Model Risk Management at U.S. Operations of Foreign Banking Organizations

Guest Speakers:

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Our Presenters and Host Today

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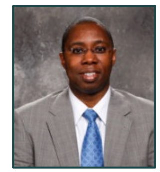

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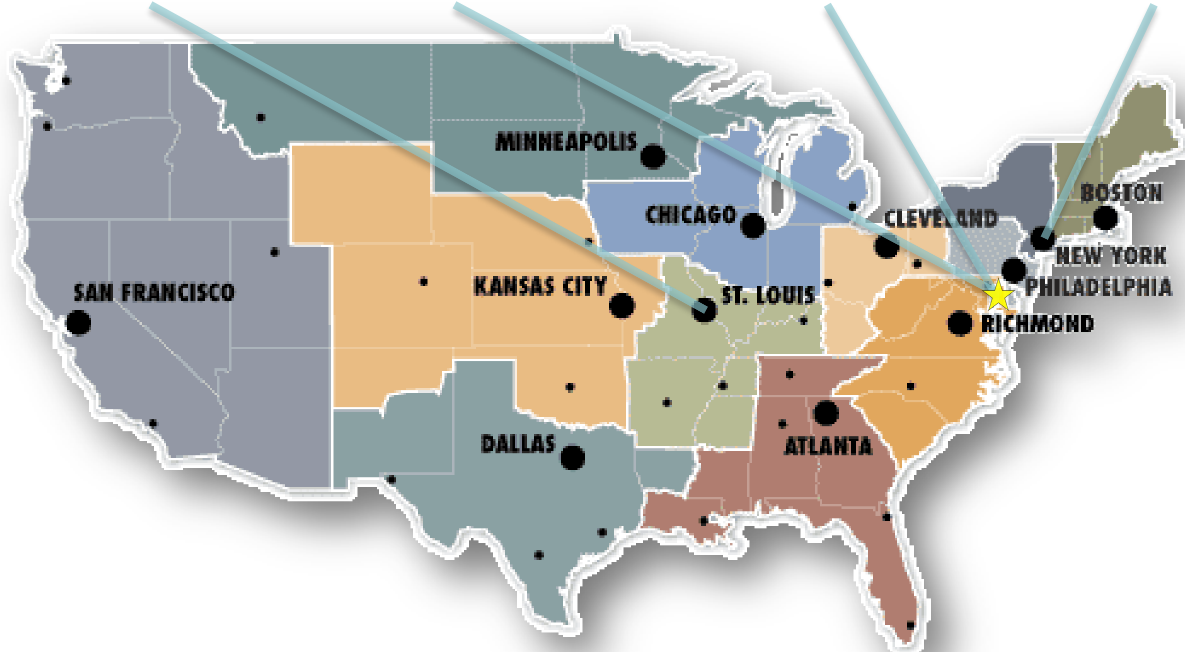

Agenda for Today

- Discuss purpose, background, and applicability of model risk management guidance (MRMG)
- Summarize the key elements of the guidance
- Provide examples of good practices and ongoing challenges
- Describe application of guidance to foreign banking organizations (FBOs) in particular
- Your questions

Purpose / Background of MRMG

- **In 2011, the Federal Reserve issued MRMG (Federal Reserve SR Letter 11-7), along with the Office of the Comptroller of the Currency (OCC)**
- **Focuses on all aspects of model risk management (MRM)**
  - Model validation at the core, but underscores that other aspects are also important
  - Supported by developers/users, controls/compliance
- **Rationale and context**
  - Principles-based, applies to variety of model uses: credit, market, compliance
  - Discusses key features/practices supervisors have observed
  - Benefited from review of bank policies and practices
  - Consistent with principles applied during bank examinations
  - Includes industry and supervisory developments (Basel II, stress testing)
- **Guidance outlines a “framework” for banks and supervisors to evaluate model risk management**

Applicability

- **MRMG applies to "bank holding companies [BHCs], state member banks, and all other institutions for which the Federal Reserve Board is the primary supervisor"**
- **Materiality plays a very important role in applicability**
  - Burden is lower on entities with fewer or less sophisticated models
- **All U.S. operations of FBOs are included**
  - U.S. BHC subsidiaries of FBOs generally are assessed with domestic U.S. BHCs
  - Focus today is on U.S. branches and agencies
  - While U.S. nonbank subsidiaries are also subject to the guidance, given ongoing policy initiatives, they are not an area of focus for this session
- **<u>Note</u>: The outstanding proposal for intermediate holding companies under the Enhanced Prudential Standards will not be discussed today**

Key Sections of MRMG

- **Federal Reserve SR Letter 11-7 and OCC Bulletin 2011–12**
  I. Introduction
  II. Purpose and Scope
  III. Overview of Model Risk Management
  IV. Model Development, Implementation, and Use
  V. Model Validation
  VI. Governance, Policies, and Controls
  VII. Conclusion
- **Highlights three key areas of responsibility or “lines of defense”**
  – Developers, users, owners
  – Staff conducting validation activities
  – Control groups and internal audit
- **Federal Deposit Insurance Corporation supports content of MRMG and also expects firms to have sound MRM practices**

