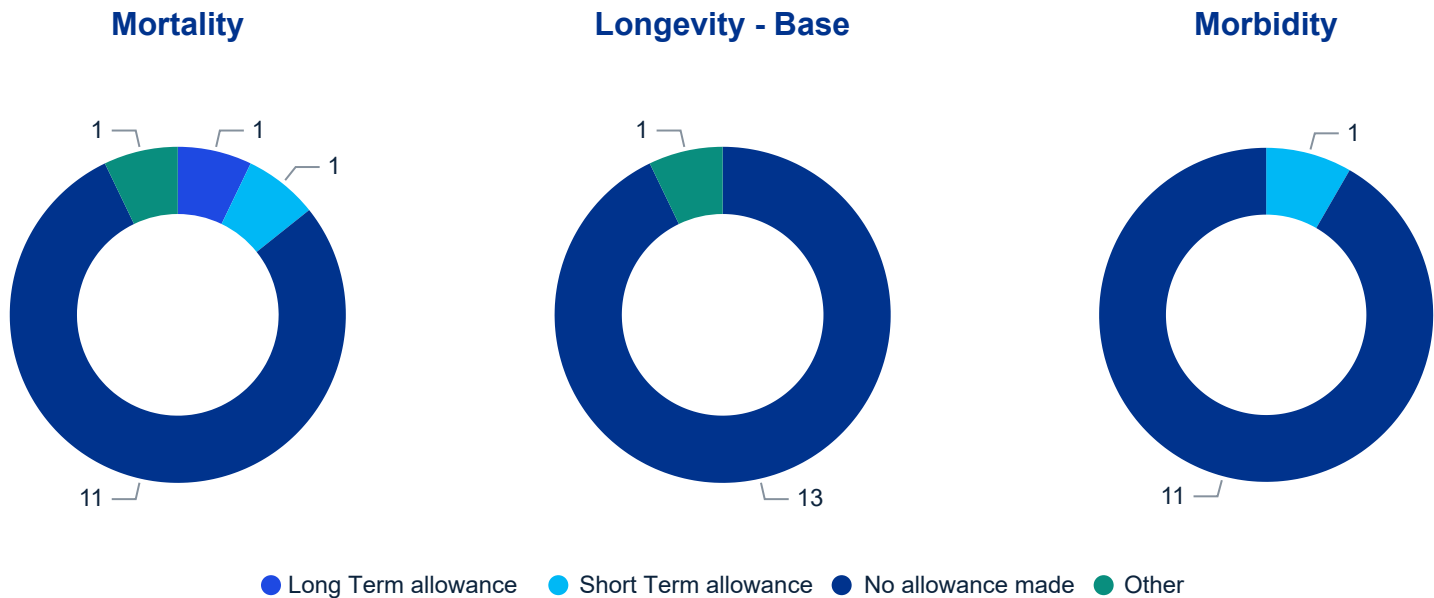| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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SF/IM

Impact of Covid-19 - Underwriting Assumptions

All firms who provided responses for question 6.9 below noted no allowance was made for excess deaths evident in 2022 for the purposes of partial withdrawal assumptions and lapse assumptions on any of protection, with-profits, or unit-linked business.

Most companies indicated they did not hold any additional provisions in respect of Covid-19 for the purposes of YE22 reporting. All firms followed the CMI core calibration approach of applying a 0% weighting to both 2020 and 2021 years of data.

6.7 In respect of your assumption setting process at YE22, how have you allowed for the excess deaths evident in 2022?

Mortality

Longevity - Base

Morbidity

● Long Term allowance   ● Short Term allowance   ● No allowance made   ● Other
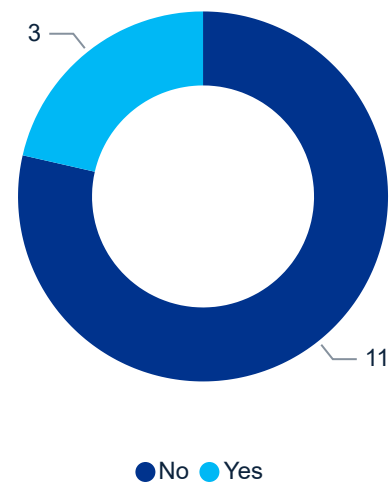
'Other' for both Mortality and Longevity - Base includes considering how the excess mortality evident may change over time.

6.8 Did you include any adjustment to reflect the impact of the Covid-19 pandemic in your YE22 improvement assumptions?

●No ●Yes
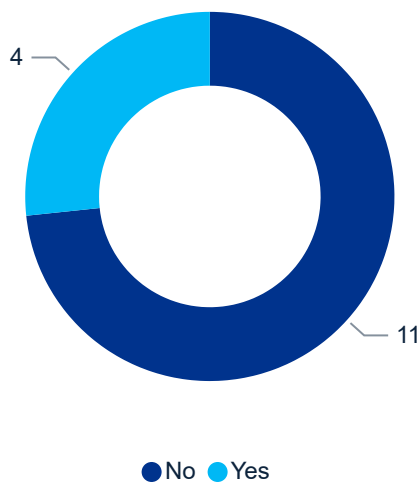
6.9 Did you hold an additional provision in respect of Covid-19 for the purpose of YE22 reporting?

●No ●Yes

Of those who responded 'Yes' to 6.8, two firms noted they applied a reduction in short term mortality improvements, while one firm noted they applied an increase in short term mortality improvements. No firms included any long term adjustments.

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Technical Practices Survey 2023
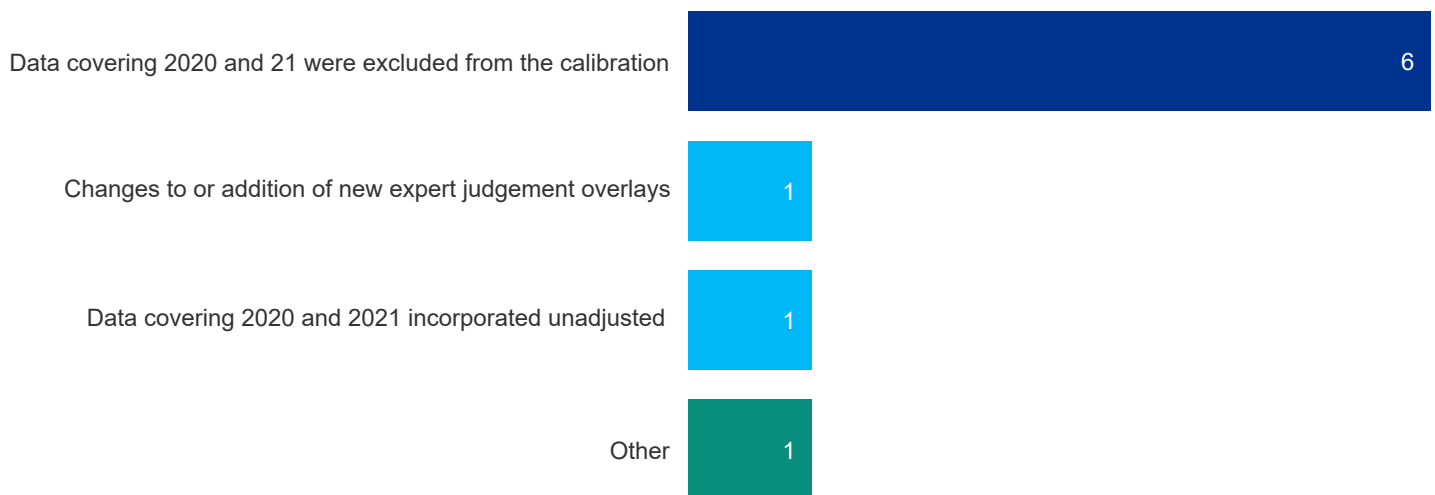## 6. Life Underwriting Risk

SF/IM

Impact of Covid-19 - Risk Capital

The majority of respondents consider Covid-19 to be both a data and an event risk and exclude 2020 and 2021 data in their longevity capital calibration.

6.10 Do you consider Covid-19 to be a data risk, an event risk, or both?

Data Risk ● Event Risk ● Both
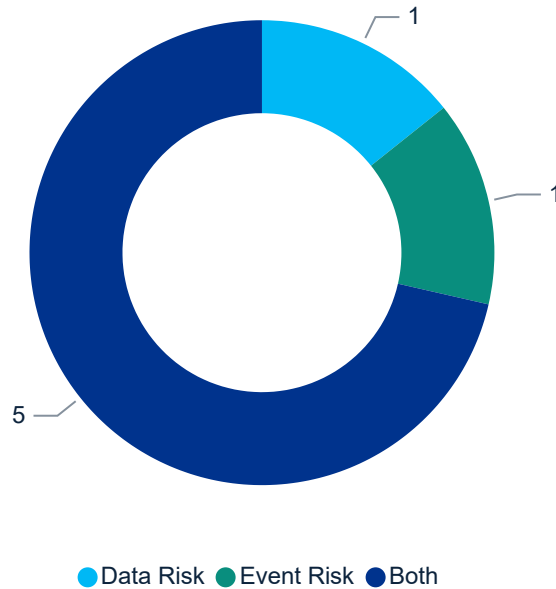
6.11 What changes have you made in respect of the impacts of Covid-19 from a risk capital calibration perspective?

Data covering 2020 and 21 were excluded from the calibration	6
Changes to or addition of new expert judgement overlays	1
Data covering 2020 and 2021 incorporated unadjusted	1
Other	1

'Other' includes no explicit adjustment to the risk calibrations for Covid-19, and noting that judgements are made with regard to the applicability of 2020 experience within each of the underlying risk behaviours.

8

1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Persistency

The majority of firms perform Persistency Risk Calibrations at product level and a third of respondents use less than five years of experience. Most firms have considered the cost of living crisis from a risk calibration perspective, however three firms have not made any adjustments to their calibration.

6.12 At what level of granularity do you perform Persistency Risk Calibrations?

6.13 What period does your persistency experience investigation cover?
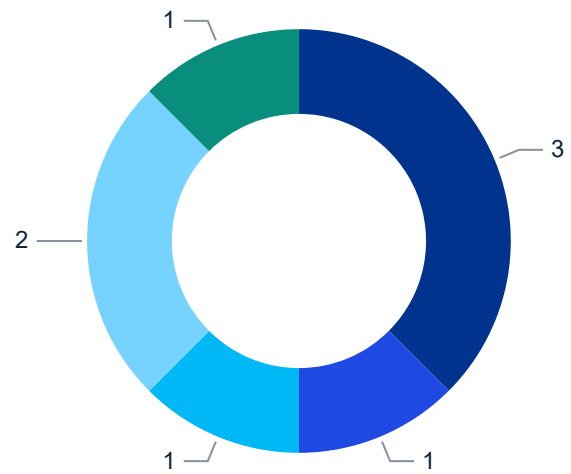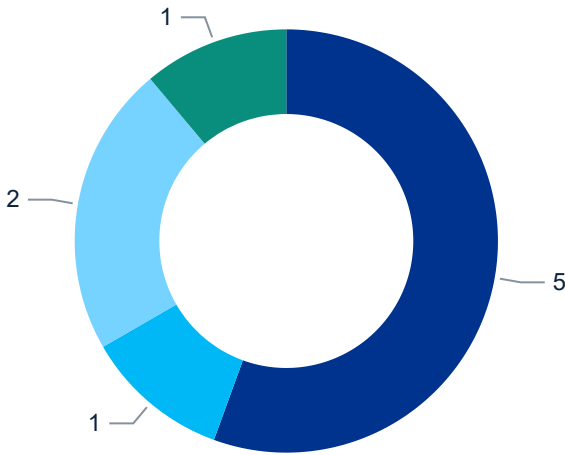
● Product level ● Line of Business level ● Fund level ● Entity level

● <5 years ● 5-9 years ● 10-14 years ● 15-19 years ● 20+ years

6.14 What changes have you made in respect of the impacts of the Cost of Living Crisis from a risk capital calibration perspective?
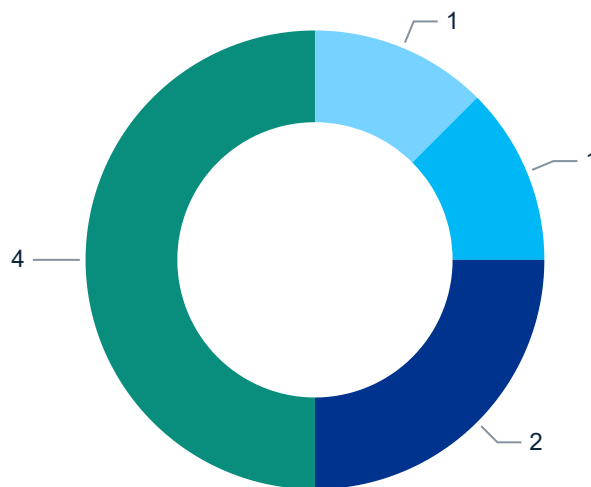
● Excluded 2021-22 data ● Changes to/new expert judgement overlays ● Unadjusted 2021-22 data used ● Other

'Other' includes no changes made as of yet but consideration of this ongoing.

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Technical Practices Survey 2023
6. Life Underwriting Risk

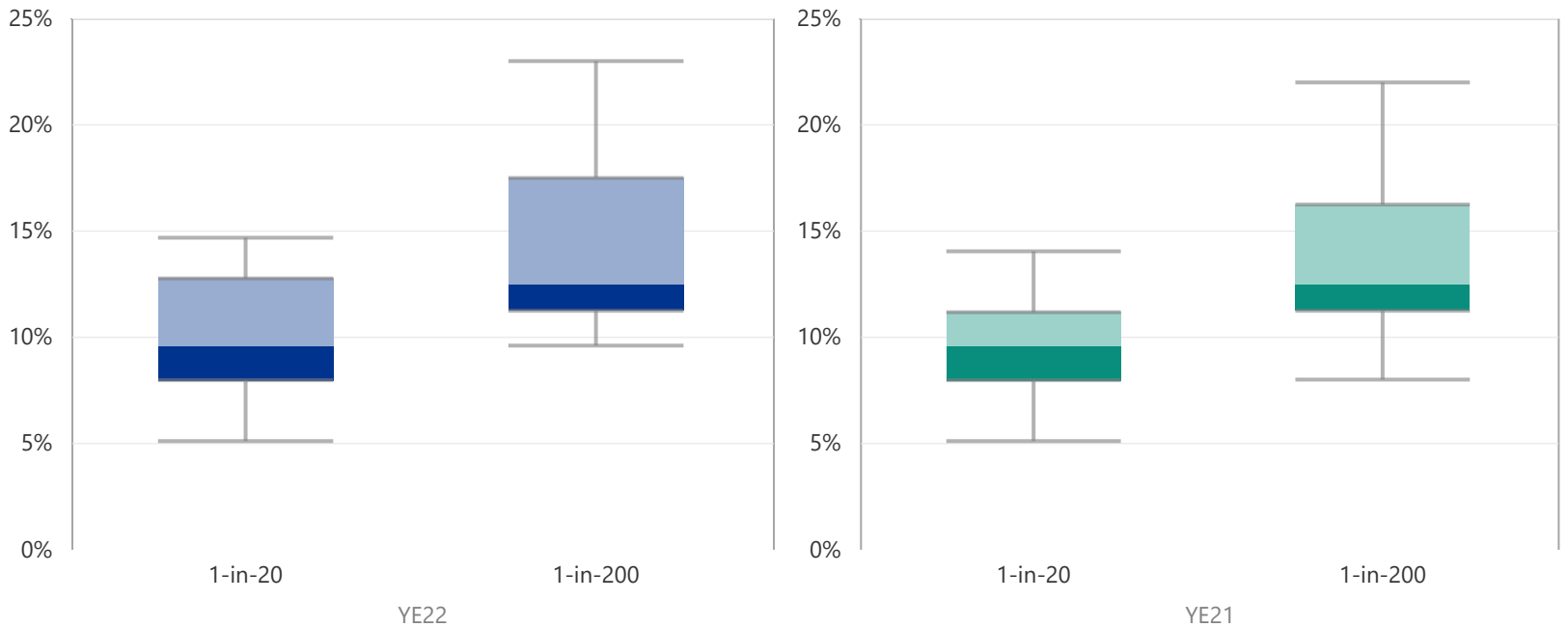| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Base Mortality Risk - Calibrations

The charts below show the percentage change in best estimate mortality rate for males and females at ages 25, 40 and 55. There are no material changes to companies' calibrations at YE22 compared to YE21.

