ORIC INTERNATIONAL

Powering risk intelligence

Annual Capital Benchmarking Survey Summary Report

FULL REPORT | JANUARY 2020

ORIC International Capital Benchmarking Survey Summary Report

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Foreword

I'm pleased to introduce the summary report of ORIC International's 2020 capital benchmarking survey. The survey focusses on operational risk, which continues to be the most challenging and subjective category of risk to quantify. The aim of the survey, in keeping with the purpose of the consortium, is to help participating firms benchmark their approaches against other insurance and investment management firms in order to identify potential areas for improvement.

The survey comprises over 100 questions, and this has allowed ORIC to offer insight into a wide range of elements of operational risk capital modelling, including model types, approaches to correlations and validation, common challenges from the regulators, and the use of internal and external loss data. With over 20 firms having participated across the general insurance, life insurance and investment management sectors a valuable cross-section of the financial services industry is represented in the findings.

In this summary report we provide an overview of the top 10 takeaways from this year's survey, including interesting and significant changes from the previous year's findings. With each annual iteration of the survey we provide trend analysis, picking out the material changes and flagging areas where industry approaches seem to be evolving.

ORIC member firms use the outputs of the survey across several elements of their ERM frameworks, including stress and scenario testing, emerging risk analysis, operational risk capital calculation and top risk assessments. This is supported by a number of other services and resources available to ORIC members:

- Over 14,000 operational risk events collected from members since 2005, anonymised and categorised according to Basel II taxonomy
- Over 35,000 public risk events sourced from reputable global sources, all categorised and tagged for ease of use
- Database of over 1,000 member submitted operational risk scenarios, including storylines, frequency and severity assessments
- Emerging risk database containing member-submitted storylines, impact and timescale assessments

Finally, the team at ORIC International and the Chair of the internal model working group would like to thank those firms who participated in this survey, and for continuing to support and advance the work of the consortium in developing thought leadership on topics of paramount importance, such as operational risk capital modelling. We would also like to thank the Prudential Regulation Authority for the opportunity to participate in an ongoing dialogue about the state of operational risk capital modelling in the insurance and investment management industries.

Caroline Coombe
CEO, ORIC International

Endorsement

After the launch of last year's survey, I received many positive comments from ORIC members regarding the quality of the information presented and how members valued the comprehensive coverage of the calibration cycle in the survey results. Indeed, several of the key findings from last year's survey have been raised as specific topics for discussion in subsequent Internal Model Working Groups, and other sessions hosted by ORIC throughout 2019, and this demonstrates the value of having a wide range of approaches presented in the report.

However, feedback from these sessions has also highlighted a few areas where the information provided could have been made clearer, either by seeking additional clarification from participants in certain areas or by including additional questions to the survey to allow the reported findings to be more valuable to participants. I have therefore worked with the ORIC team, and their members, to improve the survey for 2020 to provide further insights into end-to-end operational risk capital processes for the benefit of the all participants.

As I said in last year's survey, I believe the benchmarking of approaches and results to those of peers is a valuable tool in the model validation stage of the operational risk capital process and ultimately can help all firms in our industry to gradually improve these processes over time and increase understanding of the challenges faced each year.

I would like to thank all contributors to this survey, who are spread across a range of firms of different sizes, types and locations, as without your input the survey results would be significantly less valuable. I would also like to thank again our friends and colleagues at ORIC International who have worked hard to put the survey questions together, encourage firms to contribute to the survey, and consolidate the results in this report.

I hope you find the findings from this survey useful and I'm sure you will be able to use the results to help improve your own operational risk capital processes, and that we will use them to continue to drive some great discussions in the Internal Model Working Group throughout 2020.

Adrian Whitaker
Chair of the ORIC Internal Model Working Group

Contents

Executive Summary

The Capital Benchmarking Survey is an annual survey conducted by ORIC International and our Internal Model Working Group that explores the end to end capital model processes conducted by our insurance and investment management member firms.

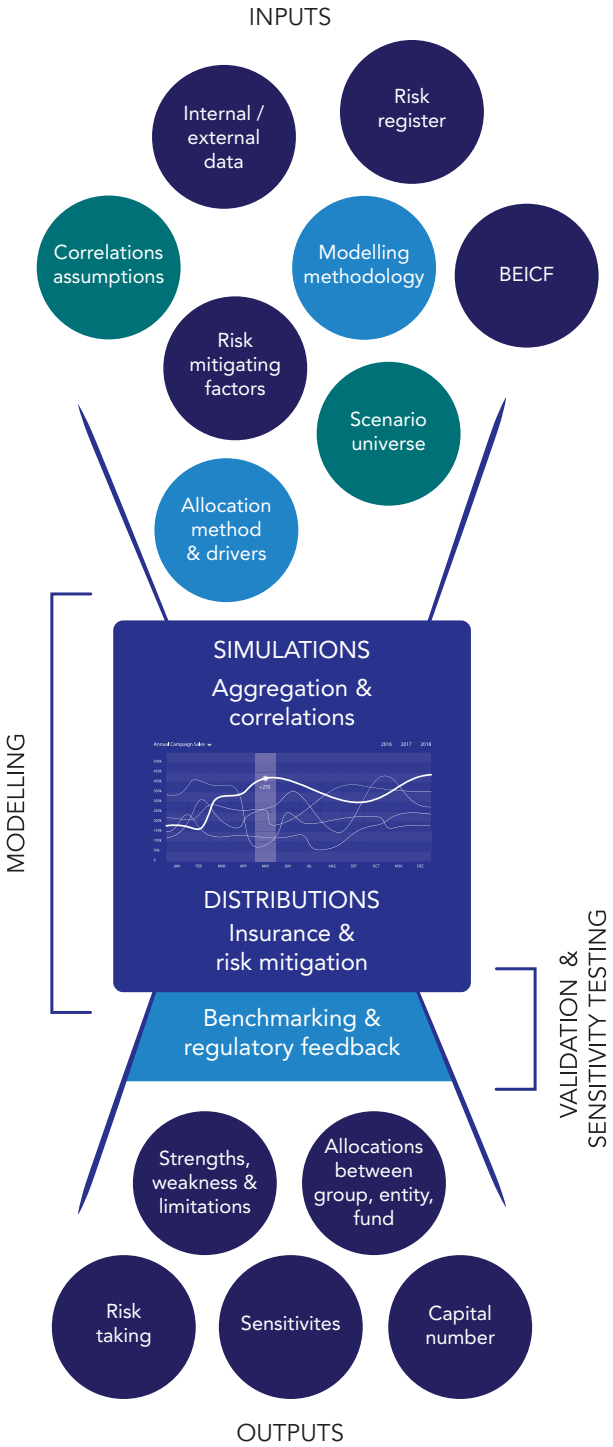
Following on from the success of the 2019 survey, this year's summary report reviews the top 10 takeaways from more than 136 questions split by five sections, covering model inputs (loss data, scenarios and the use of risk mitigation), modelling approaches (frequency and severity distributions), validation techniques, benchmarking and model outputs.

Where possible (given enough population) we have filtered the results by business line and firm size in order to allow firms to further benchmark their results and directly compare these with their most relevant peer groups. We believe this exercise is vitally important, not only for establishing where your firm sits amongst the industry, but also for allowing firms to understand the various alternative approaches conducted by the industry and the rationale behind this. We believe the results of this survey act as a best practice guide which will provide firms with a better understanding of the industry approaches to capital modelling.

Finally, whilst our Capital Benchmarking Survey is the most comprehensive survey of its kind in the market, we believe the results to be useful not only for approved Internal Model firms but also for Standard Formula and Fixed Calculation firms. The learnings from this survey can be used to inform decisions surrounding the development of a capital modelling framework and/or process and may help to support and justify methodology decisions.

This summary report details the top ten findings from the 2020 survey and has been created specifically for non-participants of 2020 Capital Benchmarking Survey. If you're interested in taking part in next year's survey, in order to get access to the full report, please contact enquiries@oricinternational.com

The key takeaways from this year's survey will inform future agendas for the Internal Model Working Group in 2020.