Overview: Some Definitions

- **What is a "model"?**
  - Produces quantitative estimate (of an uncertain value)
  - Three components: input, processing, reporting
  - Inevitably, intentionally simplified representations of the real world
- **What is "model risk"?**
  - Potential adverse consequences from decisions based on models that are incorrect or misused
  - Includes financial loss, poor decisions, damage to reputation
- **What are "sources of model risk"?**
  - Model flaws: errors in model components
  - Model misuse: comes from not understanding model limitations and/or applying existing model to new products, markets, behaviors
- **What do we mean by role of "independence"?**
  - Validation involves a degree of independence from development and use
  - Can be supported by independent reporting lines but other ways to accomplish this
  - Simply having independence on the organizational chart does not suffice

Overview: Some Principles

- **Apply familiar risk management techniques**
  - Identify the source of risk
  - Assess the magnitude of the risk (quantifying where possible)
  - Manage the risk: mitigate, control, limit, monitor
  - Materiality plays an important role
- **Effective challenge**
  - Critical analysis by objective, informed parties who can identify model limitations and assumptions, and produce appropriate changes
  - Incentives: separation from development; also affected by compensation practices, performance evaluation criteria, corporate culture
  - Competence: technical knowledge to formulate critique and institutional knowledge of line of business
  - Influence: ensure appropriate actions are taken
- **Model risk cannot be eliminated so must be managed**
  - Limits on model use, monitor model performance and usage
  - Adjust models over time, supplement with other analysis and information
  - Important to manage both individual and aggregate model risk

Overview: Some Principles (continued)

- **MRM will only be successful with strong involvement of board and senior management**
  - Having good models is not enough
  - There needs to be proper oversight, including avoiding the overuse of model output
- **Emphasize key roles and responsibilities of participants in MRM activities**
  - Ownership
  - Controls
  - Compliance
- **Importance of documentation and transparency—required for credible validation and proper usage**
- **Validation is an ongoing process, not a one-time event**

Observations on Implementing MRMG

- **Guidance has been in effect for over two years**
  - Supervisors have been working with firms on guidance implementation, responding to questions individually and collectively
  - Conducting MRM-specific exams but also incorporating MRM into other supervisory work (such as business-line, risk-specific, or Basel exams)
  - Supervisors recognize that putting in place a sound MRM framework takes time and effort—looking for progress and improving trends
  - Some identified areas of progress, but also continuing challenges

- **General observations**
  - Most firms have responded favorably to MRMG, recognizing that it contributes to overall good risk management
  - Many firms recognize that MRM is not a quick fix and that it takes time, energy, and resources to get things right
  - Not just smaller firms that are facing issues with implementing MRM
  - Most firms have a plan to reach MRM steady state, not there yet

Development, Implementation, and Use of MRMG

- **Key standards from the MRMG**
  - Satisfactory approach for firm-wide model development
  - Process for ensuring that data used in model development are appropriate and accurately represent the firm's condition and behavior
  - Adequate testing of models, data, and assumptions during development and implementation
  - Ensure that models are tracked over time, updated as needed, and that use remains appropriate
  - Ensure that any externally developed (e.g., vendor) models are developed in a satisfactory manner

Model Development Good Practices

- Clear process for deciding to build the model, with proper approvals that follow established policies and procedures
- Intended use of the model is clear, and approval is needed for expanding/altering use
- Clear documentation about the original model design and processing components—allows third party to follow the path of development
- Evidence that model developers have conducted extensive research about industry/academic theory and practice relating to the model
- Consideration of data choices and accounting for exposure characteristics
- Testing to confirm that basic elements of the model function as intended

Model Development Challenges

- Absence of consistent standards for model development (including for documentation)
- Incomplete description of underlying assumptions of the model and lack of specific statements about the model’s limitations
- Acceptance of the model without also evaluating whether outcomes make logical sense
- Lack of analysis and evidence to confirm that underlying data are relevant for intended use—even if data have been handled in an appropriate manner
- Incomplete sensitivity testing conducted to see how model performs with extreme inputs or under extreme circumstances
- Little opportunity for out-of-sample/time testing

Model Implementation Good Practices

- Model users follow set policies and procedures when moving the model out of development phase
- Bank has sound systems, controls, and checks for moving the model into a production environment
- Model reports are clear and contain some useful background and qualitative information about the model
- Strong practices for limiting overrides of model output only when there is specific approval
- Model developers communicate to users how the model functions and how to interpret its output

Model Implementation Challenges

- Lack of transparency in judgmental adjustments made to the model during implementation (i.e., not documented well)
- Vendor models sometimes treated differently than internal models (e.g., less effective challenge)
  - Assumption that they are "industry standard"
- Evidence not always provided for assertions that a model is "conservative" and thus its output is appropriate
- Model reports do not always contain information about assumptions, limitations, and uncertainties (e.g., where does the model not work?)
- Lack of additional testing, analysis, and reporting during implementation, even if just to confirm developmental testing
- Models are extended to other uses without thorough evaluation
- Vendor model data not subject to MRM framework
- Poor change controls for adjustments to models—no audit trail

