

Federal Housing Finance Agency
Office of Inspector General



DBR Provided Sufficient Oversight of the FHLBanks' Use of Market Risk Modeling

..... EXECUTIVE SUMMARY

PURPOSE

A Federal Home Loan Bank (FHLBank) uses complex models to identify, measure, and monitor its market risk exposures, and to make decisions on how best to control them. The models are subject to model risk – the risk that model errors or their incorrect use could lead management to make incorrect decisions and suffer loss. The Federal Housing Finance Agency’s (FHFA) Division of Federal Home Loan Bank Regulation (DBR) regulates and supervises the Federal Home Loan Bank System (FHLBank System). As part of our ongoing oversight of FHFA’s supervision of the FHLBank System, we performed an audit to assess whether DBR provided sufficient oversight of the FHLBanks’ use of market risk modeling to ensure management of market risk.

RESULTS

We determined that DBR provided sufficient oversight of the FHLBanks’ use of market risk modeling to ensure the management of market risk. Specifically, we found that FHFA’s supervisory guidance defined needed processes and controls commensurate with the relative risk associated with market risk models. DBR’s examination guidance provided examiners with worksteps for oversight, assessment, and evaluation of the FHLBanks’ management of market risk modeling. DBR’s supervisory activities during the audit scope met minimum frequency requirements and provided risk-based coverage of the FHLBanks’ market risk modeling. DBR’s supervisory conclusions regarding the FHLBanks’ market risk modeling were supported by the results of examination work documented in examination workpapers that had been subjected to DBR quality control processes. Furthermore, DBR assessed the remediation of Matters Requiring Attention (MRAs) related to the FHLBanks’ market risk modeling in accordance with DBR adverse findings guidance. Our review of DBR market risk monitoring reports found no indications of supervisory concern.

We made no recommendations in this report.

This report was prepared by Jim Lisle, Audit Director; April Ellison, Audit Manager; Marco Uribe, Auditor-in-Charge; and Kobe Wilson, Auditor; with assistance from Abdil Salah, Assistant Inspector General for Audits. We appreciate the cooperation of FHFA staff, as well as the assistance of all those who contributed to the preparation of this report. This report has been distributed to Congress, the Office of Management and Budget, and others and will be posted on our website, www.fhfaoig.gov, and www.oversight.gov.

James Hodge
Deputy Inspector General for Audits /s/

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ABBREVIATIONS

AB	Advisory Bulletin
DBR	Division of Federal Home Loan Bank Regulation
FHFA	Federal Housing Finance Agency
FHLBank	Federal Home Loan Bank
FHLBank System	Federal Home Loan Bank System
MRA	Matter Requiring Attention
OCC	Office of the Comptroller of the Currency
OIG	FHFA Office of Inspector General
ORAM	Office of Risk Analysis and Modeling
OPB	Operating Procedure Bulletin
QCB	Quality Control Branch

BACKGROUND.....

The FHLBank System was created by the Federal Home Loan Bank Act of 1932 (FHLBank Act) as a government sponsored enterprise to support mortgage lending and related community investment. FHLBanks connect domestic financial institutions, many of which are small, community-focused lenders, to the global capital markets. Those connections make it possible for lenders to provide more consistent and sustained support for housing finance and community development. The FHLBank System consists of 11 regional FHLBanks and the FHLBanks’ fiscal agent, the Office of Finance. Each FHLBank is a separate, government-chartered, member-owned corporation.

An FHLBank is exposed to market risk due to fluctuations in interest rates, exchange rates, or equity or commodity prices.¹ The FHLBanks use complex models to identify, measure, and monitor its market risk exposures, and to make decisions on how best to control them. Given their complexity and the unpredictability of the financial markets, these models are subject to a high degree of model risk – the risk that model errors or the incorrect use or application of model output could lead management to make incorrect decisions and suffer loss.