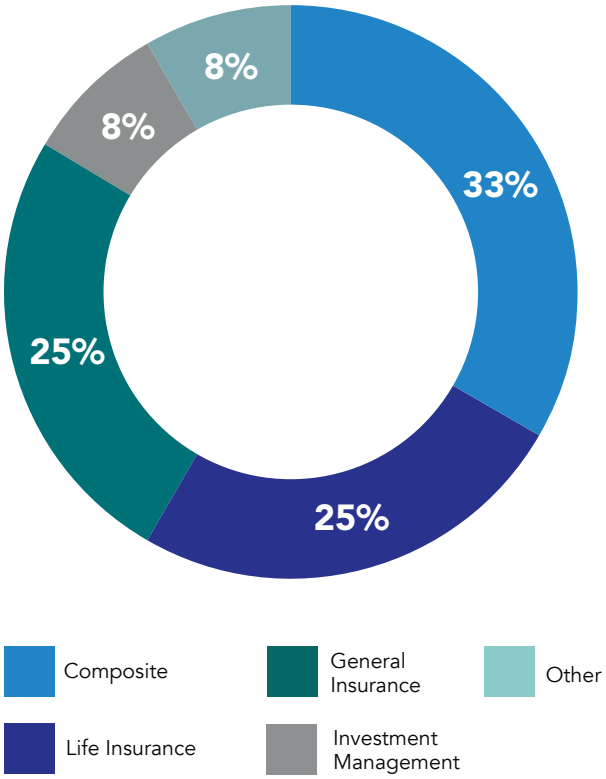
Survey Overview

The 2020 capital benchmarking survey was completed by 24 participants (an increase from 21 in 2019) of varying sizes (by GWP and AUM), from different industries (insurance and investment management) and domiciled locations (UK, Ireland, Holland, United States and Australia).

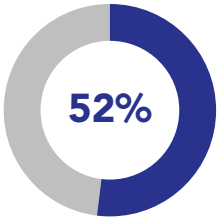
Of these 24 participants who specified their capital framework approach, 65% used either an internal model or partial internal model with the remaining 35% using a standard formula approach, a 9% increase on the 2019 survey. The composition of firms by business line was also varied and composed of Composite (33%), Life (25%), General Insurance (25%), Investment Management (8%) and 'Other' (8%) firms. Other includes both reinsurance and health insurance firms.

From the participants adopting a standard formula methodology, 71% used an additional methodology for internal use, e.g. calculating economic capital requirements. This allows firms to incorporate business decisions including acquisitions and product appraisals and explore the effects these may have on their businesses.

A.1.1 Split of survey participants by business line (N=24)

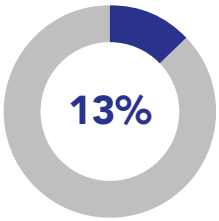


A.1.2 Split of survey participants by model type (N=23)



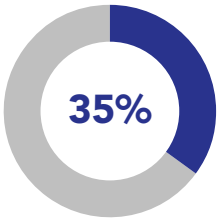
Internal Model

All risk categories are quantified using the internal model / calculation kernel



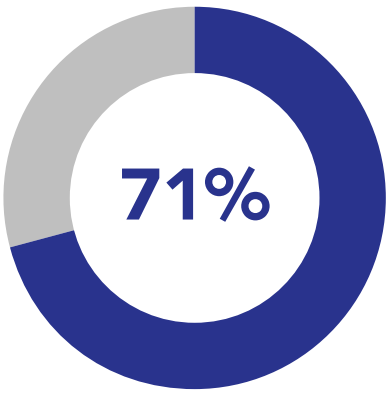
Partial Internal Model

One or more modules of the SCR (Solvency II) are calculated using the standard formula



Standard Formula/ Fixed Calculation

A set of calculations prescribed by the regulator for generating the Pillar I capital resources



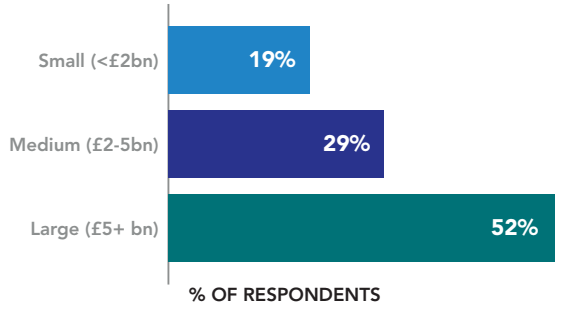
A.1.3 Of those firms who use a standard formula/fixed calculation methodology to calculate regulatory capital requirements (as per A.1.2), what percentage of firms use an alternative calculation for other internal uses? (N=7)

Survey Overview

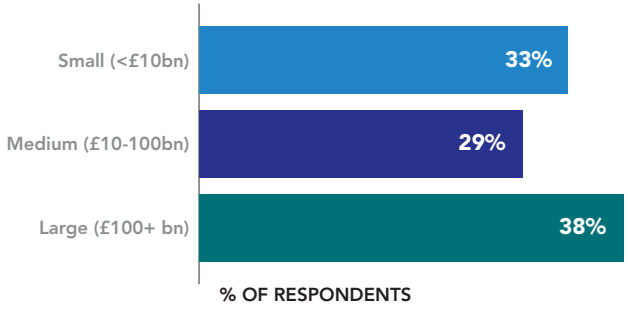
Firms provided both their Gross Written Premium (GWP) and Asset Under Management (AUM) results for 2018, as appropriate. 52% of firms wrote premiums over GBP £5bn (defined as Large), an increase from 28% in 2019. Additionally, there was an equal spread of firms by AUM size band (small, medium and large), with 38% of participating firms managing more than £100bn in AUM.

The median number of FTE's involved in the overall modelling process was three, which is consistent with the findings of the 2019 survey. The annual capital cycle is still resource intensive and requires specialist resource from both the risk and actuarial teams. The structure of the team is dependent on the model type and the governance arrangement, with 64% of participating firms (both internal model and standard formula) employing 1-4 people to run the modelling process and 23% of participating firms employing more than 9 people (all internal model). Internal model firms will require independent validation and therefore require additional resource, whereas standard formula firms may often outsource this process, reducing the internal resource required.

A.1.4 Participant split by Gross Written Premiums (N=21)



A.1.5 Participant split by Assets Under Management (N=21)

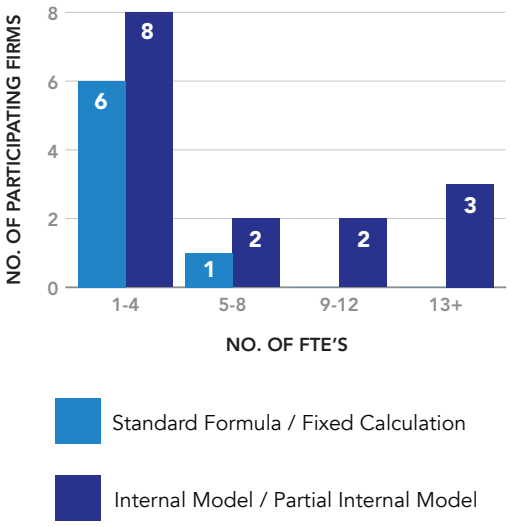


A.1.6 Number of FTE's involved in the modelling process (N=22)

