



OFFICE OF INSPECTOR GENERAL

Evaluation Report

2015-SR-B-018

The Board Identified Areas of  
Improvement for Its Supervisory  
Stress Testing Model Validation  
Activities, and Opportunities Exist for  
Further Enhancement

October 29, 2015

BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM  
CONSUMER FINANCIAL PROTECTION BUREAU

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## Abbreviations

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BHC	bank holding company
Board	Board of Governors of the Federal Reserve System
BS&R	Division of Banking Supervision and Regulation
CCAR	Comprehensive Capital Analysis and Review
Dodd-Frank Act	Dodd-Frank Wall Street Reform and Consumer Protection Act
FRB Minneapolis	Federal Reserve Bank of Minneapolis
MOG	Model Oversight Group
MVOC	Model Validation Oversight Committee
MVU	Model Validation Unit
OIG	Office of Inspector General
SCAP	Supervisory Capital Assessment Program
SR Letter	Supervision and Regulation Letter

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## **Executive Summary:**

# **The Board Identified Areas of Improvement for Its Supervisory Stress Testing Model Validation Activities, and Opportunities Exist for Further Enhancement**

2015-SR-B-018

October 29, 2015

### **Purpose**

The Office of Inspector General conducted this evaluation to assess the extent to which the Board of Governors of the Federal Reserve System's (Board) model risk management practices in support of its supervisory stress testing efforts are consistent with supervisory guidance on model risk management previously issued by the Board. Specifically, we focused primarily on model validation activities, but we also evaluated broader governance, policies, and controls as warranted.

### **Background**

In 2010, the Dodd-Frank Wall Street Reform and Consumer Protection Act mandated that the Federal Reserve conduct annual stress tests of all bank holding companies (BHCs) with \$50 billion or more in total consolidated assets. In late 2010, the Federal Reserve initiated the annual Comprehensive Capital Analysis and Review (CCAR) exercise, which includes quantitative stress tests and a qualitative assessment of the largest BHCs' capital planning practices. CCAR has developed into the cornerstone of the Federal Reserve System's supervisory program for the largest BHCs.

Although the Board oversees supervisory stress testing, it relies on a broad range of Federal Reserve System staff to execute the program.

### **Findings**

The use of models in any environment invariably presents model risk—the risk that decisionmaking may be influenced by inaccurate or unreliable models. The Board expects that its supervisory stress testing program will mitigate model risk in a manner consistent with the standards that the Board has outlined in relevant supervisory guidance. A guiding principle for managing model risk is model validation, which refers to the effective and independent challenge of each model's conceptual soundness and control environment.

The Board's model validation function has assessed its validation activities and proactively identified opportunities to improve model validation. In 2014, the model validation function conducted three reviews assessing its performance and that of the broader supervisory stress testing program. As a result of these reviews, the model validation function identified several areas for improvement. Notably, the model validation function found that its staffing approach was not consistent with industry practice, and as a result, it plans to transition to a new staffing approach. While the internal reviews demonstrate a focus on continuous improvement of supervisory stress testing model validation and governance, we believe that the Board can take additional steps to further improve its model risk management practices in support of supervisory stress testing. Specifically, our report outlines findings related to model validation and broader governance practices.

First, we identified certain risks associated with validation staffing and performance management that may not be mitigated by the implementation of a new staffing approach. These risks include insufficient performance feedback to supplemental reviewers, key-personnel dependencies, and inadequate scrutiny of models. Second, we found that although the Board has taken steps to address the risks associated with changes to models that occur late in the supervisory stress testing cycle, some risks remain. Third, we found that the model inventory lacks several components either required or deemed useful by supervisory guidelines. Finally, based on our review of a sample of validation reports, we found that limitations encountered by reviewers during model validation should be made clearly identifiable for management in the validation reports submitted to management.

### **Recommendations**

Our report contains recommendations designed to strengthen supervisory stress testing model validation practices. Management generally agreed with our recommendations and noted that a number of the recommended actions have already been completed or are in the process of being implemented. We intend to conduct future follow-up activities to determine whether the Board's actions are responsive to our recommendations.

## Summary of Recommendations, OIG Report No. 2015-SR-B-018

Rec. no.	Report page no.	Recommendation	Responsible office
1	12	<p>Ensure that model validation staff</p> <ul style="list-style-type: none"> <li>a. conduct an analysis of the types of skills necessary for validating individual supervisory stress testing models.</li> <li>b. develop a process to track reviewer expertise to better manage the pool of talent with specialized expertise.</li> </ul>	Division of Banking Supervision and Regulation
2	12	Develop and implement a process to ensure that models receive fresh scrutiny over time under the new staffing approach.	Division of Banking Supervision and Regulation
3	12	Develop and implement a process for providing supplemental reviewers with formal performance feedback based on their participation in model validation, and define the appropriate timing and frequency of that feedback.	Division of Banking Supervision and Regulation
4	15	Establish a process for assessing the materiality of late-stage changes to models that clarifies which types of changes should be considered material and, thus, require independent validation.	Division of Banking Supervision and Regulation
5	15	Develop a process that leverages the reviewer resources under the new staffing approach to validate all material late-stage changes to models.	Division of Banking Supervision and Regulation
6	18	<p>Develop guidelines for maintaining a robust inventory of models, including expectations concerning</p> <ul style="list-style-type: none"> <li>a. the roles and responsibilities of the Model Oversight Group and the model validation function in maintaining the model inventory.</li> <li>b. the frequency with which the model inventory should be updated.</li> </ul>	Division of Banking Supervision and Regulation
7	19	<p>Enhance the inventory of models so that its content aligns with the expectations outlined in Supervision and Regulation Letter 11-7. In addition, consider including the following three elements in the enhanced model inventory:</p> <ul style="list-style-type: none"> <li>a. an indication of whether the model was developed in-house or by a vendor, or whether the model relies on a vendor model.</li> <li>b. an indication of whether there are open findings from model validation activities.</li> <li>c. the risk ranking for control and soundness reviews of the model.</li> </ul>	Division of Banking Supervision and Regulation
8	21	Revise the model validation report template to include a section for reviewers to document limitations affecting model validation.	Division of Banking Supervision and Regulation



## OFFICE OF INSPECTOR GENERAL

BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM  
CONSUMER FINANCIAL PROTECTION BUREAU

October 29, 2015

### MEMORANDUM

**TO:** Michael Gibson  
Director, Division of Banking Supervision and Regulation  
Board of Governors of the Federal Reserve System

**FROM:** Melissa Heist *Melisse Heist*  
Associate Inspector General for Audits and Evaluations

**SUBJECT:** OIG Report No. 2015-SR-B-018: *The Board Identified Areas of Improvement for Its Supervisory Stress Testing Model Validation Activities, and Opportunities Exist for Further Enhancement*

The Office of Inspector General (OIG) has completed its report on the subject evaluation. We conducted this evaluation to assess the extent to which the Board of Governors of the Federal Reserve System's supervisory stress test model risk management practices in support of the Comprehensive Capital Analysis and Review are consistent with supervisory guidance on model risk management and internal control standards.

We provided you with a draft of our report for review and comment. In your response, you outlined actions that have been or will be taken to address our recommendations. We have included your response as appendix B to our report.