Model Validation Key Standards

- **Maintain processes to ensure that all models are subject to validation**
- **Ensure that there is effective challenge in the validation process**
- **Conduct validation activities as an ongoing process**
- **Ensure validation processes include an evaluation of:**
  - Conceptual soundness
  - Ongoing monitoring
  - Outcomes analysis (e.g., back testing)
- **Ensure that externally developed models are included in validation processes**

Model Validation Good Practices

- **Higher priority and more extensive validation for models with higher materiality**
- **Staff conducting model validation should:**
  - Have appropriate degree of independence
  - Have the requisite technical expertise to evaluate the model
  - Conduct an initial review of conceptual soundness and identifies some key issues
  - Review developer testing and conduct some tests of their own
- **Clear articulation of validation outcomes (e.g., “full pass,” “use only under certain conditions/limitations,” “rejection,” “provisional approval”)**
- **Evidence that validation staff are unbiased and exercising effective challenge, such as number of models rejected or required changes made before model is used**
- **Models are rejected for the validation process because they lack proper documentation**

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Model Validation Challenges

- Validation units not fully staffed, with substantial backlog of models
- Validation is rushed with little time to conduct extensive benchmarking or testing, or other work to evaluate model's performance
- Validation reports not comprehensive or difficult to interpret
- Concerns surfaced during validation not made transparent to or appropriately considered by model users
- Validation work conducted by third parties not always understood and monitored by bank staff—should not be a simple "hand-off"
- Some models not subject to validation activities before moved into production; no exception process and no limits or compensating controls
- Models not actively monitored and tracked after implementation
- Rigor/intensity of validation varies according to business line/risk area
- Implementation of vendor models not validated (even if models were)

Governance, Policies, and Controls

- **Key standards from the guidance**
  - Strong governance, policies, and controls over the MRM framework that are aligned with the extent and sophistication of its model use
  - Adequately identify all models and corresponding model risk
  - Assign roles and responsibilities for the firm's MRM that are appropriate and commensurate with model use and model risk
  - Strong internal audit function to review the effectiveness of the firm's MRM framework
  - Adequate documentation for MRM, including information in a comprehensive model inventory
  - Ensure that any external resources for MRM are used in an appropriate manner
  - Board and senior management should take appropriate steps to establish and maintain a sound and effective MRM framework that fits into the broader risk management of the organization

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Governance Good Practices

- Significant attention and discussion within companies to evaluate current MRM practices (gap analyses) and develop remediation plans
- Bank-wide committee and governance of MRM with better integration across lines of business—more systematic policies, procedures, and practices
- Attention to monitoring the entire cycle of development, implementation, use, and validation
- Model evaluation resources/expertise broadened—not only technical review process, but also includes risk managers, finance, audit, IT
- Improving model inventory to make it more comprehensive and consistent
- Greater attention to MRM by board members, and careful consideration of what information board members need to oversee MRM framework
- Recognize that implementation of sound MRM not a quick fix

Governance Challenges

- Definition of “model” not always clear/consistent—too narrow?
- Not all firms gauge materiality of models and the differing consequences of them failing or being misused
- While many firms have in place policies and main elements of governance, they are still in the process of evaluating their models
- Some policies do not require validation before a model is put into production or do not have a clear exception process
- Documentation shortcomings, especially for model development and validation reports
- Some observed shortcomings in how model results are displayed and reported, including model limitations and uncertainties
- Most firms in early stages of assessing aggregate model risk
- Some firms overly focused on a “checklist” mentality for MRM and try to rush the process with quality suffering

Addressing MRM Challenges

- The industry is making good progress in a number of areas related to MRM, but also faces a number of challenges
- Overcoming some MRM challenges will simply take time, as several aspects of MRM—when done correctly—cannot be implemented overnight
- In other cases, the industry should continue to think carefully about how to address ongoing challenges
- One of the most important aspects is for the board and senior management to recognize that all models, by definition, are deficient in some manner and reliant on key assumptions that may not hold in all cases
- Supervisors acknowledge that some issues warrant further research and exploration—not claiming we have all the answers

MRM At U.S. Operations of FBOs

- **Supervisors recognize that applying SR Letter 11-7 to the U.S. operations of FBOs presents certain issues and challenges**
  - Some models are developed and validated in the home country
  - U.S. operations may not have a single governance structure
  - MRM practices may vary at some U.S. entities
  - Models may have different uses within different areas
- **SR Letter 11-7 NOT intended to apply expectations to FBO parent**
  - But models used at U.S. operations should conform with MRMG
  - Also important to ensure that models are validated <u>for their intended use</u> in U.S. operations, even if already validated for another use
  - Useful for U.S. supervisors to understand home country MRM standards
- **It is reasonable for MRM to be conducted similarly to other aspects of risk management in the United States**
  - Does not necessarily have to be managed or governed differently than other risks at U.S. operations (credit, market)
  - MRM practices at different U.S. entities should be <u>consistent</u>, but do not have to be the same

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