6.15a Change in Mortality Rate - Males
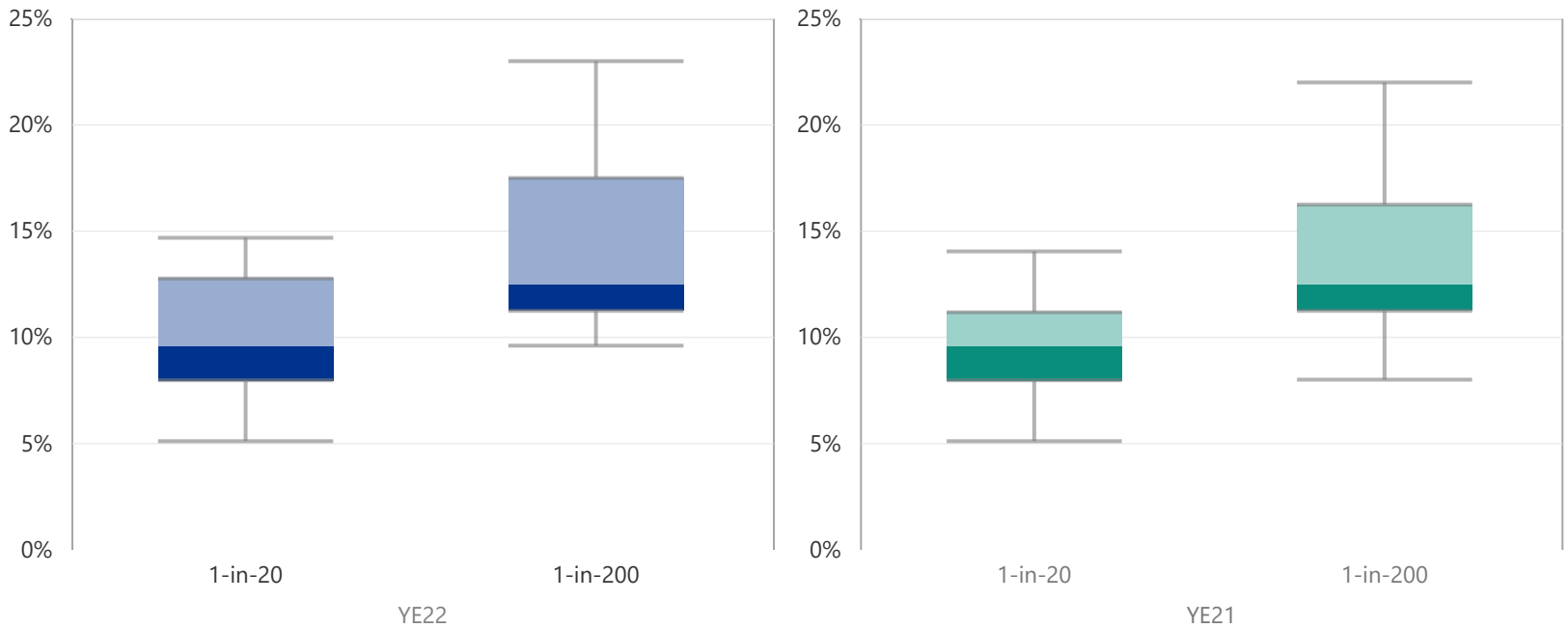
6.15b Change in Mortality Rate - Females

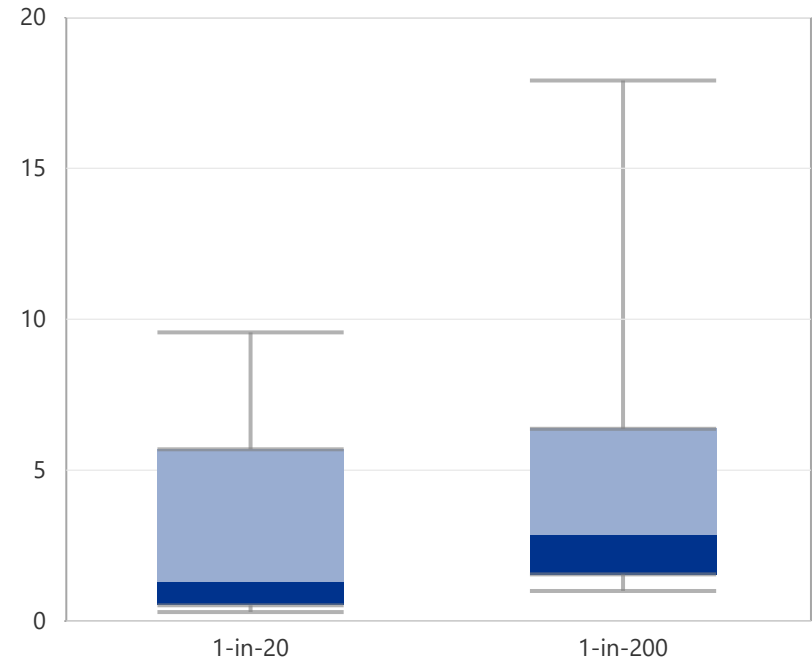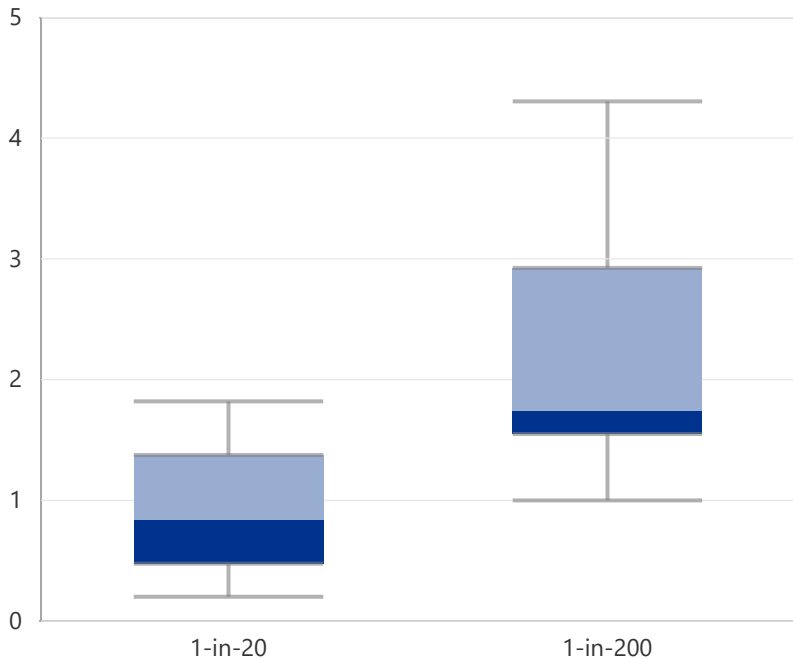| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Mortality Catastrophe Risk - Calibrations

The charts below show mortality catastrophe stresses for males and females at ages 25, 40, 55 and 75. Most companies have retained their calibrations from YE21. However, a minority of companies have changed their stresses at YE22, resulting in distributions skewed towards larger stresses.

6.16a Mortality Catastrophe for Age 25 (Overall) (deaths per 1000)

6.16b Mortality Catastrophe for Age 40 (Overall) (deaths per 1000)
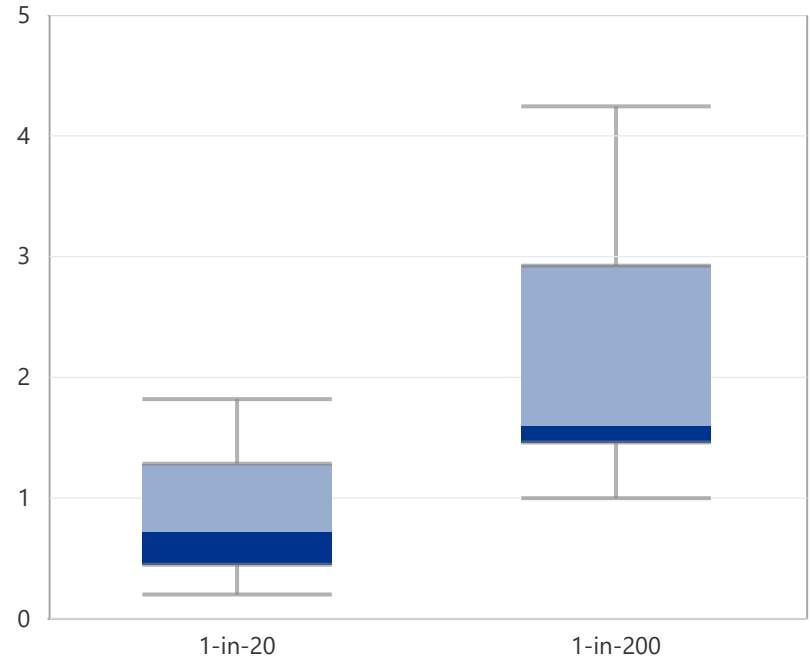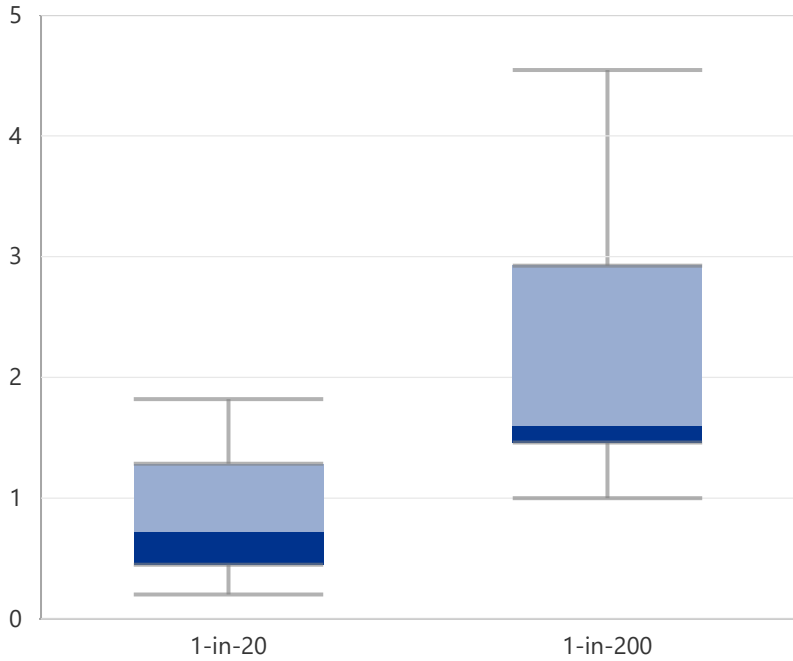
6.16c Mortality Catastrophe for Age 55 (Overall) (deaths per 1000)

6.16d Mortality Catastrophe for Age 75 (Overall) (deaths per 1000)

1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Longevity Risk - Calibrations

The charts below show each participant's response on Expectation of Lives (EoL) for males under 1-200 overall stress, i.e. combined mis-estimation and trend stresses. Each colour point represents a different participant. The charts on the left show the absolute differences between the Best Estimate (BE) and the 1-in-200 EoL, while the charts on the right show the difference between the BE EoL and the stressed EoL as a percentage of the BE EoL. Overall, we can see that companies have increased their longevity risk at YE22 compared to YE21. The increase in longevity risk is broadly consistent between Males and Females.

6.17a Expectation of Life - Male Aged 50 (overall)
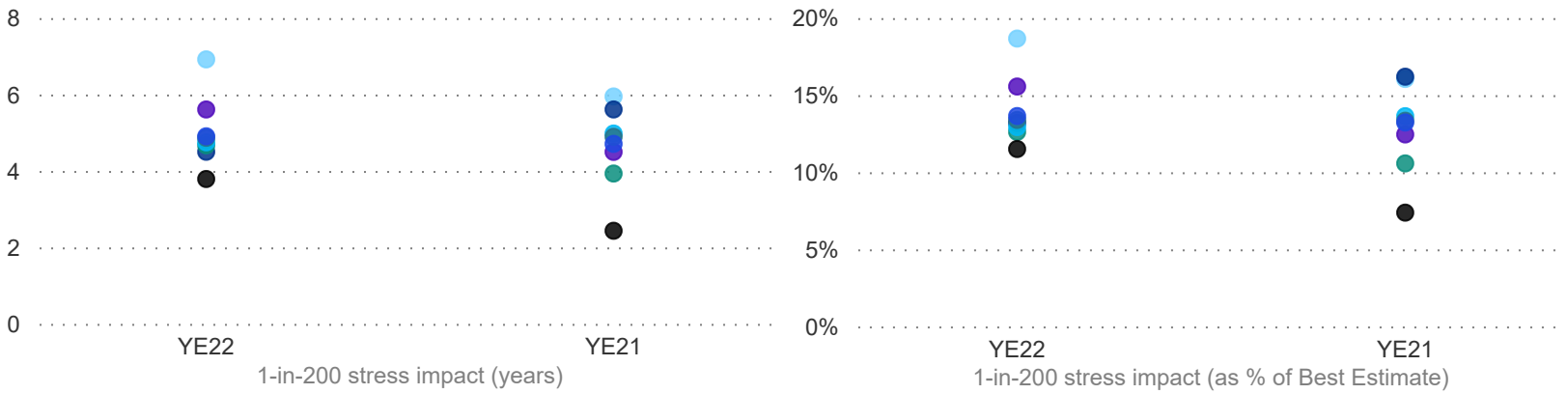
6.17b Expectation of Life - Male Aged 65 (overall)

6.17c Expectation of Life - Male Aged 80 (overall)
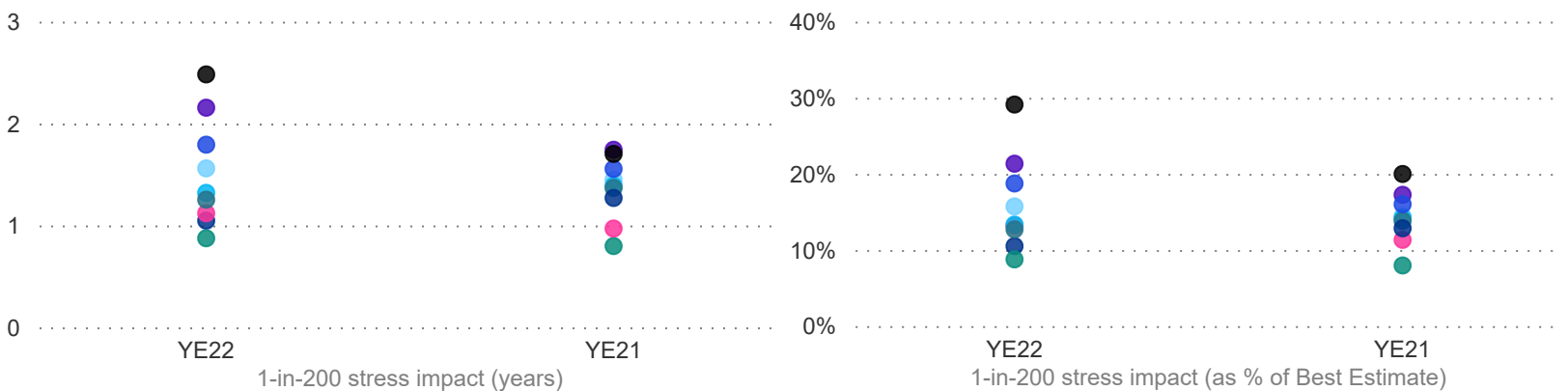
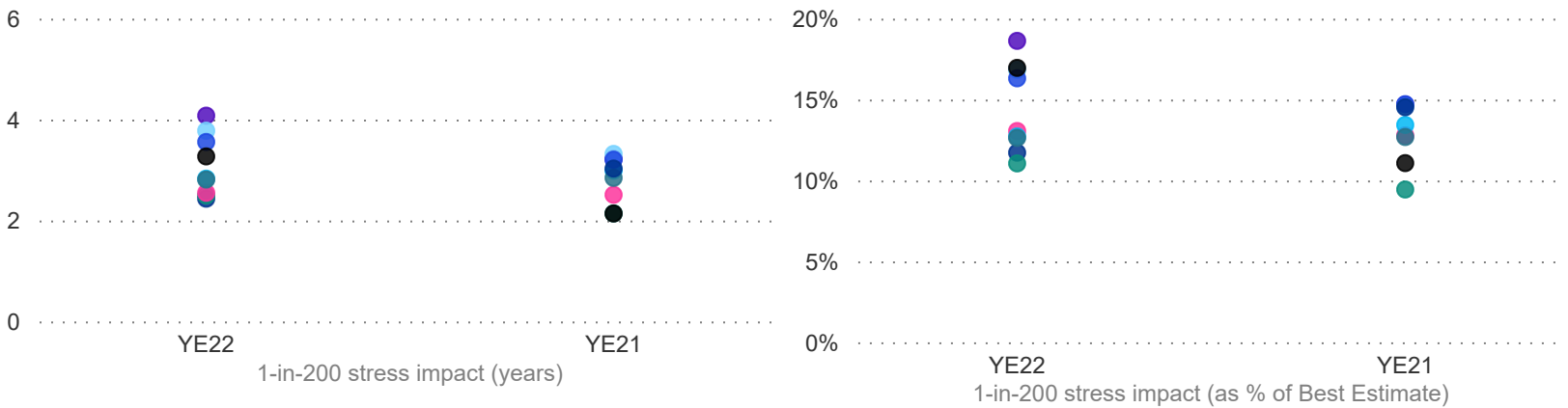| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Longevity Risk - Calibrations

The charts below show each participant's response on EoLs for females under 1-200 overall stress, i.e. combined mis-estimation and trend stresses. Each colour point represents a different participant. The charts on the left show the absolute differences between the BE and the 1-in-200 EoL, while the charts on the right show the percentage difference between the BE EoL and the stressed EoLs. Overall, we can see that companies have increased their longevity risk at YE22 compared to YE21. The increase in longevity risk is broadly consistent between male and Female.

