Sound Model Risk Management Principles

Objectives

- **Overview of Model Risk**
- **Why Model Risk Management is Important**
- **Model Risk Management Regulatory Guidance**
- **Definition of a Model and Common Models**
- **Model Risk Governance Framework including Key Stakeholders – Roles and Responsibilities**
- **Key Components within the Model Risk Management Framework**
  - Policy
  - Model Inventory
  - Model Development and Use
  - Validations
- **Overview of Internal Audit's Role in Model Risk Management**

Overview of Model Risk

Model Risk

- Potential for adverse consequences from decisions based on incorrect or misused model outputs and reports.

- Can lead to financial loss, poor business and strategic decision making, or damage to a bank’s reputation.

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Overview of Model Risk

Model risk occurs primarily for the following reasons:

- The model may have fundamental errors and may produce inaccurate outputs when viewed against the design objective and intended business uses.
- The model may be used incorrectly or inappropriately.
- Model deterioration.

Why Model Risk Management is Important?

- **Model risk should be managed like other types of risk.**
- **Banks should identify the sources of risk and assess the magnitude.**
- **Model risk increases with:**
  - Greater model complexity,
  - Higher uncertainty about inputs and assumptions,
  - Broader use, and
  - Larger potential impact.
- **Banks should consider risk from individual models and in the aggregate.**

Why Model Risk Management is Important?

- Banks continue to rely heavily on quantitative analysis and models in most aspects of financial decision making.

- Management should consider the possible adverse consequences (including financial loss) of decisions based on models that are incorrect or misused, and should address those consequences through active model risk management.

Definition of a Model

- **Management is responsible for defining what is a model.**
- **Regulatory guidance defines a model as:**
  - **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. It also includes quantitative approaches whose inputs are partially or wholly qualitative or based on expert judgment, provided that the output is quantitative in nature.
  - **A model consists of three components**:
    - Information input component – delivers assumptions and data to the model
    - Processing Component – transforms inputs into estimates
    - Reporting Component – translates the estimates into useful business information
- **A model should be clearly defined in the Model Risk Management Policy.**
- **This policy should be regularly reviewed and approved by the Board or a designated Board-level committee.**

Model vs. Tool

- **Tools generally produce defined arithmetic results or apply defined business rules.**

- **Recognize "grey area" between models vs non-model tools:**
  - Helpful to identify those that are clearly models and those that are clearly not, then isolate the "grey area."
  - Establishment of definitions and documentation is key.

- **Non-model tools and processes should still be subject to internal controls.**

Key Components within the Model Risk Management Framework

- **Governance:** Develop and maintain strong governance, policies, and controls over the model risk management framework.
- **Model Development:** Disciplined and knowledgeable development that is well documented and conceptually sound.
- **Model Use:** Processes to ensure correct and appropriate use.
- **Model Validation:** Processes and activities intended to verify that models are performing as expected.

Governance: Roles and Responsibilities

An example of how roles/responsibilities structure can be depicted:

<u>Governance and Oversight</u>

Board of Directors & Senior Management

Policies, Model Risk Tolerance and Usage, Model Risk Framework, Periodic Model Risk Reporting

Developers
Owners
Users

- Model Development
- Model Implementation
- Model Use

Risk Control Staff/Function

- Risk Measurement
- Limits
- Monitoring
- Validation
- Annual Review

Internal Audit

Assess the overall effectiveness of the model risk management framework.

Governance: Policies and Procedures

The approved Model Risk Management Policy should be commensurate with the size and complexity of the bank and address the following:

- **Define the duties and responsibilities of the BOD and Senior Management.**
- **Define the following:**
  - Model (Internal and Vendor)
  - Model Risk
  - Assessment of Model Risk
- **Detail acceptable practices for the following:**
  - Model Development
  - Model Implementation
  - Model Use
- **Outline Model Validation Activities and Requirements.**

Governance: Model Inventory

- Comprehensive set of information for models implemented for use, under development for implementation, or recently retired.
- Assists in evaluating model risk in aggregate.
- Not just a one-time exercise. Should be revised on an appropriate basis.
- Specific party should be charged with maintaining a centralized inventory of all models.
- Any variation of a model that warrants a separate validation should be included as a separate model and cross-referenced with other variations.

