Model Risk Management (MRM)

2015 SEAC Fall Meeting

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November 20, 2015

Building a better
working world

Overview

- Introduction
- Model risk management framework
- Common challenges

Introduction
Background

- Model risk management is *not* a new concept
  - Traditionally, insurers have performed tests and validations on their models to ensure calculation accuracy
  - The need now is for a more holistic and formal approach that considers and mitigates the risks that can arise throughout the life cycle of a model

- Focus on model risk management has increased over recent years mainly due to Federal regulation
  - In 2011, the Federal Reserve Board (FRB) and the Office of the Comptroller of the Currency (OCC) released supervisory guidance on *Model Risk Management* (SR 11-7/ OCC 2011-12)
  - Although not all insurance companies are subject to Federal regulation, best practice around model risk management within the insurance industry is evolving consistently with FRB guidance

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Introduction
What is a model?

"…A quantitative method, system, or approach that applies statistical, economic, financial, or mathematical theories, techniques, and assumptions to process input data into quantitative estimates." – *Federal Reserve Supervisory Letter 11-7*

- Three components:
  - Inputs - Information such as data, assumptions and parameters used in the model to produce model output
  - Calculation engine - transforms model inputs into output
  - Reporting tool - translates model output into useful business information

- May exclude routine calculations or processes based largely on judgment

Introduction
What is model risk?

Model risk is the risk of adverse consequences from decisions based on the incorrect selection, implementation or usages of models.

- Occurs for several reasons:
  - Model may not be fit for purpose
  - Model may have fundamental errors and produce inaccurate outputs when viewed against its design objective and intended business uses
  - Model may be used incorrectly or inappropriately or there may be a misunderstanding about its limitations and assumptions

- Model risk increases with:
  - Greater model complexity
  - Higher uncertainty about inputs and assumptions
  - Broader extent of use
  - Larger potential impact

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Introduction
Why does MRM matter?

Insurers rely heavily on the use of models

- Models have traditionally been used for functions such as financial reporting and product pricing.
- More recently, models are used to confront increasingly complex issues around topics such as enterprise risk management.

MRM is a key component to the recent regulatory review frameworks

- There is an increased focused by regulators across the globe on enhanced model risk management standards:
  - Federal Reserve Supervisory Letter 11-7 / OCC Bulletin 2011-12
  - NAIC Own Risk Solvency Assessment (ORSA)
  - Solvency II

Industry best practice has evolved to include it as part of the standard "toolkit" for risk management

- There have been several standards developed or in draft related to modeling and MRM:
  - Generic Technical Actuarial Standard M: Modeling (April 2010)
  - Proposed Actuarial Standard of Practice (ASOP) on Modeling - Second Exposure Draft (November 2014)
  - International Standards of Actuarial Practice (ISAP) 5: Insurer Enterprise Risk Models – Exposure Draft (October 2015)

Introduction
Adding value through MRM

MRM activities add value to the enterprise by enhancing:

Value

Accuracy

- Systematic way of improving models and their accuracy which reduces errors
- Model users and business managers are empowered to give recommendations for model development

Alignment

- Ability to make better decisions by better aligning models with intended use
  - Achieving cost synergies via alignment of actuarial models across business units

Transparency

- Increased transparency in the source of information for reporting and decision making that depends on models

Scalability

- Identifying options for areas to use models where they are not used
- Models can be readily applied to new or recently acquired business

MRM should be proportional with:

- The size, complexity, level of sophistication and nature of activities of the institution
- The scope and materiality of a specific model

Model risk management framework

EY MRM framework

1st Line of Defense
(Model Owners)

Model Lifecycle

- Business Purpose
- Model Development
- Model Implementation
- Model Operation
- Performance Monitoring
- Model Change Management

2nd Line of Defense
(Model Governance & Validation)

Enterprise Governance

Model Review Components

- Model Governance
- Conceptual Soundness
- Data & IT Infrastructure
- Process & Controls
- Independent Testing

3rd Line of Defense
(Internal audit)

Roles and responsibilities

- 1st line owns model life cycle and related activities
- 2nd line establishes model risk management framework and standards, provides review and challenge, and can perform independent model testing
- 3rd line performs independent testing and verification of 1st and 2nd line activities

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Model risk management framework

Responsibilities – 1st line of defense (model owners)

Objective: Manage the model risk of the organization by ensuring that models are developed, used and maintained consistent with enterprise policies. Focus on thoughtful and transparent model development, well controlled and tested model implementation, rigorous change management procedures and ongoing performance monitoring.