6.17d Expectation of Life - Female Aged 50 (overall)

1-in-200 stress impact (years)   1-in-200 stress impact (as % of Best Estimate)

6.17e Expectation of Life - Female Aged 65 (overall)

1-in-200 stress impact (years)   1-in-200 stress impact (as % of Best Estimate)

6.17f Expectation of Life - Female Aged 80 (overall)
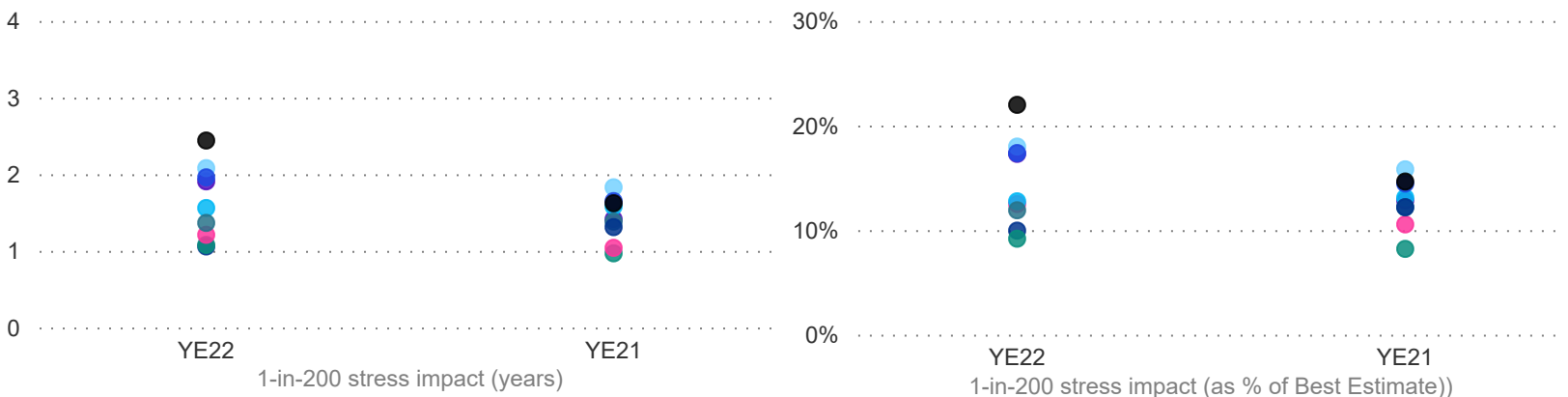
1-in-200 stress impact (years)   1-in-200 stress impact (as % of Best Estimate))

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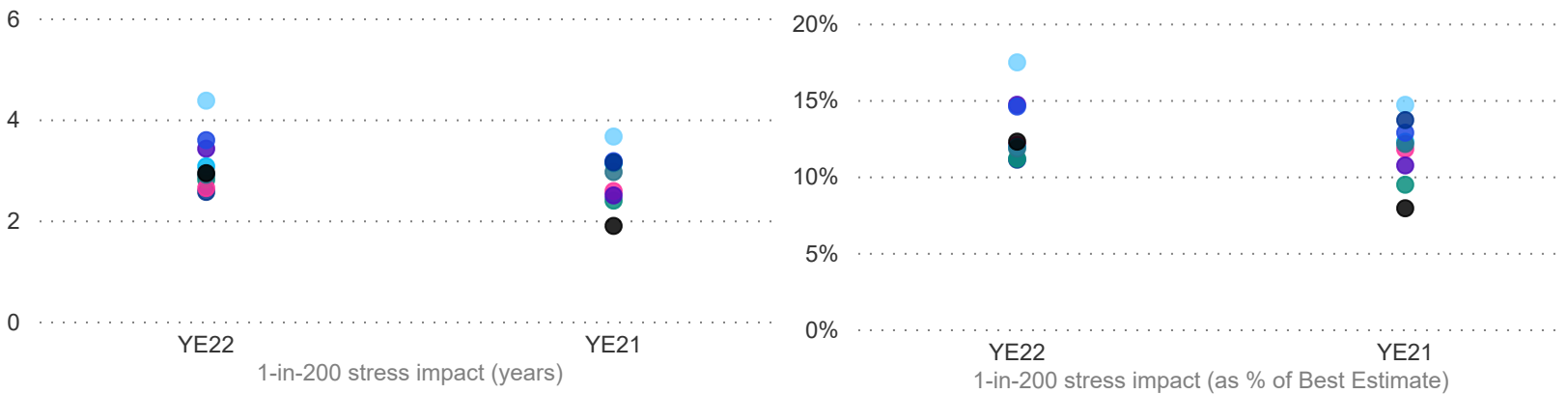| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Longevity Calibrations – Internal Model

The table below sets out, for each age and gender:

- Best Estimate (BE) Base Expectation of Life (EoL) with no mortality improvements
- BE EoL with mortality improvements, as an addition to the Base EoL
- Overall 1-in-200 stresses, as an addition to the BE EoL with mortality improvements

- Percentage increase in BE EoLs under 1-in-200 overall stress

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

Age 50

	Male		Female	
	Market Average EoL (YE22)	**Market Average EoL (YE21)**	**Market Average EoL (YE22)**	**Market Average EoL (YE21)**
Base Mortality	33.3	33.3	36.5	36.6
BE Improvements	2.5	2.5	2.6	2.6
1-in-200 Stress Impact	5.0	4.6	4.8	4.4
1-in-200 Stress Impact (%)	13.9%	12.9%	12.3%	11.1%

Age 65

	Male		Female	
Base Mortality	20.2	20.3	22.8	22.8
BE Improvements	1.2	1.2	1.4	1.3
1-in-200 Stress Impact	3.1	2.8	3.1	2.8
1-in-200 Stress Impact (%)	14.4%	13.1%	13.0%	11.7%

Age 80

	Male		Female	
Base Mortality	9.2	9.2	10.7	10.7
BE Improvements	0.4	0.4	0.5	0.5
1-in-200 Stress Impact	1.5	1.4	1.6	1.4
1-in-200 Stress Impact (%)	15.9%	14.2%	14.5%	12.7%

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1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Lapse Risk - Calibrations

The charts below show the lapse up and lapse down stresses for unit-linked contracts only. There have been very minimal movements in the lapse stresses applied compared to YE21.

6.18a Change in Lapse Rates - 1-in-200 Up Stress (Unit-linked Products Only)
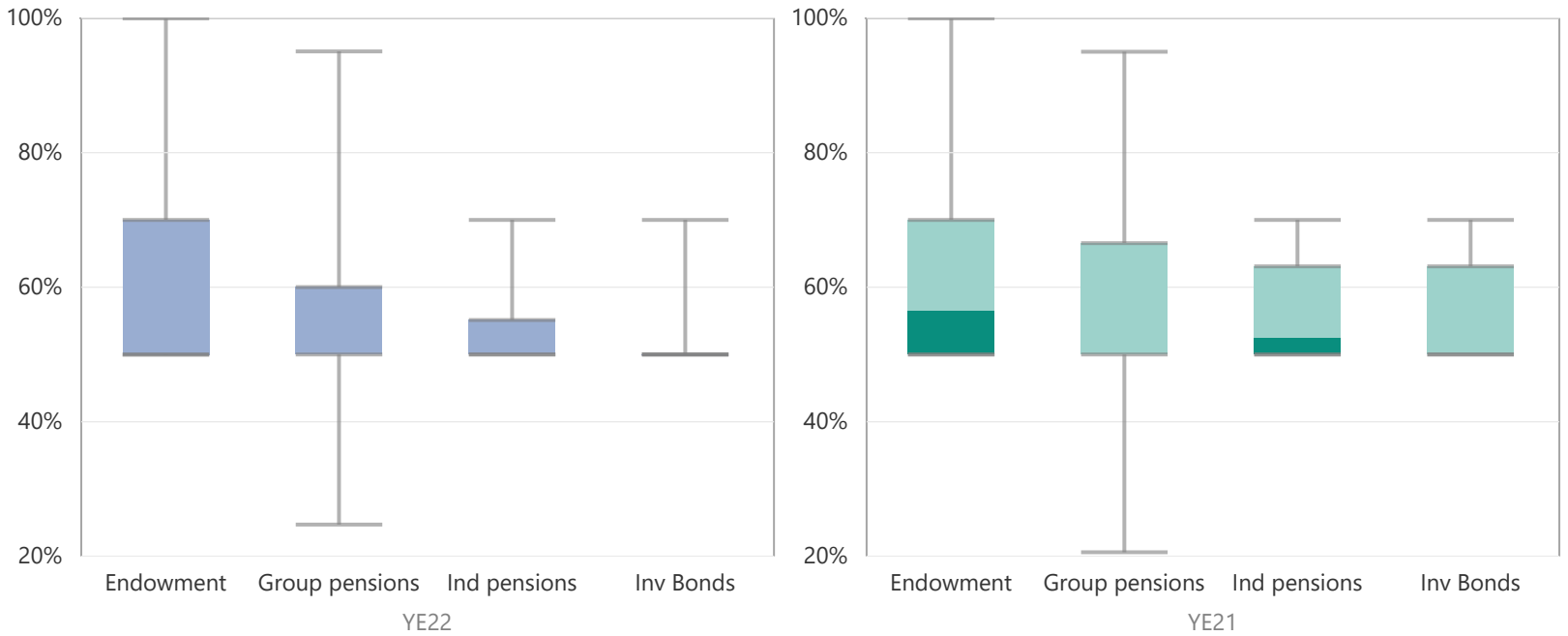
6.18b Change in Lapse Rates - 1-in-200 Down Stress (Unit-linked Products Only)

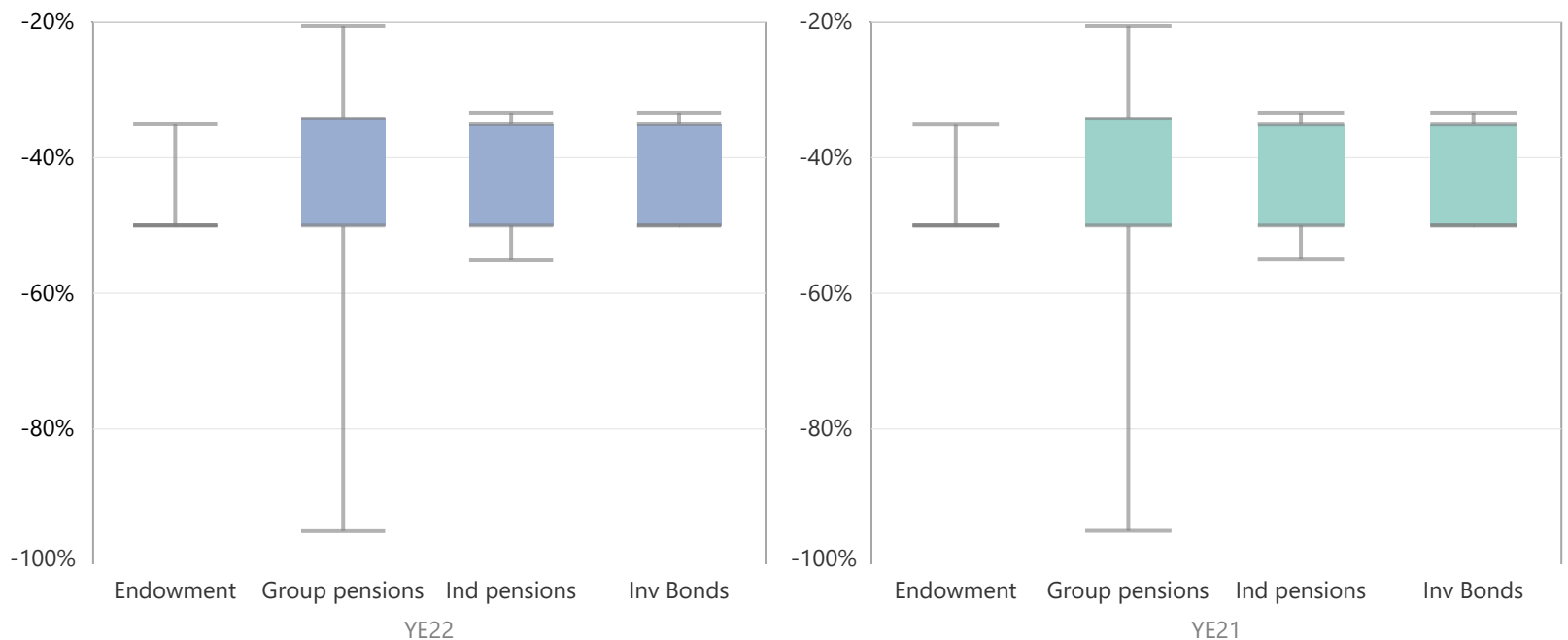| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Lapse Risk - Calibrations

The charts below show mass lapse stresses for unit-linked contracts only. Half of the respondents have not changed their calibrations at all. Among those firms who have changed their calibration, we see both increases and decreases in the mass lapse stress assumption. Some of the movements have been quite significant with movements of over 50%.

6.19a Mass Lapse - 1-in-200 Stress Impact (Unit-Linked Products Only)
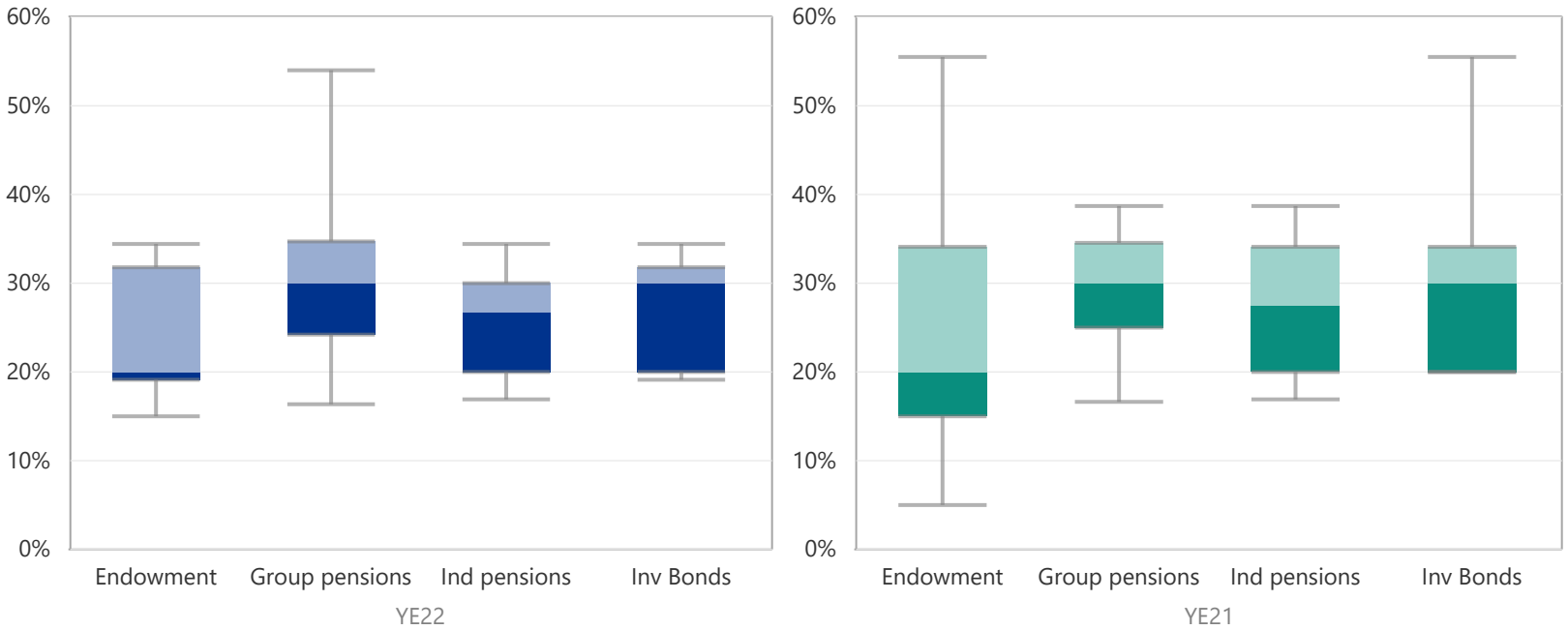
6.19b Mass Lapse - 1-in-20 Stress Impact (Unit-Linked Products Only)
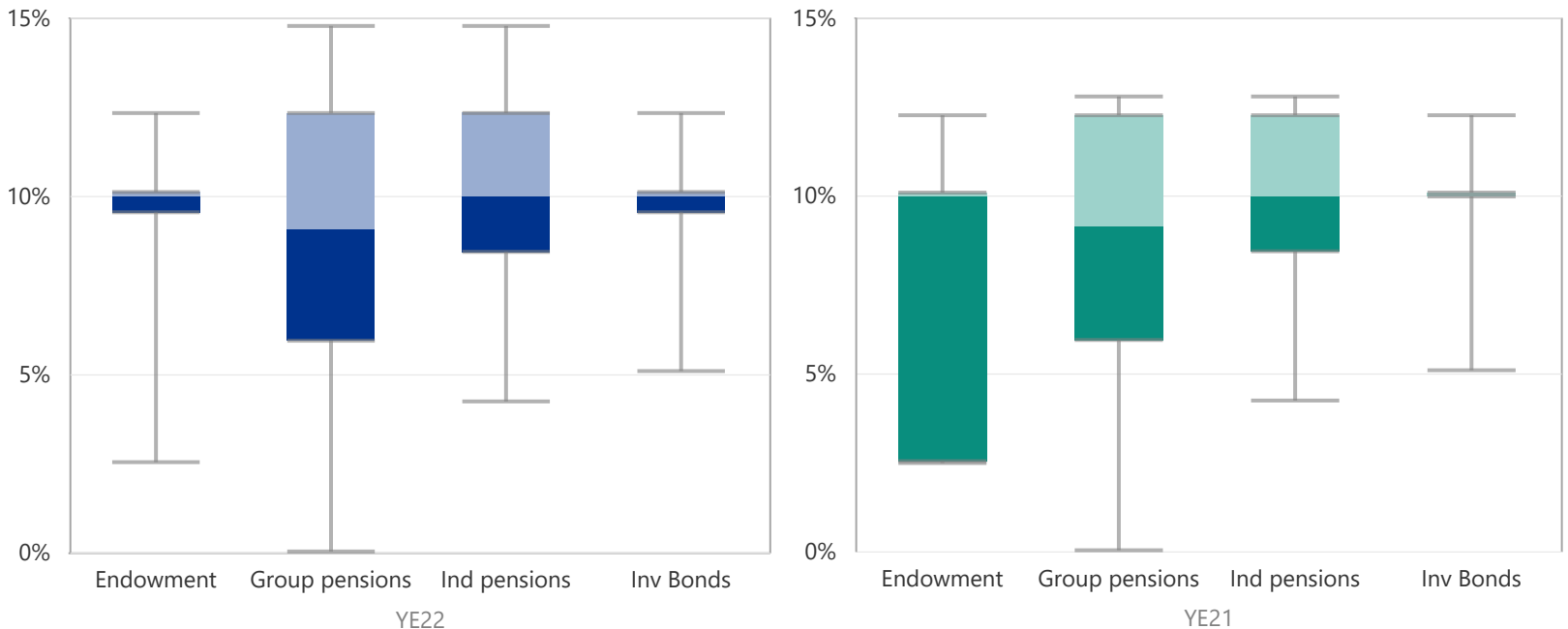
Document Classification: KPMG Public