We appreciate the cooperation that we received from your staff during our evaluation. Please contact me if you would like to discuss this report or any related issues.

cc: Ron Feldman  
James West  
Adam Ross  
Timothy Clark  
Lisa Ryu  
William Mitchell  
J. Anthony Ogden

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# Introduction

## Overview

Supervisory stress testing by U.S. financial regulatory agencies gained prominence during the 2007–2009 financial crisis in an effort to restore the market’s confidence in the financial system.<sup>1</sup> Led by the Board of Governors of the Federal Reserve System (Board), in 2009, bank supervisors conducted the Supervisory Capital Assessment Program (SCAP)—an unprecedented, forward-looking assessment of the nation’s largest bank holding companies’ (BHCs) capital positions.<sup>2</sup> In 2010, the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act)<sup>3</sup> mandated that the Federal Reserve conduct annual stress tests of all BHCs with \$50 billion or more in total consolidated assets. In late 2010, the Federal Reserve System initiated the annual Comprehensive Capital Analysis and Review (CCAR), which included quantitative stress tests and a qualitative review of the largest BHCs’ capital planning processes.<sup>4</sup> The Federal Reserve first published the results of the CCAR supervisory stress test in March 2012; since then, CCAR has become the cornerstone of the Federal Reserve’s supervisory program for the largest BHCs.

The Federal Reserve develops supervisory stress testing models<sup>5</sup> to support Dodd-Frank Act stress testing by projecting profits or losses for each participating BHC under hypothetical scenarios. The use of models necessitates that the inherent risks posed by using those models be actively managed, in part through model validation, in which models undergo effective challenge, or critical analysis of models by independent parties with the requisite knowledge and skills. The Federal Reserve has published supervisory guidance on model risk management for its supervised institutions, which it expects its own managers and staff to comply with in conducting the Board’s supervisory stress testing activities.

Our office conducted an evaluation of the Board’s supervisory stress test model risk management practices. Our objective was to assess the extent to which these model risk management practices are consistent with supervisory guidance on model risk management previously issued by the Board. CCAR includes both quantitative and qualitative assessments, and our evaluation addressed the Dodd-Frank Act supervisory stress testing models used to support the quantitative component of CCAR. Specifically, we focused primarily on model validation activities, but we

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1. For the purpose of this report, *stress testing* or *stress test* refers to exercises used to conduct a forward-looking assessment of the potential effect of adverse events and circumstances on a banking organization.
  2. Sufficient capital allows a BHC to withstand stressful operating environments, to continue lending to creditworthy businesses and consumers, and to meet obligations to creditors and counterparties.
  3. Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203, 124 Stat. 1376 (2010).
  4. Although CCAR was initiated in 2010, the Federal Reserve did not finalize the stress testing rules that implement the stress test requirements under the Dodd-Frank Act until October 2012. The Federal Reserve first released summary results of the Dodd-Frank Act stress tests in March 2013.
  5. The term *model* refers to a quantitative method, system, or approach that applies statistical, economic, financial, or mathematical theories, techniques, and assumptions to process input data into quantitative estimates.



also evaluated broader governance, policies, and controls as warranted. For more information on our scope and methodology, see appendix A.

## Background

### ***The Emergence of Forward-Looking Assessments of BHC Capitalization During the Financial Crisis***

During the 2007–2009 financial crisis, lending tightened considerably and global financial markets became increasingly volatile. As a result, sectors of the financial market previously considered safe experienced distress. As part of an effort to restore confidence in the U.S. financial system in the midst of the crisis, the Board introduced and led SCAP—an unprecedented, forward-looking exercise that employed stress tests to assess how much additional capital, if any, each of the 19 largest domestic BHCs would need if the economy weakened further. SCAP presented two hypothetical macroeconomic scenarios, including one that was more adverse than what was expected for the U.S. economy, for BHCs to use in estimating their revenues, expenses, losses, and reserve needs.

In May 2009, the Board publicly reported the results of this supervisory exercise.<sup>6</sup> Ten of the 19 BHCs that were included in SCAP did not meet the capital adequacy requirements under the adverse macroeconomic scenario. As a result, these BHCs were collectively required to add \$185 billion in capital by the end of 2010.<sup>7</sup> The Board also required these 10 BHCs to develop and submit detailed capital plans for supervisory approval.

The Board encouraged the relevant BHCs to develop plans to raise new capital from private sources but allowed those institutions to include actions such as selling assets and restricting dividends and stock repurchases. In November 2010, the Board published a revision to a Supervision and Regulation Letter (SR Letter)<sup>8</sup> clarifying that the capital plans of all 19 BHCs included in SCAP would be subject to supervisory review and describing the process the Board would follow in assessing those plans.<sup>9</sup> According to a senior Board official, the credibility of SCAP and the public disclosure of its results were significant contributing factors in stabilizing the financial system.

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6. A report detailing the results of SCAP is available at <http://www.federalreserve.gov/bankinfo/bcreg20090507a1.pdf>.
  7. The aggregate additional capital buffer required was reduced to \$75 billion after accounting for additional information, such as several BHCs' sales of assets or restructurings of capital instruments.
  8. SR Letters address significant policy and procedural matters of continuing relevance to the Board's supervisory effort.
  9. The Revised Temporary Addendum to SR Letter 09-4, *Dividend Increases and Other Capital Distributions for the 19 Supervisory Capital Assessment Program Bank Holding Companies*, is available at [http://fedweb.frb.gov/fedweb/bsr/srltrs/sr0904\\_addendum.pdf](http://fedweb.frb.gov/fedweb/bsr/srltrs/sr0904_addendum.pdf).

## ***The Establishment of the Federal Reserve’s Supervisory Stress Testing Exercises***

In 2010, Congress enacted the Dodd-Frank Act. With respect to stress testing, the act requires that (1) the Federal Reserve conduct annual stress tests on all BHCs with \$50 billion or more in assets and disclose a summary of the results and (2) all federally regulated financial companies with \$10 billion or more in assets conduct their own internal stress tests each year and publicly disclose a summary of the results of these tests. In 2012, the Federal Reserve finalized the stress testing rules that implement the stress test requirements under the Dodd-Frank Act. The purpose of the Dodd-Frank Act stress testing exercise is to quantitatively assess how bank capital levels would fare in stressful economic and financial scenarios.

In late 2010, the Federal Reserve initiated the annual CCAR exercise, which built on SCAP by taking a forward-looking and comprehensive approach to assessing capital adequacy. The quantitative results of the Dodd-Frank Act supervisory stress tests are a key input to the CCAR exercise, which combines those results with more qualitative assessments of the capital planning processes used by banks.

According to the Board, while the Dodd-Frank Act supervisory stress tests and CCAR are closely related, there are some important differences. To project capital levels for the Dodd-Frank Act supervisory stress tests, the Federal Reserve uses a standardized set of assumptions that are specified in the Dodd-Frank Act stress test rules. In contrast, for the CCAR capital analysis, the Board states that it uses BHCs’ planned capital actions and assesses whether a BHC would be capable of meeting supervisory expectations for minimum capital levels even if stressful conditions emerged and the BHC did not reduce planned capital distributions. As a result, capital levels projected under the Dodd-Frank Act supervisory stress tests may differ significantly from those projected under CCAR.<sup>10</sup>

In addition, the CCAR supervisory stress tests review all the largest U.S. BHCs simultaneously, thereby providing a horizontal perspective of the current financial condition of, and the prospective outlook for, these firms. Each participating BHC seeks to demonstrate that it can maintain capital above the minimum regulatory capital requirements under hypothetical stress conditions and that its capital planning processes meet the Federal Reserve’s standards.