Model Development

- **Include a clear statement of purpose to ensure that model development is aligned with intended use.**
- **Have well-documented coverage of the following:**
  - Design, theory, and logic underlying the model
  - Model methodologies and processing components
  - Mathematical specification and numerical techniques
- **Demonstrate that components work as intended, are appropriate for intended use, and are conceptually sound and mathematically and statistically correct.**
- **Model development documentation should describe these items in a manner appropriate for the model users.**

Model Use

Model Users:

- Provide insight during the development or selection process.
- Ensure model meets needs.
- Challenge methodology and assumptions.
- Identify whether model is functioning properly.
  - Asses performance over time.
- Adjust model, as needed, with qualitative adjustments for model uncertainty.

Model Validation

Processes and activities intended to verify that models are sound and performing as expected, in line with their design objectives and business uses.

- Model validations should be performed by staff with appropriate incentives, competence/expertise, and influence.
- Should generally be done by people who are not responsible for development or use.
- Validation reports should articulate model aspects that were reviewed, highlight potential deficiencies, and summarize overall validation results.
- Validation frequency will vary depending on the model's risk.
- Ongoing monitoring should continue after the model goes into use.
    - Perform periodic reviews - with the frequency determined by the nature and risk of the model.

Model Validation: Key Elements

A comprehensive model validation consists of three core elements:

- Evaluation of conceptual soundness, including developmental evidence.
- Assessment of ongoing monitoring, including process verification and benchmarking.
- Review of outcomes analysis, including back-testing.

Third-Party Models

- **Third-party developed models should be covered by the bank's MRM framework using the same principles as in-house developed models.**
- **Banks should require the vendor to:**
  - Provide developmental evidence explaining components, design, and intended use, to determine whether the model is appropriate for the bank's products, exposures, and risks;
  - Provide appropriate testing results that show their product works as expected;
  - Outline model's limitations and assumptions; and
  - Conduct and disclose ongoing performance monitoring and outcomes analysis.
- **Banks should validate their own use of vendor models.**
- **Banks should have contingency plans.**

Overview of Internal Audit's Role in Model Risk Management

- **Internal Audit should assess the overall effectiveness of the MRM framework and the ability of the framework to address model risk.**
- **Findings from Internal Audit should be reported to the Board or a designated committee.**
- **Internal Audit function should operate with or have the following:**
  - Proper Incentives
  - Appropriate Skills
  - Adequate Stature in the Organization
- **Internal Audit should not duplicate MRM Activities**
  - Should evaluate whether MRM is:
    - Comprehensive
    - Rigorous
    - Effective

Questions?

Appendix: Model Risk Management Regulatory Guidance

- **FDIC Financial Institution Letter 22-2017**
  Adoption of Supervisory Guidance on Model Risk Management **(Issue Date – 6/7/2017) https://www.fdic.gov/news/news/financial/2017/fil17022.pdf**

- **FRB Supervisory Letter 11-7** ***Supervisory Guidance on Model Risk*** **(Issue Date – 4/11/2011)**
  http://www.federalreserve.gov/bankinforeg/srletters/sr1107.htm

- **OCC 11-12** ***Supervisory Guidance on Model Risk*** **(Issue Date – 4/11/2011)**
  http://www.occ.treas.gov/news-issuances/bulletins/2011/bulletin-2011-12a.pdf

- **FDIC Supervisory Insights - Winter 2005 –** ***Model Governance***
  http://www.fdic.gov/regulations/examinations/supervisory/insights/siwin05/siwin05.pdf

Thank You

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