



# Regulatory Drivers in Model Risk Management

This paper explores the global regulatory efforts driving change within model risk management and the emerging guidelines that are providing structure to model risk.

# Introduction

The banking industry uses models in a variety of operations – e.g. pricing transactions, performing risk analysis and optimizing returns. However, the use of incorrect or misrepresented models or failing to effectively challenge assumptions increased financial losses following the 2008-2009 financial crisis. Since then, intensified scrutiny has regulators increasingly looking at how banks build, approve and maintain models and requesting evidence that banks are managing model risk.

The U.S. Federal Reserve Board defines a “model” as “a quantitative method, system or approach that applies statistical, economic, financial or mathematical theories, techniques and assumptions to process input data into quantitative estimates.”

Applying such statistical, economic, financial or mathematical theories, techniques and assumptions to available data creates simplified representations of real-world relationships. These are then used to price loans and derivatives, analyze business strategies, make investment decisions, evaluate risk, manage client assets and more.

## What is model risk?

**Model risk is the potential for adverse outcomes** – such as financial loss, poor business and strategic decisions or reputational damage – stemming from incorrect model results and reports. Model risk generally has two causes:

- Fundamental errors that result in inaccurate outputs for the model’s design objective and intended business use
- Incorrect or inappropriate use or a misunderstanding of the model’s limits and assumptions

# U.S. regulators spur increased scrutiny of model risk management

Prior to 2011, firms used model validation and other methods for model risk management (MRM), but such practices were limited, inconsistent across the industry and greatly dependent on manual processes and controls.<sup>1</sup> In 2011, however, the U.S. Federal Reserve and the Office of the Comptroller of the Currency (OCC) jointly issued the SR 11-7<sup>2</sup> Supervisory Guidance on Model Risk Management. The SR 11-7 expanded MRM beyond model validation to include requirements on model development, implementation, use, governance and control structure.

Under SR 11-7, any bank with an operation in the U.S. needs to identify sources of model risk, assess the magnitude of such risk and establish a framework for managing it. Here are three elements recommended by SR 11-7 for a strong MRM process:

## 1. Robust model development, implementation and use

Model risk management requires that organizations properly develop, implement and use models to ensure they perform as intended and are accurate and stable. Minimizing risk requires that organizations understand the capabilities and limitations of the underlying assumptions and account for model uncertainties. Making up for such ambiguities may include adjustments, less reliance on models, or only using a model in conjunction with other models or approaches.

Given increased documentation requirements under SR 11-7, organizations should document every step of the process. Documentation ought to describe the model, data, risk factors and supporting evidence for the selected methodology. The documentation should also identify model limitations and compensating controls, and make accountabilities clear so that not only management has a full understanding of the model, but also any knowledgeable person reviewing it.

## 2. Sound model validation practices

Model validation is the process of assessing a model's assumptions, the underlying theoretical basis and data, as well as its processing, output and reporting. Model validation is one of the key ways to manage, mitigate and control model risk. An effective validation process requires the use of an independent party to offer an objective, knowledgeable and critical model review. As a result, staff with any role in model development and use – and, therefore, with an incentive for the review to deem a model legitimate – should not be involved in performing validations. Once the organization receives these reviews, it is equally important to address any issues identified during the validation process.

As with other financial analytics and risk-assessment measures, once developed, working properly and used correctly, models require continuous monitoring to ensure they remain effective and relevant. Changes in products, risk levels, business activities, clients or market conditions could require that an organization change, revise or replace a model, as well as verify that any such changes are necessary and effective. Regulators also expect organizations to create a comprehensive model inventory and continue working on expanding effective model review, validation and monitoring processes.

## 3. A solid governance framework for minimizing model risk

Responsible governance involves an effective framework, oversight and controls for model use and for model risk management. This includes policies and the procedures for implementing model risk management policies, resource allocation, validation procedures, and monitoring mechanisms to oversee the framework. An organization's leaders should ensure its model risk management program is commensurate with the institution's risk exposure, complexity and the extent of model use. It is also critical they ensure that the model risk stays within the organization's tolerance levels.

Effective governance requires that stakeholders in a variety of functional roles within the organization support the model risk framework. In this way, organizations can make an important step in minimizing model risk: creating a deep cultural awareness of models, as well as its risk and value to the organization.

1. [reply.com/en/Shared%20Documents/Model\\_Risk\\_June\\_2017.pdf](https://www.reply.com/en/Shared%20Documents/Model_Risk_June_2017.pdf)

2. [federalreserve.gov/supervisionreg/srletters/sr1107.htm](https://www.federalreserve.gov/supervisionreg/srletters/sr1107.htm)

# European regulators follow suit with enhanced model risk management supervision

European regulators increasingly assess MRM as part of annual Supervisory Review and Evaluation Process (SREP)<sup>3</sup> inspections, established in 2014 and effective since 2016. The SREP establishes a bank's health, primarily in terms of its capital requirements and the way it handles risks. Following a SREP inspection, banks receive a list of identified issues they must correct within a certain period of time.