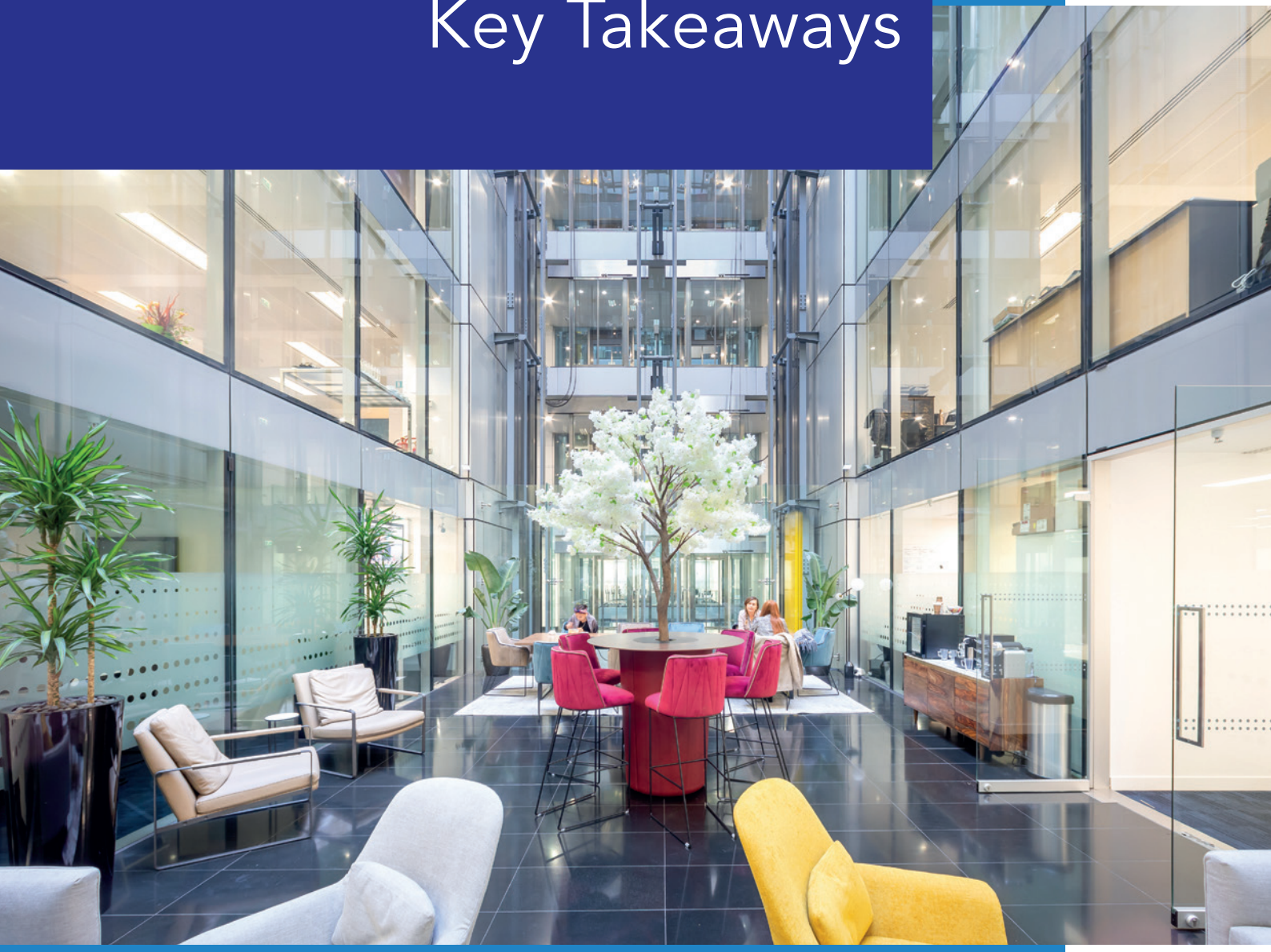
3 FTE'S

Median number of FTE's involved in the overall modelling process. (Excludes those who don't have an FTE assigned).

A.1.7 Number of FTE's employed by model type (N=22)



Key Takeaways



Reported Operational Risk SCR remains stable

Of the firms who provided their post-diversification operational risk SCR against total SCR, 74% reported a number between 2% and 8%. Adjusting for any exceptional outliers, the average post-diversification operational risk SCR as a proportion of total SCR was 6.45%.

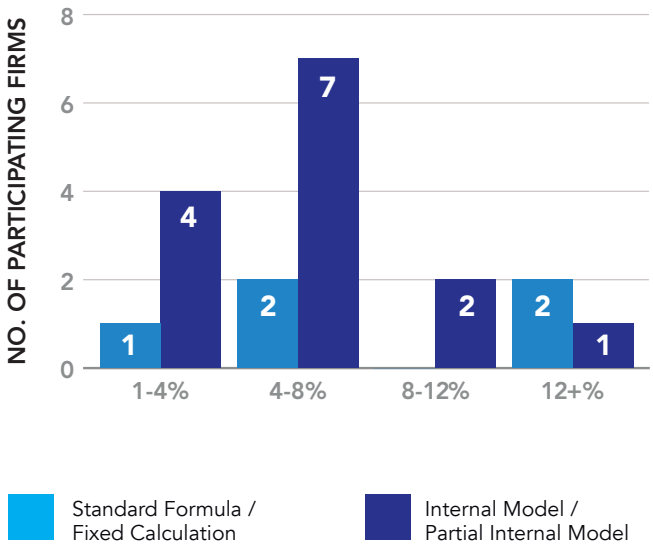
These findings are consistent with the previous survey conducted in 2019 and the Institute of Risk Management (IRM) operational risk modelling survey conducted in 2015, which included many ORIC members.

Consortium members reported a range of capital figures dependent on their capital framework approaches (i.e. internal/partial internal model or standard formula) and these are described in the following table:

Use of an internal model is likely to lead to a more efficient management of capital (i.e. a lower SCR) as senior management can better understand the company's risk profile, and therefore firms have a greater opportunity to refine modelling assumptions. However, a shift to an internal model brings with it many challenges, including a significant burden on resources and a time-intensive internal and external sign-off process. These challenges and benefits should be considered by any firm that is considering developing an internal model framework.

Model type	No. of firms recording a SCR% less than 12%	No. of firms recording a SCR% greater than 12%	Total
Internal/Partial-Internal Model	13	1	14
Standard Formula/Fixed Calculation	3	2	5

A.1.8 Operational risk SCR as % of total SCR by participant and model type (N=19)



Firms can benefit further from using more external data

Compared to the banking industry, insurers and investment managers have long suffered from a relative lack of internal risk event data. Firms' internal loss datasets are unlikely to contain sufficient data to model all operational risks they face by operational risk category.

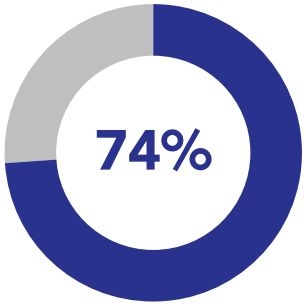
This is where ORIC International can help. ORIC has collected operational risk event data since 2005 and sets data standards for operational risk categorisation and validation which helps ensure consistency in submissions and facilitates ease of comparison by its members, whilst also preserving anonymity of contributing firms. ORIC now provides over 400 company years of losses to its members across all main risk operational risk categories. Where there are new emerging risks the consortium dataset can be rich with data and include events, which are unlikely to be appear in a firm's internal dataset, e.g. losses incurred by firms as a result of new regulation. This allows members to better understand and assess the risk before they materialise.

When informing expert judgement in workshops, there is a greater reliance on internal risk event data than external risk event data (73% compared to 56% as per B.1.2 and B.2.3). However, when undertaking validation work, participants place more reliance on external risk event data (39% compared to 27% as per B.1.2 and B.2.3)

We note that firms continue to hold more external risk event data than they use in their model. The reason for this is changing industry risk profiles and improving data quality standards which mean that firms can benefit from more recent data. Encouragingly, 78% of firms now use between 0 to 15 years' worth of external risk event data in their model and 39% of firms now hold more than 16 years' worth of external risk event data.

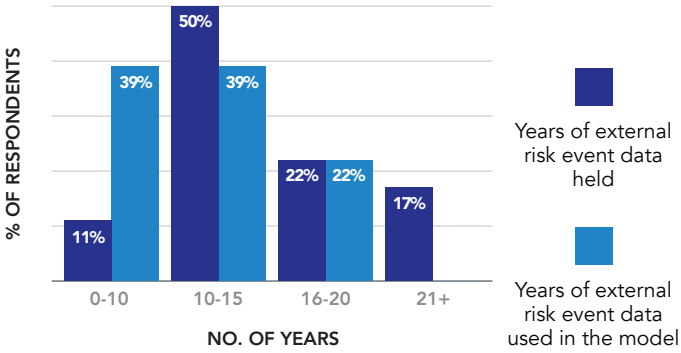
Firms are increasingly filtering risk event data in order to make frequency and severity comparisons with their peers. 44% of surveyed firms filtered external risk event data by business line. Whilst this may be useful for comparing business or product-specific risks, it is still important for firms to review and make use of data outside of their own business line and even industry (i.e. insurance industry loss data for investment managers). Given there is homogeneity in taxonomy across all business lines, there are certain types of risk that will still have relevance regardless of business line, e.g. data protection breaches, system failures, fraud, HR issues etc.