1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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IM

Expense Risk - Calibrations

There have been some very small changes in the expense stresses since the prior year with movements in both directions. On the whole the stresses have remained stable.

6.20a Change in Base Acquisition Expense Assumption
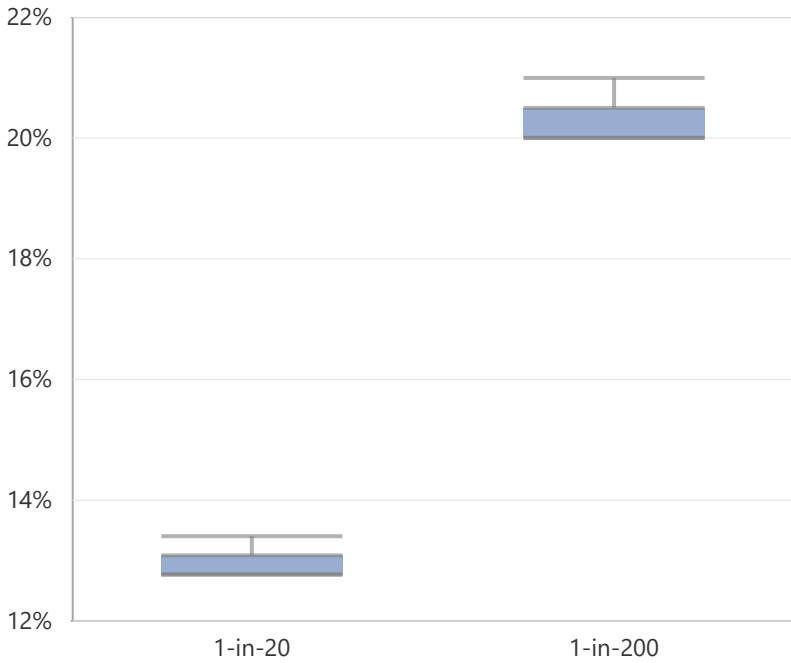
6.20b Change in Base Investment Expense Assumption

6.20c Change in Base Servicing Expense Assumption

6.20d Change in Expense Inflation

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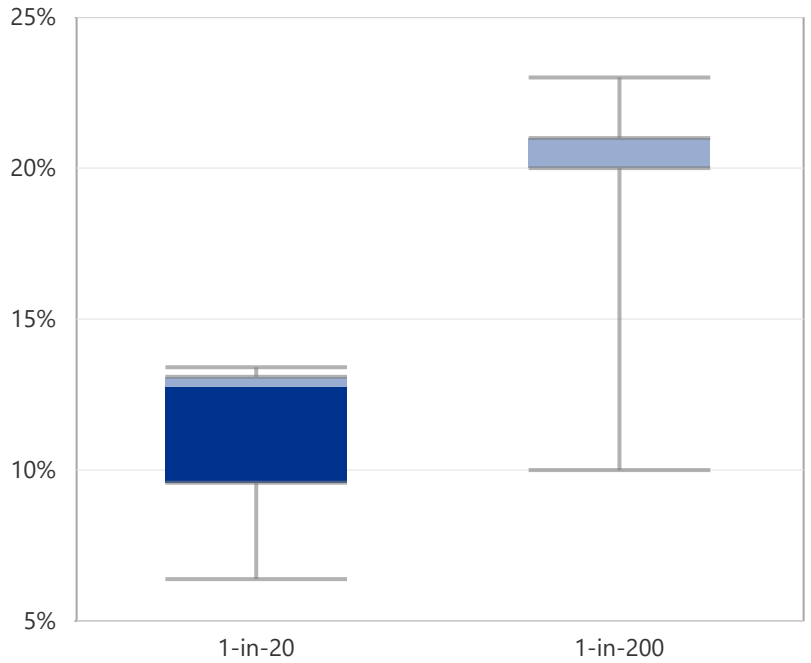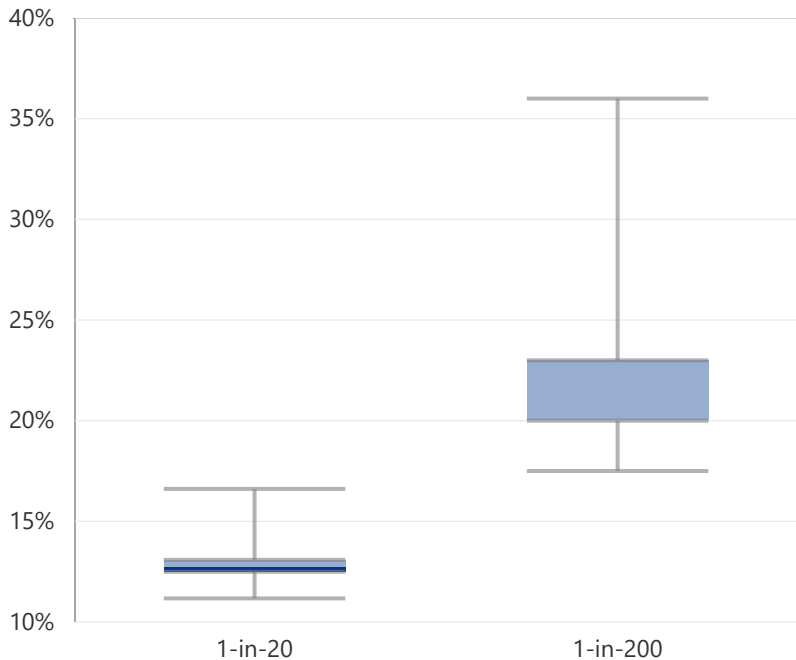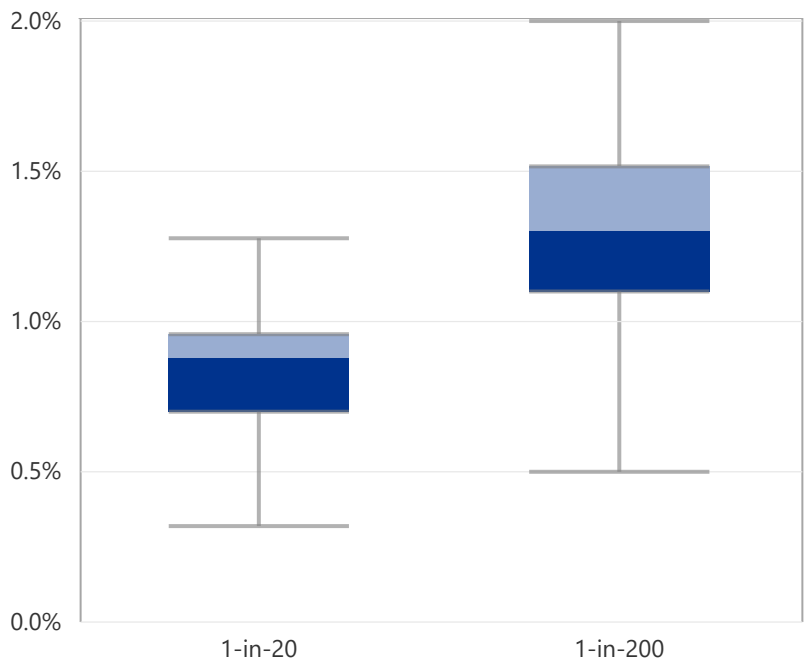| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

SF/IM

Capital Management

The capital buffers that respondents use are highly dependent on their risk profile and chosen confidence level. The graphs show a high level of variability overall, but the interquartile range does show more consistency. We have observed a slight reduction in the level of the capital buffer between the previous year and this year's survey. Some of this is due to the different sets of respondents in each year, but comparing the responses on a like-for-like basis shows that a few respondents have made a change to their capital buffer. For the most part these changes are refinements, however two firms have updated their risk appetite calibration or approach in the past 12 months.

There are a number of respondents that use a 1-in-10 or 1-in-20 confidence level for calibration of risk appetite. However, there are quite a few firms that stated that the method was a more comprehensive approach that considered a range of different scenarios to give a complete picture of an appropriate appetite.

7.1 At the operating company level what coverage ratio for SCR do you set as the Risk Appetite?
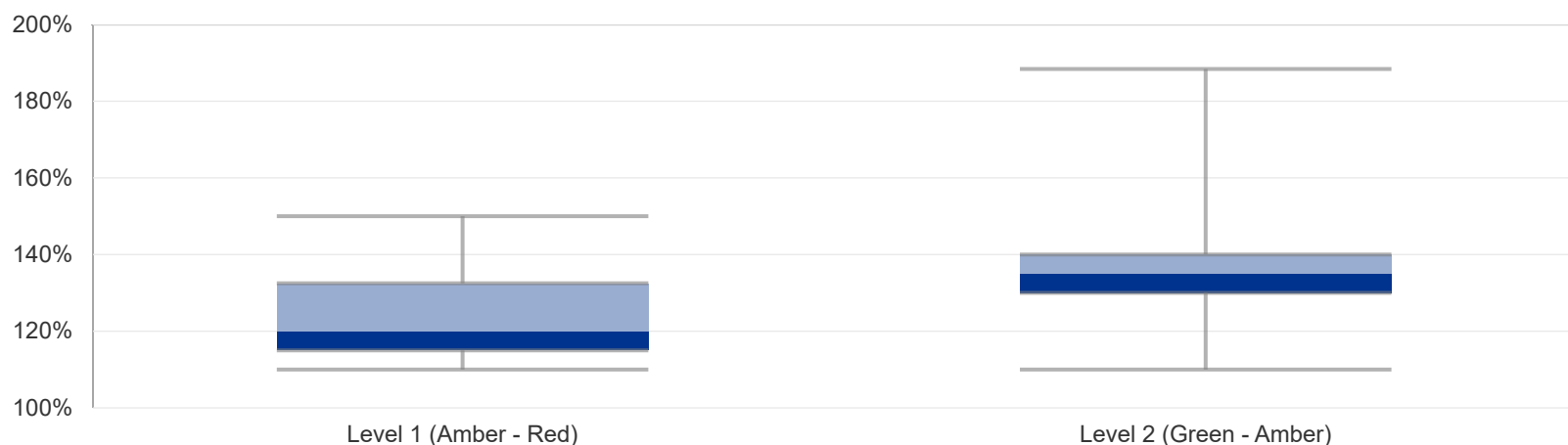
%	Level 1 (Amber - Red)	Level 2 (Green - Amber)
YE22 Median	120	135
YE21 Median	123	138

7.2 What is your approach to calibration of the Risk Appetite and the confidence level used?

Company	Level 1 (Amber - Red)	Level 2 (Green - Amber)
1	1-in-10	1-in-40
2	1-in-10	1-in-20
3	Based on the Level 2 boundary after removal of any buffer	1-in-5
4	Based on the Level 2 boundary after removal of any buffer	1-in-10
5	Based on the Level 2 boundary after removal of any buffer	1-in-20
6	1-in-10	1-in-25
7	Based on the Level 2 boundary after removal of any buffer	1-in-10
8	Close to 1-in-4	Close to 1-in-4
9	1-in-10	1-in-10
10	1-in-10	1-in-10
11	1-in-20	Based on the Level 1 boundary plus a buffer
12	1-in-10	1-in-50
13	N/A	1-in-20
14	N/A	1-in-10
15	N/A	1-in-25

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1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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SF/IM

Capital Management and Recovery and Resolution Plans

The majority of firms calibrate their coverage ratio risk appetite using t=0 position only. In chart 7.4, 'Base Actions' do not need specific approval and are included in the SCR (e.g. investment decisions within current limits, policyholder charge increases, dynamic aspects of policyholder benefits etc.), 'Contingent Actions' are known to be available and feasible but have not been specifically Board approved and 'Recovery Actions' would be taken in the stresses used for calibration. Key features considered as part of setting the coverage ratio risk appetite remain broadly similar to previous years, with a greater focus now on economic conditions. A few respondents also stated that their recovery plan triggers are set at the group level focusing on group solvency position rather than the insurance entity.

7.3 Is your coverage ratio risk appetite calibrated using the t=0 position only or do you perform a projection over the first year?

