Institute and Faculty of Actuaries

Operational Risk Modelling

Market Survey

Life Conference – November 2018

Introduction and overview

Operational risk modelling continues to be an area of challenge in many firms as practices mature in both Internal Model and Standard Formula firms.

Greater attention is being paid to methodologies through the model validation process and regulatory oversight. There are drivers to make the process more sophisticated and complex, while resources to enact them may be limited.

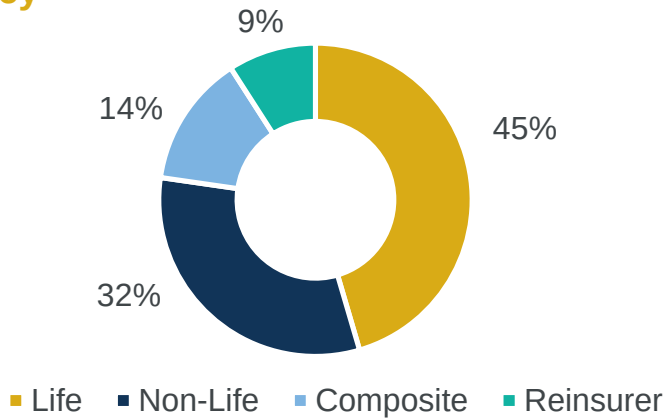
The following chart summarises the key processes in quantifying operational risk capital and our presentation will be structured around these areas:

Framework	Scenario analysis	Capital model	Validation
• Operational risk function. • Risk and control register or system.	• Scenario definition. • Workshop process to calibrate the inputs to capital model.	• Setting frequency and severity distributions. • Simulating a large number of scenarios to draw a total loss distribution. • Aggregation between scenarios. • Aggregation with other risks.	• Validation testing. • Sensitivity testing.

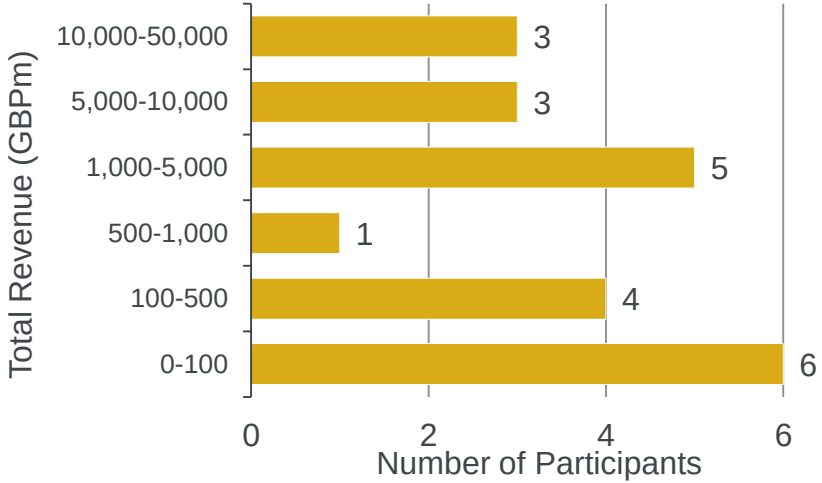
About the survey

Our survey covered 22 firms to give a representative picture of the insurance industry. Respondents ranged from life to non-life insurers with a large mix of sizes.

Type of firms participating in the survey



Size of participated firms



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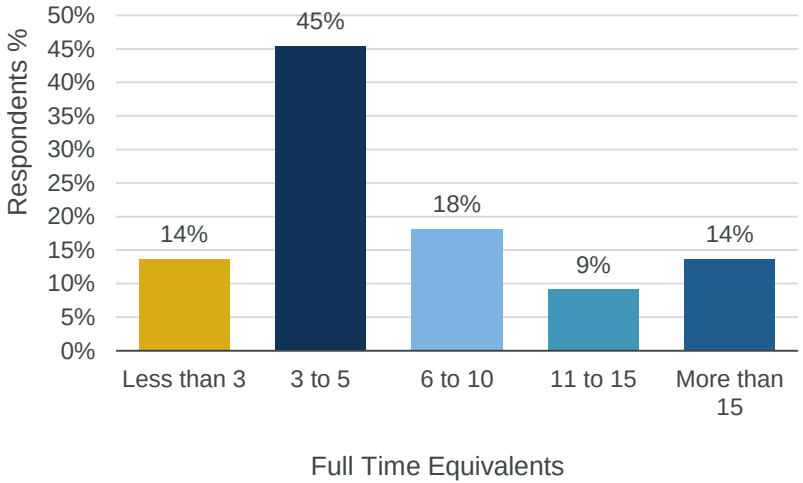
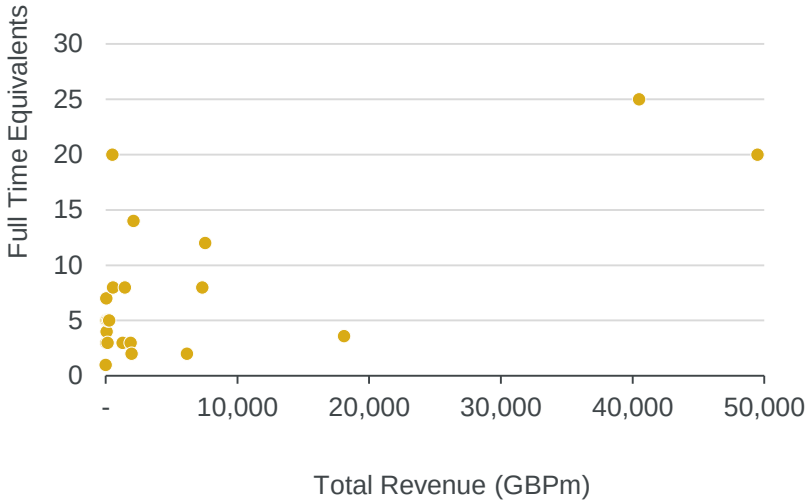
Operational risk framework