Supervisory Expectations for the Management of Market Risk Modeling

FHFA has communicated its supervisory expectations for an FHLBank’s management of market risk modeling in the following advisory bulletins (ABs), which were in effect during our audit scope:

- AB 2013-07, *Model Risk Management Guidance*, sets supervisory expectations for model risk management, including that the regulated entities develop and implement policies, procedures, and responsibilities; a model control framework; and a model validation program.
- AB 2022-03, *Supplemental Model Risk Management Guidance*, provides supplemental guidelines to AB 2013-07 and addresses the regulated entities’ model documentation, model validation program, model control framework, and model testing.
- AB 2018-09, *Interest Rate Risk Management*, describes principles the regulated entities should follow to identify, measure, monitor, and control interest rate risk, which is a key component in the management of market risk.

¹ Market risk is the risk that the market value of an FHLBank's portfolio will decline as a result of changes in interest rates, foreign exchange rates, or equity or commodity prices.

- AB 2023-03, *FHLBank Changes to Internal Market Risk Models*, provides supervisory guidance on how an FHLBank should obtain approval to implement changes to a previously approved internal market risk model after proper notification to FHFA.

Oversight of the FHLBanks' Market Risk Modeling

DBR conducts risk-based supervisory activities pertaining to the FHLBanks, including annual examinations, periodic visitations, special reviews, and offsite monitoring of each FHLBank. DBR relies on these supervisory activities to reach conclusions on each FHLBank's overall condition and the adequacy of its risk management practices. At the conclusion of an examination, DBR issues a report of examination to each FHLBank's board of directors. The report of examination communicates substantive examination conclusions, principal findings—including all MRAs² and the composite and component CAMELSO ratings.³

DBR's Office of Risk Analysis and Modeling (ORAM) is responsible for performing supervisory activities on the FHLBanks' use of market risk models. ORAM's staff of economists and financial analysts assists DBR examiners in market risk examinations and monitor FHLBanks' market risk.⁴

Guidance for Oversight of the FHLBanks' Market Risk Modeling

The *FHFA Examination Manual*, Risk Modeling module, provides direction to examiners for developing the examination scope and selecting examination procedures to assess an FHLBank's market risk modeling activities and risk management practices. This module provides examination guidance on significant risks associated with market risk modeling, such as a model risk management framework, including policies and procedures to govern the model lifecycle; a model control framework, including model inventory management, model documentation, change control management, and model performance tracking; and a model validation program, including independent model validation, which consists of a review of data inputs and assumptions, model theory and code, model calculations, and model output reports. Examiners

² The DBR OPB, Federal Home Loan Bank Adverse Examination Finding Processes, identifies three broad classifications of findings: MRAs, which are the most serious; recommendations; and violations. This OPB also communicates various processes and provides examiners with guidelines to follow when issuing, following up, and closing adverse examination findings.

³ CAMELSO is a risk-focused rating system under which each FHLBank is assigned a composite rating based on an evaluation of various aspects of its operations. The components evaluated are Capital, Asset Quality, Management, Earnings, Liquidity, Sensitivity to Market Risk, and Operational Risk.

⁴ ORAM maintains a suite of models for use in monitoring an FHLBank's market risk and validating FHLBank models. ORAM also manages the regulatorily mandated process by which FHFA evaluates changes to an FHLBank's market risk models. As this audit is focused on DBR's examinations of market risk models, neither ORAM's internal model risk management practices nor this model change review process were included within the scope of this audit.

use suggested worksteps from the *FHFA Examination Manual*, Risk Modeling module to develop the scope and examination procedures for the Risk Modeling workprogram.⁵

Examiners conduct and document their work in accordance with DBR’s Operating Procedures Bulletins (OPBs) which are as follows:

- 2012-DBR-OPB-03, *Workprogram Minimum Frequency Guidelines*, establishes minimum frequency guidelines for the various workprograms performed in FHLBank System examinations. The Risk Modeling workprogram has been assigned a biennial minimum frequency.⁶
- 2016-DBR-OPB-01, *Federal Home Loan Bank Examination Workpaper Standards*, sets guidelines regarding the standards and quality of DBR examination workpapers.
- 2017-DBR-OPB-01, *Federal Home Loan Bank Adverse Examination Findings Processes*, establishes processes for issuing adverse findings, conducting remediation follow-up, and assessing FHLBank corrective actions. It complements AB 2017-01, *Classifications of Adverse Examination Findings*.
- 2018-DBR-OPB-03, *Quality Control Program*, sets forth DBR’s guidance for implementing its quality control program for examination workpapers.