7.4 Which Management Actions do you allow for in your coverage ratio Risk Appetite calibration?
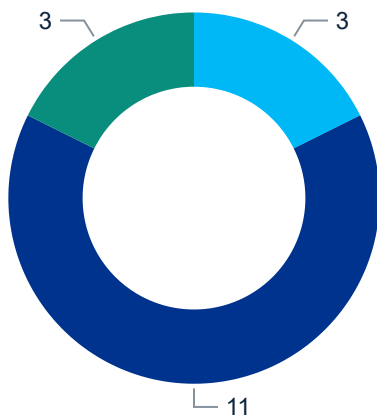
Legend: ● Projection considering entirety year 1 ● t=0 position only ● Other

'Other' includes using bespoke approach along with performing projection over a longer period.
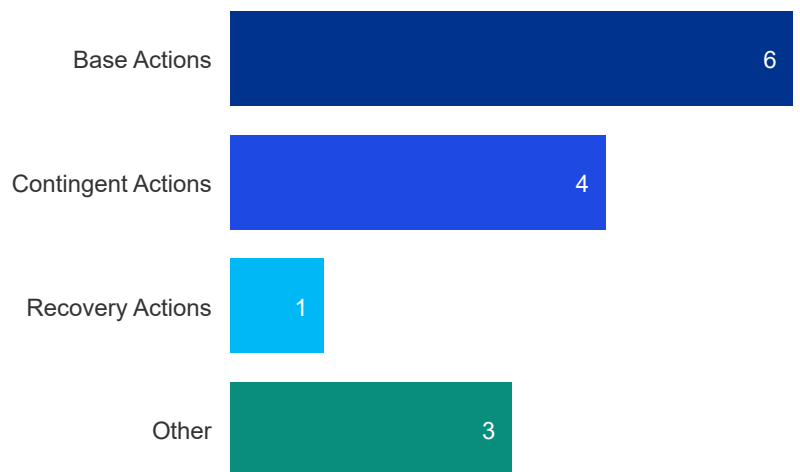
'Other' includes a combination of base, stress, planned and recovery actions

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7.5 Which of the following features are considered as part of setting your coverage ratio risk appetite?
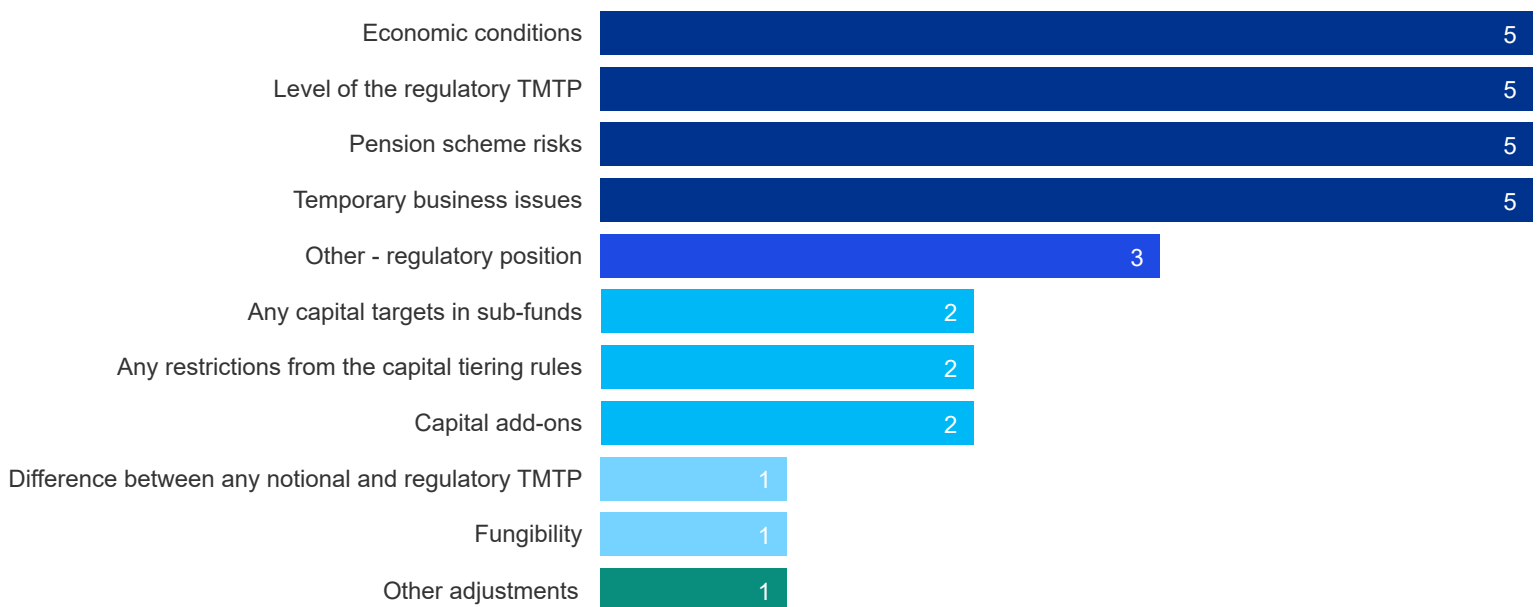
'Other' includes adjustments for the risk that solvency estimates are less accurate than hard close results.

11

Technical Practices Survey 2023
7. Capital Management

1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

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Capital Management and Recovery and Resolution Plans

The majority of firms neither changed their approach or calibration in the last 12 months, nor do they plan to change in the near future, at least the next 12 months.

7.6 Have you changed your approach or calibration of risk appetite levels in the last 12 months?
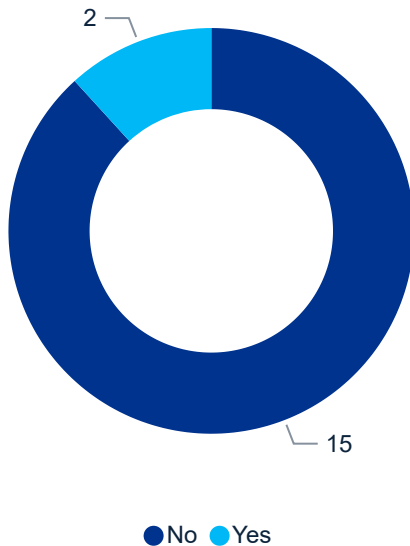
7.7 Have you planned any changes in your approach or calibration of risk appetite in the near future, say next 12 months?

2

15

● No ● Yes

4

13

● No ● Yes
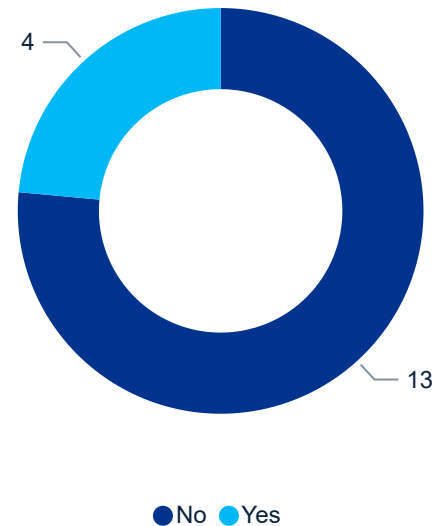
7.8 How have you defined the point at which your Recovery Plan is initiated?

At Level 1 (Amber - Red)	7
At a defined level below Level 1 but above 100% SCR coverage	5
Based on a defined liquidity trigger	4
Based on a defined operational trigger	3
No formal triggers set, use Board / Management discretion	4

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Document Classification: KPMG Public

1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

SF/IM

Liquidity Risk

We see that companies differ widely in their approach to liquidity risk assessment. However, two common approaches consider liquidity in stressed positions and the effect of asset price haircuts on liquidity. The chart below shows that a wide range of stresses are applied in order to give a full picture of liquidity risk.

There are also a lot of insurers focusing on the very short-term horizons, which is a continuation of a trend seen last year.

7.9 If your liquidity risk appetite is based on cash assets available in stressed conditions, what stresses do you apply?
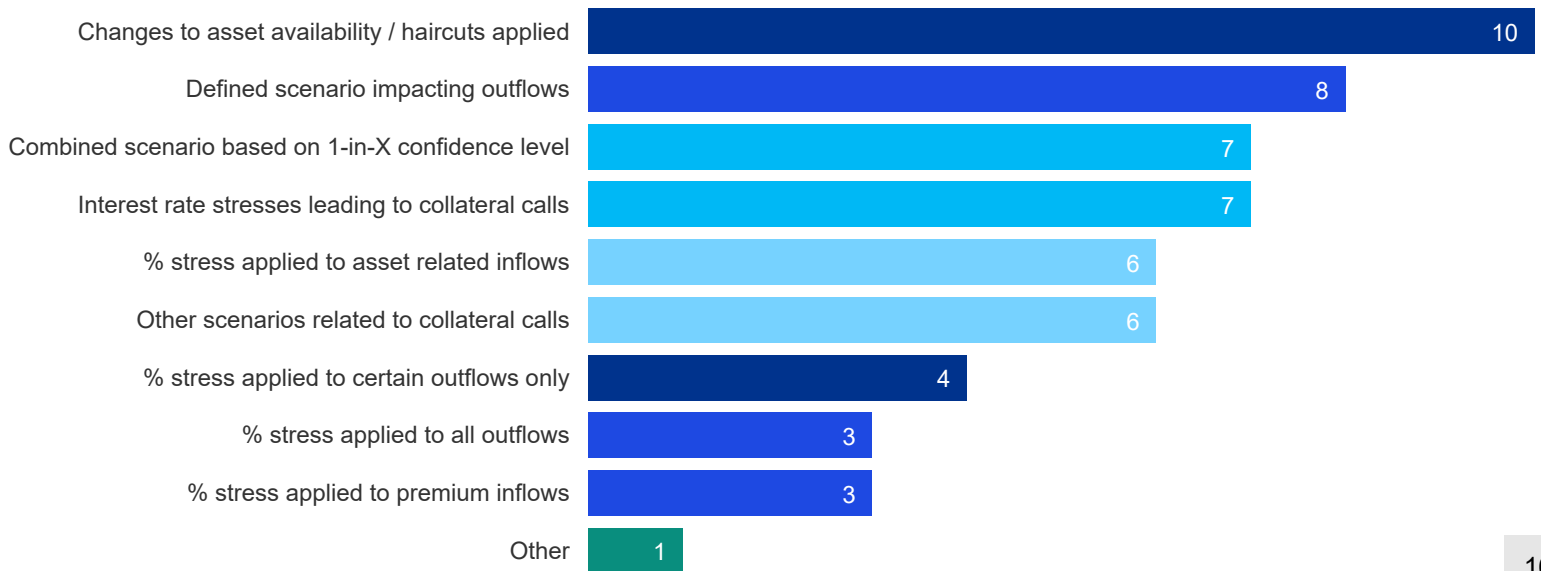
'Other' includes a combined market / persistency stress impacting fee income generation.

7.10 What liquidity scenarios do you test within your SST framework or ORSA?
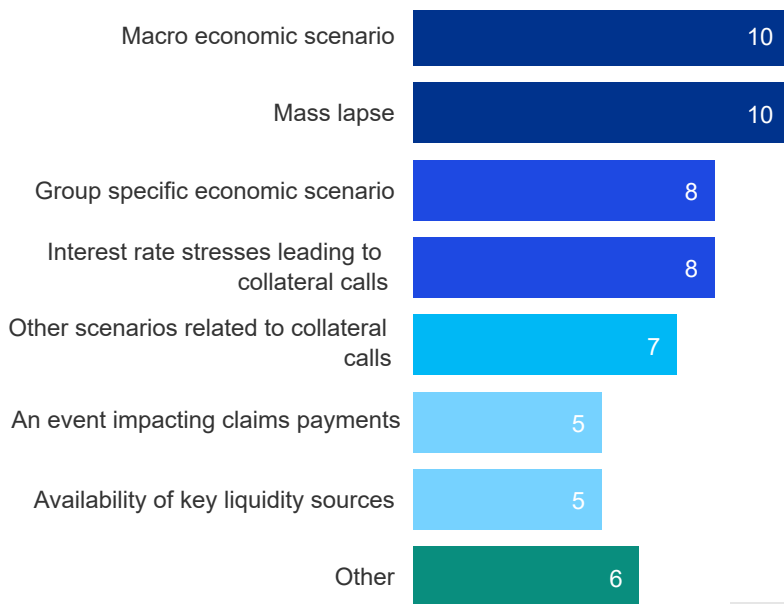
'Other' includes a range of operational risk scenarios.

7.11 What is the shortest time horizon you consider for liquidity risk?
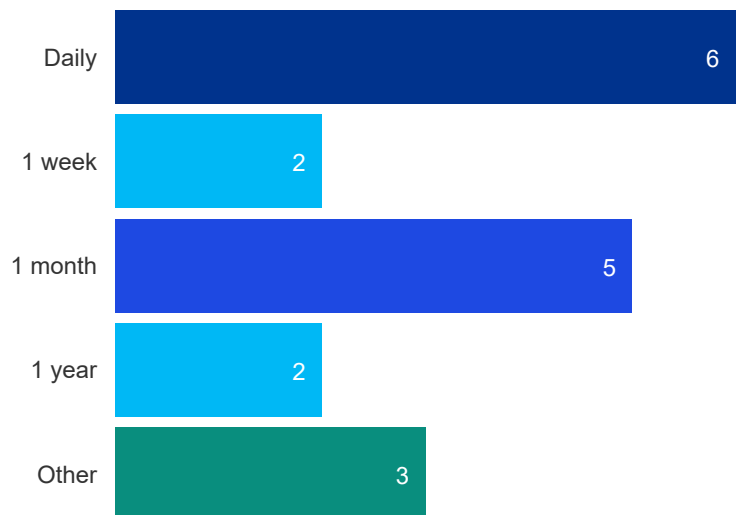
'Other' includes time horizons ranging from 4 days to 10 years.

1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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Operational Risk Capital

This section covers methodologies in respect of Operational Risk Capital. We asked about the sort of risk scenarios that materially contribute to Operational Risk Capital (i.e. are among five most significant). We continue to see a wide range of responses which reflects differences in the operating models of respondents and therefore the risks that arise. There are also some differences in how risks are classified and defined. However a clear feature is that all respondents ranked cyber attack & information security within their top five with model risk and product flaws & inappropriate sales practices selected by the majority of respondents.

8.1 If you were to rank your largest Operational Risks (by undiversified capital), which of the following would be in the top five risks?

Risk	Count
Cyber Attack & information security	10
Model risk	7
Product flaws & inappropriate sales practices / mis-selling	6
External fraud, financial crime and sanctions	4
Failure of third party / outsourcing failure	4
Inadequate Reserving process	3
Regulatory breach	3
Conduct risk	2
Failed or inappropriate pricing / UW process	2
Business disruption	1
Change Management & Projects	1
Internal fraud	1
Regulatory mandated reduction in product charges	1

10

Given the importance of model risk and the recent regulatory focus on this in the banking sector, we asked about progress in mitigating model risk through setting up model risk frameworks and extending the Internal Model control environment to wider models. We had limited responses to these questions but we could see a high degree of consistency in approaches between respondents and that overall progress was being made to improve model risk management.

Respondents treated actuarial models, financial models and other models the same within their framework. Validation as a control was being applied across these three sets of models whilst the formalisation of documenting limitations, expert judgements etc was also a step that some respondents had taken. Developing a risk appetite for model risk is a theme of the new banking regulations (PRA SS1/23) and we have seen progress here with metrics based on risk events, validation results and control assessments being introduced.

Technical Practices Survey 2023
8. Operational Risk

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SF/IM

## Operational Risk Capital and Calibration

It remains common practice to explore a relatively wide number of scenarios to investigate Operational Risk. Many insurers find the process of holding workshops to explore operational events to be a useful exercise and therefore insurers are using this as part of their overall risk management as well as to set capital requirements.

Similar to last year, the majority of the respondents stated that they are using statistical frequency / severity models and simple estimation approach for estimating their operational risk capital requirement.

8.2 What type of methodology does your firm use for estimating its Operational Risk Capital requirement?
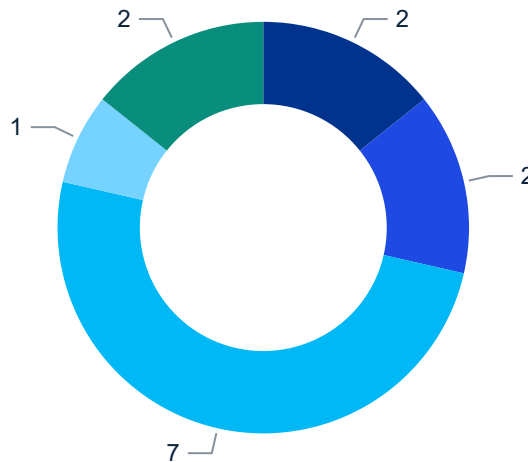
- Simple estimation approach
- Multiple scenarios (deterministic)
- Monte Carlo / statistical frequency / severity model
- Statistical model using conditional dependencies
- Other

'Other' includes calculating capital deterministically from data for individual risks, making use of deterministic scenario analysis, using a loss data model, and using a hybrid of the scenario options listed above.