B.2.1 What percentage of firms use external data as part of their op risk model? (N=23)

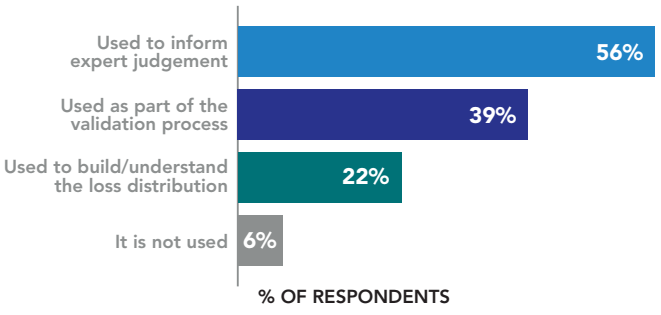


In comparison, 78% of firms use internal data as part of their operational risk model. Maturity is a key driver for determining whether firms use data within their op risk model.

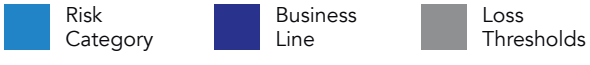
B.2.2 Years of external risk event data used by firms (N=18)

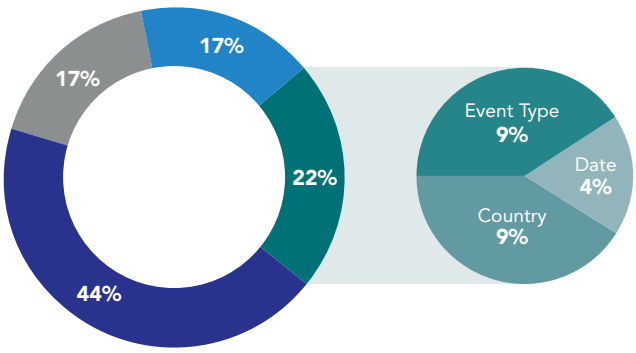


B.2.3 How is external risk event data used in the modelling process? (multiple options, N=18)



B.2.4 How do firms filter external risk event data? (N=16)





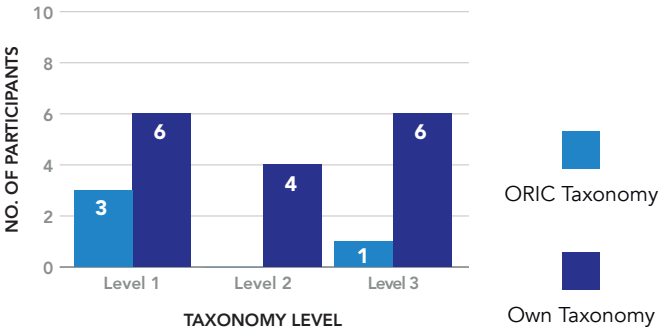
Industry review required for operational risk taxonomies

Our results show that the Basel II operational risk categorisation is failing to adequately reflect the evolving operational risk profiles of the insurance and asset management industries. Many firms are now starting to develop their own taxonomies to better capture new or rapidly evolving risks (e.g. cyber risk), enhance and clarify definitions following new regulations (e.g. GDPR) and identify risk scenarios at a more granular level (e.g. model risk). ORIC members have been aided by the ORIC taxonomy, which categorises operational risk events in line with the Basel II level 1 and 2 categories and the ORIC specific level 3 category. The clear definitions and granularity provided by the ORIC level 3 category helps firms to refine their scenario analysis.

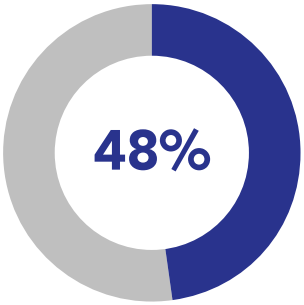
The results show that 65% of participating firms continue to model at either Level 1 or Level 2 and this is consistent with the 2019 Capital Benchmarking Survey. For internal model firms, a change towards modelling at Level 3 with greater granularity may be viewed as a material change and therefore require prior regulatory approval which could take up to six months.

The Bank of International Settlement (BIS) released a paper entitled 'Operational risk – Supervisory Guidelines for the Advanced Measurement Approaches' in June 2011 and discussed loss data thresholds in some detail. The paper makes clear that firms should identify internal loss collection thresholds based on statistical evidence which clearly show that any losses below the threshold would have an immaterial impact on capital calculations. 48% of firms exclude loss data below a defined threshold, with 70% of these firms employing a threshold equal to a monetary value of 10,000 based at the reported local currency as per ORIC's required mandatory reporting threshold. Despite this, firms should continually assess the costs and benefits of varying thresholds on the risk profile and not underestimate low severity/high frequency events. The ORIC International dataset has implemented aggregated events into its reporting standards in order to capture this. Aggregated events refer to risk events which stem from one systemic issue, i.e. a system failure which may individually have minimal cost, but when combined may be significant.

B.1.3 What taxonomy do firms use when modelling and at what granularity? (N=20)

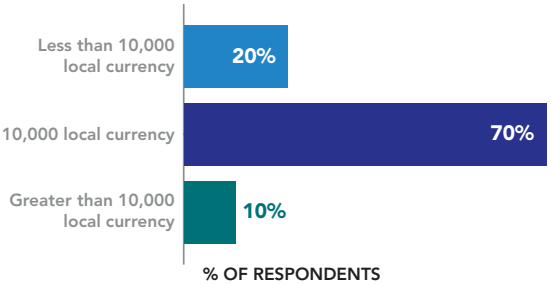


Thresholds



B.1.7a What percentage of firms exclude loss data below a certain defined threshold? (N=21)

B.1.7b What threshold is employed for firms who exclude loss data below a certain threshold (N=10)



Modelling error considered most material scenario by firms

What are the most material operational risk scenarios by capital allocation?

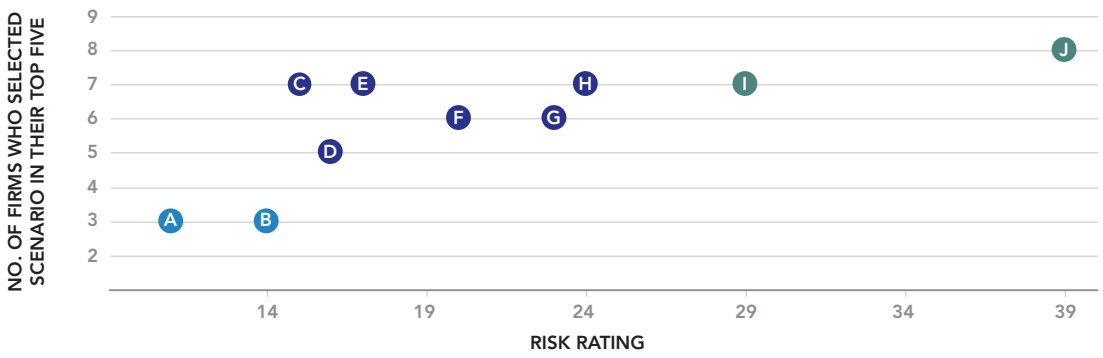
Participating firms were asked to provide their top five operational risk scenarios by capital allocation. The responses were then mapped to the ORIC International benchmark scenarios and each scenario provided with a risk rating which was calculated as follows: 5 points for a scenario ranked most material by capital allocation, 4 points for the second most material and so on. The y-axis indicates the number of firms who placed the benchmark scenario in their top five. Therefore, the top right of the graph represents the scenarios which not only appeared most frequently in firms' top five scenarios, but also were ranked higher in the list, i.e. most material.

Analysis

Modelling error is the use of incorrect model assumptions or inputs in a firm's actuarial, economic or financial models and was listed most frequently in firms' top five scenarios and it also had the highest risk rating.

We note that firms used a wide variety of scenario definitions for modelling error which ORIC International will look to explore further at upcoming Internal Model Working Groups.