The Federal Reserve has conducted CCAR annually since its inception in 2010, and CCAR has become the cornerstone of the Federal Reserve’s supervisory program for the largest BHCs. According to a senior Board official, CCAR “provides a regular, structured, and comparative way to assess the capacity of these firms to manage their capital positions, and by implication, more generally to manage their risks.” Further, the official stated that Dodd-Frank Act supervisory stress testing and CCAR have provided a platform for building a regulatory framework that is more dynamic, more focused on systemic risk, and more data driven than the framework in place before the financial crisis, leading the way in transforming supervision of the nation’s largest financial firms.

The Federal Reserve’s implementation of Dodd-Frank Act stress testing and its publication of the CCAR methodology and results have evolved over time. Notably, the Federal Reserve has

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10. Board of Governors of the Federal Reserve System, *Comprehensive Capital Analysis and Review 2014: Assessment Framework and Results*, March 2014, p. 21.

increasingly disclosed information concerning CCAR methodology and results. For example, the Board first published BHC-specific results of the CCAR exercise in March 2012. In 2013, the Federal Reserve publicly disclosed for the first time whether it objected to BHCs' capital plans. In advance of the 2014–2015 CCAR, the Board published historical and projected quarterly data for the variables considered under each macroeconomic scenario. Nineteen BHCs were included in the original 2010–2011 CCAR, while 31 BHCs were included in the 2014–2015 CCAR.

### ***Model Risk Management in Support of Supervisory Stress Testing***

The Federal Reserve relies heavily on models as quantitative decisionmaking tools to conduct supervisory stress testing. The Federal Reserve uses models to project profits or losses for each participating BHC under hypothetical scenarios. To implement supervisory stress test models, the Federal Reserve uses firm-specific financial data from regulatory filings as well as historical and projected macroeconomic data to generate the hypothetical stress scenarios.

The use of models presents the potential for adverse consequences if models are incorrect or misused and the outputs of the models are used in decisionmaking. In April 2011, the Board issued SR Letter 11-7, *Supervisory Guidance on Model Risk Management*,<sup>11</sup> to establish model risk management standards for the BHCs under its supervision, which also rely heavily on models. Although SR Letter 11-7 applies to BHCs, the Director of the Division of Banking Supervision and Regulation (BS&R) expects the Federal Reserve's own model risk management policies and procedures to comply with the standards outlined in the guidance, including the standards related to model validation. Our evaluation focused on assessing whether the Board's model validation activities comply with the model risk management expectations outlined in SR Letter 11-7.

### ***The Structure and Oversight of Supervisory Stress Testing***

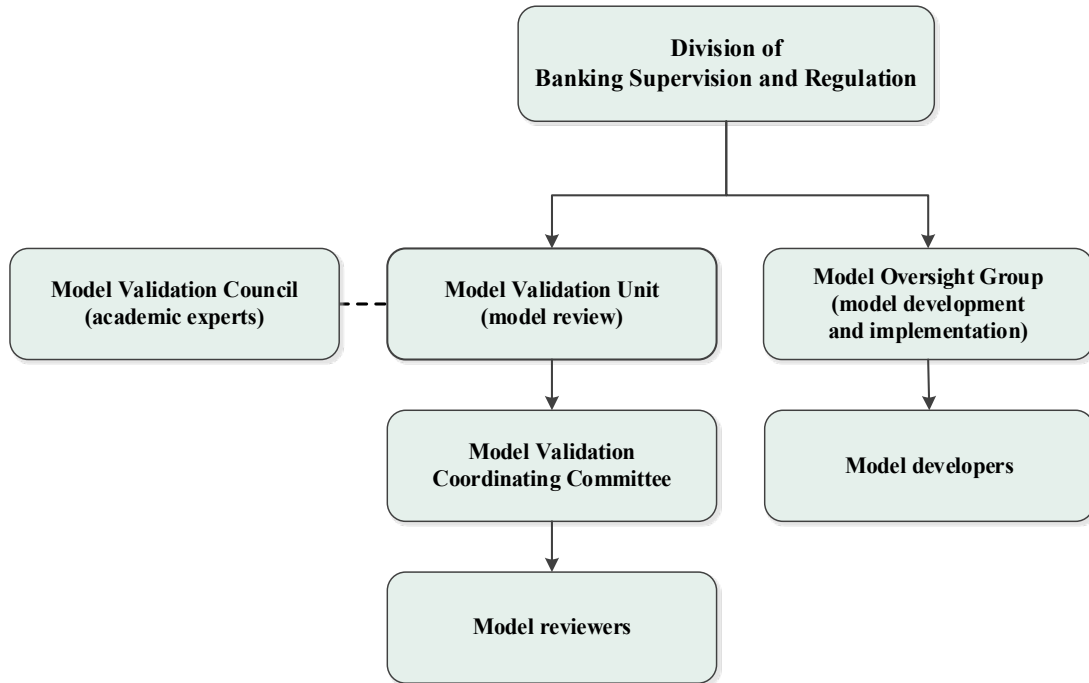
While the Board oversees Federal Reserve supervisory stress testing, it relies on a broad range of Federal Reserve System staff to execute the stress testing. Staff members from the Board and various Reserve Banks participate in supervisory stress testing, including senior bank supervisors, financial analysts, accounting and legal experts, economists, risk management specialists, financial risk modelers, regulatory capital analysts, and examiners responsible for supervising each of the participating BHCs. In the Board's view, this multidisciplinary approach brings diverse perspectives to the Federal Reserve's assessment of the BHCs' capital plans.

As outlined in figure 1 below, the groups that are responsible for model development and implementation and model validation both report to the Director of BS&R. The Model Oversight Group (MOG) oversees model development and implementation activities of model developers, while the Model Validation Unit (MVU) oversees independent model reviewers' validation activities.

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11. SR Letter 11-7 is available at <http://www.federalreserve.gov/bankinfo/srletters/sr1107.htm>.

**Figure 1: 2014–2015 Supervisory Stress Testing Organizational Structure**



Source: OIG compilation based on a review of BS&R organizational charts.

Note: This organizational chart is not comprehensive and includes the details most relevant to this evaluation. According to a BS&R official, a model risk management governance committee will advise the Director of BS&R's oversight of the Federal Reserve's supervisory model development, implementation, and validation functions starting in 2015.

According to SR Letter 11-7, model validation requires effective challenge, or critical analysis of models, performed by independent staff members with appropriate incentives, competence, and influence. It also requires a well-developed model validation function, reinforced through strong model governance, policies, and controls. According to SR Letter 11-7, the effective challenge of models is a guiding principle for managing model risk.

The MVU seeks to provide effective challenge of supervisory stress testing models and, in turn, credible assurance of their quality to internal and external stakeholders. Under the direction of the MVU, the Model Validation Coordinating Committee oversees the implementation of the model validation program. It ensures consistency in the interpretation and implementation of modeling objectives, facilitates communication between model developers and reviewers, and provides updates on the status of model validation efforts to the MVU and other interested parties, among other responsibilities. An external panel of individuals from academia composes the Model Validation Council and provides independent expert advice to the MVU on the functioning of the Federal Reserve's model validation program. The MOG and the MVU share responsibility for ensuring strong model risk management.

## ***Model Validation Reviews and Staffing***

To conduct model validation activities, the MVU has historically employed a contingent staffing approach whereby it relied on a team of reviewers from within the Federal Reserve System who conducted model validation activities on a part-time basis and during an agreed-upon review period. Under this staffing approach, the MVU recruited approximately 85 such reviewers from various Board divisions and most of the Reserve Banks to perform model validation during the 2014–2015 supervisory stress test cycle. These reviewers performed model validation activities concurrently with their day-to-day job responsibilities.