8.3 For how many different Operational Risks do you use scenario workshops / expert judgement to set the modelling parameters?
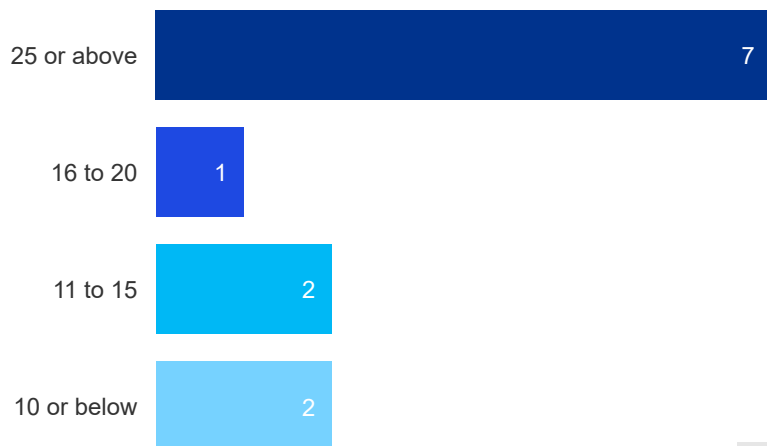
8.4 Do you model your frequency and severity distribution separately?
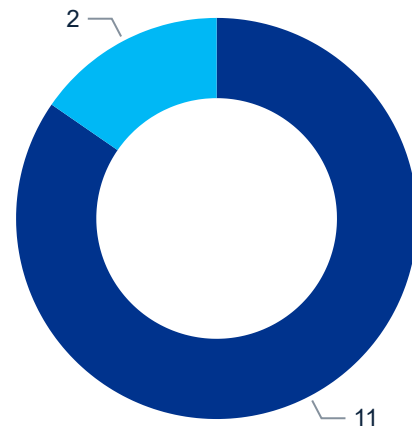
- Yes
- No

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Technical Practices Survey 2023
8. Operational Risk

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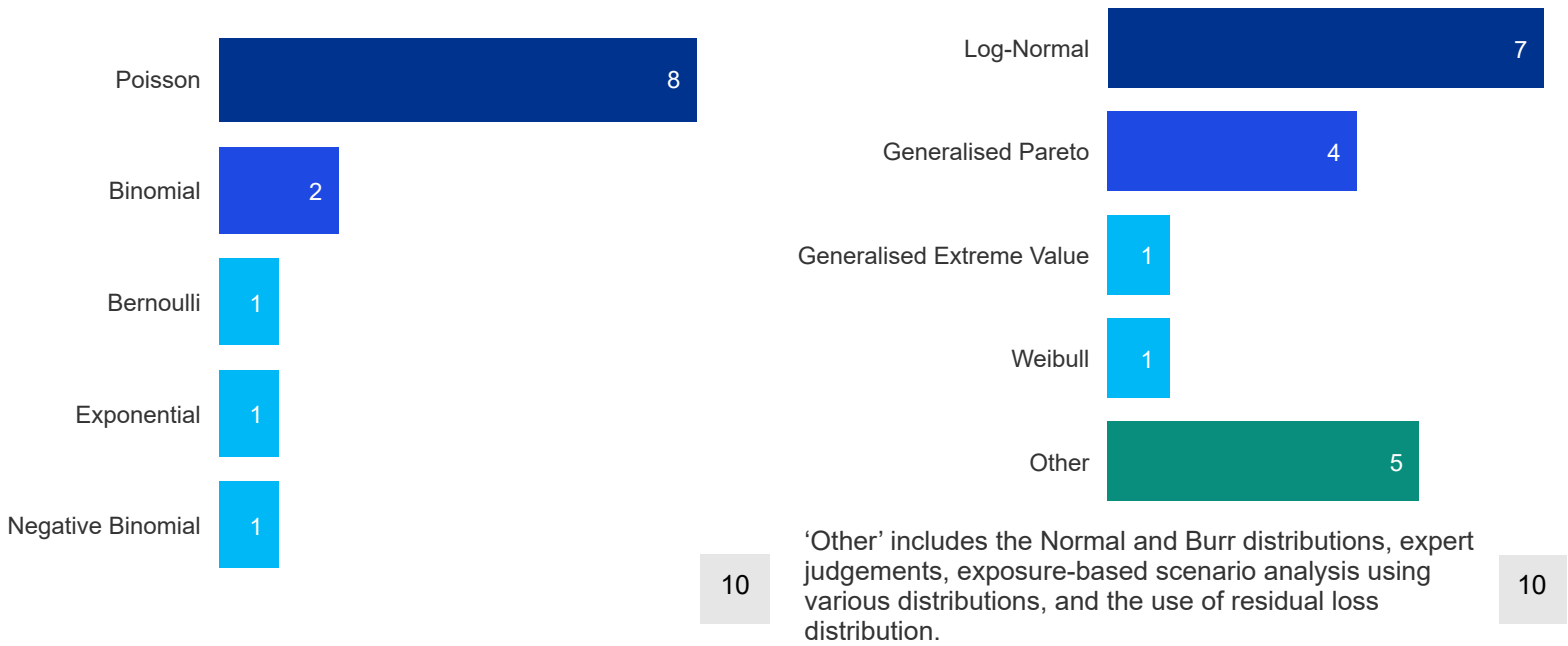## Operational Risk Capital and Calibration

The majority of our respondents have not made changes to the statistical distributions used to model the frequency or severity of operational risk in the last 12 months. However, one firm made changes to its frequency distribution and one firm made changes to its severity calibration. Given the economic changes seen in recent years, it is not surprising that refining the Operational Risk model appears to not be an area of focus at the moment. Respondents ensure that their Operational Risk capital modelling accounts for recent events and data by holding risk workshops to discuss model parameters and risk drivers. The Poisson distribution remains the most common way to model event frequency. For severity, there is a wider variety of distributions used and the use of more than one distribution is also prevalent. The log-normal distribution remains the most commonly used statistical distribution to model severity.

8.5 What statistical distributions are used to model the frequency of your Operational Risk scenarios?

- Poisson 8
- Binomial 2
- Bernoulli 1
- Exponential 1
- Negative Binomial 1

10

8.6 What statistical distributions are used to model the severity of your Operational Risk scenarios?

- Log-Normal 7
- Generalised Pareto 4
- Generalised Extreme Value 1
- Weibull 1
- Other 5

'Other' includes the Normal and Burr distributions, expert judgements, exposure-based scenario analysis using various distributions, and the use of residual loss distribution.

10

8.7 On what basis are correlations set between Operational Risks, and between Operational Risks and other risks?

- Combination 4
- Causal driver approach 2
- Pure expert Judgement 5
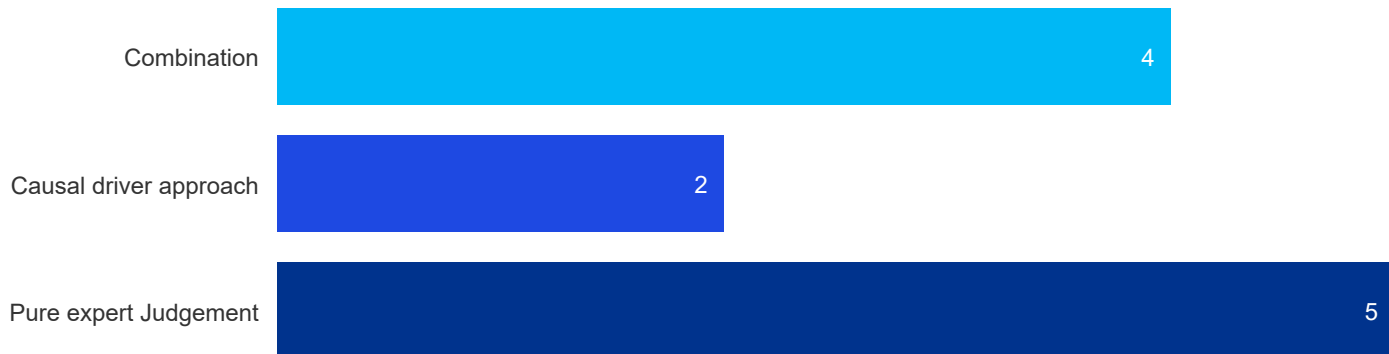
Additional Comments included:
- Correlations assessed as High, Medium or Low and correlation coefficients for each of these levels is set by expert judgement
- Set primarily using expert judgement taking into account causal drivers and common underlying factors

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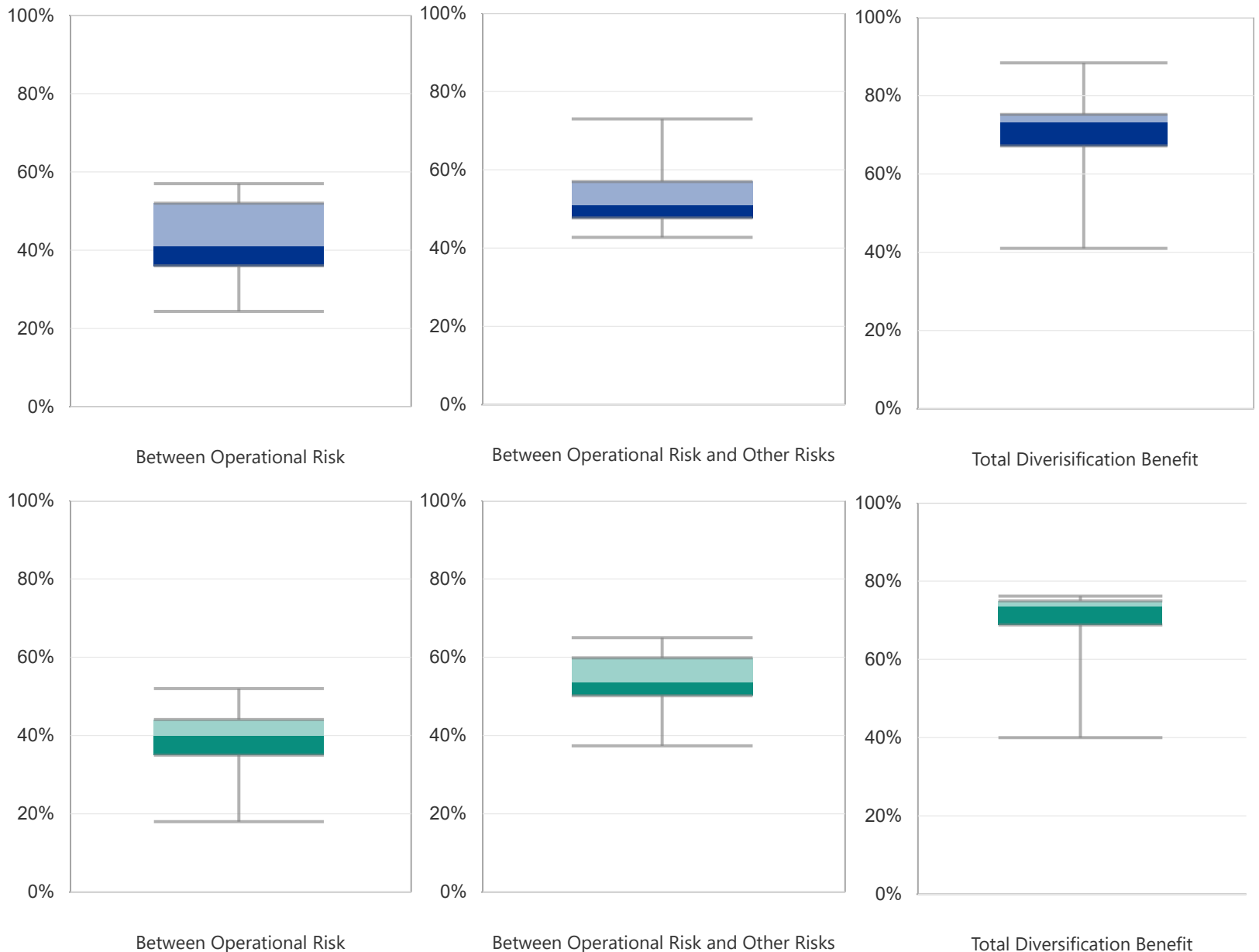| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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SF/IM

Correlations, Diversification, and Recoveries

Insurers achieve a high level of diversification between Operational Risks and between Operational Risks and other risks. Therefore, Operational Risk contributes less to the overall capital requirement than might appear from the individual scenarios. The correlation parameters that underpin the diversification benefit are relatively subjective and broadly set using pure expert judgement. Even the alternative approach of using causal driver analysis is underpinned by expert judgment. The setting of correlation parameters and ensuring that the overall diversification allowance is appropriate will remain an area that insurers need to keep under review.

One firm responded with substantially higher diversification benefit between their Operational Risks and other risks as a percentage of undiversified Operational Risk Capital as compared to all other respondents.

Diversification benefit between operational risks remained consistent to previous year. However, diversification benefit between Operational Risks and other risks has increased slightly when compared to last year.

8.8 What diversification benefit are you able to achieve, as a percentage of undiversified Operational Risk Capital?

Between Operational Risk

Between Operational Risk and Other Risks

Total Diverisification Benefit

Between Operational Risk

Between Operational Risk and Other Risks

Total Diversification Benefit

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Technical Practices Survey 2023
8. Operational Risk

1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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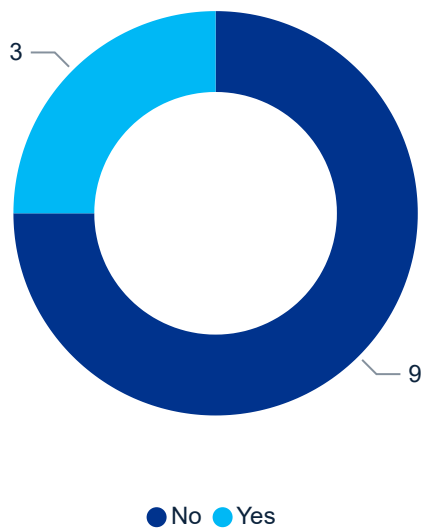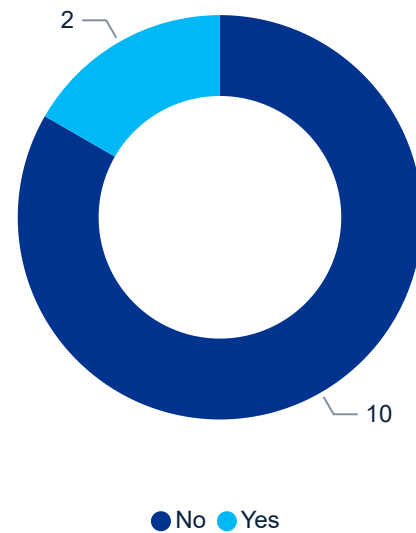### Operational Risk Capital and Calibration

We continue to see companies using workshops to set their Operational Risk Modelling parameters. As in previous years, the majority of companies use data from historic internal events and risk/control assessments for Operational Risk Calibration. Further, the direct use of the internal/external data for setting parameters is limited with greater use of this data to inform expert judgement and validate the Operational Risk Capital.

Although Operational Risk modelling has remained stable, firms have shown interest in making updates in terms of refinements and developments. Six respondents expect to make changes to their operational risk modelling in the near future, which seems to be mainly driven by the re-examination of risk appetite. A few of the respondents said that they do not expect changes in the near future but that might change based on the outcome of their annual review exercise.

8.9 Have there been any changes to the statistical distributions used to model the frequency or severity of your Operational Risk scenarios in the last 12 months?
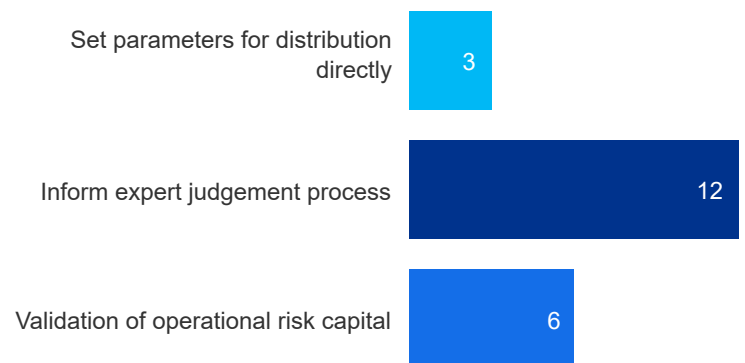

- 3
- 9

● No ● Yes

8.10 Have you planned any changes to your Operational Risk Modelling in the near future, say next 12 months?

- 2
- 10

● No ● Yes

8.11 What data do you use in your Operational Risk Calibration process?

Historic internal events	11
Risks from risk assessment processes	11
Control assessments	9
Emerging risks	8
Historic external events	8
Prior year's calibration	8
Forward looking business plans	7
Internal audit findings	6
Risk indicators	6
Events outside your entity	2

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8.12 How is internal/external data used in your Operational Risk model?

Set parameters for distribution directly	3
Inform expert judgement process	12
Validation of operational risk capital	6

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| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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Risk Calibration and Proxy Models

In general firms continue to perform their risk calibrations annually but some firms update less material risks on a triennial basis.