B.4.7 What are the ten most material operational risk scenarios by capital allocation (multiple options, N=21)



- **A** Corporate Governance failures
- **B** Material human error
- **C** External Fraud
- **D** Loss of personal/ confidential or sensitive customer; client data
- **E** Internal Fraud
- **F** Compliance failure or regulatory breach
- **G** Financial reporting errors
- **H** Cyber attack for the purposes of fraudulent activity
- **I** Mis-selling
- **J** Modelling error

Risk Rating Colour	Risk Rating Value
BLUE	14 and below
NAVY	Between 15 and 24
AQUA	25+

Insurance recoveries is an increasing area of focus for firms

Methodology for insurance recoveries

Insurance recoveries are increasingly being used, with 11 participants considering it as a risk mitigation factor in 2020, compared to just 6 in 2019. The IRM survey, 'Aligning operational risk and insurance' (April 2018) concluded that to get the best synergies, firms need to internally link the insurance purchase decision and the capital modelling approach. When using insurance recoveries as a mitigant, best practice includes:

- Identifying specifications in insurance policy requirements, e.g. maximum coverage limits (considered by 92% of participating firms who consider insurance recoveries)
- Identifying recovery success of prior insurance claims and the hurdle of insurance deductibles
- Limiting the recovery time horizon i.e. get cashflows within 1 year (considered by 25% of participating firms who consider insurance recoveries)
- Taking account of the credit risk of the insurance provider (considered by 33% of participating firms who consider insurance recoveries)

Validating insurance mitigation

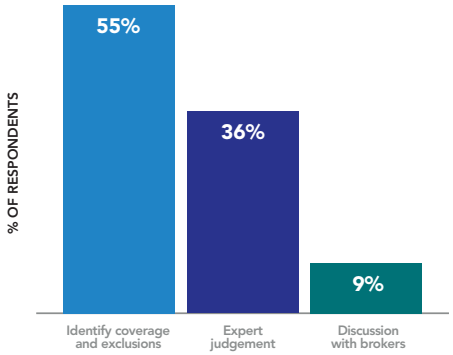
From the survey, when undertaking validation of insurance recoveries, 55% of firms focused on mapping risk scenarios to policy coverage and exclusions and 36% of participants relied on internal expert judgement. Only 9% of participating firms held independent discussions with brokers, which may be more valid as they are likely to have extensive claim data.

Policy coverage

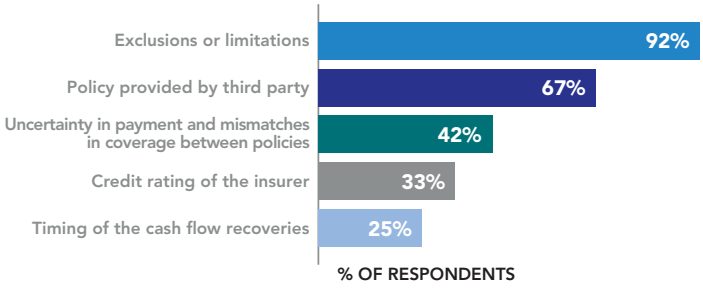
A variety of insurance policies are used by participants within their risk mitigation methodologies. Cybercrime and business interruption were the most common insurance policies factored in, with both policies being considered by 79% of participants. This seems logical given the increasing focus from industry stakeholders on avoiding customer harm and improving operational resilience.

In 2018, ORIC International undertook an exercise with Marsh to review industry claims data and map these to their 38 benchmark scenarios. This exercise has allowed firms to identify standard insurance policies that can be used to mitigate risk scenarios and also highlight the likelihood of achieving recoveries.

B.7.2a For firms who use insurance recoveries as a risk mitigation factor, how are these validated? (N=11)



B.7.2b Which of the following do firms consider in their methodology for insurance recoveries? (multiple options, N=12)



B.7.2c For firms who use insurance recoveries as a risk mitigation factor, what insurance policies have firms factored in? (multiple options, N=14)

79% Cyber Crime

79% Business Interruption

71% Professional indemnity

71% Property damage

64% Directors & Officers

64% Employers/ Public Liability

Consistency in key modelling approaches

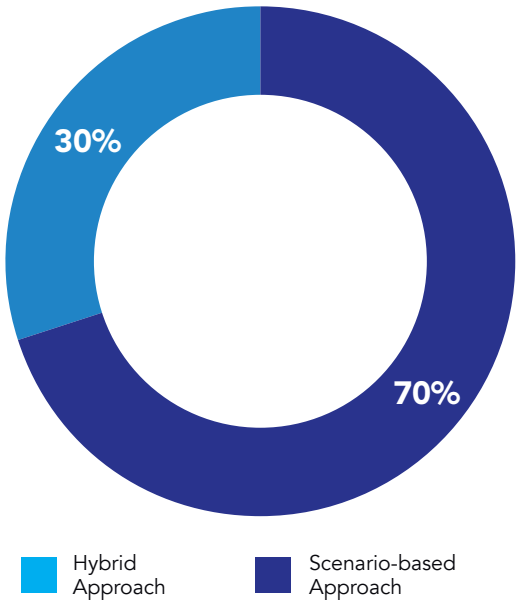
Firms continue to model operational risk using two distinct methodologies: the hybrid approach and the scenario-based approach.

The hybrid approach involves modelling frequency of loss as a data-driven probability distribution function (PDF) but uses scenarios to estimate severity, usually re-expressed in the form of a PDF. The scenario-based approach derives both frequency and severity through scenario analysis and is usually re-expressed in the form of a PDF.

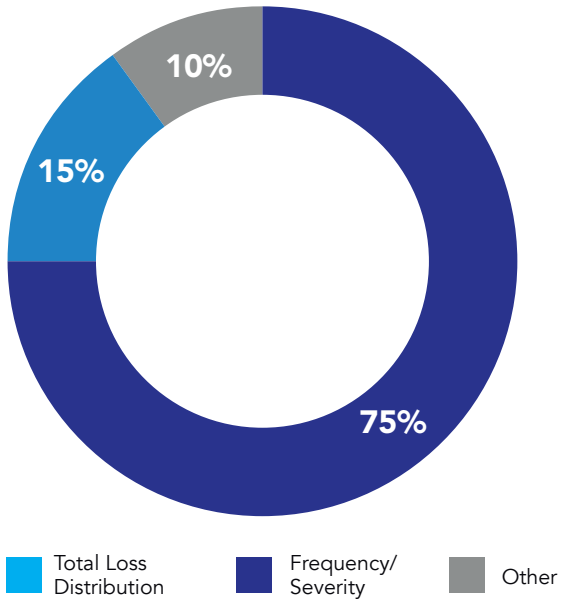
Modelling approaches are increasingly sophisticated and the link between data capture in parameterisation and the data input into the model needs to be clearly understood, particularly when satisfying use test requirements. The total loss distribution approach continues to be employed by the minority, with just 15% of participants adopting this approach, comparable with the 17% of participants in the 2019 survey. This may be due to the perception of the approach being backward-looking, as well as the relatively scarce internal loss event data required to provide enough comfort in the methodology.

We have also noted that firms are beginning to adopt more advanced approaches to their operational risk loss distributions, including Bayesian networks. The Bayesian network approach is a combination of graph theory and Bayesian statistical theory which allows the user to produce 'networks' of variables (described as nodes) that are linked via causal assumptions (e.g. internal fraud losses, staff turnover influencing processing errors etc.). A combination of expert judgement and historical data is then combined in the process of specifying the structure and underlying probability of each node. The Bayesian network can be structured in such a way that all the various operational risk factors can be transformed into an overall loss distribution, allowing capital to be calculated.

C.1.1 What modelling approach do firms employ? (N=20)



C.1.2 What overall approach do firms take to their operational risk loss distributions? (N=20)



Other* includes:

- Bayesian network approach to determine loss distribution
- Deterministic scenarios

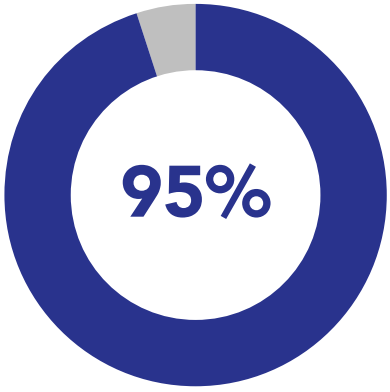
How diversification benefits compare between participants

Diversification benefit takes account of the fact that not all risks will happen at the same time and as expected, 95% of firms allow for diversification between operational risks.

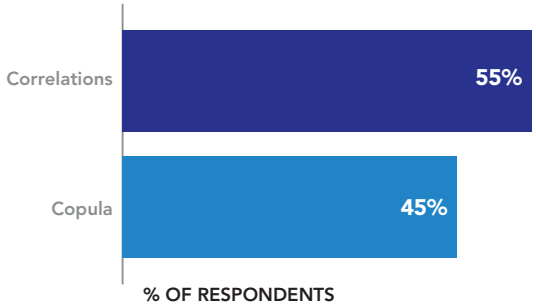
For firms who allow for diversification between operational risks, correlations (55%) and copulas (45%) were the most common approaches used. Correlations refer to measuring the co-dependency between two variables, whereas a copula is a stochastic concept of dependency that connects marginal distributions to a joint distribution.

