

# **Verifying and Validating an Operational Risk Framework**

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# Overview

- **Background**
- **Verification**
  - Definition and Examples
- **Validation**
  - Validation of an Operational Risk Framework
  - Model Validation Process
  - Documentation and Responsibilities
- **Industry Observations**

# References

- Notice of proposed rulemaking (NPR) to implement Basel II risk-based capital requirements in the United States for large, internationally active banking organizations, September 25, 2006.  
<http://a257.g.akamaitech.net/7/257/2422/01jan20061800/edocket.access.gpo.gov/2006/pdf/06-7656.pdf>
- OCC Bulletin 2000-16 on Model Validation, May 30, 2000.  
[http://www.ffiec.gov/ffiecinfobase/resources/retail/occ-bl2000-16\\_risk\\_model\\_validation.pdf](http://www.ffiec.gov/ffiecinfobase/resources/retail/occ-bl2000-16_risk_model_validation.pdf)
- Draft Supervisory Guidance for Internal Ratings-Based Systems for Corporate Credit and Operational Risk Advanced Measurement Approaches for Regulatory Capital, August 4, 2003.  
<http://www.federalreserve.gov/boarddocs/press/bcreg/2003/20030804/default.htm>

# New Reference

- Proposed Supervisory Guidance for Internal Ratings-Based Systems for Credit Risk, Advanced Measurement Approaches for Operational Risk, and the Supervisory Review Process (Pillar 2) Related to Basel II Implementation, February 15, 2007.

<http://www.federalreserve.gov/boarddocs/press/bcreg/2007/20070215/attachment.pdf>

# Purposes of Verification & Validation

To ensure:

- The operational risk (OR) framework is robust and appropriate for the institution
- The OR framework is functioning as intended
- The underlying logic and theory are sound
- Input data are complete and accurate
- Output accurately reflects the institution's risk profile

# Operational Risk Framework

## Governance

Board & Management Oversight, Firm-wide Risk Management Function, Line of Business Management, Policies & Procedures, Reporting

Internal Data

External Data

Scenario Analysis

BEICFs

Quantification  
Methodology

Statistical Model

Use of Elements

Unit of Measure

Dependence

Risk Mitigants

Operational  
Risk  
Capital

VERIFICATION & VALIDATION

# Independence

- The verification and validation processes should be conducted independently
- In other words, these processes should be objective and unbiased
- Those conducting verification and validation should have the ability to:
  - Carry out the process freely
  - Render impartial judgments

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NPR(09/25/06): A bank's validation process must be independent of the advanced systems' development, implementation, and operation or be subject to independent assessment of its adequacy and effectiveness. (Federal Register, pg. 55924, Section 22(j)(4))

# What is Verification?

- Verification is the process by which management ensures:
  - The accuracy and integrity of input data
  - The appropriate use of results
  - Model validation procedures were properly followed
- Verification is conducted by testing the various parts of the OR framework
- Verification of OR frameworks is typically conducted by internal or external audit

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Supervisory Guidance (2003): The institution must test and verify the accuracy and appropriateness of the operational risk framework and results. (S32)

# Examples of Verification Activities

# Internal Loss Data

- **Example: test a sample of internal loss data to ensure data collection is consistent with policies and procedures, including:**
  - All required fields are being collected
  - Losses are captured in a timely fashion
  - Escalation and reporting procedures are followed
  - Loss data are accurately and systematically collected across business lines

# BEICFs (RCSAs)

- Example: test a sample of risk & control self-assessments to ensure process is consistent with policies and procedures, including:
  - RCSAs are completed on time and at required intervals
  - Business line managers complete their responsibilities as outlined in policies and procedures
  - Action plans are carried out
  - Escalation and reporting procedures are followed

# Validation

# What is Validation?

- The set of activities designed to give the greatest possible assurances of accuracy of the OR framework
  - Model Validation
  - OR Framework Validation
- Validation is not a new concept
- Validation is an ongoing process

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NPR (09/25/06): A bank must validate its systems on an ongoing basis. Validation is the set of activities designed to give the greatest possible assurances of accuracy of the advanced systems. (Federal Register, pg. 55853)

# OR Framework Validation

- Logic check for overall OR framework and framework elements
- Examples
  - Is the governance structure appropriate and functioning effectively?
  - Are the business lines sufficiently integrated into the overall framework?
  - Does the use of the four data elements for both risk management and quantification make sense?

# Framework Validation Examples (cont.)

- Does the unit of measure provide sufficiently granular results?
- Are the BEICF tools effectively assessing business and internal control environments?
- Does the reporting process provide the necessary and appropriate information to each level of the institution?