How many full-time equivalents (FTEs) are there in the "second line" Operational Risk function? (22)

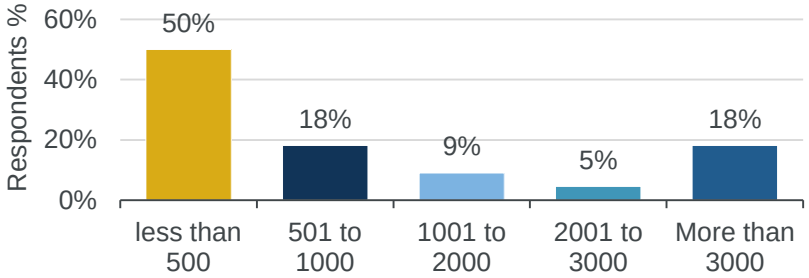


Total Revenue versus FTE (22)

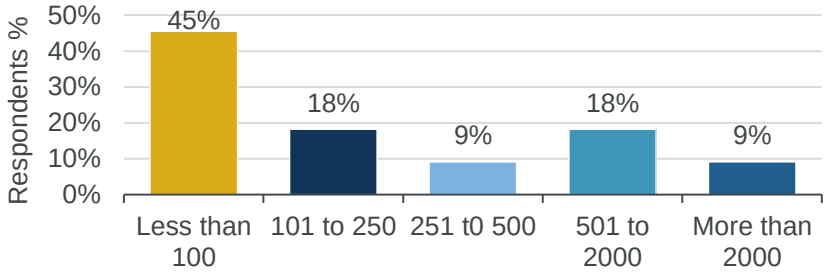


Operational risk framework (cont.)

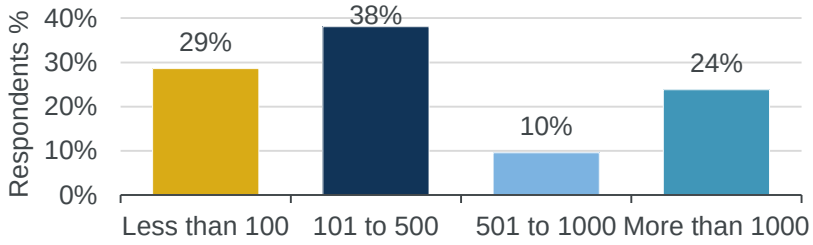
How many controls are currently recorded in your operational risk and control register or system? (22)



How many operational risks are currently recorded in your risk and control register or system? (22)



In your database/log/system of operational risk events/losses/ incidents, how many entries are currently recorded? (22)