Participants were asked to provide their intra-operational risk diversification benefit, with the average across the entire population equal to 52%. Internal / partial internal model firms achieved higher diversification benefit than their standard formula counterparts from the participants surveyed, with a total range between 5% and 85%.

C.3.1a What percentage of firms allow for diversification between operational risks? (N=21)



C.3.1b For firms who allow for diversification between operational risks, what approach is taken to achieve this? (N=20)



C.3.1c What is the intra-operational risk diversification benefit achieved by firms? (Between 0 and 100%) (N=20)

Statistic	Entire population	Internal/Partial-internal model firms	Standard formula/fixed calculation firms
Average Value	52%	58%	38%
Median Value	49%	56%	38%
Minimum Value	5%	37%	5%
Maximum Value	85%	85%	76%

Top three material scenarios account for major proportion of the total undiversified operational risk capital

Material scenarios pre-diversification

Firms were asked to provide the proportion of total undiversified operational risk capital represented by their three most material scenarios. From the 21 participants surveyed, firms on average allocated 51% of their undiversified operational risk capital to their top three material scenarios with an overall range between 16% and 84%. Graph E.1.1 indicates the median, quartile and range of values submitted by participating firms across various business lines, with the dots representing individual responses.

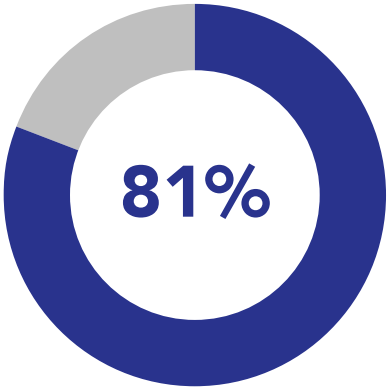
Diversification Benefits

For many firms, aggregate diversification effects will be the most significant determinant of required capital. This year, we noted that 64% of participating firms obtained a diversification benefit between 60% and 70% when diversifying operational risk with other risks. For firms who take advantage of diversification benefit, the board and senior management should have confidence that the numbers are appropriate and therefore it is vital that all expert judgement and validation (i.e. sensitivities) are appropriately documented.

It is encouraging to see that 81% of participating firms review their operational risk capital methodology on an annual basis. Models, which are akin to any other type of formal process or control, should always look to be enhanced, with validation and industry benchmarking key for providing continuous challenge.

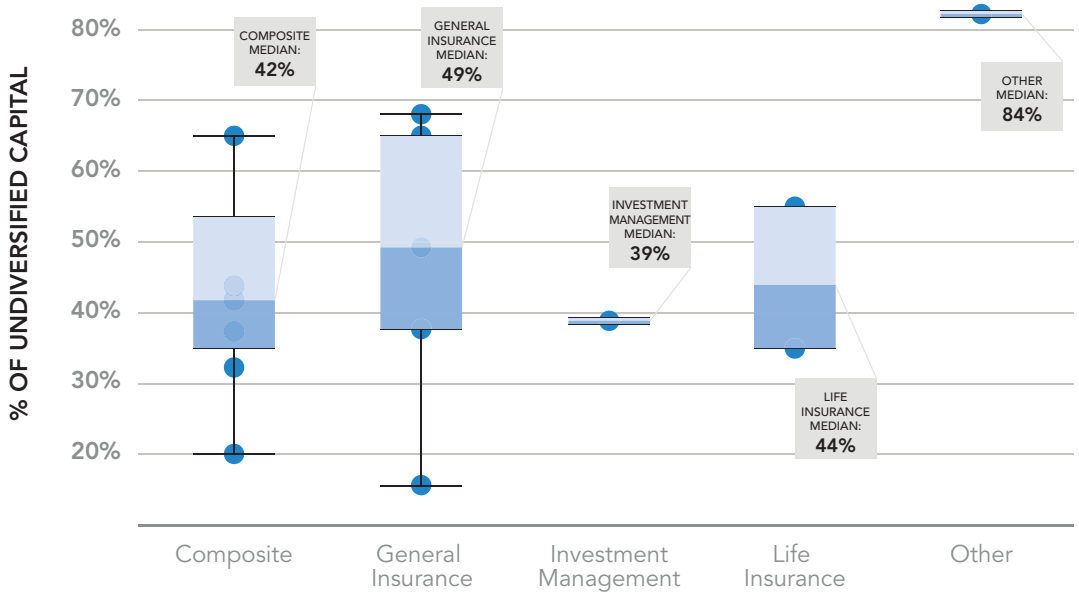
E.1.2 What level of overall diversification benefit do firms obtain when diversifying operational risk with other risks? (N=14)

Statistic	Entire population
Average Value	61%
Median Value	64%
Minimum Value	50%
Maximum Value	70%



E.1.3 What percentage of firms review their operational risk capital methodology on an annual basis? (N=21)

E.1.1 Proportion of total undiversified operational risk capital represented by firms' three most material scenarios (N=21)



Future Modelling Considerations

Board Ownership & Training

Best practice within the insurance and investment management industries is that the board have ownership of the capital framework. The board will then delegate its operation and oversight to the sub-committees in line with the three lines of defence model that they have adopted. In 2016, the Solvency II directive was launched in the European Union in order to ensure insurance companies held sufficient capital to reduce the risk of insolvency. A subsequent effect of the new directive was that firms embedded ORSA processes within the board agenda and timetable. Given this, and following the implementation of the Senior Managers and Certification Regime (SMCR) regulation, our survey finds that only 29% of firms have undertaken specific board training relating to operational risk capital over the last 12 months and only 52% of firms have allocated operational risk scenarios to executive owners, which appears quite low. A key principle of this new regulation is ensuring that the board and executive team clearly understand and can demonstrate where responsibilities lie for key risks. Training the board to understand the capital framework and allocation of risk scenarios to executive owners would be good evidence to demonstrate compliance with SMCR and this is an area that firms may wish to review. This point is even more important given the current regulatory review of operational resilience across the UK financial services industry. When boards are considering resilience scenarios, impact tolerances and contingency plans, key elements will be linked to their capital frameworks.

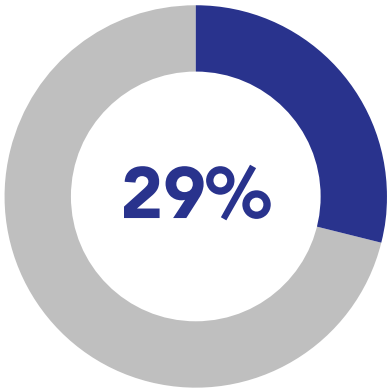
Use of expert judgement

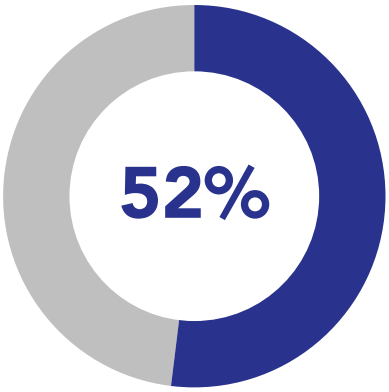
As expected, the survey confirms that for the majority of the insurance and investment management firms, expert judgement continues to be used extensively throughout the capital modelling process as a result of a lack of internal historical data (including quality). The three areas of the operational risk framework that rely the most on expert judgement are scenario assessments (81% of participants, which include frequency and severity assessment), correlations between operational risks and other risks (50%) and the determination of specific parameters within the model (25%). In addition to this, firms also cited scenario identification and selection (19%), capital appropriateness (including reasonability of the model outputs, 19%), model selection and calibration (19%) and allocation methodologies as key areas of expert judgement.

Modelling considerations – Brexit

Following the June 2016 referendum in the United Kingdom, in which the UK electorate voted to formally withdraw from the European Union, firms have been preparing for the consequences of Brexit. Brexit has appeared countless times within firms' emerging risk registers and board agendas over the past three years and clearly a lot of the thinking and preparation is now complete for firms, with 69% of firms stating that Brexit is likely to have minimal or limited impact on their operational risk capital models. The remaining 31% of firms are either factoring the effects of Brexit into their scenario analysis and/or ORSA/ ICAAP processes or increasing capital for certain legal entities within their group that are likely to be affected.