The MVU validates each model to assess two characteristics: (1) the model’s conceptual soundness and performance (*soundness reviews*) and (2) the model’s change and implementation controls (*control reviews*). The soundness reviews are designed to evaluate aspects of the model’s performance and conceptual soundness, while the control reviews are designed to evaluate the processes and procedures to ensure that the model is developed and implemented in an appropriately controlled environment.

The requisite background and expertise for soundness reviewers differs from that for control reviewers. Soundness reviewers must have a strong understanding of modeling techniques for the particular model under review and be able to evaluate the model’s underlying assumptions and their effect on the model’s performance. Some of the soundness reviewers we interviewed have advanced degrees in economics and highly specialized experience with modeling and the regulatory requirements underpinning stress testing scenarios and assumptions. Control reviewers must have a strong understanding of internal control standards and often have a background in general auditing or information technology auditing.

## ***Model Validation Processes***

We reviewed the MVU’s policies and procedures for implementing the model validation process. Prior to conducting model validation, the MVU performs a risk assessment of all models to prioritize their validation activities. Each model’s risk ranking determines the extent of validation it will undergo during a supervisory stress testing cycle.

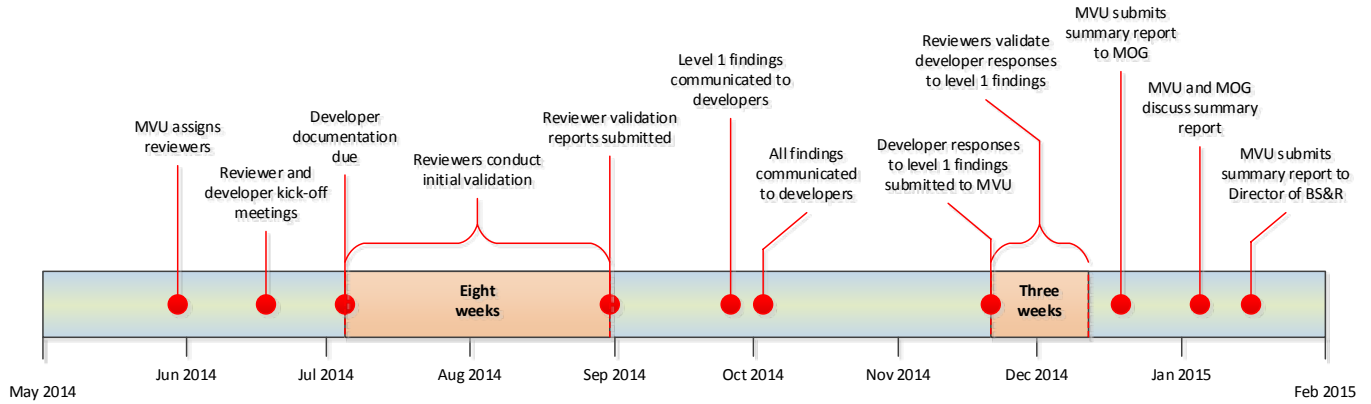
At the start of the model validation period, reviewers meet with developers to discuss the model to be reviewed. Reviewers perform validation activities over the course of two months. The validation activities differ depending on the type of model and whether the validation is a soundness review or a control review. Reviewers document their results using standard validation report templates. The completed validation reports describe any findings, which are classified into one of the following categories:

- Level 1 findings: Critical issues that significantly affect model reliability, stability, or data control
- Level 2 findings: Important issues that affect model reliability and data control

Reviewers submit the completed validation reports to the MVU, which reviews and, if necessary, revises the levels assigned to the findings for consistency across validation reports. The MVU communicates the findings to the MOG. According to MVU policy, model developers must respond to each level 1 finding prior to the model’s implementation. Once the developers have

implemented a change to a model, reviewers have an additional three weeks to validate the change. Figure 2 depicts the timeline for validation activities during the 2014–2015 supervisory stress testing cycle.

**Figure 2: 2014–2015 Supervisory Stress Testing Model Validation Timeline**



Source: OIG compilation based on a review of MVU documentation.

Note: This timeline pertains to the 2014–2015 model validation cycle and is subject to change in subsequent cycles.

# Commendable Actions: The MVU Has Proactively Identified Opportunities to Improve Supervisory Stress Testing Model Validation and Governance

As a result of a series of internal assessments unrelated to our evaluation, the MVU has identified opportunities to improve supervisory stress testing model validation and governance. In 2014, the MVU completed three reviews assessing its own performance and the broader model risk management practices that support supervisory stress testing. The first assessment, completed in January 2014, identified lessons learned during the 2013–2014 supervisory stress testing cycle. The second, completed in March 2014, assessed the MVU’s model risk management practices relative to the standards established by SR Letter 11-7. The third, completed in December 2014, was a governance review of the Federal Reserve’s model risk management activities in support of supervisory stress testing. These three reviews demonstrate the MVU’s commitment to continuous improvement.

## **A Lessons-Learned Assessment Identified Several Areas for Improvement**

The MVU conducted a lessons-learned assessment to evaluate model validation activities associated with the 2013–2014 supervisory stress testing cycle against the MVU’s objectives. The lessons-learned assessment conducted during the prior year informed the objectives for the 2013–2014 assessment. In turn, the 2013–2014 assessment sought to identify possible improvement opportunities for the following supervisory stress testing cycle. Based on its assessment, the MVU found that the model validation function effectively met its objectives for the 2013–2014 supervisory stress testing cycle but identified several additional areas for improvement. The MVU also identified some opportunities for improvement pertaining to the model development process.

## **A Gap Analysis Raised Concerns About the MVU’s Staffing Approach**

In March 2014, the MVU analyzed whether the Federal Reserve’s model validation practices met the supervisory standards outlined in SR Letter 11-7. While SR Letter 11-7 outlines various aspects of effective model risk management, the MVU’s gap analysis focused on the portions of SR Letter 11-7 related to model validation.

Notably, the MVU’s gap analysis found that its staffing approach was not consistent with industry practice regarding (1) the Federal Reserve’s contingent workforce approach to staffing model validation, (2) the time available for model review, and (3) the time spent reviewing any particular model. The gap analysis found that large BHCs generally have full-time model validation staff working year-round to review changes to models. In contrast, the MVU noted that the Federal Reserve’s staffing approach resulted in limited time for validation activities. According to the MVU, this finding represented the most substantial gap between the Federal Reserve’s model validation practices and industry practices.

As a result of this finding, the MVU developed a proposal to transition to a new staffing approach for model validation by the end of 2016. The new staffing approach, which the Director of BS&R approved in November 2014, will employ full-time model validation staff members, along with temporary detailees who will help to validate models that require highly specialized expertise. These detailees, whom we refer to as *supplemental reviewers*, will support the dedicated staff by conducting periodic, short-duration reviews.

The Director of BS&R selected the Federal Reserve Bank of Minneapolis (FRB Minneapolis) to lead the supervisory stress testing model validation function on a permanent basis.<sup>12</sup> Under the new staffing approach, a senior FRB Minneapolis official will chair what will be known as the Model Validation Oversight Committee (MVOC), which will replace the MVU. A program officer will report to the MVOC Chair and will manage the validation program. Several dedicated soundness and control reviewers will be permanently assigned to the model validation function at FRB Minneapolis and will perform validation activities under the direction of the MVOC throughout the year.

## **A Governance Review Made Several Recommendations to Improve Broader Supervisory Stress Testing Governance**

The MVU completed a governance review in December 2014 that included an assessment of the Federal Reserve's supervisory stress testing governance structure. Overall, the MVU concluded that certain governance practices do not conform fully to SR Letter 11-7 standards and exhibit fundamental weaknesses in key areas. The governance review findings include, among other items, a shortcoming in policies and procedures, insufficient model testing, insufficient planning and procedures to address the risks posed by potential key-personnel departures, and incomplete structures and information flows to ensure proper oversight of model risk management.