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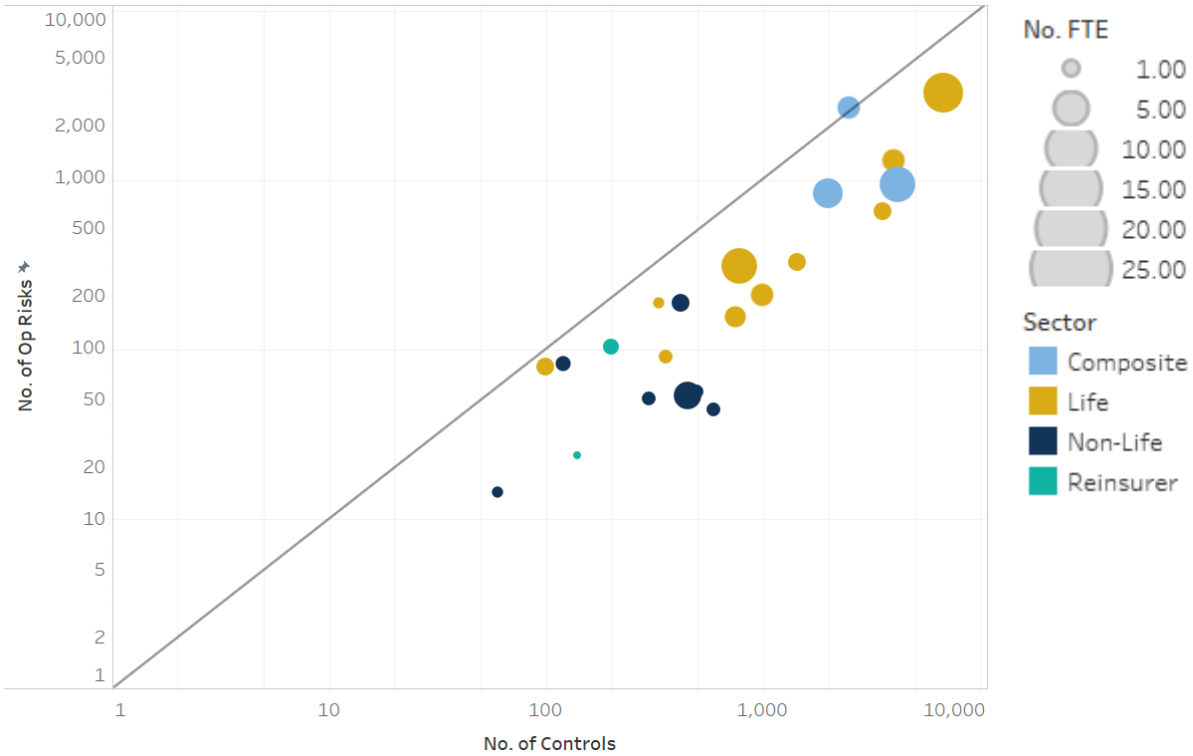
Operational risk framework (cont.)



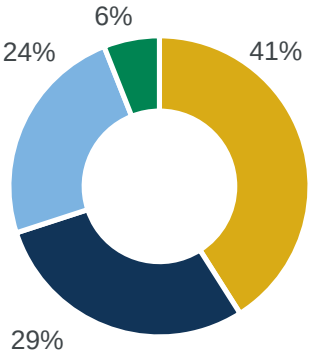
What is the relationship between the volume of risks and controls managed by the team and the number of FTEs?

Scenario definition

Firms may be unclear of the type of event/incident that their operational risk methodology considers. The varying approach in scenario definition may mean that some firms are more prudent than others when determining the list of scenarios. As operational risk capital is highly reliant on the scenario list, it is important for firms to improve their documentation in this area.

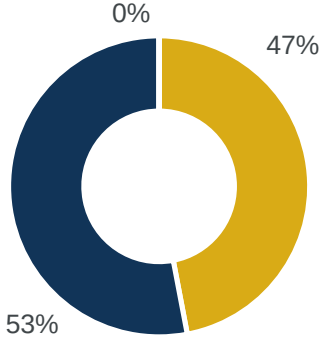
Does your firm have a definition for the type of operational risk event(s)/incident(s) that your scenario-based methodology considers? (17)

- There is a quantitative definition of the type of event/incident the methodology considers (e.g. in the methodology that refers to 1-in-200 events)
- There is a qualitative definition of the type of event/incident the methodology considers (e.g. the methodology refers to high impact events)
- There is a general, but undocumented understanding of the type of event/incident the methodology considers
- Other



Which statement below best portrays the purpose of drafting scenario descriptions? (17)

- The description describes a realistic event, but not in any precise detail
- The description describes a realistic event in detail to make it easier to calibrate it consistently
- The description does not attempt to describe an actual event; it merely points to a type of event with a risk category



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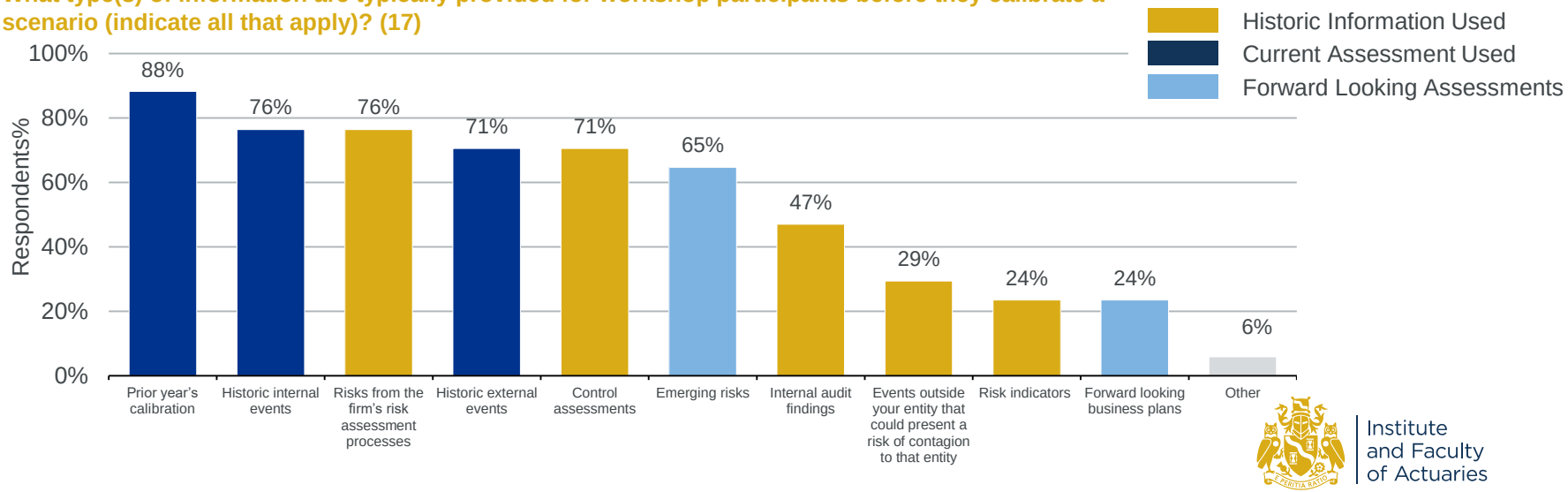
Information provided to workshop participants

