INTERNAL MODEL VALIDATION

Governance and Operating model
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Workstream B: IMV Governance and operating model
The Role of Validation

- We see the following key aspects to the role of Internal Model Validation across insurers today:
  - independent series of reviews to provide the Board with information on the key strengths / weaknesses, limitations and appropriateness of the model
  - **ahead of model approval**, to provide the board with information regarding areas of concern and potential inadequacies, and provide regulators with assurance that internal controls are appropriate and model changes are being governed
  - **post model approval**, to provide the Board with assurance on the ongoing appropriateness of the model and to feed into a continuous cycle of model improvement, highlighting areas of focus, enabling prioritisation
  - to play a broader role in ensuring the model is appropriate for use in a number of areas as process matures

- Should be viewed alongside other key materials presented to the Board, external validation as well as industry information such as SRI benchmarking

- In the pre Solvency II IMAP phase, there is more subjectivity as the industry view on appropriate calibrations and methodology is developing

- The role of validation in providing assurance on model changes is also developing

- Model Validation is now:
  - a recognised industry practice,
  - being seen as a BAU function primarily within risk teams,
  - emerging as a formal discipline for risk and actuarial professionals,
  - finding its feet as a function providing Boards and management with key information and insight
The Role of Validation

Solvency II requires firms to establish validation processes to ensure that the internal model is properly designed, developed, tested, documented, implemented and used appropriately. The Solvency II directive requires a regular cycle of validation (Article 124) that includes:

- Model performance, its ongoing appropriateness, and testing its results against experience,
- An effective statistical process for validation the IM (to ensure resulting capital requirements are appropriate)
- Analysis of stability and sensitivity to changes in underlying assumptions, and
- Assessment of accuracy, completeness and appropriateness of data.

The PRA views model validation as a framework providing efficient challenge for the Board to ensure the model is appropriate on an ongoing basis.

Organisations need to ensure independence, and typically the Risk function is tasked with conducting validation.

Assurance or information?

‘Validation framework should address two key questions:

Does the model do what we want it to do? Have we got the right model (is it fit for purpose)?’ (PRA May 2013)

This year we see a slight shift in focus from assurance, to highlighting the model inadequacies / limitations if any

Emerging theme: Validation is a key tool to provide the Board with information regarding the strengths and weaknesses of the model, and providing an independent view on the outputs, key limitations and overall appropriateness for use
Validation Approach

- Narrow bandwidth for in-depth analyses – specific areas of focus for each validation cycle
- A knowledgeable “outsider view” of the risks inherent to the area of focus
- Scenario testing is a useful part of the validation suite to test whether the model captures a sufficient risk range

- Automated first-line tests with clear pass/fail criteria are useful
- Tightly defined and replicable second-line tests showing complete coverage of tests and standards will also be needed
- Look for rapid integration with third-line, with different timelines
- Consider breadth required – automated processes may deliver 100% coverage, but subjective tests may need more selectivity

All users and component owners of the model can have a role to play in informal validation
- Encourage those touching the model to develop “rules of thumb” to test model inputs and outputs
- Encourage an active feedback process that can take advantage of many pairs of eyes

Good as control process but may ignore complex risks

Requirements

- Requires rigorous and tightly defined process, with many automated steps
- Good for “deep dives” into specific chosen areas
- Generic “rules of thumb” applied outside core validation team
- Simply testing with clearly defined pass/fail criteria can be easily automated
- Such a suite of tests can be reapplied to every model run
- These are tests that are not expected to regularly fail. Each fail will need justification
- More complex problems are unlikely to be picked up this way
Validation is an ongoing activity on a rolling basis, feeding into a continuous process of model improvement. Possible examples of regular validation activities are given below. Each year different activities could be prioritised. The order of activities could be structured pragmatically interacting with other business processes e.g. Operational Plan production, model runs, data assessments, audits, regulatory requests. Priorities could be set based on the insurer’s risk profile, changes to the model, regulatory feedback, changes to business, trends in industry, open observations from previous cycles. Regular checks / governance by first line could be reviewed and incorporated into the validation cycle. To complement the annual validation cycle, selected bespoke / ad-hoc reviews could take place as well.

