REDACTED

Federal Housing Finance Agency
Office of Inspector General

FHFA Completed Examination Work Sufficient to Determine Whether the Enterprises' Credit Default Models Met Supervisory Expectations

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Executive Summary

Fannie Mae and Freddie Mac (together, the Enterprises) use models to evaluate the credit risk from borrowers failing to meet their financial or contractual obligations, such as making payments on their mortgages. These models use predictive variables, such as credit score, loan-to-value ratio, and the borrower's debt-to-income ratio, to project expected future delinquencies, defaults, and losses, and the Enterprises' exposure to the possibility of such losses in different economic environments. The Federal Housing Finance Agency (FHFA) has observed that "[a]lthough models are often essential, reliance on inaccurate or inappropriate models may lead to poor or costly decisions." The Enterprises have cautioned that unprecedented events, such as the COVID-19 pandemic, challenge model performance.

FHFA's Division of Enterprise Regulation (DER) is responsible for examining the Enterprises' models. We conducted this evaluation to assess whether DER completed the examination work sufficient to reach conclusions on whether the Enterprises' credit default models met FHFA's supervisory expectations. The evaluation focused on seven models the Enterprises used to estimate default and prepayment in connection with their single-family affordable housing products during our review period, which was January 2020 through October 2022.

We confirmed from examination records that DER's examination work covered the seven models that were within the scope of our review. We also found that examiners completed examination work sufficient for DER to determine whether the Enterprises' credit default models met supervisory expectations. DER identified practices that prompted it to issue adverse examination findings to Enterprise management that, among other things, criticized certain aspects of the Enterprises' [redacted]. DER did not conclude that the criticized practices rose to the level of unsafe or unsound practices. Further, during our review period, DER did not communicate to the Enterprises that their credit default models were unreasonable for business use and did not recommend that the Enterprises discontinue, or limit the business use of, any of the models that were within the scope of our evaluation.

For purposes of this evaluation, we consider examination work sufficient when it is incorporated into an examination plan, related to single-family credit default modeling, completed consistent with the examination scope, and appropriately documented in DER's records. We assessed the sufficiency of the examination work by analyzing whether: (1) the scope and objectives of the examination activity related to the single-family credit default models, and (2) DER's examination documentation showed that the planned examination

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work was completed. Because we found that FHFA completed sufficient examination work to reach its conclusions relevant to these models, we make no recommendations in this report.

We provided FHFA an opportunity to respond to a draft of this evaluation report. FHFA provided technical comments on the draft report, which were considered in finalizing this report.

This report was prepared by Adrienne Freeman, Attorney Advisor, and Jason Ramserran, Program Analyst, with assistance from Jon Anders, Lead Program Analyst. 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.

/s/

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ABBREVIATIONS

AB 2013-07	FHFA Advisory Bulletin 2013-07, *Model Risk Management Guidance*
DER	Division of Enterprise Regulation
Enterprises	Fannie Mae and Freddie Mac
FHFA or Agency	Federal Housing Finance Agency

BACKGROUND

Models Are Critical to the Enterprises' Business and Present Significant Risk Management Challenges

FHFA's advisory bulletin on *Model Risk Management Guidance* (AB 2013-07) defines a model as "a quantitative methodology or approach using statistical, economic, financial, or mathematical theories, techniques, and assumptions to process input data into quantitative estimates."[1] The Enterprises rely heavily on models to measure and monitor risk exposures and make business decisions, and use them extensively for, among other things, mortgage underwriting, collateral valuation, home price forecasting, mortgage cash flow analysis, financial reporting, risk management, risk measurement, stress testing, portfolio management, hedging, financial instrument valuation, measuring compliance with internal risk limits, and measuring capital reserves.

The use of models involves model risk, which FHFA defines as "the risk of loss resulting from model errors or the incorrect use or application of model output."[2] FHFA has observed that "[a]lthough models are often essential, reliance on inaccurate or inappropriate models may lead to poor or costly decisions."[3] During the 2008 financial crisis, deficiencies in the Enterprises' model practices and risk management contributed, in part, to the Agency's decision to place the Enterprises into conservatorship. FHFA observed unsafe or unsound practices for modeling at both Enterprises that resulted in an unsafe or unsound condition to transact business.[4]

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[1] FHFA, Advisory Bulletin 2013-07, *Model Risk Management Guidance*, at 5 (Nov. 20, 2013).

[2] *Id.*, at 6.

[3] *Id.*, at 2.

[4] For example, FHFA found that the Fannie Mae models used to guide credit decisions had been deficient and "did not fully account for Alt-A and other nontraditional loans that had new product features and layering of risk . . .." FHFA, *Draft Mid-Year Letter to Fannie Mae CEO Daniel Mudd*, at 4 (Sep. 4, 2008); *see also* FHFA, *Draft Mid-Year Letter to Freddie Mac CEO Richard Syron*, at 18-19 (Sep. 4, 2008).