A wide range of information is provided to workshop participants to support the scenario analysis process. The most common information provided are prior year's calibration, historic internal and external events, firms' internal risk and control assessments.

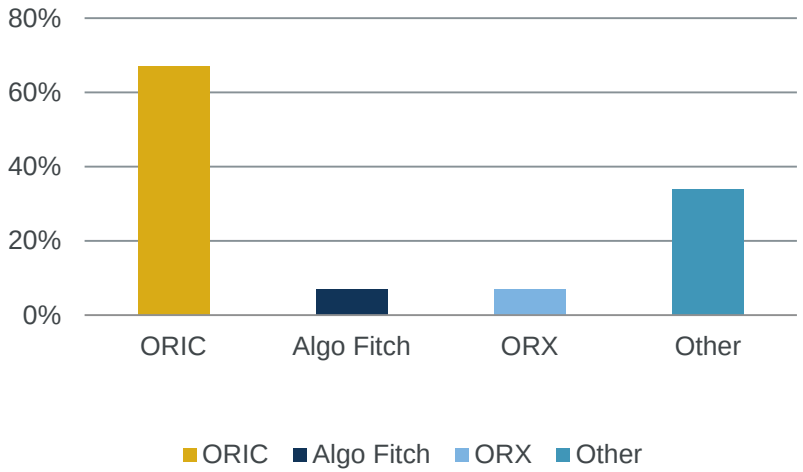
Further information considered by a number of firms include emerging risks and forward looking business plans. This information ensures that workshop participants consider the forward looking profile of the operational risk scenarios, rather than solely relying on historic data.

What type(s) of information are typically provided for workshop participants before they calibrate a scenario (indicate all that apply)? (17)

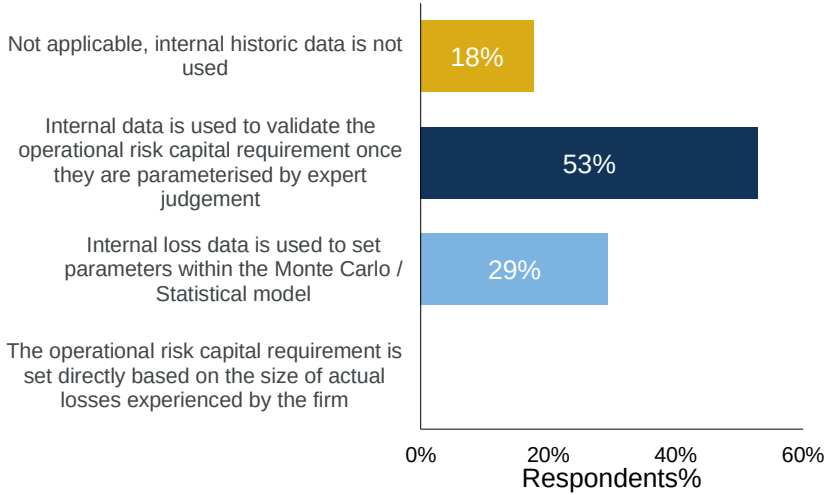


Use of internal and external data

If external historic data is used, name the data source. (13)



How is internal historic data used to sense check/validate the operational risk capital requirement? (17)



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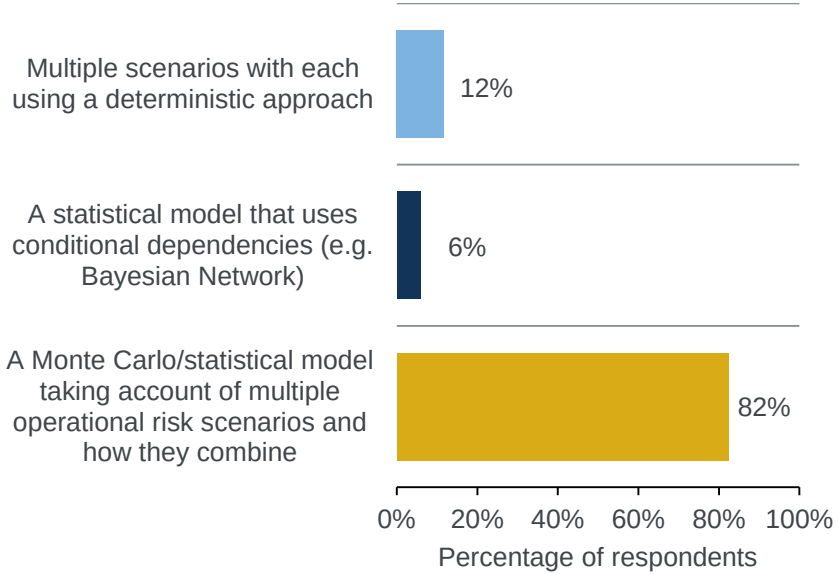
Methodology for operational risk capital