E.2.1 What percentage of firms have provided operational risk training to the board over the last 12 months following the introduction of SMCR? (N=21)





E.2.2 What percentage of firms allocate an executive owner to each of the operational risk scenarios, following the introduction of SMCR? (N=21)

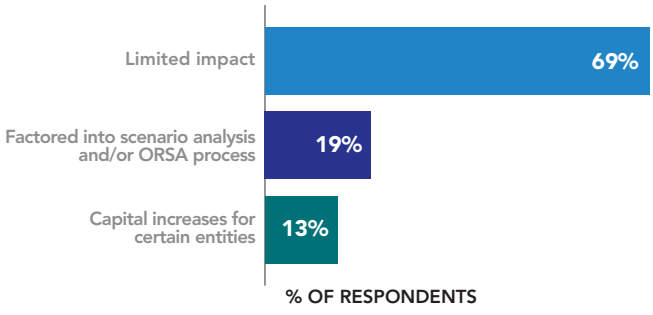
E.2.3 What areas of the operational risk framework rely most on expert judgement. (Percentage of firms) (Multiple options, N=16)

81% Scenario Assessments

50% Correlations

25% Parameters

E.2.4 What challenges will Brexit have on the operational risk capital model for applicable firms? (N=16)



Regulatory Challenge and Enhancements

Given the complexity and rigour of the operational risk framework it is no surprise that several areas have received challenge from the regulators over the past year.

From the participants surveyed, modelling approaches and model validation remain the key areas of challenge by regulators (40% of participating firms respectively) over the last 12 months and these findings are consistent with the 2019 capital benchmarking survey results. Other* areas receiving challenge from the regulator in 2019 include:

- The quality of governance
- Use-test
- Stability of modelled results
- Sensitivity to risk ratings
- Choice of distributions
- Support for the use of insurance

As expected, the areas of enhancement somewhat align with areas of challenge from the regulator, with 63% of surveyed firms looking to enhance modelling approaches in 2020. This is followed by improved documentation (42%) and improving quality of inputs (37%) and validation checks (37%). Good documentation standards help firms to justify the strengths, weaknesses and limitations of the operational risk methodology and evidence the use of expert judgement throughout the process. Other* areas firms are looking to enhance include:

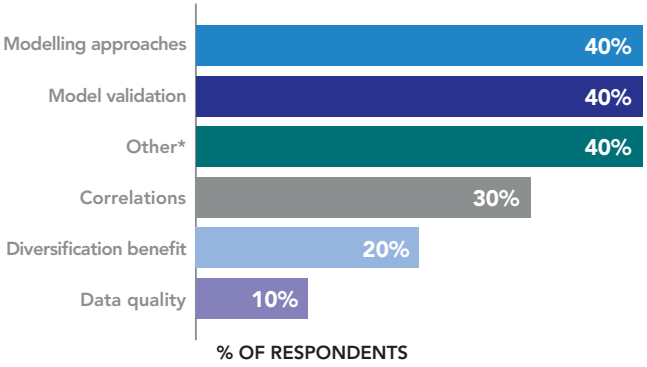
- Changes to severity distributions
- Changes to the aggregation structure
- Improvements to Line 2's risk scenario workshops
- Assessment of insurance coverage adequacy
- Process streamlining

What changes or developments have firms made to the model over the previous 12 months?

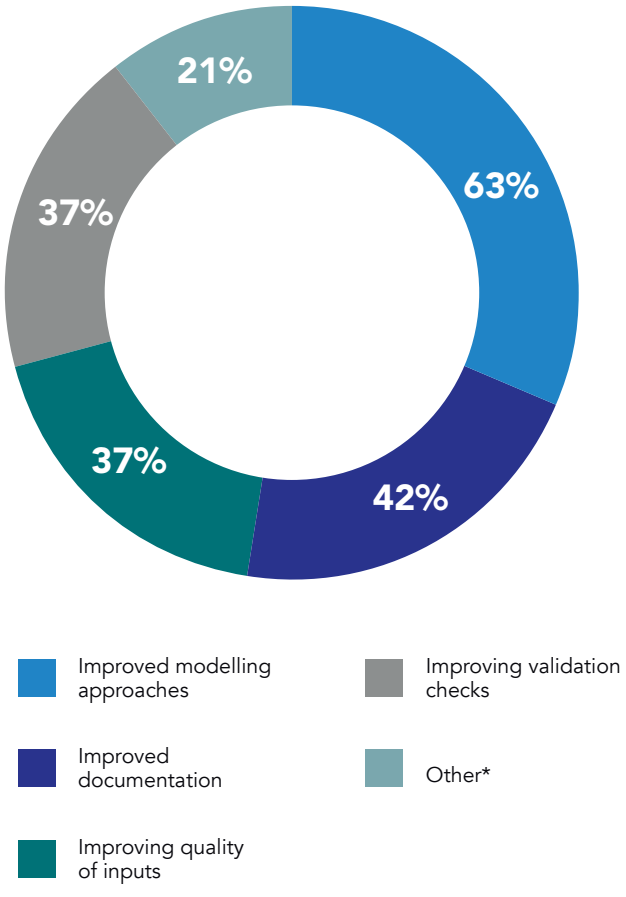
Over the past 12 months, improvements to the validation process appears to have been a major focus for participating firms, with increasing usage of external and internal data to supplement subject matter expert judgements. Outputs have also been examined, with a greater emphasis on the analysis of year-on-year movements from the capital outputs as well as greater use of industry benchmarking data.

Distributions have also been reviewed extensively by a small number of firms, with two firms changing their choice of severity and/or frequency distributions to align with the majority of the industry. Lastly, scenario programs have also been enhanced in the last 12 months, with one firm opting to change their scenario selection process, whereas another has chosen to amend their assessment procedure and simplify the likelihood/frequency assessment by removing confidence intervals, i.e. 1 in x years, and replacing it with a 'High', 'Medium' and 'Low' assessment.

D.3.1 What areas of the operational risk model have received the most challenge from regulators? (multiple options, N=10)



D.3.2 What areas of the operational risk model are firms looking to enhance over the next 12 months (multiple options, N=19)



Conclusions

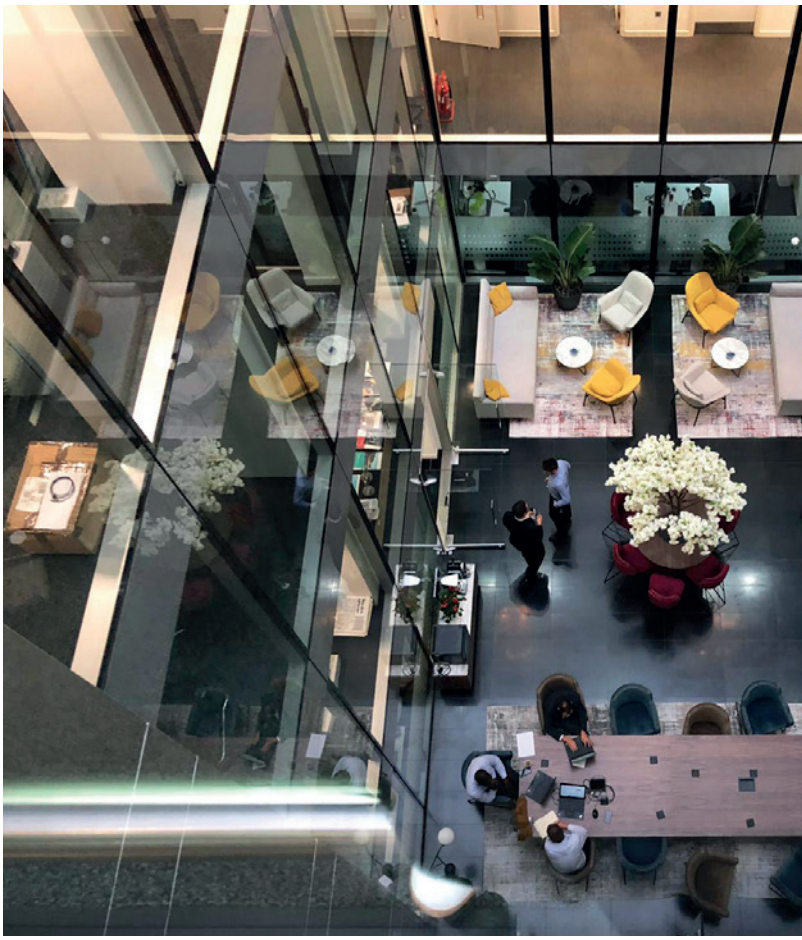
The detailed findings within the 2020 ORIC International Capital Benchmarking Survey help to enhance our understanding of operational risk capital approaches subsequent to Solvency II and CRD IV implementation. We have noted that there is a growing convergence in the modelling approaches and distributions adopted by firms with an increasing focus on how external data can be used to supplement subject matter expert judgements which continue to inform many of the decisions made throughout the capital modelling process.