The governance review notes that similar findings identified at institutions supervised by the Federal Reserve have typically been characterized as *matters requiring immediate attention* or as *matters requiring attention*.<sup>13</sup> The report resulting from the governance review detailed six recommendations to address the findings, including a recommendation to develop a formal gap analysis and remediation plan with specific timelines and resources to address all model risk management issues.<sup>14</sup> We concur with the recommendation and believe that the development of this plan should be a high priority for the Federal Reserve's supervisory stress testing program.

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12. During the 2014–2015 supervisory stress testing cycle, the Chair of the MVU transitioned to FRB Minneapolis from the Federal Reserve Bank of Philadelphia.

13. *Matters requiring immediate attention* refers to matters of significant importance or urgency, arising from an examination, inspection, or any other supervisory activity, that the Federal Reserve requires banking organizations to address immediately. *Matters requiring attention* refers to matters that are important and that the Federal Reserve expects a banking organization to address over a reasonable period of time, but the timing need not be immediate.

14. According to BS&R, the MOG has completed this gap analysis.



# Finding 1: Opportunities Exist to Further Enhance the Model Validation Function's Staffing and Performance Management Practices

As noted previously, the Director of BS&R approved a plan to transition the model validation function<sup>15</sup> from a contingent staffing approach to an approach that will rely on dedicated reviewers along with some supplemental reviewers. We believe that this transition will improve the effectiveness of the Federal Reserve's model validation program; however, we identified certain risks related to staffing and performance management that the new staffing approach may not mitigate. These risks include insufficient performance feedback provided to supplemental reviewers, key-personnel dependencies, and inadequate scrutiny of models. SR Letter 11-7 requires that appropriate resources be assigned to model validation and states that model validation should be performed by staff with appropriate incentives, competence, and influence. If the risks identified above are not mitigated, they may hinder the model validation function's ability to meet the model validation staffing standards outlined in SR Letter 11-7.

## The Model Validation Function Had Not Provided Formal, Robust Performance Feedback to Reviewers

According to SR Letter 11-7, managers can support appropriate incentives in validation through performance evaluation standards that link directly to the quality of model validation and the degree of critical, unbiased review. After the 2013–2014 supervisory stress test, the MVU collected information on each reviewer's performance and assigned an evaluation rating to the reviewer. The lowest rating precluded the MVU from inviting the reviewer to participate in model validation activities the following year, while the next-lowest rating on the scale allowed the MVU to invite the reviewer back under exceptional circumstances and if feedback to improve was provided. However, the MVU did not formally share the performance feedback with the reviewers directly<sup>16</sup> or formally share the feedback with the reviewer's day-to-day supervisor for discussion as part of that person's annual review. Therefore, reviewers might not have been in a position to improve performance on a cycle-to-cycle basis. In one case, a reviewer with a rating that warranted feedback prior to participating the following year indicated that he received no formal performance feedback concerning his model validation work. We determined that this individual participated in model validation the following year.

According to a senior validation official, under the new staffing approach, individuals who are assigned to perform model validation on a dedicated basis will receive feedback on their model validation activities directly. However, the official did not identify a plan for providing feedback to the supplemental reviewers who will assist the dedicated staff in carrying out reviews. Further, as the model validation function implements validation on a continuous basis, we believe that it should assess the timing and frequency of the performance feedback provided to the supplemental

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15. As previously noted, oversight of supervisory stress testing model validation will transition from the MVU to the MVOC with the implementation of the new staffing approach for model validation. We use the term *model validation function* to encompass both entities.

16. The ratings were instead used for managerial purposes within the MVU. At the culmination of the review period, the MVU sent reviewers a standardized letter of gratitude for their participation in model validation.

reviewers. Absent formal and robust performance feedback, the supplemental reviewers may not be aware of their opportunities for improvement. Supplemental reviewers with higher evaluation ratings might also benefit from feedback that encourages high performance and continuous improvement.

## **A Limited Pool of Specialized Reviewers Could Present Key-Personnel Dependency Risk for Certain Models**

According to some reviewers, there is a limited pool of talent from which the Federal Reserve can draw the expertise necessary to validate certain models. For example, one reviewer noted that there are very few individuals across the entire Federal Reserve System with the expertise required to validate the model this reviewer was assigned to. This reviewer added that a colleague with such experience was planning to retire in the near future, which would reduce the already small number of people able to validate that model. Another reviewer with subject-matter expertise in certain banking regulations noted that only a core group of individuals possesses the specialized expertise to perform validation of certain models. Such key-personnel dependencies could heighten the Federal Reserve's vulnerability to the loss of model validation capabilities in the event of unforeseen departures.

During our review, we sought to determine the process by which the MVU identifies reviewers with specialized expertise to perform model validation. A senior validation official noted that historically, the MVU has leveraged Federal Reserve System committees to help identify and recruit reviewers with the necessary skills to validate certain models. According to BS&R, these committees may have broader knowledge of the relative expertise of staff members across the Federal Reserve System than individual reviewers. However, we determined that the MVU does not currently conduct a formal assessment of the expertise required to validate each model or maintain an inventory to track the skills and expertise of reviewers. The senior validation official acknowledged that the MVU can improve its tracking of reviewer expertise across the system, and that the MVU would benefit from tracking this information.

In our opinion, without a formal method for assessing the expertise required to validate each model as well as for tracking the skills and expertise of reviewers, the MVU may not be aware of which models are vulnerable to key-personnel dependency risk, which may hinder the MVU's ability to mitigate that risk. We believe that tracking such information would enhance the MVU's ability to implement measures for mitigating such risks, such as performing contingency planning, facilitating job shadowing, or bolstering efforts to recruit staff with highly specialized skills.

## **Using Dedicated Reviewers May Increase the Risk That Models Do Not Receive Fresh Scrutiny Over Time**

Many of the reviewers we interviewed indicated that they validated the same model during consecutive supervisory stress testing cycles. Six of the 10 reviewers we interviewed noted the importance of obtaining fresh scrutiny to ensure the effective challenge of models over time. Many reviewers suggested that the model validation function should rotate reviewers across models every few years to ensure that the models receive fresh scrutiny over time.

Rotating reviewers among models may prove challenging as the model validation function transitions from a contingent staffing approach, with approximately 85 reviewers participating in model validation, to a new staffing approach that includes far fewer permanently staffed and supplemental reviewers. It may also present a challenge for models that require highly specialized expertise from which there is a limited pool of talent to draw.

A senior validation official noted that because the model validation function has recently begun to recruit a permanent staff of new reviewers, ensuring that reviewers provide fresh scrutiny is not an immediate challenge facing the model validation function. However, that official agreed that it will be important to plan to address this risk over time. In our opinion, the model validation function would benefit from evaluating options to ensure that models receive fresh scrutiny in the near term. If the model validation function does not plan to address this issue, it faces the risk that reviewers may provide insufficient scrutiny to models over time and that models may not receive the effective challenge prescribed by SR Letter 11-7.

## Conclusion

We believe that the implementation of the new staffing approach is an important step toward addressing weaknesses in the Federal Reserve's model validation program. However, the new staffing approach may not mitigate certain risks and issues associated with validation staffing and performance management, such as insufficient feedback provided to supplemental reviewers, key-personnel dependencies, and inadequate scrutiny of models. We believe that as the model validation function transitions to an alternative staffing approach, the MVU and its successor, the MVOC, should take steps to mitigate these risks. If they are not addressed, these risks may hinder the model validation function's ability to meet the model validation staffing standards outlined in SR Letter 11-7.