OBJECTIVE AND SCOPE

The objective of our audit was to assess whether DBR provided sufficient oversight of the FHLBanks’ use of risk modeling to ensure the management of market risk. The scope of our work included DBR’s examinations of market risk modeling at the FHLBanks from October 1, 2022, through September 30, 2024 (audit scope).

For details on methodology, see the Appendix.

⁵ A workprogram contains the examination procedures and suggested lines of inquiry that an examiner performs to meet the examination scope objectives and to document the basis for conclusions on the level of risk and quality of risk management pertaining to the area examined.

⁶ Workprograms can be assigned an annual, biennial, triennial, or quadrennial minimum frequency.

RESULTS

We found that DBR provided sufficient oversight of the FHLBanks' use of risk modeling to ensure the management of market risk. Specifically, we determined that:

- FHFA's supervisory guidance for the FHLBanks defined the processes and controls needed to manage an FHLBank's market model risk. Specifically, the guidance calls for FHLBanks to implement the following:
 - Model Risk Management Framework – to include policies, procedures, and practices over market model risk governance, such as board and senior management's establishment of model risk appetite and reporting requirements.
 - Model Control Framework – to include policies, procedures, and practices for model inventory management,⁷ model documentation, change and version control management, model performance tracking, model assumptions, and adjustments.
 - Model Validation Program – to include policies, procedures and practices for independent model validation, assessments and periodic model reviews, monitoring, findings, and model risk issues management.
- The *FHFA Examination Manual*, Risk Modeling module, provided examiners with worksteps needed to review and evaluate the FHLBanks' management of market model risk consistent with supervisory guidance.
- DBR examiners completed 22 Risk Modeling workprograms across the 11 FHLBanks during the audit scope (one for each FHLBank for each of the two years in our audit scope), meeting the biennial minimum frequency requirement.
- DBR's market risk model examination activities, as documented in the 22 Risk Modeling workprograms, provided risk-based coverage to assess whether the FHLBanks had established and followed policies, procedures, and practices over modeling consistent with the FHFA supervisory guidance (noted in the first bullet). In addition, DBR examiners performed reviews of FHLBank assumptions and independently validated the model results for each of the FHLBank's primary market risk sensitivity models.

⁷ Model inventory management includes a comprehensive inventory listing of models implemented for use, under development, or recently retired that should be updated at least on a quarterly basis. FHLBanks should classify or risk rank each listed model based on its inherent risk as driven by its factors such as its purpose, extent of use, and relative impact to financial statements, financial disclosures, risk management, or decision making.

- DBR’s examination workpapers for the four examinations in our sample supported its supervisory conclusions that market risk modeling was generally satisfactory (for three FHLBanks) or that deficiencies in market risk modeling existed (for one FHLBank). These examination results were documented in accordance with DBR’s examination workpaper standards. DBR issued an MRA related to deficiencies found at the one FHLBank, which was closed during the audit scope. We assessed DBR’s evaluation of the FHLBank’s MRA remediation as part of our review of closed MRAs (noted below).
- DBR performed independent quality control and peer reviews of the Risk Modeling workprograms in accordance with DBR’s quality control guidance. We sampled 15 of 26 completed reviews and found that DBR identified three substantive documentation issues (identified in three independent quality control reviews) that examiners addressed prior to issuance of the reports of examination.
- DBR assessed the FHLBanks’ remediation of all 10 market risk modeling MRAs closed during the audit in accordance with DBR’s adverse examination findings guidance. Specifically, DBR examiners: monitored progress of corrective actions against each FHLBank’s remediation plan; reviewed each FHLBank’s Internal Audit’s validation of corrective actions; documented supervisory concurrence, where needed; and assessed sufficiency of corrective actions.
- DBR’s ORAM prepared 11 quarterly market risk reports for the FHLBanks that covered calendar years 2022 through the third quarter 2024 and provided a regular status of the FHLBanks’ market value of equity. DBR’s reports did not disclose any areas of supervisory concern.

