



BOARD OF GOVERNORS
OF THE
FEDERAL RESERVE SYSTEM

WASHINGTON, D.C. 20551

DIVISION OF SUPERVISION
AND REGULATION

Subject: Enhancements to Federal Reserve Models Used to Estimate Post-Stress Capital Ratios

Dear Sir or Madam,

The Federal Reserve is committed to continuous assessment and enhancement of the supervisory models used in the stress testing program required under the Dodd-Frank Wall Street Reform and Consumer Protection Act.¹ As has been the practice in previous years,² the purpose of this letter is to notify firms participating in this year's Dodd-Frank Act Stress Test (DFAST) and Comprehensive Capital Analysis and Review (CCAR) of key enhancements to certain aspects of these models.³

As outlined by Governor Daniel Tarullo in his September 26th speech on stress testing,⁴ the Federal Reserve will now adhere to a policy of phasing in the most material model enhancements over two stress test cycles to smooth the effect on post-stress capital ratios. For DFAST 2017, the enhancements to the model estimating certain components of pre-provision net revenue (PPNR) will fall under that policy.

¹ See 12 USC 5365(i)(1).

² For letters in previous years, see "Enhancements to Federal Reserve Models Used to Estimate Operational Risk and Capital," February 16, 2016: <https://www.federalreserve.gov/bankinfo/reg/model-changes-20160217.pdf>; "Enhancements to Federal Reserve Projected Capital," December 12, 2014: <http://www.federalreserve.gov/bankinfo/reg/scm-changes-letter-20141215.pdf>; and, "Federal Reserve Independent Balance Sheet and RWA Projections," December 16, 2013: <http://www.federalreserve.gov/bankinfo/reg/independent-projections-letter-20131216.pdf>

³ In addition to enhancements to the supervisory capital model or other models, a number of other factors can affect year-over-year changes in projected regulatory capital ratios. Those factors include changes in the supervisory scenarios, bank holding companies' recent performance, portfolio composition, business mix at the "as-of" date of the stress test, any material restatement of prior regulatory reports, and the overall quality of regulatory data submitted by participating bank holding companies. Combined, these factors could have material effects on bank holding companies' projected capital ratios each year without any change in supervisory models.

⁴ Governor Daniel K. Tarullo, "Next Steps in the Evolution of Stress Testing": <https://www.federalreserve.gov/newsevents/speech/tarullo20160926a.htm>

Enhancements to better align the operational risk and mortgage repurchase models

Operational risk events and expenses related to mortgage repurchases represent two significant components of PPNR. For DFAST 2017, the Federal Reserve will retire the mortgage repurchase model used during DFAST 2016 and use an enhanced operational risk model to capture losses from both of these components.

The Federal Reserve's operational risk model forecasts losses using an average of estimates from two models — the historical simulation model, which will remain unchanged, and a regression-based model, which relates operational risk to macroeconomic conditions. The regression-based model used in previous stress testing cycles determined total losses from loss frequency and severity separately. Loss frequency was modeled as a function of macroeconomic conditions while loss severity was based on a firm-specific, long-run average for each type of operational risk event. This dampened the sensitivity of projected losses to macroeconomic conditions.

For DFAST 2017, the Federal Reserve will use an enhanced regression-based model that forecasts total losses at the industry level and then distributes those losses to each firm based on its asset size. By combining the frequency and severity measures, this approach simplifies the methodology and increases the sensitivity of projected losses to macroeconomic conditions.

Additionally, the Federal Reserve will retire the mortgage repurchase model used during DFAST 2016. Mortgage repurchase risk has declined in recent years due to improved underwriting standards and settlements relating to representations and warranties for pre-crisis vintages. Further, new data from recent mortgage repurchase settlements has allowed the operational risk model to better incorporate mortgage repurchase risk, reducing the need to have a separate mortgage repurchase model.

Based on analysis using data and scenarios from DFAST 2016, if both changes had been in place, the net effect would have been a small decrease in industry PPNR under the supervisory severely adverse scenario. The decrease would have been larger for individual firms with lower historical operational risk losses. The effect on projections for DFAST 2017 and future years is uncertain and will depend on changes in bank portfolios, data, and scenarios.

Enhancements to other PPNR component models to account for firm-specific differences

Certain PPNR components such as net interest income, noninterest income, and noninterest expenses have been modeled using econometric models in which, among groups of firms with similar asset compositions, the PPNR components return to the same level over the long run. As a result, DFAST 2016 income and expense projections for these firms converged over the planning horizon.

For DFAST 2017, the Federal Reserve will update the PPNR models so that projections of a firm's PPNR components converge to that firm's own post-crisis average rather than that of firms with similar asset compositions. This change will result in projections that are more sensitive to a firm's own post-crisis income and expense histories. Additionally, the Federal Reserve updated the models' macroeconomic variable selection process. Under the updated model, the PPNR forecasts are generally less sensitive to the most recent historical firm data, thereby improving year-over-year forecast stability, and are more sensitive to macroeconomic conditions.

Based on analysis using data and scenarios from DFAST 2016, if these changes had been in place, the net effect would have been material for some firms under the supervisory severely adverse scenario — particularly those firms that consistently have had notably weaker or stronger earnings than their peers. Firms with weaker post-crisis earnings relative to their peers would have seen their PPNR estimates decline while firms with stronger post-crisis earnings performance would have seen an increase in their PPNR estimates compared to their results from DFAST 2016. The effect on projections for DFAST 2017 and future years is uncertain and will depend on changes in bank portfolios, data, and scenarios.

Given the materiality of the model change, the Federal Reserve will phase in the change over two years to smooth the effect on post-stress capital ratios. For the 2017 stress test, PPNR estimates will reflect the average of the model used during DFAST 2016 and the updated model with these changes. PPNR estimates for the 2018 stress test will reflect the updated model only.

Enhancements to the commercial real estate loan loss model (CRE model) to better accommodate different data sources

The CRE model projects losses on loans collateralized by income-producing properties as well as construction and land development loans. The model used in previous stress test cycles relied on parameters estimated separately from the Capital Assessments and Stress Testing (FR Y-14Q) data and commercial mortgage-backed securities data to capture the losses from the downturn and more recent times. Combining those parameters in a consistent fashion required a strong set of assumptions.

For DFAST 2017, the Federal Reserve will streamline the data and estimation process. In addition, the Federal Reserve will update the model's macroeconomic variable selection process. Based on analysis using the data and scenarios from DFAST 2016, the streamlined approach would have resulted in slightly higher aggregate loan losses under the supervisory severely adverse scenario, but the size of the increase would have varied depending on the individual firm's portfolio composition. The effect on projections for DFAST 2017 and future years is uncertain and will depend on changes in bank portfolios, data, and scenarios.

Addition of the supplementary leverage ratio (SLR) to the capital calculation

The capital calculation incorporates a firm's projected losses, revenue, balances, risk-weighted assets, and capital plans to construct projected supervisory capital ratios. For DFAST 2017, the Federal Reserve will update the capital calculation to include post-stress projections of the SLR. Under the Board's capital regulations, advanced approaches BHCs are required to maintain at least a 3 percent SLR starting in 2018.

The SLR is defined as tier 1 capital divided by the total leverage exposure, which includes both on- and off-balance sheet items. The new calculation will incorporate the projections of tier 1 capital and on-balance sheet assets that are already included in the Basel III tier 1 leverage ratio, as well as a newly projected path of off-balance sheet assets. The path of those off-balance sheet assets will be based on the bank-reported off-balance sheet SLR exposure, and will be assumed to grow at the supervisory model-projected total asset growth rate.