## Recommendations

We recommend that the Director of BS&R

1. Ensure that model validation staff
  - a. conduct an analysis of the types of skills necessary for validating individual supervisory stress testing models.
  - b. develop a process to track reviewer expertise to better manage the pool of talent with specialized expertise.
2. Develop and implement a process to ensure that models receive fresh scrutiny over time under the new staffing approach.
3. Develop and implement a process for providing supplemental reviewers with formal performance feedback based on their participation in model validation, and define the appropriate timing and frequency of that feedback.

## Management's Response

In its response to recommendation 1, management states that it will identify and document the skills needed to validate each model and incorporate that information in its hiring and retention efforts. Management also states that under the new staffing approach, the model validation function will more formally track the expertise of available staff in comparison to its efforts under the prior staffing approach. Finally, management notes that the new staffing approach will significantly reduce the use of supplemental reviewers, and given this reduced need, it anticipates that there will be a broader pool of staff with the ability to serve as supplemental reviewers.

In its response to recommendation 2, management states that the new staffing approach will use well-established methods to ensure the models receive fresh scrutiny, such as rotating reviewers among models.

In its response to recommendation 3, management states that the new staffing approach will largely address this recommendation, as work will primarily be performed by permanent staff who will receive formal performance feedback at least annually. Management also notes that the Board has recently developed a new process to evaluate the performance of staff who work on Systemwide activities, which will be used to evaluate supplemental reviewers going forward.

## OIG Comment

In our opinion, the actions described by the Director of BS&R appear to be responsive to our recommendations. We plan to follow up on the Board's actions to ensure that the recommendations are fully addressed.

## Finding 2: The MOG and the MVU Have Taken Steps to Mitigate the Risks Associated With Late-Stage Changes, but Risks Remain

The contingent staffing approach hindered reviewers' ability to validate late-stage changes, which are changes implemented by model developers after the validation period concludes. SR Letter 11-7 requires that material changes to models undergo independent validation. As noted previously, to address this risk and other shortcomings of the contingent staffing approach, the model validation function is transitioning to a new staffing approach with dedicated reviewers who will be available to conduct validation year-round. However, the new staffing approach will only partially address the risks associated with late-stage changes. The model validation function can take steps to further mitigate the risks associated with such changes and better ensure compliance with the model risk management standards outlined in SR Letter 11-7. If late-stage changes are not independently validated, the risk of error and reputational damage posed by the reliance on models to implement supervisory stress testing is significantly heightened.

### **Reviewers Were Unable to Validate Late-Stage Changes to Models Under the Contingent Staffing Approach**

As noted previously, the MVU's contingent staffing approach relied on reviewers who participated in model validation on a part-time basis and during a fixed time period. As such, model validation could only be conducted during the specific time period that reviewers were allocated for validation activities; after this period concluded, the reviewers returned to their day-to-day responsibilities. Developers may seek MOG approval to make limited model changes after the validation period concludes, sometimes in response to validation findings. These late-stage changes may be necessary to improve the model's conceptual soundness or data accuracy. We understand that it is important for the developers to retain the flexibility to make such changes when necessary.

However, several of the validation reviewer interviewees stated that they were unable to review late-stage changes prior to model implementation. Some reviewers noted that they reviewed such changes during the following year's supervisory stress testing exercise, while some noted that they were not aware of late-stage changes to their assigned models. The inability to validate all material changes to models increases the likelihood that the Federal Reserve relies on models that are inaccurate or do not perform as intended.

### **Despite Steps Taken to Mitigate the Risks Associated With Late-Stage Changes, Risks Remain**

The MVU has acknowledged that the inability to validate late-stage changes represents a significant weakness in its ability to meet SR Letter 11-7 requirements. In its lessons-learned assessment, the MVU found a significantly elevated risk of error among models that underwent substantial changes after the conclusion of the validation review period, due to insufficient time devoted to testing and validating these changes. According to a senior MVU official, the MVU believes that the implementation of late-stage changes should be carefully controlled. The MVU

subsequently concluded that the MOG should improve the discipline and controls around the model change process.

A senior MOG official stated that the MOG has taken steps to address this concern by enhancing the controls around the communication and approval of late-stage changes. These enhanced controls require model developers to provide a detailed description of late-stage changes to MOG management for review and approval prior to implementing the model changes. The MOG then provides the MVU with an exceptions log, detailing a description of each model change; however, this information is communicated to the MVU after the models are implemented.<sup>17</sup>

The MVU's transition to a new staffing approach with dedicated staff offers an opportunity to further mitigate the risks associated with late-stage changes to models. Under the new staffing approach, some reviewers will be assigned to the MVU on a permanent basis and, therefore, should be available to validate changes to models throughout the supervisory stress testing cycle. However, the MOG and the MVU do not currently have a formal process for determining what types of late-stage model changes should be considered material and, thus, require validation. Further, changes that occur just prior to model implementation may not allow for sufficient time for validation, even with dedicated reviewers available. It is important that the MOG and the MVU address these issues in a way that balances the need for developers to refine models late in the supervisory stress testing cycle with the need for reviewers to validate all material late-stage changes to models in accordance with the requirements of SR Letter 11-7.

## Recommendations

We recommend that the Director of BS&R

4. Establish a process for assessing the materiality of late-stage changes to models that clarifies which types of changes should be considered material and, thus, require independent validation.
5. Develop a process that leverages the reviewer resources under the new staffing approach to validate all material late-stage changes to models.

## Management's Response

In its response to recommendation 4, management states that while all models undergo validation, late-stage changes presented a challenge under the previous staffing approach. According to management, under the new staffing approach the Board has developed tools to assess the materiality of late-stage changes and to prioritize changes based on that assessment. Management notes that a new risk management governance committee will continue to develop processes and procedures to address this recommendation.

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17. In addition, the MOG has instituted a two-year model development cycle that would restrict the implementation of new models during the year in which the models were initially proposed and developed, and before the MOG and the MVU assess the models' conceptual soundness and performance, with certain exceptions.

In its response to recommendation 5, management states that the model validation function is currently working with the MOG to facilitate independent validation of all material late-stage changes.

## **OIG Comment**

In our opinion, the actions described by the Director of BS&R appear to be responsive to our recommendations. We plan to follow up on the Board's actions to ensure that the recommendations are fully addressed.

# Finding 3: Model Inventory Management Does Not Meet Several of the Supervisory Guidelines Outlined in SR Letter 11-7

The supervisory stress testing model inventory does not contain several of the components outlined in the guidelines. SR Letter 11-7 states that a specific party should be responsible for maintaining a model inventory and establishes information required and deemed useful for inclusion in that inventory. We attribute the gaps in the model inventory in part to a lack of policies or procedures pertaining to model inventory management, including policies that clarify roles and responsibilities. A model inventory that does not contain complete, accurate, and up-to-date information on supervisory stress testing models increases the risk that those models will not undergo validation in accordance with the standards outlined in SR Letter 11-7.

## **The Model Inventory Lacks Several Components Required or Deemed Useful by SR Letter 11-7**

We determined that the model inventory does not meet several of the guidelines outlined in SR Letter 11-7. Specifically, the guidelines state that the model inventory should describe the purpose and products for which the model is designed, the model's actual or expected usage, and any restrictions on the use of the model. In addition, SR Letter 11-7 states that it is useful for the model inventory to include the following information: inputs, outputs, intended use, a description of when the model was last updated, and the dates of completed and planned validation activities.