Based on our results, we made no recommendations in this report.

FHFA COMMENTS AND OIG EVALUATION.....

We provided FHFA an opportunity to comment on a draft of this audit report. FHFA management provided a technical comment, which we considered in finalizing this report. FHFA management chose not to provide a written management response because there were no recommendations.

APPENDIX: METHODOLOGY

To accomplish our objective, we performed the following procedures:

- Reviewed Government Accountability Office’s *Standards for Internal Control in the Federal Government* (GAO-14-704G; September 2014) and determined that the control activities component of internal control was significant to this objective. We focused on the underlying principles that management should: (1) design control activities to achieve objectives and respond to risks; and (2) implement control activities through policies.
- Assessed whether the following FHFA market risk modeling related supervisory guidance (advisory bulletins) identified the processes and controls needed to manage an FHLBank’s market model risk by comparing FHFA’s supervisory guidance to model risk guidance issued by other federal financial regulators.⁸
 - AB 2013-07, *Model Risk Management Guidance* (November 2013)
 - AB 2022-03, *Supplemental Guidance to AB 2013-07 – Model Risk Management Guidance* (December 2022)
 - AB 2018-09, *Interest Rate Risk Management* (September 2018)
 - AB 2023-03, *FHLBank Changes to Internal Market Risk Models* (April 2023)
- Assessed the *FHFA Examination Manual*, Risk Modeling module to determine the extent to which it provided guidance and included worksteps that addressed the model risk management practices identified in the aforementioned FHFA supervisory guidance (advisory bulletins).
- Reviewed the following FHFA and DBR guidance to identify requirements for DBR’s supervisory activities.
 - FHFA, *FHFA Examination Manual* (December 2013)
 - 2012-DBR-OPB-03, *Workprogram Minimum Frequency Guidelines* (revised October 1, 2020)
 - 2016-DBR-OPB-01, *Federal Home Loan Bank Examination Workpaper Standards* (revised September 9, 2020)

⁸ Board of Governors of the Federal Reserve System and Office of the Comptroller of the Currency, [*Supervisory Guidance on Model Risk Management*](#) (April 4, 2011) (SR Letter 11-7) (OCC 2011-12).

- 2017-DBR-OPB-01, *Federal Home Loan Bank Adverse Examination Findings Processes* (revised January 31, 2022)
- 2018-DBR-OPB-03, *Quality Control Program* (revised December 21, 2021)
- Reviewed prior OIG reports to identify findings and recommendations related to the FHLBanks' management of market risk modeling and determined there was no impact on our audit.
 - OIG, [Despite FHFA's Recognition of Significant Risks Associated with Fannie Mae's and Freddie Mac's High Risk Models, its Examination of Those Models Over a Six Year Period Has Been Neither Rigorous nor Timely](#) (March 25, 2020) (EVL-2020-001)
- Interviewed DBR personnel to gain an understanding of DBR's oversight of the FHLBanks' use of market risk modeling. DBR personnel included a Senior Associate Director, Associate Directors, Supervisory Economists, Principal Financial Analysts, Financial Analysts, a Senior Financial Database Specialist, as well as a Supervisory Examination Specialist responsible for conducting independent quality control reviews of DBR examination workpapers. Obtained written responses, as needed, from DBR personnel to address questions and observations related to our audit testing procedures.
- Reviewed DBR's Risk Modeling examination scope memoranda prepared during the scope of our audit to determine: (a) the population of Risk Modeling workprograms completed by DBR and (b) whether DBR complied with 2012-DBR-OPB-03, *Workprogram Minimum Frequency Guidelines* for the Risk Modeling workprogram. We found that DBR completed the Risk Modeling workprogram 22 times during our audit scope (once for each FHLBank for each of the two years in our audit scope).
- Analyzed the Risk Modeling workprograms completed during each of the annual FHLBank examinations conducted during our audit scope to determine whether DBR's examination procedures, taken as a whole, addressed risk management practices identified in FHFA's market risk modeling related supervisory guidance, to include:
 - A model risk management framework, including policies and procedures to govern the model lifecycle;
 - A model control framework, including model inventory management, model documentation, change control management, and model performance tracking; and

- A model validation program, including independent model validation, assessments and periodic model reviews, monitoring, findings and model risk issues management).