Transparency

Business purpose and model development

- Clear purpose for the model
- Well documented rationale for key modeling decisions , including alternatives considered
- Use of developmental evidence and supporting analysis for key decisions

Model operation and performance monitoring

- Operates model in a manner consistent with intended
- Regular reviews of model performance to confirm fit for purpose
- Monitoring Includes confirmation of key assumptions and modeling choices

Model implementation

- Clearly defined and comprehensive testing of calculations prior to use in Production environment
- Appropriate reviews and sign-off by senior management

Model change management

- Formal controls over changes to models including adequate testing to maintain validation integrity
- Formal governance process prior to change implementation
- Robust assumption management and review process

Model risk management framework

Responsibilities – 2nd line of defense (governance and validation)

Objective: Manage the model risk of the organization by establishing and implementing a model risk management policy. Key roles include maintaining and monitoring model inventory, performing independent model validation and providing effecting challenge throughout the model development process.

Enterprise governance

- Establish model risk management policy and governance body
- Define models and maintain model inventory
- Determine prioritization approach and define requirements for model lifecycle

Model validation

- Perform regular validation on models depending on prioritization
- Procedures for 2nd line usually focus on challenging judgment in model development process
- Detailed testing of calculations may be included

Effective challenge

Set standards

- Determine documentation standards and templates to assist 1st line of defense implementation
- Determine standards for model validators including expectations around specific tests and approaches

Understand model risk

- Develop a view of the key risk to the organization from models
- Determine potential impact for highest risk models, and determine mitigation approaches

Model risk management framework

Responsibilities – 3rd line of defense (internal audit)

Objective: To ensure that the 1st and 2nd line of defense are complying with the model risk management policies within the organization.

1st Line review components

- Confirm model documentation requirements are being followed throughout model development lifecycle – including development, implementation and performance monitoring
- Ensure all models included in reviewed processes are included on model inventory
- Confirm testing performed during model development confirms with policy

Confirmation

2nd line review components

- Review model validation reports and confirm compliance with policy and presence of effective challenge
- Confirm model governance committee charters, agendas and meeting minutes are compliant with firm expectations
- Confirm the execution of the model risk policy and validation schedules/calendar

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Model risk management framework

Implementation

Key steps	1st Line	2nd Line	3rd Line
Establish MRM policy and governance structure • Defines what models and model risk are • Clearly defines roles and responsibilities of all three lines of defense • Creates a framework for model validation including documentation standards and appropriate validation activities		●	○
Create model inventory • Identify models across the enterprise based on model definition • Capture critical model information such as intended and actual use	◐	●	○
Perform model risk assessment • Assess models, recognizing the different levels of inherent risk • Prioritize models for validation		●	○
Model documentation and testing • Typically requires significant investment as documentation and testing procedures may not exist or be consistent with documentation standards	●		○
Validate models • Incorporates end-to-end view of process (inputs, processing, outputs) and controls across key validation components (e.g., conceptual soundness) • Evidence of effective challenge is critical	◐	●	○
Prioritize and remediate findings • Process should be consistent with model change management framework	●	◐	○
Implement ongoing MRM procedures • Applies to models in all parts of lifecycle (i.e., includes new and existing models) • Upkeep may be less onerous than initial effort, but still requires diligence	●	●	○

● Primary responsibility ◐ Secondary/potential responsibility ○ Review compliance

Common challenges

- Scaling for organization complexity
- Governance and policy:
  - Board more involved
  - Centralized or decentralized MRM function
- Model definition and inventory
- Model validation:
  - Definition important
  - Vendor models are tricky
  - Truly independent model review is difficult
  - Easy to over-rely on 3rd party validation
- Model documentation

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Questions

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