Examples of activities performed:

- Asssessing whether or not the model is used as stated by the Use Test
- Stress and Scenario Testing (SAST) to assess whether or not risks are appropriately captured
- Back-testing assumptions against actual outcomes
- Comparing the risks modelled to risk profile of the company
- Ensuring credit exposures are appropriately modelled
- Governance and processes of CAT models if external; in depth reviews if in-house
- P&L attribution looks at the actual P&L movements compared to plans and assessing whether or not the differences are attributable to risks modelled
- Detailed review of the key mortality / longevity assumptions and modelling
- Review of specific modules including asset modelling, operational risk, underwriting and reserve risk
- Review of the Economic Scenario Generator and its use
- Review of Operational Risk model
- Ensuring appropriateness of data
- Review of Model outputs and their appropriateness

The Validation activity reports at least annually to the Board / appropriate committee.
The degree to which a model is validated can vary between a simple ‘desktop review’ and a ‘full’ model validation:

<table>
<thead>
<tr>
<th>Validation Type</th>
<th>Example Use</th>
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</thead>
<tbody>
<tr>
<td><strong>Full Model Validation</strong></td>
<td>• New Model</td>
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<tr>
<td>• Review of documentation</td>
<td>• Material Model Annual Review</td>
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<tr>
<td>• Methodology Assessment</td>
<td></td>
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<tr>
<td>• Independent re-calculation of the entire model</td>
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<tr>
<td>• Independent testing of the model</td>
<td></td>
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<tr>
<td>• Impact assessment</td>
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| **Hybrid Review**          |                                                  |
| • Review of documentation  | • Annual Review                                  |
| • Methodology Assessment    |                                                  |
| • Independent calculation of model scores      |                                                  |
| • Calculation of a sample of tests              |                                                  |
| • Impact Assessment          |                                                  |

| **Desktop Review**          | • Non-Material Model Review                      |
| • Review of documentation   |                                                  |
| • Methodology Assessment    |                                                  |

**Typical models include:**
- Balance sheet valuation
- Traded Markets Pricing models (Analytic / stochastic processes)
- Credit Models (Bulk of Risk Weighted Assets for most banks)
- Market Risk (VaR – most commonly historic simulation)
- Operational Risk

Most are used daily or at least monthly

Economic Capital model brings together Credit Risk, Market Risk, Op Risk and other risks, correlated together, and calibrated specifically to each institution.

EC Models largely use Pillar 1 metrics as inputs.

Most involved process is around credit models.
Typical Bank Process for Credit Models

New Model
• Developers agree model ToR and data approach with business and validators
• Developers build model
• Developers perform internal model validation and independent code review
• Developers complete documentation (!)
• Business often are asked to attest to efficacy of model
• Submitted to validators
  • Often second line
  • Smaller banks may not have a permanent validation team, so will outsource
• Validators will review, raise issues with developers, re-review etc
  • Not unusual to see c. 100 initial issues raised
• When validation complete, validators will support (or not!) business proposal to Model Committee
• Model Committee may also be Approval Committee, or sub-committee of experts who review/challenge and recommend for approval. Approval Committee generally a sub-committee of the Executive Risk Committee

Monitoring
• Model performance regularly monitored against agreed KPI (Gini etc) – at least quarterly for retail credit models
• May perform quarterly re-calibration

Annual Review
• Developers perform annual review, based on performance monitoring
• Review can be brought forward if monitoring KPIs breached
• Submitted to validators for review/validation, depending on materiality
• Validators recommend, or not, for re-approval by Approval Committee, or maybe lower level than for new model
# IMV Governance – What does good look like?

<table>
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<tr>
<th>Good practice</th>
<th>Negative indicators</th>
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<tr>
<td>Governance processes ensure senior decision makers and the Board can accept that IMV aids understanding and trust of the model outputs, assumptions, key drivers, representation of the firm’s risk profile, performance and its limitations.</td>
<td>IMV purpose appears only as a regulatory tick box exercise, considered as an unwelcome but necessary overhead.</td>
</tr>
<tr>
<td>Perceived value of the IM is thereby enhanced through:</td>
<td>Limited senior visibility or understanding of IMV purpose or results.</td>
</tr>
<tr>
<td>- Extensive use in business decision making</td>
<td>Validation discussions are dominated by process and cost over content, business implications and actions.</td>
</tr>
<tr>
<td>- New uses and model improvements being actively sought by business decision makers as well as technical experts</td>
<td>Challenge appears to be predominantly in the low level technical detail rather than key judgment areas of assumptions, tools and testing.</td>
</tr>
<tr>
<td>- Benefits being seen to outweigh the costs of IMV</td>
<td>Validation observations and recommendations are openly discussed in terms of their non technical business implications and involve relevant people outside Actuarial/Risk.</td>
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<tr>
<td>Governance processes ensure a suitable IMV policy is adopted, kept up to date and adhered to with clear roles &amp; responsibilities, ensuring appropriate independence and unimpeded escalations are made when appropriate.</td>
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**IMV Governance – What does good look like?**

