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Practical Challenges of Internal Model Independent Validation

Richard Reid, Group IMIV Director, Aviva
Andrew James, Director, PwC



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Agenda

- Regulatory requirements of validation
- Real world aims of validation
- Background to Aviva UK Life and its validation approach
- Necessary skills of a validator
- Some practical validation techniques and issues
- Regulator and Board interaction
- Documentation
- Future development of IMV

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Regulatory requirements of validation



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Regulatory requirements of validation

- Outlined in Article 120-125 of the Solvency II Directive
- Regular process to monitor the performance and appropriateness of the internal model
- Should ensure that:
 - Model scope is **appropriate**
 - Effective **statistical processes** and appropriate techniques are used
 - **Data** used by model is complete, accurate and appropriate
 - **Assumptions** can be justified
 - The **capital** requirements are appropriate

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Regulatory requirements of validation

- Should ensure that:
 - The **probability distribution forecast** is appropriate
 - The required **validation tools** are used
 - The model is used for **decision making**
 - **Documentation** covers model design / operation, compliance with Articles and indicates where the internal model does not work effectively
- Independent Validation is required to be independent from the development and operation of the internal model

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...but why is independent validation important?

It ensures a robust technical underpin to the model and consistency by risk;

It challenges long held assumptions and approximations;

It provides a system for the continuous improvement and review of the model;

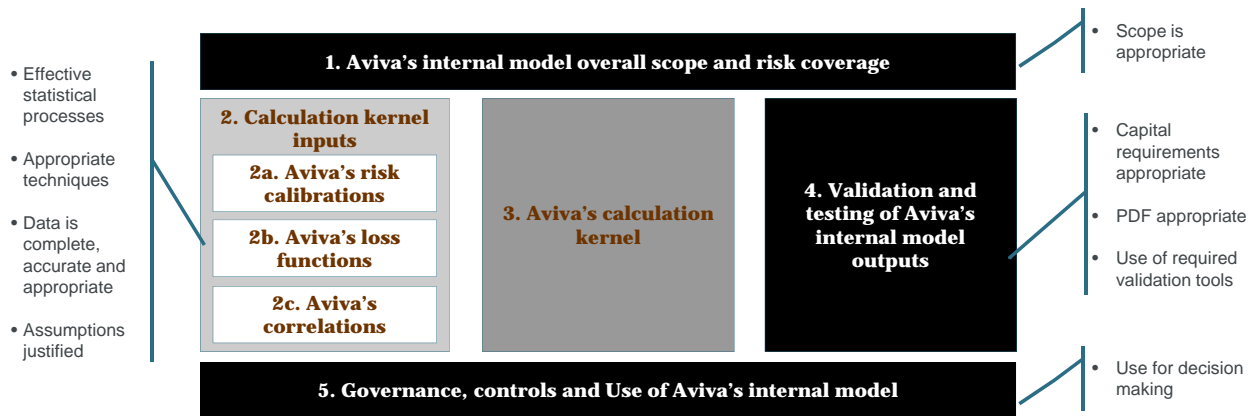
It improves understanding of the model highlighting the model's weaknesses and limitations and the key expert judgements; and

It gives comfort to the Board, CRO and regulators.

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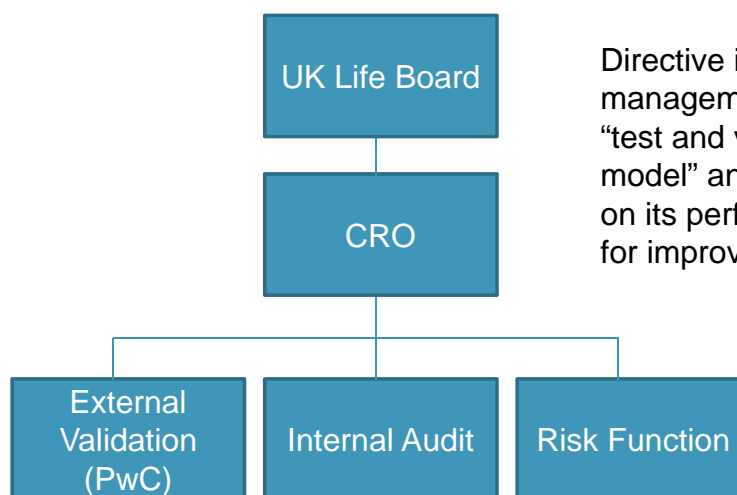
Simplified Aviva Internal Model structure



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Responsibilities for Validation