We observed that the model inventory used in support of supervisory stress testing lacks several required and useful elements outlined in SR Letter 11-7. For example, the model inventory does not clearly state the purpose and products for which the model is designed, when the model was last updated, whether the model is functioning properly, and the dates of completed and planned validation activities. The inventory also includes certain information fields that have not been completed consistently. Specifically, information on model inputs and outputs was populated in the inventory for only certain models. The governance review conducted by the MVU in December 2014 also noted that the model inventory should be enhanced.

## **Roles and Responsibilities Related to Inventory Management Are Not Clearly Defined**

Our interviews revealed that there was a lack of common understanding between the MVU and the MOG on roles, responsibilities, and accountability for managing the model inventory. According to an MVU official, historically, the MOG had been solely responsible for maintaining the model inventory, which the MVU uses as a basis for conducting model validation.<sup>18</sup> However, a MOG staff member stated that the MOG took full ownership of the model inventory at the start of the 2015–2016 supervisory stress testing cycle. According to that staff member, in previous years, the MOG and the MVU jointly maintained the model inventory. The MOG staff member

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18. The MVU separately maintains multiple model databases that track the number of validation findings and validation scope, among other information related to model validation.



also informed us that the MOG does not currently have written policies or procedures related to model inventory management. Therefore, roles and responsibilities, expectations for how often the inventory should be updated, and expectations regarding model inventory content have not been clearly defined, and the standards outlined in SR Letter 11-7 have not been satisfied.

## **Including Additional Elements Could Strengthen Model Inventory Management**

We identified three additional elements to include in the model inventory, in part based on information currently tracked in various repositories used by the MVU, that we believe would help strengthen model risk management. These elements include

- an indication of whether the model was developed in-house or by a vendor, or whether the model relies on a vendor model
- whether there are open findings from model validation activities
- the risk ranking for control and soundness reviews of the model

Each of these elements would provide additional data on the risks associated with each individual model. In our opinion, such data could be useful in managing model risk during model development or validation by providing a clearer picture of the risks posed by each model to all parties involved in supervisory stress testing. For example, regarding vendor models, SR Letter 11-7 states that such models pose “unique challenges for validation and other model risk management activities because the modeling expertise is external to the user and because some components are considered proprietary.” A model inventory that contains complete, accurate, and up-to-date information on models mitigates the risk of those models not undergoing validation in accordance with the standards outlined in SR Letter 11-7.

## **Recommendations**

We recommend that the Director of BS&R

6. Develop guidelines for maintaining a robust inventory of models, including expectations concerning
  - a. the roles and responsibilities of the MOG and the model validation function in maintaining the model inventory.
  - b. the frequency with which the model inventory should be updated.

7. Enhance the inventory of models so that its content aligns with the expectations outlined in SR Letter 11-7. In addition, consider including the following three elements in the enhanced model inventory:
  - a. an indication of whether the model was developed in-house or by a vendor, or whether the model relies on a vendor model.
  - b. an indication of whether there are open findings from model validation activities.
  - c. the risk ranking for control and soundness reviews of the model.

## **Management's Response**

In its response to recommendations 6 and 7, management states that the MOG is responsible for maintaining the model inventory and has recently established a project team tasked with ensuring that the model inventory aligns with the expectations in SR Letter 11-7. The project team performed its own analysis and identified the same issues noted by the OIG. The project team has also begun work on a longer-term effort to develop policies, procedures, and expectations for maintaining the Board's inventory of stress testing models.

## **OIG Comment**

In our opinion, the actions described by the Director of BS&R appear to be responsive to our recommendations. We plan to follow up on the Board's actions to ensure that the recommendations are fully addressed.

# Finding 4: The Model Validation Function Should Improve Internal Communication of Model Validation Limitations

We determined, based on a review of a sample of validation reports, that limitations encountered by reviewers during model validation were often not documented in validation reports. SR Letter 11-7 requires that limitations in model validation be communicated in reports to users, senior management, and other relevant parties. Model validation limitations should be communicated internally to facilitate management's understanding of the constraints faced during the validation process. We attribute the lack of such documentation to the fact that the validation report templates do not contain a section for documenting model validation limitations. The absence of disclosures in the validation reports regarding such limitations may lead to undue reliance on the results of validation and hinder management's ability to mitigate those limitations going forward.

## **Limitations That Adversely Affect Model Validation Activities Have Not Been Communicated Internally Through Validation Reports**

During interviews, reviewers frequently described limitations that adversely affected their ability to conduct model validation activities, but we found that they seldom documented those limitations in validation reports. Some reviewers stated that they faced difficulty obtaining or understanding the documentation associated with a model. Reviewers also noted that time constraints adversely affected their ability to complete model validation. For example, we learned that data access procedures delayed one review team's access to model data, hindering the team's ability to review the model in a timely manner. In another instance, a reviewer stated that the validation team had not documented the team's decision not to perform validation activities on the vendor model, despite a requirement in SR Letter 11-7 that vendor models undergo the same rigor of validation as internally developed models. According to a reviewer assigned to that model, the reviewers decided that it was unnecessary to validate the vendor model because it was widely used and, therefore, trusted. However, the reviewers did not document this rationale in the model validation report.<sup>19</sup> Overall, 9 of 10 reviewers identified some type of limitation during model validation in our interviews, yet only 3 reviewers documented any limitations in the corresponding model validation report.

Although the model validation report templates generally contain a section for reviewers to document limitations affecting model implementation, we did not identify a similar dedicated section for documenting limitations affecting model validation. Reviewers communicated regularly with points of contact from the Model Validation Coordinating Committee, during which the reviewers may have had the opportunity to communicate validation limitations they encountered. A senior validation official also noted that reviewers have the opportunity to communicate limitations encountered during model validation in their responses to a survey the MVU disseminates after the model validation period concludes. However, we believe that it would be more effective and more useful to managers if limitations encountered during model validation were documented in a clearly identifiable manner directly in the validation reports submitted to management. If limitations are not disclosed in the validation reports in such a

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19. The validation report template includes a section for documenting the validation of vendor models and states that the template is applicable to both internally developed models as well as any vendor models.

manner, senior validation officials may not be aware of the specific limitations faced by reviewers, potentially leading to undue reliance on the results of validation. Further, management's ability to mitigate those limitations going forward may be hindered.

## **Management Actions Taken**

Our fieldwork ended in March 2015 and our review included data as of that month. During the reporting phase of our evaluation, we learned that the MVU revised the model validation templates to include a section for reviewers to document limitations affecting model validation. We received and reviewed this documentation in August 2015. In addition to including a section for reviewers to document limitations affecting model validation, the revised template also provides examples of limitations that reviewers might encounter, such as time constraints, insufficient access to data, and insufficient guidance.

## **Recommendation**

We recommend that the Director of BS&R

8. Revise the model validation report template to include a section for reviewers to document limitations affecting model validation.

## **Management's Response**

In its response to recommendation 8, management states that it has updated the model validation report template for the most recent stress testing cycle and notes that the OIG has indicated that the revisions are responsive to the recommendation. Management also states that it will continue to note limitations affecting model validation.

## **OIG Comment**

Based on our August 2015 review of the revised model validation templates, we determined that the revisions to the validation report template are responsive to our recommendation. No further follow up for this recommendation is necessary.