Generally speaking, an unsafe or unsound practice is an action or inaction that is contrary to generally accepted standards of prudent financial institution operation that, if continued, would result in an abnormal risk of loss or damage to a financial institution. *See, e.g.*, Federal Deposit Insurance Corporation, *Formal and Informal Enforcement Actions Manual*, at 3-1 (June 2022). FHFA's Enforcement Policy does not define the term "unsafe or unsound practice," but it states that unsafe or unsound practices could result in FHFA imposing a formal enforcement action, such as a cease-and-desist order or capital reclassification. In addition, if an unsafe or unsound practice is "likely to cause insolvency or substantial dissipation of assets or earnings, or weaken the condition of the regulated entity," federal law authorizes FHFA to place the regulated entity into conservatorship or receivership. *See* 12 U.S.C. § 4617(a)(2) and (3).

The Enterprises Cautioned That Their Models Face Heightened Challenges During Periods of Economic Stress

The Enterprises use credit default models to evaluate the credit risk from borrowers failing to meet their financial or contractual obligations, such as making payments on their mortgages. These models use predictive variables, such as credit score, loan-to-value ratio, and the borrower's debt-to-income ratio, to project expected future delinquencies, defaults, and losses, and the Enterprises' exposure to the possibility of such losses in different economic environments.

The Enterprises acknowledge the potential negative impact of unprecedented events, such as the COVID-19 pandemic, on model performance. In its 2021 10-K, Freddie Mac advised that:

> The unprecedented events surrounding the COVID-19 pandemic have generated an increased degree of model risk and uncertainty. As a result, we expect our models to face significant challenges in accurately forecasting key inputs into our financial projections. These can include, but are not limited to, projections of mortgage rates, house prices, credit defaults, yields, prepayments, and interest rates.

Similarly, in its 2021 10-K, Fannie Mae cautioned that, "[m]odeling often assumes that historical data or experience can be relied upon as a basis for forecasting future events, an assumption that may be especially tenuous in the face of unprecedented events, such as the COVID-19 pandemic[.]"

FHFA Conducts Examinations of Models and Model Risk Management

The Agency is required by the Federal Housing Enterprises Financial Safety and Soundness Act of 1992, as amended, to conduct annual onsite examinations of "each regulated entity" (which includes the Enterprises) to "determine the condition" of the entity "for the purpose of ensuring its financial safety and soundness."[5] DER is responsible for examining the Enterprises.

FHFA's regulations and Prudential Management and Operating Standards establish broad requirements and standards for the Enterprises' risk management programs that apply to model risk management.[6] FHFA issues more specific guidance to the Enterprises through its

[5] 12 U.S.C. § 4517(a).

[6] FHFA's Enterprise Examination Manual identified FHFA's regulation on the Responsibilities of Boards of Directors, Corporate Practices, and Corporate Governance (12 C.F.R. Part 1239) and its Prudential

advisory bulletins. Specifically, AB 2013-07 sets forth supervisory expectations for each Enterprise's model risk management and outlines a framework of control and governance requirements. Examiners assess the Enterprises' modeling practices and risk management against these standards and guidance during their examination activities.

Our Evaluation

In light of the unsafe or unsound modeling practices that FHFA observed at the Enterprises during the 2008 financial crisis and the Enterprises' caution that their models face increased risk of uncertainty during pandemic-induced stressed environments, we conducted this evaluation to assess whether DER has completed the model risk examination work sufficient to reach conclusions on whether the Enterprises' credit default models met the Agency's supervisory expectations. We asked DER to identify the models the Enterprises used to estimate default and prepayment in connection with single-family affordable housing products during our review period.[7] DER identified seven such models. These models, or suites of models, were designed to calculate the probability of events such as delinquency, cash flow, default, prepayment, loss severity, or securitization eligibility. However, DER explained to us that in its review of credit default models, it assesses the models by reviewing predictive variables, not by mortgage product type.[8]

FACTS & ANALYSIS ....

Examiners Completed Examination Work Sufficient for DER to Assess Whether the Enterprise Credit Default Models Met Supervisory Expectations

DER internal guidance states that all model risk examinations are designed to give DER confidence that the Enterprises have a robust model risk management framework. To obtain that level of confidence, model risk examinations may include objectives that address the reasonability or adequacy of a model and model methodology, design, development process,

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Management and Operations Standards 1, 3, 4, and 8 (Appendix to 12 C.F.R. Part 1236) as being among the "primary authorities governing, or relevant to, model risk at the Enterprises."

[7] The Enterprises' congressional charters and governing statute establish their housing mission. This mission includes purchasing mortgages on housing for low- and moderate-income families. Through the affordable housing programs available to low- and moderate-income families, the Enterprises offer borrowers affordable home financing with loan-to-value ratios above 80%, accept credit scores equal to or higher than 680, and may allow for zero to three percent downpayment.

[8] FHFA's Division of Housing Mission and Goals is responsible for monitoring the performance of the affordable housing products. That division receives periodic reports from the Enterprises and utilizes an automated database with Enterprise loan level data for policy monitoring. Historically, this has included monitoring of loan originations, credit attributes, delinquencies, and applicability to housing mission and goals.

performance tracking, implementation, and deployment, as well as the effectiveness of model validation, reviews, governance, and controls.