What type of methodology does your firm use for estimating its operational risk capital requirement? (17)



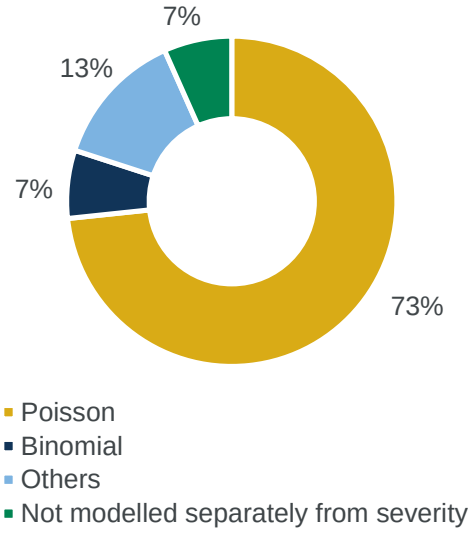
35% of firms are planning to make improvements to their operational risk models. The key enhancements considered are:

- Allowing for recoveries from corporate insurances.
- Embedding and more extensive use of empirical data.
- Further sensitivity tests to improve justification of expert judgements.
- Better fitting of distribution to data.
- Improve correlation calibrations.

Distribution for frequency and severity

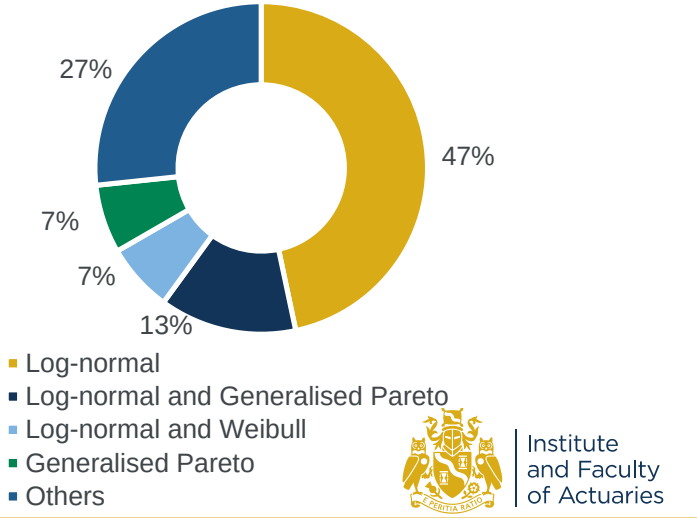
Frequency distribution (15)

Poisson distribution is the most common approach used to model frequency. Other distributions include truncated pareto and custom distributions. Mean is the most common parameter used to calibrate frequency.



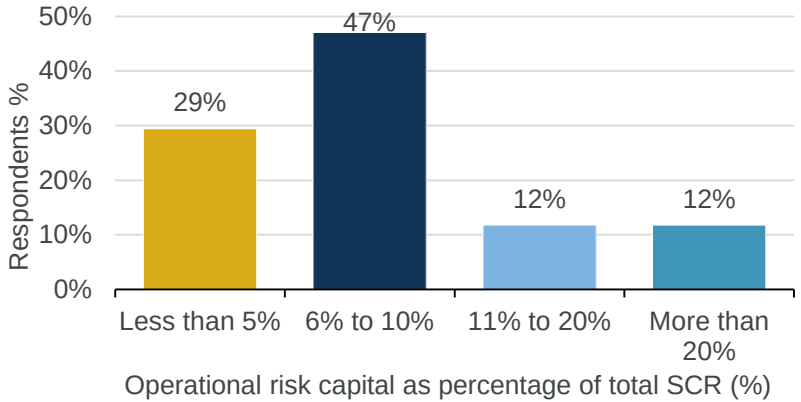
Severity distribution (15)

The most commonly used severity distributions are log-normal and generalised pareto distributions. Other distributions used include beta distribution, truncated pareto and custom distributions. Firms typically use two points to calibrate their severity distributions (e.g. median and extreme value).