## European Central Bank TRIM requirements

The European Central Bank (ECB) is tackling MRM more directly with its Targeted Review of Internal Models (TRIM)<sup>4</sup> project.

The ECB will conduct more than 100 on-site reviews, involving more than 600 people and 68 eurozone banks – covering approved internal models for credit, market and counterparty credit risks. The ECB hopes TRIM will harmonize bank and national supervisory practices relating to models by reducing inconsistencies and unwarranted variability in banks' use of internal models to calculate their risk-weighted assets.

Under TRIM, a well-developed model risk management framework includes:

- Processes and procedures for identifying, mapping, testing and reviewing model risk
- A comprehensive model inventory
- Model risk assessment procedures that utilize risk-based resource allocation
- Monitoring mechanisms to proactively detect and address model errors
- A documented MRM policy outlining such things as the different mandates, roles and responsibilities under the policy of various sectors of the organization, and key reporting procedures for escalating issues
- A robust governance system that actively fosters MRM throughout the organization

It is critical that organizations assess whether model risk poses a material risk to their capital and where it does, just how much of a risk – and those that cannot calculate the capital requirements to cover a specific risk must establish a clear lump sum as a cushion. Organizations can prepare for TRIM by reviewing the ECB's 150-page guide containing specific guidance for TRIM compliance.

3. [bankingsupervision.europa.eu/about/ssmexplained/html/srep.en.html](https://bankingsupervision.europa.eu/about/ssmexplained/html/srep.en.html)

4. The Guide for the Targeted Review of Internal Models (TRIM) [bankingsupervision.europa.eu/ecb/pub/pdf/trim\\_guide.en.pdf](https://bankingsupervision.europa.eu/ecb/pub/pdf/trim_guide.en.pdf)

# UK guidance offers insight into future regulations

On December 6, 2017, the UK's Prudential Regulation Authority (PRA) published a consultation paper entitled "Model risk management principles for stress testing"<sup>5</sup> setting out its expectations for risk management practices by firms using stress test models. While it only covers stress testing models and has no regulatory weight, the guidance does offer a glimpse at what broader MRM regulations may look like in the future.

The PRA's guidance took the form of four key principles that mimic the MRM core expectations described in the SR 11-7:

## PRINCIPLE 1

### Model Definition:

Define a model and record such models in inventory.

## PRINCIPLE 3

### Lifecycle Management:

Create robust model development, implementation and usage processes.

## PRINCIPLE 2

### Risk Governance:

Establish model risk governance framework, policies, procedures and controls.

## PRINCIPLE 4

### Effective Challenge:

Undertake appropriate model validation and independent review.

The PRA proposes that firms participating in the Bank of England's (BoE) annual concurrent stress test adopt the above principles for all stress test models. For firms that do not participate in this test, they should apply these principles taking into account their size, nature, scale, complexity of business activities, and their use of stress test models. For these firms, the PRA proposes at a minimum:

- Implementation of Principles 1 and 2
- Application of Principles 3 and 4 to models they have identified as material

With these four principles, the PRA hopes to both offer more transparency regarding its expectations on stress test model management, as well as help banks assess their own stress test model management frameworks.

## Regulators urge firms to reduce risk and raise minimum standards

Regulators have increased their focus on models in recent years, issuing various forms of guidance documents emphasizing ways to reduce model risk – at both a firm and a system level – and improving model quality by raising minimum standards. While many organizations have moved to strengthen their MRM programs, Deloitte's 2017 global risk management survey<sup>6</sup> reported that forty percent of respondents did not rate their organization highly in terms of managing model risk.

Organizations wishing to successfully engage in the growing use of models while facing escalating regulatory and supervisory scrutiny need to implement a strong MRM system. They should approach model risk in the same manner as other types of risk: identify sources of risk and assess the magnitude of potential impacts. Likewise, model complexity, inaccuracy of the data or the assumptions; broadness of usage or extent of potential impact equals a greater risk that the model poses. Nonetheless, leadership should keep in mind that managing model risk and using models properly allows organizations to use internal data to learn about risks and opportunities, thus enhancing business decision-making and profitability.

5. [bankofengland.co.uk/prudential-regulation/publication/2017/model-risk-management-principles-for-stress-testing](http://bankofengland.co.uk/prudential-regulation/publication/2017/model-risk-management-principles-for-stress-testing)

6. [dupress.deloitte.com/dup-us-en/topics/risk-management/global-risk-management-survey.html](http://dupress.deloitte.com/dup-us-en/topics/risk-management/global-risk-management-survey.html)

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