Directive is clear - Risk management function will "test and validate the internal model" and inform the Board on its performance and areas for improvement

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Materiality and proportionality

Scoping

Findings

Remediation

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Skills required for successful validation



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Skills required for successful validation

- Technical skills and a solid grasp of the Solvency II regulations
- A genuine desire to work with model owners to improve the model
- Challenge in a constructive way and build solid working relationships
- Sound business knowledge and an understanding of the business strategy
- The ability to focus on only the material issues
- Ability to introduce the right experts at the right time
- Communicate findings to the CRO and Boards in the right way at the right time

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Validating calibrations

- ✓ Process is usually well established and understood
- ✓ Well known statistical techniques for fitting and testing
- ✓ Relatively easy to benchmark

Data - representative of the underlying risk v statistically robust – problematic with changing risks

Distribution choice

- distribution with the best overall fit might not give the best fit in the critical scenario
- over-fitting versus capture of risk attributes
- odd behaviour in extreme tail can give spurious results which might require adjustment

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Expert judgements

*Where facts
are few,
experts are
many*



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Expert judgements

When is it legitimate to use expert judgement?

Who qualifies as an expert?

How do you cope with cultural bias?

What happens when internal experts disagree?

How do you communicate the impact of expert judgements?

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Validation tools

Profit and Loss Attribution

Stress and scenario testing

Analysis of the critical scenario

Benchmarking

How are they used to validate the model?

What would invalidate the model?

Out of cycle testing – ever valid?

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Documentation



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Documentation

Key issue for the validator as documentation is the evidence you rely on to come to your opinion.

If you believe the model is sound but the documentation is weak, validators need to consider if that is enough to reject the model.

Significant problem when considering well embedded processes, assumptions and expert judgements.

Proportionality is important. Material or unique risks and their modelling must be well documented but a lower bar should be acceptable for less material and standard risks, particularly if there are reliable benchmarks.

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Future development of IMV

Trigger frameworks and their implementation

Management of major model changes

Improvement of model – removing weaknesses

Cost effective validation

Providing and demonstrating value

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Questions

Comments

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Appendix 1 – Requirements of validation

Article 124 - Validation standards

- a regular cycle of model validation
- monitoring the **performance** of the internal model
- reviewing the ongoing **appropriateness** and testing its results against experience
- include an **effective statistical process**
- demonstrate that the resulting **capital requirements are appropriate**
- test the **appropriateness of the probability distribution forecast** compared to loss experience and all material new data
- include an analysis of the **stability** of the internal model and sensitivity testing
- an assessment of the accuracy, completeness and appropriateness of the **data** used by the internal model.

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Appendix 1 – Requirements of validation

Article 124 - Validation standards

- **independent** from the development and operation of the internal model.
- assess the quality and independence of the validation
- test the results and the key assumptions of the internal model at least annually against experience and other appropriate data
- applied at the level of **single outputs as well as at the level of aggregated results**.
- compare to the results of the **profit and loss attribution**
- able to explain the reasons for **sensitivities** and how the sensitivity is taken into account in their **decision-making** process.
- compare the coverage and the **scope** of the internal model - include a **reverse stress test**, identifying the most probable stresses that would threaten the viability of the insurance or reinsurance undertaking.

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Appendix 1 – Requirements of validation

Article 120

Use test

- **widely used** in system of governance (risk-management and capital assessment)
- **Board responsible** for ensuring the ongoing appropriateness of the internal model and that the internal model continues to appropriately reflect the risk profile

Article 121

Statistical quality standards

- based on adequate, applicable and relevant **techniques**
- consistent with technical provisions.
- based upon current and credible information and realistic assumptions.
- able to **justify the assumptions**
- data is accurate, complete and appropriate.
- internal model can rank risk to perform important role in the system of governance
- covers all material risks
- assesses risks associated with financial guarantees and options
- may take account of future management actions.

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Appendix 1 – Requirements of validation

Article 122

Calibration standards

- corresponds to the Value-at-Risk of the basic own funds of an insurance or reinsurance undertaking subject to a confidence level of **99,5 %** over a one-year period

Article 123

Profit and loss attribution

- review, at least annually, the **causes and sources of profits and losses** for each major business unit
- the categorisation of risk and attribution of profits and losses shall reflect the risk profile

Article 125

Documentation standards

- document the design and operational details of their internal model
- **demonstrate compliance** with Articles 120 to 124.
- provide a detailed outline of the theory, assumptions, and mathematical and empirical bases
- indicate any circumstances under which the internal model **does not work effectively**