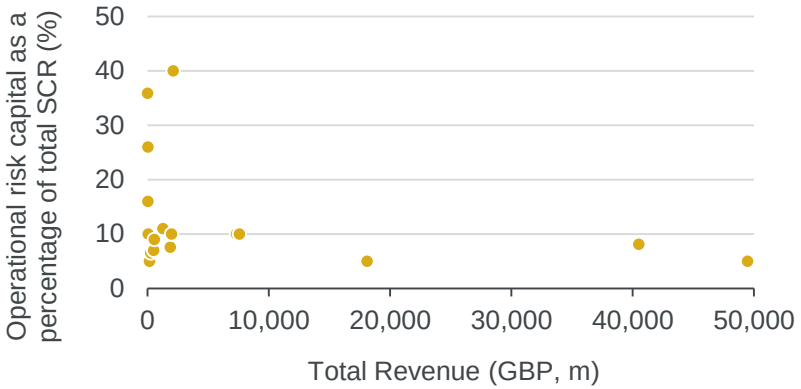


Operational risk capital

What is the magnitude of operational risk capital requirement as a percentage of the total Solvency Capital Requirement of your firm? (17)



Magnitude of operational risk versus revenue (17)



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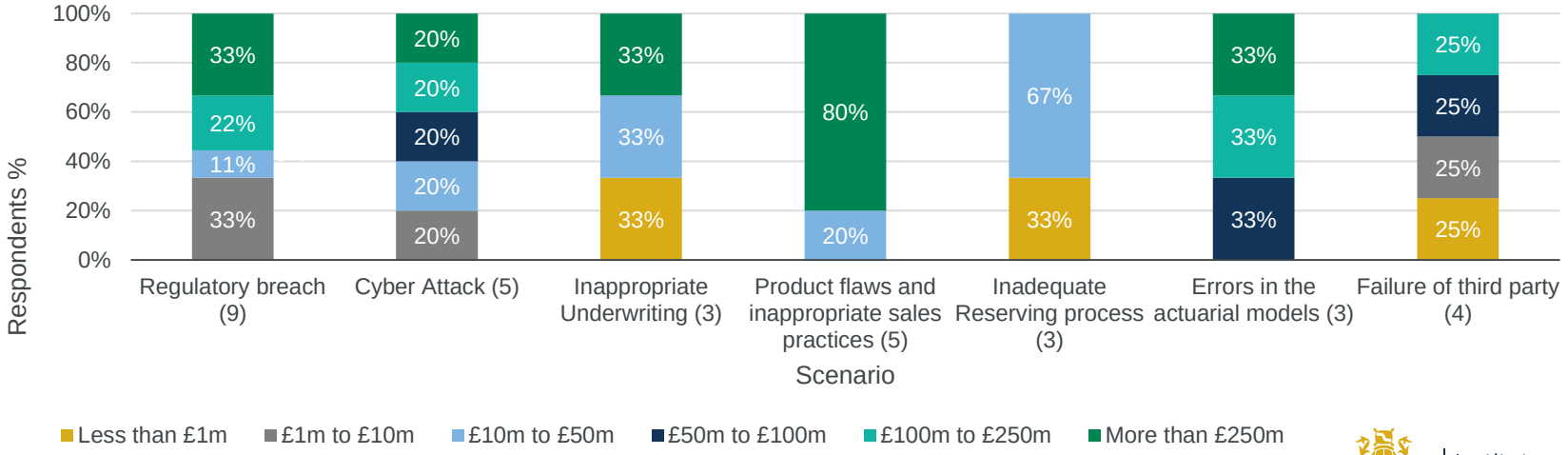
Most material operational risk scenarios

- Regulatory breach, cyber attack, inappropriate underwriting and product flaws are the most common material operational risk scenarios.
- Some of these scenarios have capital of more than £250 million for just one scenario.

In the most recent cycle of capital modelling, what was the estimated undiversified operational risk capital requirement (in GBP) for each of the top scenarios? (15)



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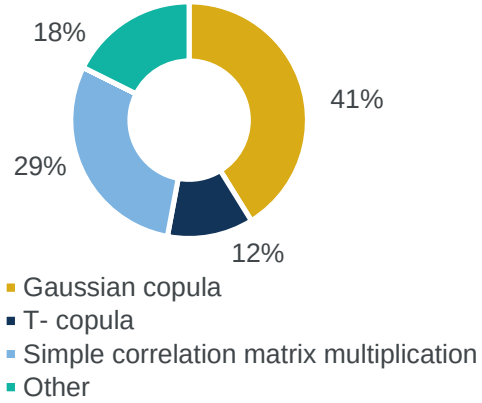
Aggregation of individual scenarios

What approach does your firm's methodology take for assessing the impact of diversification benefit? (17)



- 82% of firms use pure expert judgement to set correlations between operational risk scenarios, but good practice would be to introduce a causal driver approach which provides a better structure to the expert judgement process to avoid under- or over-estimation of correlations.

Causal driver analysis

Identify risk drivers

- Generic across all scenarios.
- Influence the dependency.
- Output of workshop 1.

Assess influence of risk drivers

- Influence of each risk driver to individual risks.
- Output of subsequent workshops.