# Appendix A

## Scope and Methodology

To accomplish our objective, we reviewed model validation activities related to the 2013–2014 supervisory stress testing cycle, as well as model validation policies and procedures in effect during 2014. Our evaluation focused on the model risk management standards outlined in SR Letter 11-7 that apply to supervisory stress testing model validation activities, as well as broader governance, policies, and controls, as warranted.

We reviewed materials detailing relevant background on the CCAR supervisory stress testing program, such as publicly issued CCAR results, supervisory documentation related to stress testing, model validation policies and procedures, and model validation reports. We also reviewed public commentary on supervisory stress testing, including speeches by Federal Reserve officials and other publicly available information. We interviewed Board officials from the MOG. We also interviewed FRB Minneapolis officials from the MVU and the Model Validation Coordinating Committee. Additionally, we interviewed the Chair of the Model Validation Council to obtain the perspective of an expert outside the Federal Reserve System. Given our evaluation’s focus on the Federal Reserve’s model validation activities, we did not interview employees of the BHCs that participate in supervisory stress testing.

To evaluate the Federal Reserve’s execution of the model validation program, we selected a judgmental sample of approximately 16 percent of the top-level models implemented during the 2013–2014 supervisory stress testing cycle. We considered several attributes in selecting our sample, including model risk rankings and review scopes, with an emphasis on higher-risk models and models that underwent a full-scope review. We also considered the number and type of review findings, with an emphasis on higher-priority findings. We reviewed one control validation report and one soundness validation report for each of the models we sampled. We also interviewed one reviewer from each control validation and one reviewer from each soundness validation. We selected the reviewers based on a dispersion of evaluation ratings and geographic locations.

We conducted our fieldwork from June 2014 through March 2015. We performed our evaluation in accordance with the *Quality Standards for Inspection and Evaluation* issued in January 2012 by the Council of the Inspectors General on Integrity and Efficiency.

# Appendix B Management's Response

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**BOARD OF GOVERNORS  
OF THE  
FEDERAL RESERVE SYSTEM**  
WASHINGTON, D.C. 20551

October 23, 2015

Mr. Mark Bialek  
Inspector General  
Board of Governors  
of the Federal Reserve System  
20<sup>th</sup> Street and Constitution Avenue, NW  
Washington, DC 20551

Dear Mark:

Thank you for the opportunity to comment on your draft report, *The Board Identified Areas of Improvement for Its Supervisory Stress Testing Model Validation Activities, and Opportunities Exist for Further Enhancement*. We have reviewed the report and provide our comments below. We appreciate the effort that the Office of Inspector General (OIG) has put into this report and the recommendations you provide for improving our supervisory efforts.

The draft report contains eight recommendations relating to the Board's model validation activities. We are in general agreement with the recommendations; however, we believe a number of the recommended improvements have already been completed or are in the process of being implemented, as outlined below.

Our responses to your recommendations are as follows:

*1. Ensure that model validation staff*

- a. conduct an analysis of the types of skills necessary for validating individual supervisory stress testing models.*
- b. develop a process to track reviewer expertise to better manage the pool of talent with specialized expertise.*

Under the new staffing approach, the model validation function will identify and document the skills needed to validate the current model inventory. The model validation function will incorporate the skills identified when hiring and retaining permanent staff and when recruiting supplemental reviewers in the future.

Under the previous staffing approach, the model validation function worked with Federal Reserve System committees throughout the Federal Reserve System to identify part-time reviewers with the

Page 1 of 3

relevant skills needed to validate supervisory stress testing models; however, this process was relatively informal. Under the new staffing approach, the process will be more formal. The model validation unit will work with the appropriate Federal Reserve System functions to effectively track expertise of available staff who could be deployed as supplemental reviewers. Moreover, the new staffing approach will significantly reduce the use of supplemental reviewers on temporary assignment. We anticipate that given this reduced need, there will be a broader pool of staff with the ability to serve in the role of supplemental reviewers.

2. *Develop and implement a process to ensure that models receive fresh scrutiny over time under the new staffing approach.*

Once implemented, the new staffing approach will use well-established methods to ensure models receive fresh scrutiny, such as rotating validation staff across models.

3. *Develop and implement a process for providing supplemental reviewers with formal performance feedback based on their participation in model validation, and define the appropriate timing and frequency of that feedback.*

As previously indicated, the new staffing approach will largely address this recommendation, as work will be primarily performed by permanent staff who will receive formal performance feedback at least annually. In addition, the Board has recently developed a new process to evaluate performance of supervisory staff who work on Systemwide activities, which will be used to evaluate supplemental reviewers.<sup>1</sup> The model validation function is adopting the new process outlined in the guidance.

4. *Establish a process for assessing the materiality of late-stage changes to models that clarifies which types of changes should be considered material and, thus, require independent validation.*

To clarify, all models undergo validation. However, under the previous staffing approach late-stage model changes did present a challenge. Under the new staffing approach, there will be a more effective process to validate late-stage changes. Specifically, the Board has developed tools that analyze the materiality of late-stage model changes. For example, the Board established a Model Risk Management Governance Committee (MRMGC) to advise the Director of BS&R on model risk management. The MRMGC continues to develop processes and procedures to address this recommendation. In addition, the Model Oversight Group (MOG) has adopted a written framework that discusses prioritization of model changes based on materiality.

5. *Develop a process that leverages the reviewer resources under the new staffing approach to validate all material late-stage changes to models.*

The model validation function is currently working with the MOG on steps to facilitate independent validation of all material late-stage changes to models.

6. *Develop guidelines for maintaining a robust inventory of models, including expectations concerning*
  - a. *the roles and responsibilities of the MOG and the model validation function in maintaining the model inventory.*
  - b. *the frequency with which the model inventory should be updated.*

<sup>1</sup> AD letter 15-11/CA Admin 15-4, *Guidance on Resource Management of Large Supervision System Initiatives*.

The MOG is responsible for maintaining the inventory of models and calculation tools used for stress testing. In the first quarter of 2015, the MOG established a Model Risk Management (MRM) project team to ensure that its inventory of models aligns with the expectations outlined in SR Letter 11-7. In April 2015, the MRM project team performed its own gap analysis self-assessment and identified the same issues noted by the OIG. A long-term project is underway by the MRM project team to draft inventory management procedures, as well as a revised inventory field list, to address the issues identified in the gap analysis self-assessment. The formal policy document describing the procedures and new model inventory template has a target completion date of October 2015. The MRM project team also intends to share the inventory policy and procedure documents with its model validation function liaisons for comment before finalized. Once these formal documents have been created, the MRM project team will work with the Model Coordination and Advisory Team to populate an initial version of the model inventory reflecting the current state of the supervisory model suite.

7. *Enhance the inventory of models so that its content aligns with the expectations outlined in SR Letter 11-7. In addition, consider including the following three elements in the enhanced model inventory:*
- a. *an indication of whether the model was developed in-house or by a vendor, or whether the model relies on a vendor model.*
  - b. *an indication of whether there are open findings from model validation activities.*
  - c. *the risk ranking for control and soundness reviews of the model.*

Please refer to the answer provided for recommendation six, above.

8. *Revise the model validation report template to include a section for reviewers to document limitations affecting model validation.*

As noted in management actions taken, the model validation function updated the report template for the 2015 validation cycle and the OIG determined the revisions to be responsive to their recommendations. The model validation function will continue to note limitations impacting validations.

Thank you, again, for the opportunity to provide comments to this report.

Regards,



Michael S. Gibson  
Director  
Division of Banking Supervision  
and Regulation





**OFFICE OF INSPECTOR GENERAL**  
BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM  
CONSUMER FINANCIAL PROTECTION BUREAU

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