We reviewed the examination workpapers for 15 examination activities from the 2020, 2021, and 2022 examination cycles that were relevant to credit default modeling. We confirmed that the seven credit default models identified by DER were within the scope of examination activities during the review period, either through targeted examinations, model risk monitoring activities, or monitoring of the Enterprises' remediation of adverse examination findings. In our review of DER's examination workpapers, we observed that examination objectives included an assessment of the adequacy of management and board level committee oversight and proper model development, implementation, documentation, and performance tracking, among other things. For example, DER assessed Freddie Mac's Loan Product Advisor and Single-Family Current Expected Credit Loss models for reasonability and reviewed Fannie Mae's Desktop Underwriter for the appropriateness and adequacy of its controls, governance, and performance tracking.

We also found that examiners completed examination work sufficient for DER to assess whether the Enterprises' credit default models met supervisory expectations. For purposes of this evaluation, we consider examination work sufficient when it is incorporated into an examination plan, related to single-family credit default modeling, completed consistent with the examination scope, and appropriately documented in DER's records. We assessed the sufficiency of the examination work by analyzing whether: (1) the scope and objectives of the examination activity related to the single-family credit default models, and (2) DER's examination documentation showed that the planned examination work was completed.[9]

As part of its examination work, DER issued adverse examination findings [redacted].[10] [redacted]. DER also issued lower priority adverse examination findings [redacted] Although DER criticized certain practices, it did not identify any practice that rose to the level of an unsafe or unsound practice at either Enterprise during our review

[9] We further explain our methodology for assessing DER's examination activities in more detail in the Objectives, Scope, and Methodology section, below.

[10] During an examination activity, DER may identify significant deficiencies and issue adverse examination findings that "require the board of directors and/or management to take corrective action to address critical supervisory matters or deficiencies." *See* FHFA, *2020 Performance and Accountability Report* (Nov. 16, 2020). As part of its ongoing monitoring activities, DER monitors and assesses the Enterprises' remediation of adverse examination findings.

period.[11] In addition, DER did not communicate to the Enterprises that their credit default models were unreasonable for business use and has not recommended that the Enterprises discontinue or limit the use of any of the models included in our review.

CONCLUSION……………………………………………………………

During our Review Period, examiners completed examination work sufficient for DER to assess whether the Enterprises' credit default models met supervisory expectations. Thus, we make no recommendations in this report. DER examined the seven credit default models within the scope of our evaluation. It criticized [redacted], but DER did not identify unsafe or unsound model risk practices, and the Agency did not restrict the Enterprises' business use of any of the credit default models.

[11] The Deputy Director of DER explained that the types of mortgages at issue during the 2008 crisis presented different credit risk attributes than the mortgage products of the Enterprises today.

OBJECTIVE, SCOPE, AND METHODOLOGY ....

Our objective was to assess whether FHFA completed examination work sufficient to reach conclusions on whether the Enterprises' credit default models met FHFA's supervisory expectations. The review period for this evaluation was from January 1, 2020, to October 31, 2022.

To meet this objective, we reviewed DER's examination plans for the 2020, 2021, and 2022 examination cycles and identified the examinations that, based on the entries in the examination plans, appeared to be directly related to credit default modeling for single-family affordable housing products. DER reviewed the list of examination activities we identified, and confirmed that those activities involved the "relevant component models and modeling applications that determine the probability of delinquency, termination event, and loss severity of a mortgage product, including, in this case, affordable housing products." We reviewed the applicable examination procedures documents and the descriptions of the scope of these examination activities to confirm that they related to at least one of the seven models DER identified. We also reviewed the examination documentation that supported DER's examination findings and conclusions and assessed whether the examination work described in those memoranda aligned with the scope of the examination. In addition, we reviewed the adverse examination findings that DER identified during the review period and the supervisory correspondence that communicated those findings. We did not independently confirm DER conclusions or assess the quality of the examination work performed.

We assessed the sufficiency of the examination work by analyzing whether: (1) the scope and objectives of the examination activity related to the single-family credit default models, and (2) DER's examination documentation showed that the planned examination work was completed. For purposes of this evaluation, we consider examination work to be sufficient when it is incorporated into an examination plan, related to single-family credit default modeling, completed consistent with the examination scope, and appropriately documented in DER's records.

We also reviewed applicable FHFA guidance and standards in effect during our review period, prior OIG reports, and the 2021 Enterprise Annual Reports on Form 10-K.

We provided FHFA an opportunity to respond to a draft of this evaluation report. FHFA provided technical comments on the draft report, which were considered in finalizing this report.

This evaluation was conducted between October 2022 and January 2023 under the authority of the Inspector General Act and in accordance with the Council of the Inspectors General on Integrity and Efficiency's *Quality Standards for Inspection and Evaluation* (December 2020).

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