Risk driver	Scenario A	Scenario B	Scenario C
1	10%	25%	20%
2	20%	5%	15%

Aggregate common drivers between risks

- Take the minimum influence between each risk pair.
- Total the influences across risk drivers.

Risk driver	Scenario A	Scenario B	Scenario A: Scenario B
1	10%	25%	10%
2	20%	5%	5%
Implied correlation			**15%**

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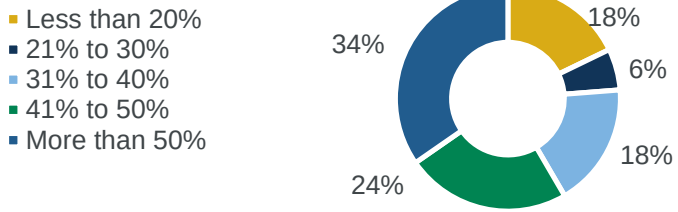
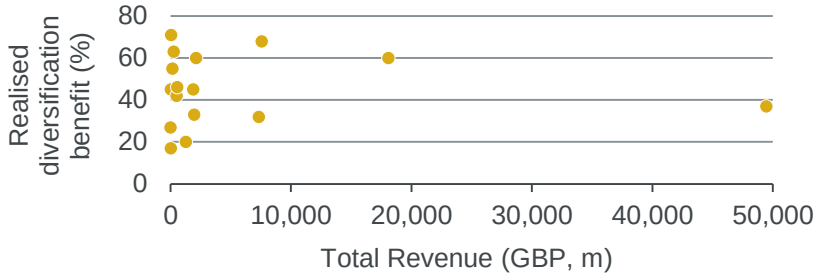
Aggregation of individual scenarios (cont.)

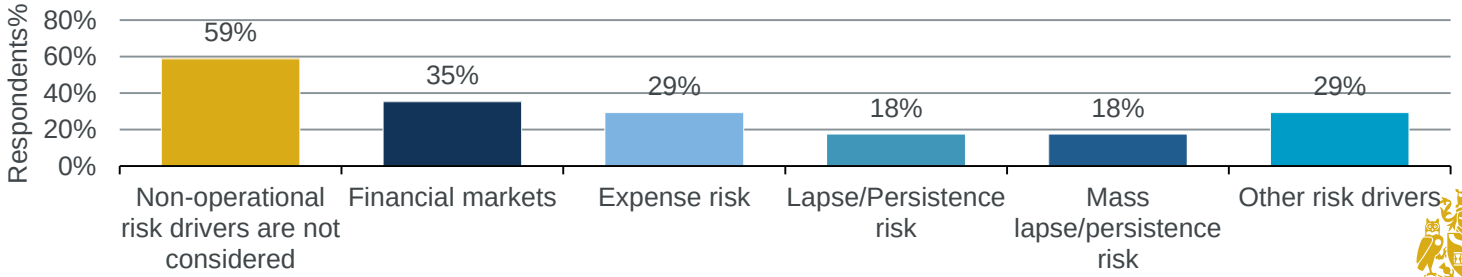
As a percentage of undiversified operational risk capital, what is the diversification benefit that you are able to realise from the correlation between all of your operational risk scenarios (i.e. before correlation with any non-operational risk drivers) (16)



Realised diversification benefit from correlation between all operational risk scenarios



If the correlation with non-operational risk drivers is taken into account, what risk drivers are considered? (17)