We have also noted that firms are increasingly forward-looking with respect to their modelling considerations, with a greater variety of areas being challenged by regulators and validation plans as businesses seek to incorporate emerging risks and more accurately establish correlations between these risks. Furthermore, with validation playing a vital role in assuring model adequacy, more firms are using industry benchmarking in order to justify the modelling decisions taken.

There is a growing consensus that the Basel II operational risk categorisation is failing to adequately reflect the evolving operational risk profiles of the insurance and asset management industries. We have noted an increasing number of firms starting to develop their own taxonomies to better capture new or rapidly evolving risks (e.g. cyber risk), enhance and clarify definitions following new regulations (e.g. GDPR) and identify risk scenarios at a more granular level (e.g. model risk).

Insurance recoveries are being increasingly considered by firms as a risk mitigation factor. Firms are considering a wide range of insurance policies within their methodology and we have noted an alignment of insurance policy coverage following various regulatory developments which focus on customer harm and improving operational resilience.

The key takeaways from this report as well as any other interest areas raised by our member firms will inform the agenda for the Internal Model Working Group in 2020 which continues to provide useful benchmarking and comparison for all ORIC International members.



Glossary

Keyword	
Allocation method	Operational risk capital may be calculated at a group level and then allocated by a risk driver at a legal entity or a fund level. Examples of risk drivers include policy count, assets under management, number of staff etc.
Assets Under Management (AUM)	The total market value of assets that an investment company or financial institution manages on behalf of investors.
Best Estimate Liabilities	The expected or mean value (probability weighted average) of the present value of future cash flows for current obligations, projected over the contract's run-off period, taking into account all up-to-date financial market and actuarial information.
Business Environment and Internal Control Factors (BEICF)	A way of assessing the business operating environment and its influence in driving operational risk exposures, e.g. size and volume of the business, nature/complexity of products or services offered etc.
Copula	An approach by which the marginal distributions of a set of variables are combined into a single multivariate distribution.
Generalised Pareto Distribution	In statistics, the Generalised Pareto Distribution (GPD) is a set of continuous probability distributions. It is often used for modelling other distributions' tails.
GWP (Gross Written Premium)	The sum of both direct premiums written and assumed premiums written before the effect of ceded reinsurance.
Modelling - Hybrid Approach	Operational risk is quantified using a mixture of operational risk scenario assessments and statistical analysis of internal and/or external operational risk loss data.
Modelling - Loss Data Approach	Operational risk is quantified entirely based on a statistical analysis of historic internal and/or external operational risk loss data.
Modelling - Scenario Approach	Operational risk is quantified entirely based on operational risk scenario assessments.
RCSA	Risk and control self-assessment is a technique to assess the effectiveness of risk management and control processes.
Non linearity	Non-linearity describes the effect whereby the impact of stresses occurring together differs from the sum of the impacts of the individual stresses.
Scenario Analysis	In the context of operational risk, scenario analysis is the process of assessing low frequency, high severity events. A scenario is an unlikely but plausible risk event.
SCR - Solvency Capital Requirement	The amount of capital that (re)insurance companies in the European Union are required to hold under the Solvency II directive.
Technical Provisions	Solvency II requires the technical provisions to be a 'best estimate' of the current liabilities relating to insurance contracts plus a risk margin.
Total Assets	The final amount of all gross investments, cash and equivalents, receivables and other assets as they are prepared on the balance sheet.

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Our mission is to lead the advancement of operational risk management and measurement for the (re)insurance and asset management sector. By fostering best practice amongst our members we have a positive impact on the industry, helping to raise the bar on operational risk.

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- We provide unrivalled insight into trends and common root causes in operational risk, driven by the data provided by our members on their operational losses and near misses.
- We help firms benchmark across a number of areas of their risk framework, including operational loss experience, stress and scenario testing, operational risk capital modelling and emerging risk.
- We run forums and working groups for our members on the topics they want to explore. Meetings are held under the Chatham House Rule and participants can be assured of confidentiality, therefore creating a safe environment in which to have open and honest discussions.
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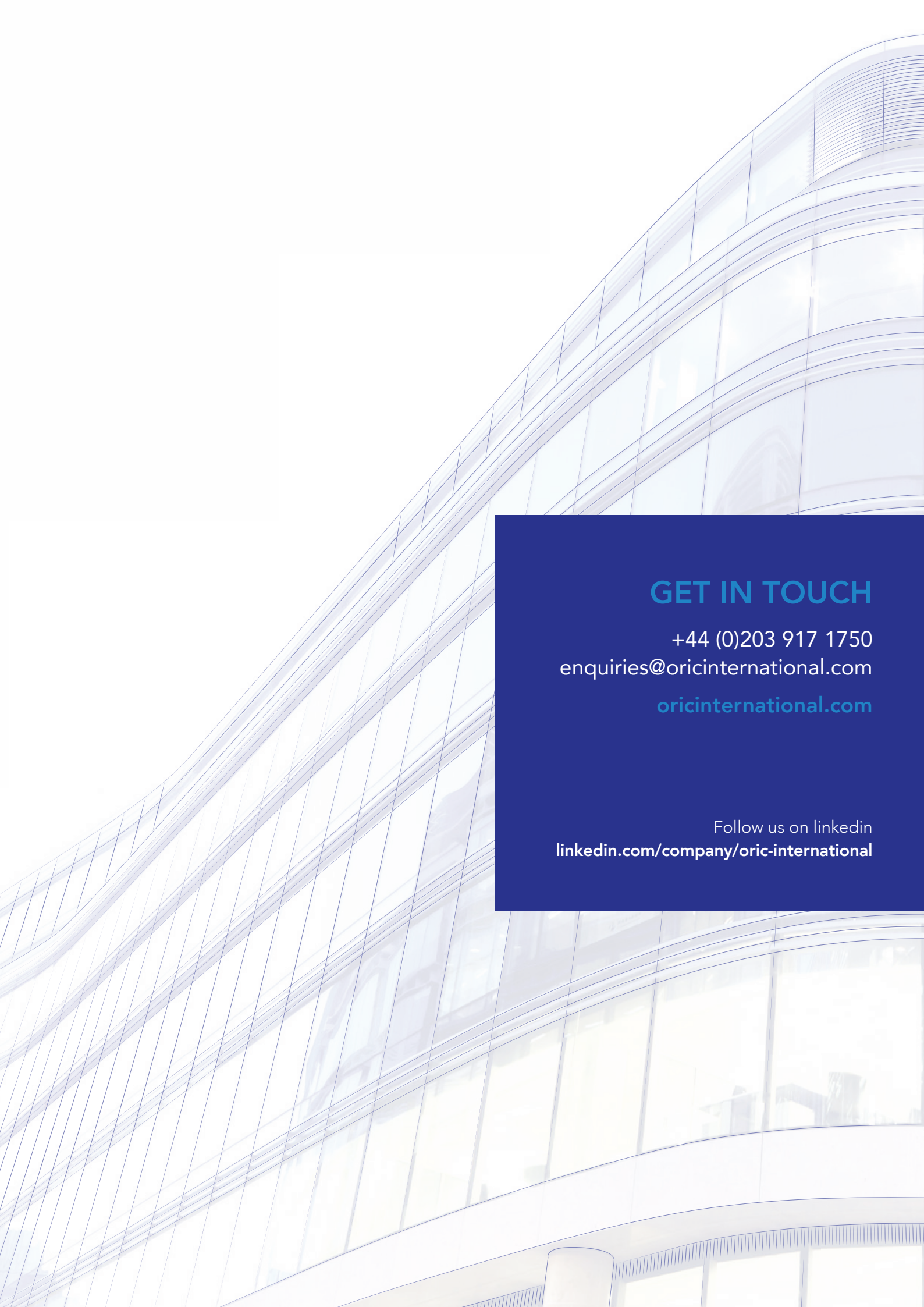

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