Having invested in the capacity to run larger fitting data sets, a number of firms are investigating more complex ways of fitting proxy models, for example making use of automated fitting routines. Matching Adjustment under Stress (MAuS) continues to be an area in which firms are seeking to make improvements, often driven by enhanced modelling capacity. Some firms continue to look to increase the amount or improve the quality of the data they are using for calibration and validation, for instance in response to the PRA's challenge of proxy models.
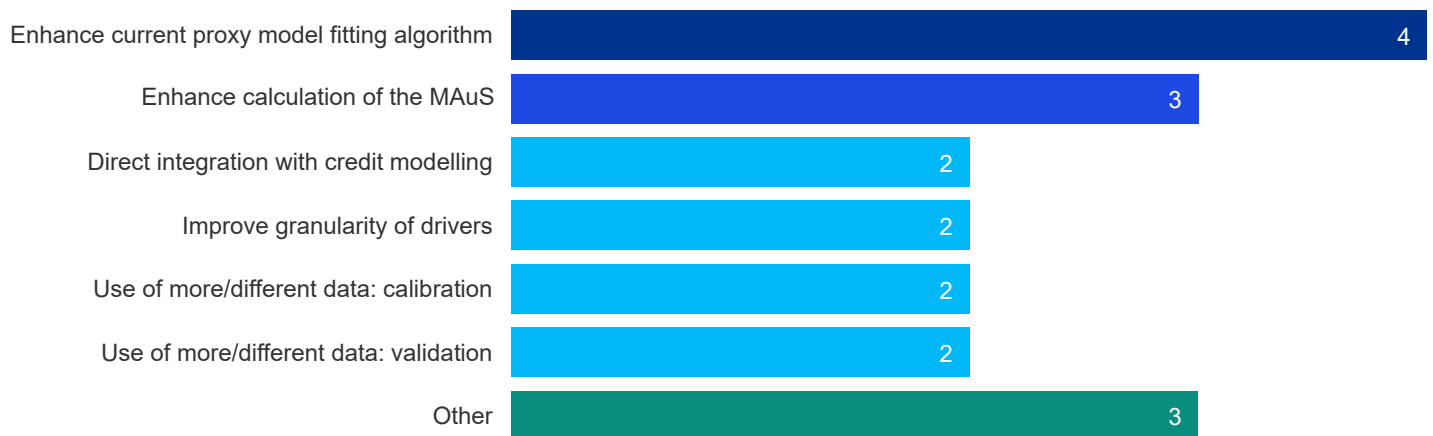
9.1 How frequently do you calibrate the following risks?
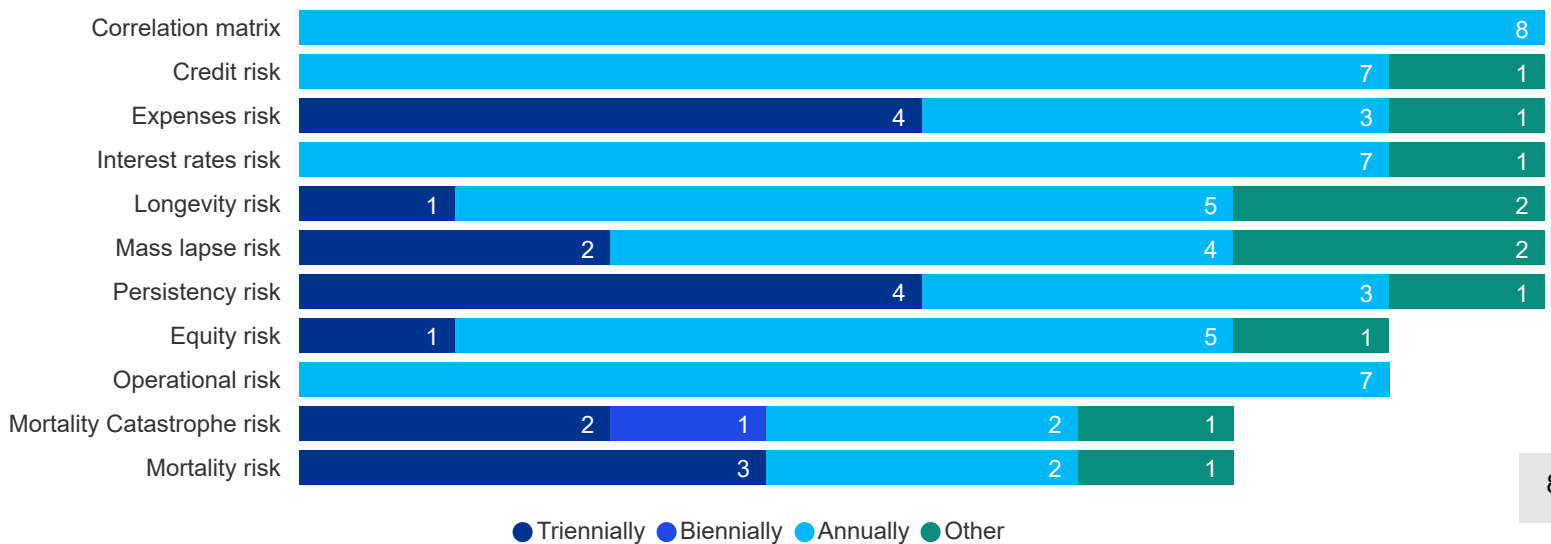
'Other' refers to respondents who do not have a fixed calibration frequency and rather recalibrate the risks in response to monitoring triggers or to address regulatory or business needs.

9.2 Are you planning any development to your capital model?

'Other' includes other actions such as use of higher polynomial terms (cubic) for certain types of business.
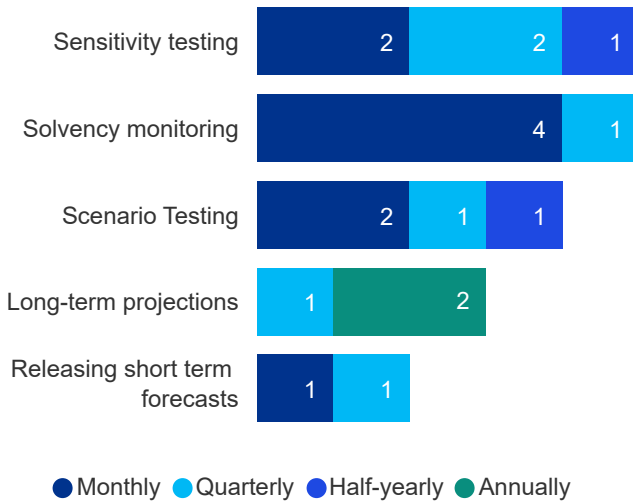
1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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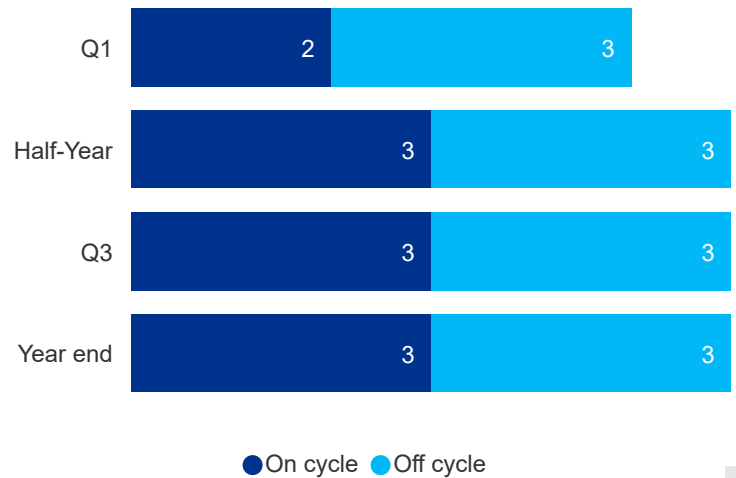## Proxy Modelling

Continued enhancements to the IT infrastructure (both software and hardware), alongside cloud computing solutions, have meant that firms are increasingly able to calibrate their models on-cycle, although it is not yet universal practice. Chart 9.3 shows the different purposes for which firms make use of their proxy models and long-term projections seems to be one of the many purposes. Not all firms have developed the capabilities to calibrate the proxy model for reporting on-cycle. For those reporting off-cycle, the majority perform their calibration within three months prior to reporting date.

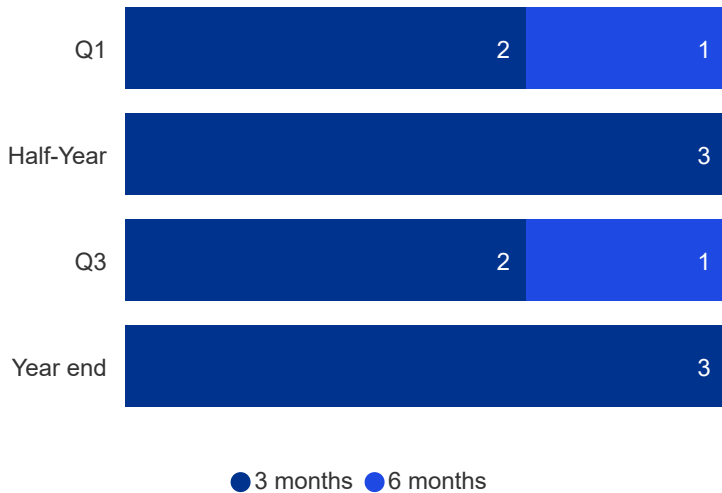**9.3** For what purposes do you use your proxy model?

Some firms use their proxy models for other purposes such as SCR calculations, RM calculations, Pricing, & ALM.

9.4a At each reporting period, do you calibrate your proxy model for reporting on-cycle or off-cycle?
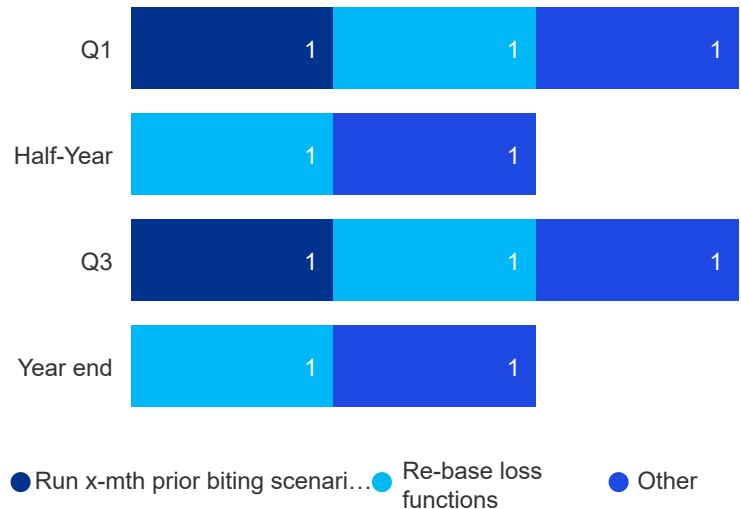

9.4b If performed off cycle, how many months prior to reporting date is the calibration performed?

9.4c If performed off cycle, how is the SCR rolled forward?

'Other' includes calibration carried out at prior quarter end with roll-forward.

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Technical Practices Survey 2023
9. Aggregation

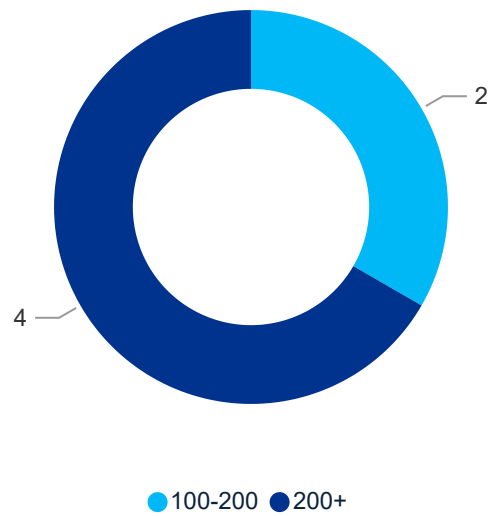| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
6. Life Underwriting Risk	7. Capital Management	8. Operational Risk	9. Aggregation	10. Correlation

IM

Proxy Modelling

None of the respondents perform fewer than 100 fitting scenarios for their largest funds. For both "With-profits" and "Other" funds, the majority of respondents performed more than 200 fitting scenarios. However, for validation scenarios, there were two responses suggesting the use of fewer than 100 scenarios for both "With-profits" and "Other" funds.

9.5 For your largest fund, how many fitting scenarios do you perform?
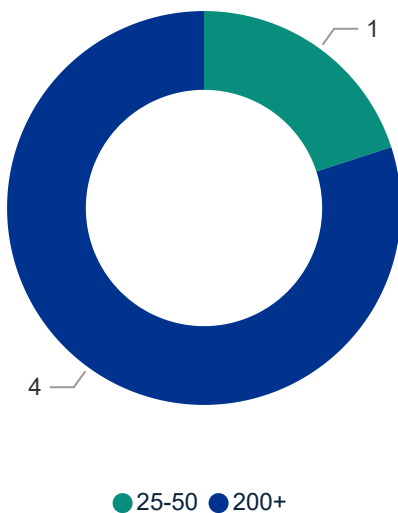
With-profits Fund

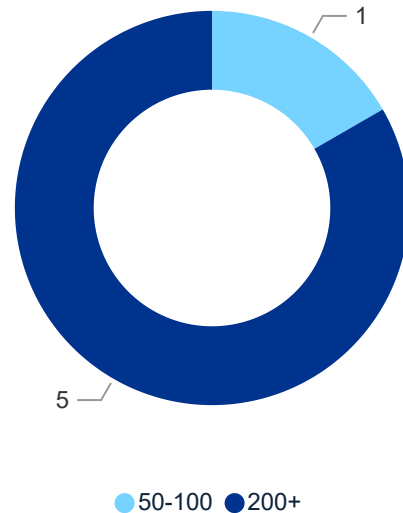### Other Funds

100-200 200+

100-200 200+
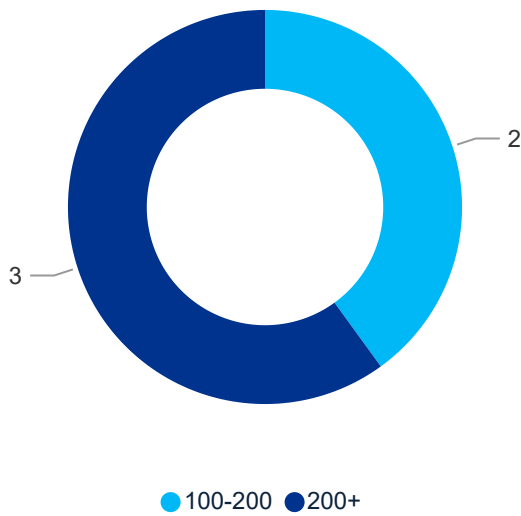
9.6 For your largest fund, how many validation scenarios do you perform when testing the goodness-of-fit?

With-profits Fund

Other Funds

25-50 200+

50-100 200+

1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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Diversification Level

The diversification benefits presented in chart 9.10 are the percentage by which the total SCR, excluding Loss Absorbing Capacity of Technical Provisions and Deferred Taxes is reduced through diversification. Internal Model firms are able to achieve higher diversification than the Standard Formula firms.

9.7 Diversification amongst life risks as a percentage of total undiversified risk (%)
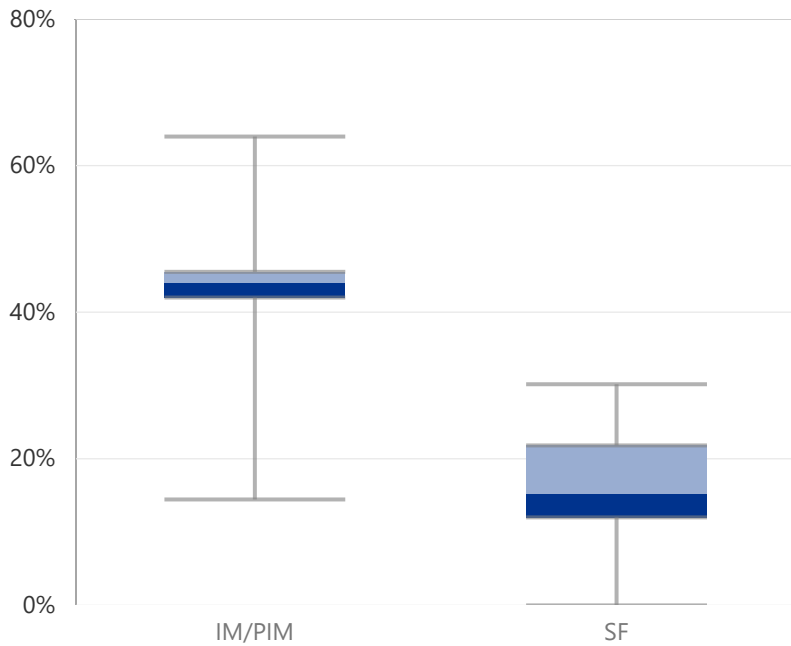
9.8 Diversification amongst market risks as a percentage of total undiversified risk (%)
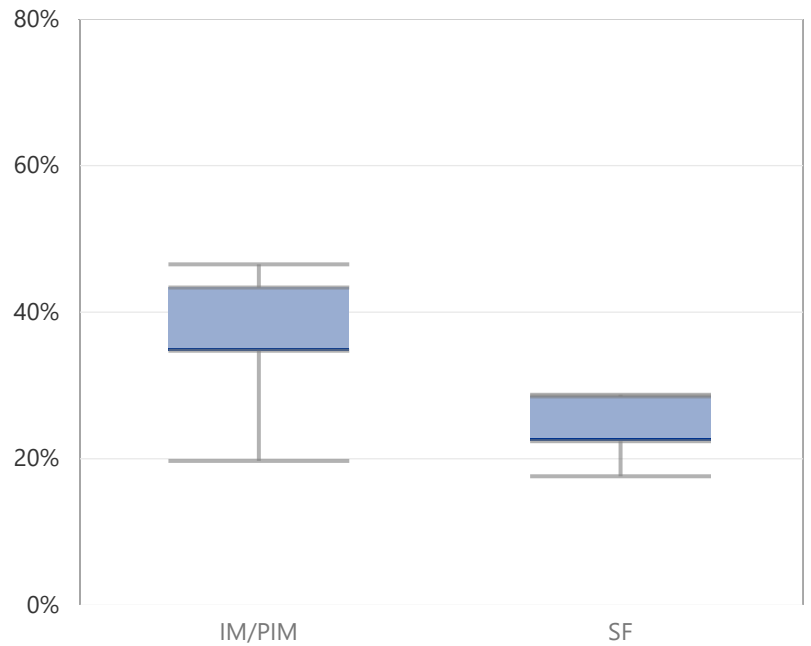
9.9 Diversification between risk modules (%)