# Model Validation

# Typical Elements of a Model Validation Process

## ➤ Identification

- Corporate definition of a model
- An inventory of all models in use throughout the institution

## ➤ Review Process

- Validation Policy
- Validation procedures for different types of models
- Prioritization of models
- Validation frequencies for different types of models
- Sufficient, independent technical resources to assess the models and the model-building process

# Typical Elements of a Model Validation Process (cont.)

- **Approval**
  - Minimum criteria for model acceptance
- **Ongoing Monitoring**
- **Change Control Processes**
  - Procedures to document and review model changes
- **Reporting**
  - Validation findings, issues tracking, and summary reports to senior management

# What gets validated?

- Model input data
- Assumptions
  - Sensitivity
  - Limitations
- Logic & Theory
  - Type & structure of model
  - Types of input data
- Computer Code
- Output

# Model Validation

- Validation covers the entire model design and implementation process and includes:
  - Evaluation of conceptual soundness
  - Ongoing monitoring
  - Outcomes analysis
- Validation begins during model development
- Some validation activities should be performed before a model is ever used

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NPR (09/25/06): Validation must include: (i) The evaluation of conceptual soundness of (including developmental evidence supporting) the advanced systems; (ii) An on-going monitoring process that includes verification of processes and benchmarking; and (iii) An outcomes analysis process that includes back-testing. (Section 22(j)(4))

# Conceptual Soundness

- Analyzing the design and construction of the operational risk model
- Includes a review of developmental evidence
- Examples
  - Why use an LDA model?
  - How were the frequency and severity distributions chosen and why do those choices make sense?
  - Why was the particular combination of data elements chosen?
  - What is the empirical or theoretical support for the level of dependence used in the model?

# Ongoing Monitoring

- Confirming that the operational risk model continues to perform as intended
- Examples
  - How well does the model perform compared to alternative models?
  - Is the combination of the four data elements still appropriate?
  - Does the model continue to provide reasonable and consistent estimates of operational risk capital?
  - Is the insurance offset still reasonable and justifiable?

# Outcomes Analysis

- Comparing model output against actual outcomes
  - Back-testing
  - Out-of-sample testing
- The nature of the data poses a challenge for back-testing operational risk models

# Potential Back-Testing Alternatives for OR Models

- Compare operational risk capital to:
  - Largest loss in internal database
  - Aggregate loss amount over the period
  - Losses in external data
  - Peer operational risk capital estimates

# Documentation and Responsibilities

# Validation Documentation

- Corporate-wide governance
  - Validation policy
  - Validation procedures
- Process documentation
  - Validation activities performed
  - Results and findings
  - Communication of results to management
  - Resolution of issues

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NPR Supplemental Information (09/25/06): A bank must document adequately all material aspects of its advanced systems, including but not limited to the internal risk rating and segmentation systems, risk parameter quantification processes, model design, assumptions, and validation results. The guiding principle governing documentation is that it should support the requirements for the quantification, validation, and control and oversight mechanisms as well as the bank's broader risk management and reporting needs. (Federal Register, pg. 55855)

# Senior Management Responsibilities

- Define and assign responsibility for model validation
- Possess sufficient understanding of the capital model's intended purpose and limitations
- Review validation results and take corrective action where appropriate

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NPR Supplemental Information (09/25/06): Senior management of the bank should be notified of the validation results and should take corrective action, where appropriate. (Federal Register, pg. 55854)

# Internal Audit Responsibilities

- At least annually, review the validation process
  - Procedures
  - Responsibilities
  - Results
  - Timeliness
  - Responsiveness to findings
- May also perform testing and verification

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NPR Supplemental Information (09/25/06): At least annually, internal audit should review the validation process, including validation procedures, responsibilities, results, timeliness, and responsiveness to findings. Further, internal audit should evaluate the depth, scope, and quality of the risk management system review process and conduct appropriate testing to ensure that the conclusions of these reviews are well founded. Internal audit must report its findings at least annually to the bank's board of directors (or a committee thereof). (Federal Register, pg. 55854)

# Industry Observations on OR

- Testing and verification is the least developed governance function
  - All institutions have or plan to have internal audit conduct this process
- Only a few institutions have formal model validation procedures
- Institutions are evaluating validation resources: internal resources, external resources, or co-source
  - A few institutions have standalone model validation groups
  - Some use resources from other areas within the institution
  - Some use a combination of internal and external resources

# Validation Challenges

- Vendor/third party models
- Ongoing monitoring
- Sufficient, independent technical resources to conduct validation

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