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<tr>
<td>- Ensures demonstrable independent challenge in validation over:</td>
<td>- Validation appears insufficiently independent; few significant recommendations are made or adopted</td>
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<tr>
<td>o Scope</td>
<td></td>
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<td>o Tools used</td>
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<td>o Range of expert judgements considered, proportionate to materiality with assessments of the pros and cons of each</td>
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<tr>
<td>o Reporting, including of rating of model performance and limitations, to assess degree of representation of firm’s risk profile</td>
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<tr>
<td>o Effectiveness and timeliness of actions taken</td>
<td></td>
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<tr>
<td>o Model improvement plans are followed up on regularly</td>
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<tr>
<td>- Any proxy models (“speedboats”) used are demonstrably validated alongside the full model (“ocean liner”) to ensure confidence in their continuous use and limitations</td>
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<tr>
<td>- In doing the above compliance is demonstrated with the regulatory spirit and letter of validation (SII - Art 124, PRA requirements)</td>
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<tr>
<td>- Any proxy models used to make business decisions are not regularly demonstrably validated against the full model</td>
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<tr>
<td>- As a result compliance with regulatory requirements cannot be demonstrated</td>
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IMV Governance – Considerations

Possible governance structures and things to consider

- Disagreement on an observation between 1st line and independent validation – how is it escalated? Who decides on what outcome to go with?
- Expert Judgement? Who is more expert? Can you criticise the selected parameter or only point out flaws in the process?
- Terms of reference and membership of a “model steering committee”
Internal Model Validation – Model Change

The Internal Model Validation is linked to model change in 3 different aspects:

1. The Internal Model validation exercise can trigger an internal model change.
2. Internal model changes should be validated.
3. The Internal Model validation report can be used to design appropriate indicators for classifying model changes to major or minor.
Internal Model Validation – Model Change

- Model Governance committees will have responsibility for overseeing model changes receive appropriate governance, as well as effective, adequate validation.
- Insurers are in the process of designing model change policies, with developing views towards how to classify ‘major’ and ‘minor’ changes.
- There are various views on how to classify such changes including:
  - Quantitative metrics linked to outputs i.e. amount or percentage of capital metric
  - Qualitative metrics allowing more judgement but also more subjective
- Clear that insurers are expected to establish an appropriate materiality assessment.
- Accordingly validation expectations are emerging. These are influenced by:
  - Level of assurance required internally by committees / boards
  - Regulatory expectations
  - Whether assurance is required before approval of changes or as part of cycle
- Validation can flag the need for model changes.
- Model changes may then flag the need for additional validation.
- We expect this to be part of an ongoing cycle.
Board engagement and communication

- Clearly stated validation objective, scope, framework
- Single internal model validation report
- Company specific confirmation statements
- Use test questions
- Key graphics and metrics
- Standardised validation test schedules
- Understanding how external resources can provide support
- Regular reporting and/or agenda item
Board engagement and communication

Potential key elements of Board communication

Clear documentation of validation framework / landscape
- Demonstrate that all elements of validation are covered and where they need to look for it
- Demonstrate all regulatory requirements are met
- Provide assurance regarding the independence of the validation activity

At least annual Board reporting
- An annual report could ensure that all relevant information is available in one place, and can feed into a planned cycle of risk reporting

Company specific confirmation / assurance statements
- The assurance provided should work for the business, providing the Board with a clear idea on what they should be comfortable with

Use test questions
- The Board should have a clear understanding of where the model is used, where use is intended, and whether it is fit for those purposes

Use of key graphics
- Smart use of graphics can be more effective than text, tables and numbers – however this is not straightforward!

Use of standardised tests
- Understandable, standardised tests where possible with digestible results can make it easy to understanding the testing and key findings

Understanding how external resources can provide support
- Targeted use of external consulting can be very useful, with potential projects varying from:
  - Full reviews, deep dives – covering technical areas and thematic reviews such as pass/fail criteria or the use of expert judgment
  - Use of marketing materials such as surveys and benchmarking
- Regular use of data / survey results provided by the PRA and Lloyds

Regular reporting and/or agenda item
- Ensure that validation is an agenda item on model governance / risk committees
- Validation will only become effective and efficient when it is integrated and viewed as a BAU process
IMIF workstream B - Members

- RSA
- Parker Fitzgerald
- Promontory
- EY
- Lloyd’s of London
- LCP
- ACE
- Amlin