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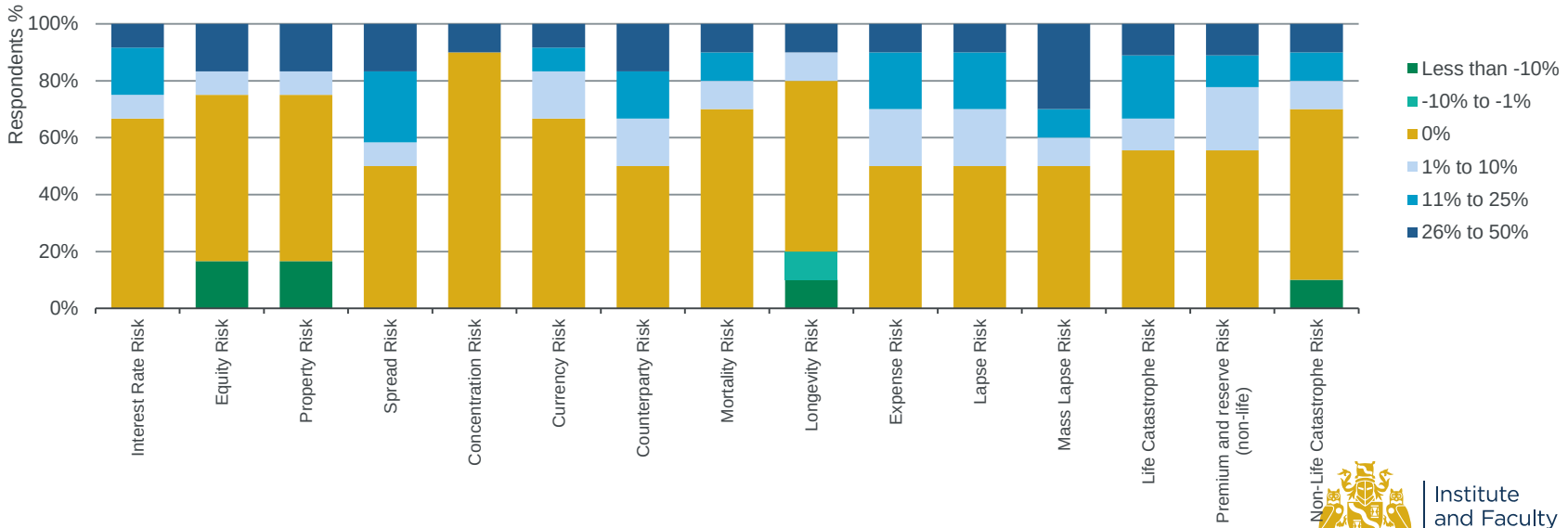
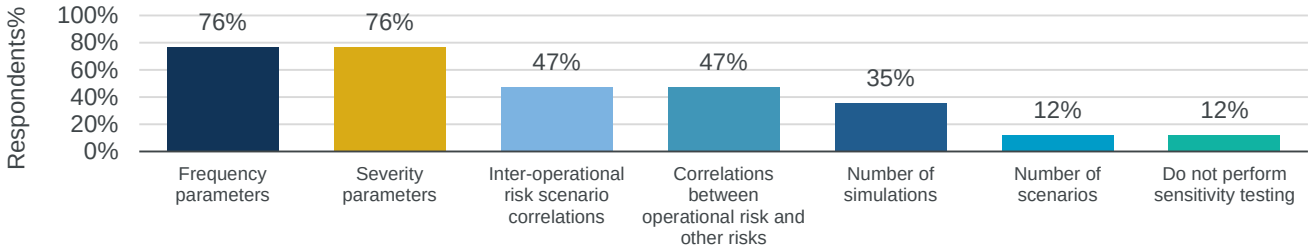
Diversification with other risks

What are the correlations (negative or positive) in percentage terms (using the range of -100% to 100%) set between operational risk and the following risks? (12)

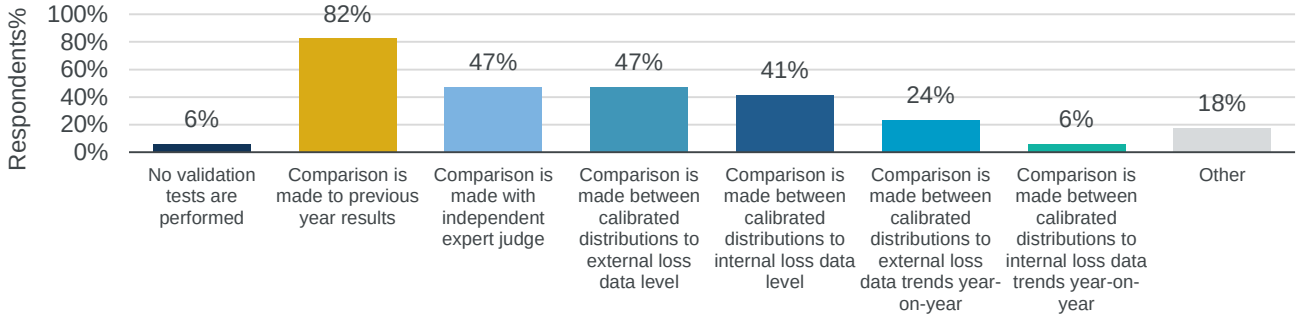


Sensitivity and validation testing

Which parameter(s) do you perform sensitivity testing for? (17)



What validation tests are performance to confirm the results of estimating the undiversified and diversified operational risk capital requirement? (17)



- Less than 50% of the firms validate its operational risk capital requirement against internal and external data.
- 12% of firms do not perform sensitivity testing. This should be considered to ensure a clear understanding of the impact of calibration against result.
- A lack of sensitivity and validation testing may mean that firms do not understand the implication of calibration changes to the operational risk capital.

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Key takeaways

The overall operational risk modelling methodology has matured over the last few years. However, given the level of expert judgement required in this area, it is important that firms continue to evolve their approaches so that the models produce capital requirement that truly reflect their operational risk profile.

Survey responses indicate that some firms could focus their development on:

- **Documentation** – clarifying the type of event/incident the operational risk methodology considers.
- **Forward-Looking information** – e.g. bringing emerging risks and future business plans into scenario analysis workshops
- **The use of external historic data** – e.g. ORIC and other data sources.
- **Potential allowance for insurance recoveries and improved correlation calibrations.**
- **The process of setting correlation inputs** – some respondents could enhance their approach by introducing a causal driver approach.
- **Strengthened validation & sensitivity testing** – to ensure firms understand the impact of calibration changes to capital results.

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