We also reviewed DBR examination workpapers to assess DBR reviews of FHLBank assumptions and their independent validation of an FHLBank's primary market risk sensitivity models.

- Selected 4 of 22 (18.2 percent) FHLBank examinations where the Risk Modeling workprogram was completed during our audit scope to assess whether DBR's examination workpapers for the Risk Modeling workprograms complied with 2016-DBR-OPB-01, *Federal Home Loan Bank Examination Workpaper Standards*, including whether examiners' supervisory conclusions were supported by the results of examination work documented in the examination workpapers. In determining the sample size, FHFA-OIG's statistician recommended a range of 15 percent or higher for this type of review. We randomly selected four examinations, which exceeded the recommended 15 percent, to avoid bias and not for the purpose of projecting results to the entire population of FHLBank examinations where the Risk Modeling workprogram was completed.
- Reviewed the population of quality control reviews pertaining to market risk modeling, and segregated them into two groups: (1) General Reviews completed by DBR's Quality Control Branch (QCB), who are independent of examination teams, and (2) Peer Reviews performed by DBR examination team members. DBR's QCB completed 22 General Reviews and DBR examination staff completed 4 Peer Reviews during our audit scope. For the 22 QCB General Reviews, we selected a non-projectable, judgmental sample of 11 reviews by selecting the one most recent review for each FHLBank. For the 4 Peer Reviews, we reviewed all Peer Reviews that were completed. We assessed whether the reviews were performed in accordance with 2018-DBR-OPB-03, *Quality Control Program* (updated December 21, 2021), and whether all substantive issues identified in the quality control reviews were resolved prior to the issuance of the report of examination.
- Assessed whether DBR examiners evaluated FHLBanks' remediation of market risk modeling related MRAs in accordance with 2017-DBR-OPB-01, *Federal Home Loan Bank Adverse Examination Findings Processes*. There were 13 market risk model MRAs open during our audit scope. Of these, six MRAs were issued during examinations conducted before our audit scope but were closed during the scope; four MRAs were both issued and closed during audit scope; and three MRAs were issued during our audit scope but were not closed. We reviewed all 10 closed MRAs to assess whether DBR examiners: monitored progress of corrective actions against the FHLBank's remediation

plan; assessed FHLBank's Internal Audit's validation of corrective actions; documented supervisory concurrence, where needed; and assessed sufficiency of corrective actions in compliance with 2017-DBR-OPB-01.

- Reviewed all 11 of ORAM's quarterly *Market Risk Monitoring Reports for the FHLBanks* prepared immediately prior to and during our audit scope to determine whether these reports disclosed any supervisory concern.
- Assessed the sufficiency of oversight by determining whether: (1) FHFA's supervisory guidance defined needed processes and controls commensurate with the relative risk associated with market risk models; (2) DBR's examination guidance provided examiners with worksteps for oversight, assessment, and evaluation of the FHLBanks' management of market risk modeling; (3) DBR's supervisory activities during the audit scope met minimum frequency requirements and provided risk-based coverage of the FHLBanks' market risk modeling; (4) DBR's supervisory conclusions regarding the FHLBanks' market risk modeling were supported by the results of examination work documented in examination workpapers that had been subjected to DBR quality control processes; (5) DBR assessed the remediation of MRAs related to the FHLBanks' market risk modeling in accordance with DBR adverse findings guidance; and (6) DBR market risk monitoring reports disclosed indications of supervisory concern.

We conducted this performance audit from October 2024 to March 2025, at our headquarters in Washington, D.C., in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Federal Housing Finance Agency Office of Inspector General

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