9.10 Total Diversification (%)

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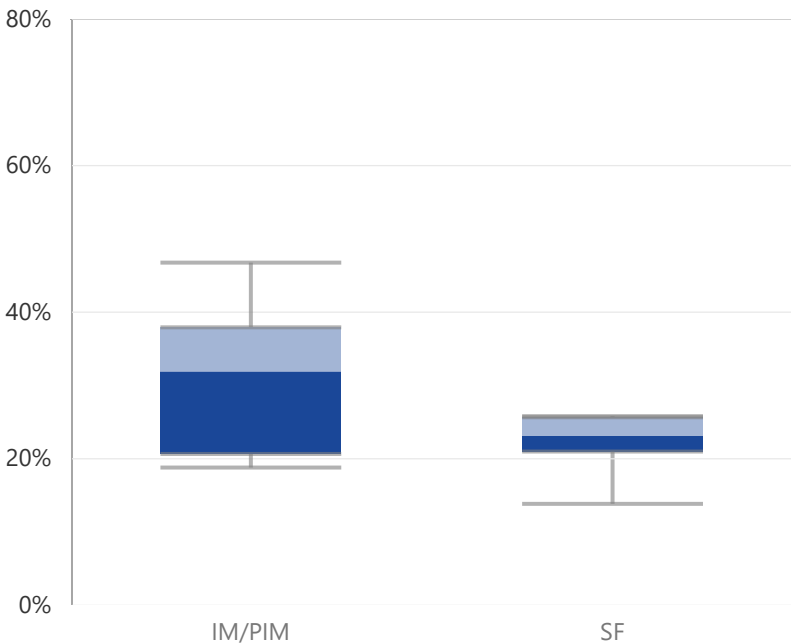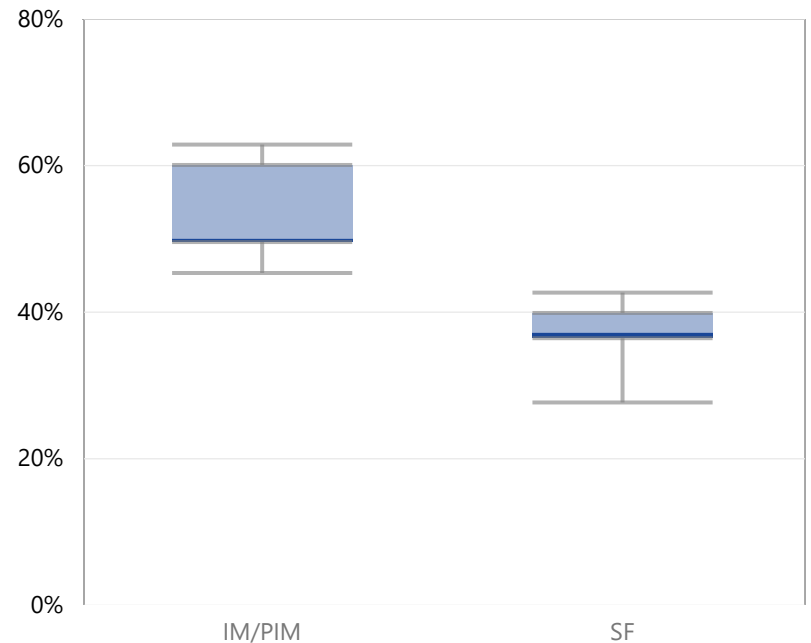| 1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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SF/IM

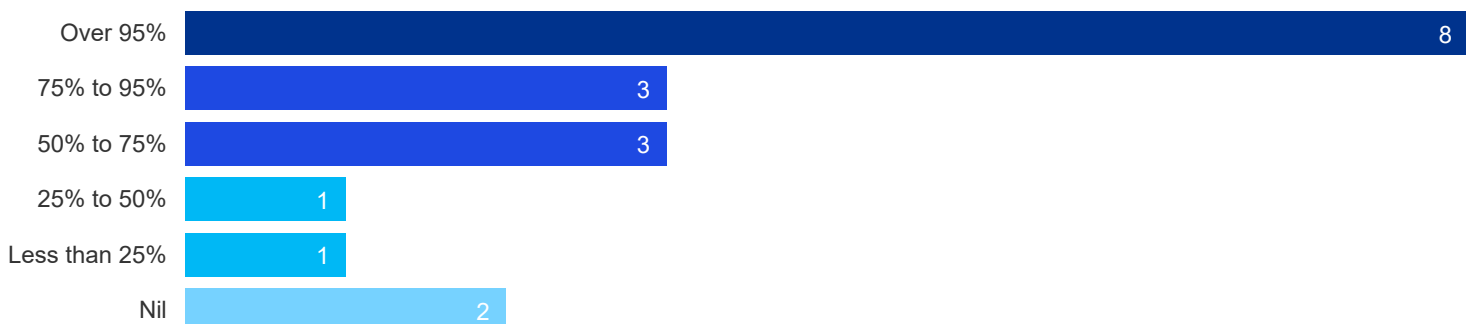## Loss Absorbing Capacity of Deferred Tax (LACDT)

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

The most common basis to support firms' LACDT continues to be offsetting with deferred tax liabilities and prior year tax liabilities. In addition, five firms indicated that they have relied on future profits from future new business to support their YE22 LACDT. No respondent allowed for the release of Risk Margin on closed books or products (but one did for open business). Four firms permitted the release in resect of closed business in their methodology but did not rely on it in practice.

9.11 Which of the following sources of future income or profits support your 31 December 2022 LACDT?

Source	Permitted in our methodology	Actually used to support YE22 LACDT
Offset with deferred tax liabilities	15	14
Offset with prior year current tax liabilities	9	5
Taxable profits arising on future long-term NB	8	5
Investment return on excess capital	6	4
Post-shock management actions	4	3
Reverse effect of SII assumptions considered to be overly prudent	3	2
Release some/all of RM for closed books/products	4	
Yield on debt in excess of the post-stress RFR	3	1
Release some/all of RM for open books/products	2	1
Use modified business as usual forecasts incl. some / all of other sources	2	1
Yield on equity in excess of the post-stress RFR	3	
Income or profits from GI or non-insurance entities in the group	2	
Post-shock tax planning	1	
Other	1	1

●Permitted in our methodology ●Actually used to support YE22 LACDT

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9.12 How much of the potential LACDT do you recognise in your SCR?

Over 95%	8
75% to 95%	3
50% to 75%	3
25% to 50%	1
Less than 25%	1
Nil	2

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Technical Practices Survey 2023
10. Correlation

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IM

Correlation Parameters

In order to facilitate better comparability for the correlation pairs, the data submitted have been amended where required to appropriately align sign conventions amongst respondents. Not all respondents complete a full correlation matrix, so there are some correlation pairs with fewer data points than others.

Correlation matrices were provided by nine internal model firms. The majority of the correlations have remained unchanged from year to year with one firm making no changes at all to their correlation matrix. This is, however, an area of significant judgement and we have seen more movement this year than in previous years. Almost all changes that have been made to correlation matrices have been in respect of market risk pairs, with some changes of 20% or more. Only one respondent made a change to any of their market/non-market correlations.
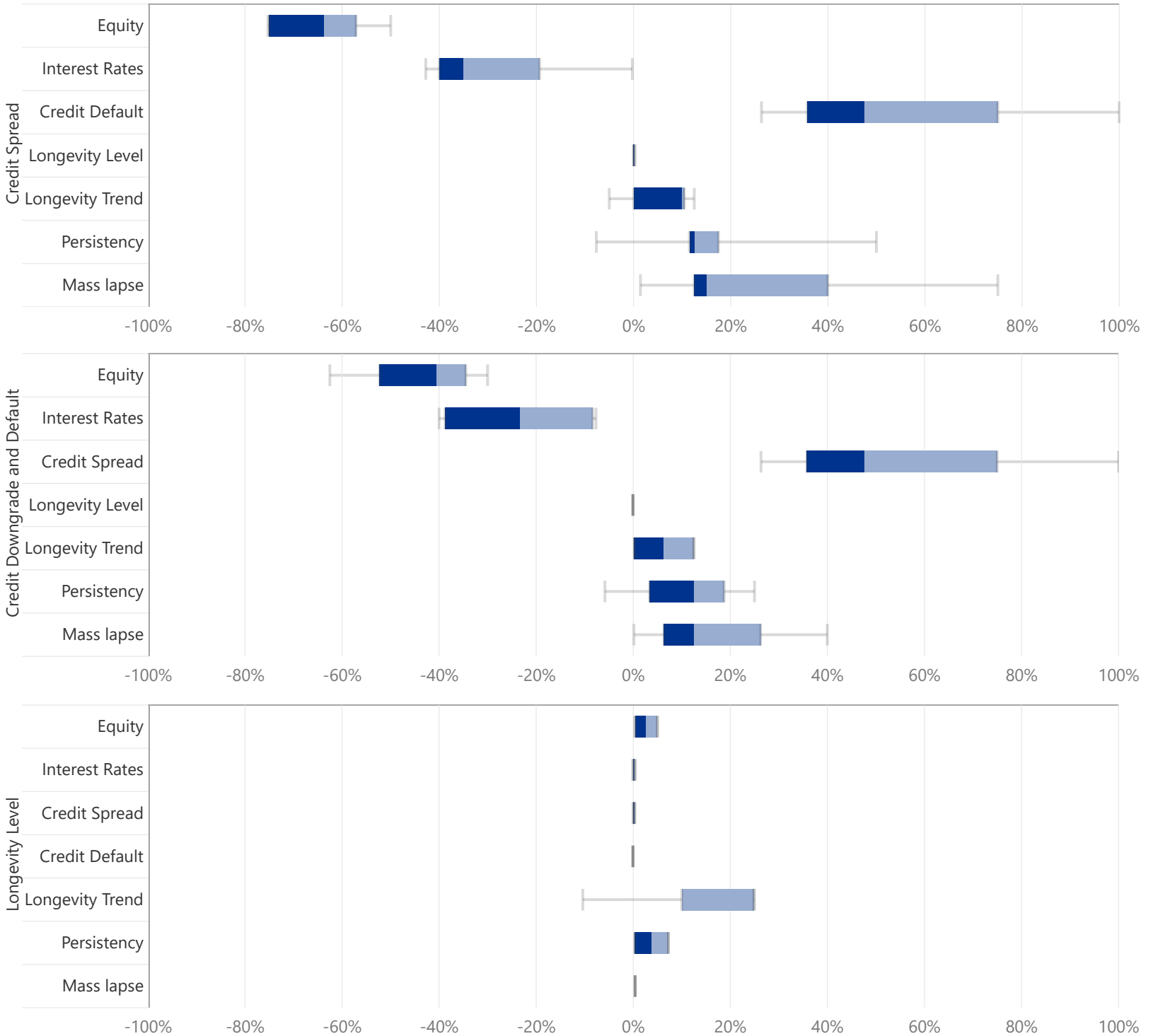

Correlation Parameters (in %)

1. Balance Sheet	2. Standard Formula	3. Market Risk (excl. Credit)	4. Credit Risk	5. Lifetime Mortgages
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Correlation Parameters (in %)

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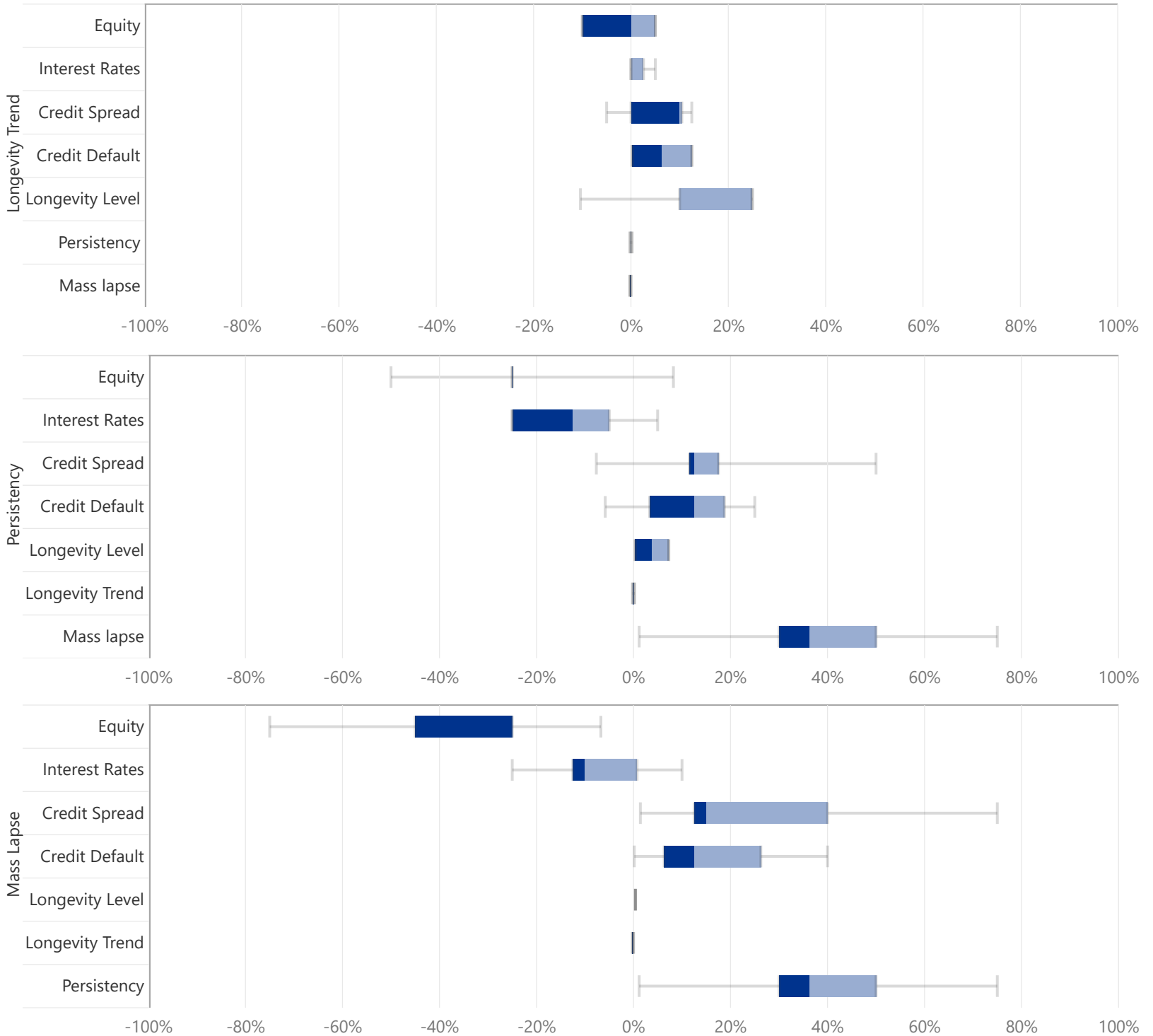

Correlation Parameters (in %)

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Glossary

ALM	Asset and Liability Management		**LTGM**	Long Term Guarantee Measure
BE	Best Estimate		**LTM**	Lifetime Mortgage
bps	Basis Points		**LTR**	Long Term Rate
CMI	Continuous Mortality Investigation		**MA**	Matching Adjustment
CoC	Cost of Capital		**MAP**	Matching Adjustment Portfolio
CoD	Cost of Downgrade		**MAuS**	Matching Adjustment under Stress
CoG	Cost of Guarantees		**MBS**	Mortgage Backed Securities
CREL	Commercial Real Estate Lending		**MV**	Market Value
DB	Defined Benefits		**Non-MAP**	Non-Matching Adjustment Portfolio
DTA	Deferred Tax Assets		**ORSA**	Own Risk and Solvency Assessment
ECAI	External Credit Assessment Institutions		**PCA**	Principal Component Analysis
EIOPA	European Insurance and Occupational Pensions Authority		**PIM**	Partial Internal Model
EoL	Expectation of Life		**PoD**	Probability of Default
ERM	Equity Release Mortgages		**PRA**	Prudential Regulation Authority
EVT	Effective Value Test		**RFR**	Risk Free Rate
FRN	Floating Rate Note		**RM**	Risk Margin
FS	Fundamental Spread		**SCR**	Solvency Capital Requirement
FX	Foreign Exchange		**SF**	Standard Formula
HPI	House Price Index		**SST**	Stress and Scenario Testing
IBNR	Incurred But Not Reported		**ST**	Short Term
IM	Internal Model		**T&D**	Transition and Default
IR	Interest Rate		**TMTP**	Transitional Measure on Technical Provisions
LACDT	Loss Absorbing Capacity of Deferred Tax		**TP**	Technical Provisions
LGD	Loss Given Default		**UL**	Unit-linked
LT	Long Term		**UW**	Underwriting
LTAS	Long Term Average Spreads		**VA**	Volatility Adjustment
			WP	With Profits

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 19 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.

The survey requires a large investment of resources on our part, in particular the analysis and interpretation of the data. 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 Jo Thorpe, Courtney Davison, Sophie Gong, Dipesh Gupta and Charlotte Nugent for their hard work in managing the survey.
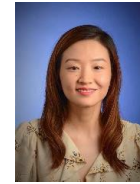
Core team

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Survey Manager

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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:

- Aegon UK
- Aviva
- Countrywide Assured
- Forester Life
- HSBC Life
- Irish Life Assurance
- Just Group
- Legal & General
- M&G
- NFU Mutual

- Phoenix
- Quilter
- Royal London Mutual
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- Sun Life Assurance Company of Canada
- Unum
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