FEDERAL RESERVE SYSTEM

12 CFR Part 252

Regulation YY; Docket No. R-1649

RIN 7100-AF 38

Stress Testing Policy Statement

AGENCY: Board of Governors of the Federal Reserve System (Board).

ACTION: Final rule.

SUMMARY: The Board is adopting a final policy statement on the approach to supervisory stress testing conducted under the Board's stress testing rules and the Board's capital plan rule.

DATES: Effective **[Insert date 30 days after publication in the Federal Register].**

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SUPPLEMENTARY INFORMATION:

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I. Background

Supervisory stress testing is a tool that allows the Board to assess whether the largest and most complex financial firms are sufficiently capitalized to absorb losses in stressful economic conditions while continuing to meet obligations to creditors and other counterparties and to lend to households and businesses.

The Board's approach to supervisory stress testing has evolved since the Supervisory Capital Assessment Program (SCAP) in 2009, which was the first evaluation of capital levels of bank holding companies (BHCs) on a forward-looking basis under stress. The lessons from SCAP encouraged the creation, pursuant to the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act),[1] of the Dodd-Frank Act Stress Test (DFAST), a forward-looking, quantitative evaluation of the impact of stressful economic and financial market conditions on firms' capital. Supervisory stress test models are used to produce estimates of post-stress capital ratios for covered companies,[2] pursuant

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[1] 77 FR 62377 (October 12, 2012) (Stress Test rules). *See* 12 CFR part 252, subparts E and F.

[2] Covered companies are BHCs with average total consolidated assets of $50 billion or more, U.S. intermediate holding companies of foreign banking organizations, and any nonbank financial company supervised by the Board. On July 6, 2018, the Board issued a public statement regarding the impact of the Economic Growth, Regulatory Relief, and Consumer Protection Act (EGRRCPA) (Pub L. No. 115-174, 132 Stat. 1296 (2018)). The Board stated, consistent with the EGRRCPA, that it will not take action to require BHCs with total consolidated assets greater than or equal to $50 billion but less than $100 billion to comply with the Board's capital plan rule (12 CFR 225.8) or the Board's supervisory stress test and company-run stress test rules (12 CFR 252, subparts E and F). https://www.federalreserve.gov/newsevents /pressreleases/files/bcreg20180706b1.pdf.

to the Dodd-Frank Act and the Board's stress test rules.[3]

The supervisory models are also used in the Comprehensive Capital Analysis and Review (CCAR), a related supervisory program, pursuant to the Board's capital plan rule.[4] CCAR focuses on forward-looking capital planning and the use of stress testing to assess firms' capital adequacy.[5] By assessing the capital adequacy of a firm under severe projected economic and financial stress, the supervisory stress test complements minimum regulatory capital ratios, which reflect the firm's current condition.

II.   Description of Stress Testing Policy Statement

On December 15, 2017, the Board invited comment on a proposal to adopt a stress testing policy statement (Policy Statement).[6] The proposed Policy Statement would have described the Board's approach to the development, implementation, use, and validation of the Federal Reserve's supervisory stress test models, and would have complemented the Board's policy statement on scenario design.[7] The proposal would have included seven principles that have guided decisions regarding supervisory stress test modeling in the past and that

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[3] Pub. L. 111-203, 124 Stat. 1376 (2010); 12 CFR part 252, subpart E.

[4] 12 CFR 225.8.

[5] *Id.* CCAR also includes a qualitative assessment of capital planning practices at the largest and most complex firms, which is not the subject of this proposed Policy Statement.

[6] 82 FR 59528 (December 15, 2017).

[7] *See* 12 CFR 252, Appendix A.

would continue to guide the development of the modeling framework. In addition, the proposed Policy Statement would have established procedures and policies designed to adhere to at least one of the foundational principles of supervisory stress testing. These policies and procedures would have included modeling-specific policies and associated assumptions, such as the policy of credit supply maintenance. Finally, the proposed Policy Statement would have addressed principles and policies of supervisory model validation, which is integral to the credibility of the supervisory stress test. By establishing these principles, policies, and procedures, the proposed Policy Statement would have increased transparency around the Federal Reserve's approach to supervisory modeling.

III. Summary of Comments Received and Revisions to the Stress Testing Policy Statement

The Board received twelve comments in response to the proposal. Commenters included public interest groups, academics, individual banking organizations, and trade and industry groups. Commenters generally supported the elements of the proposed Policy Statement, and provided alternative views on certain principles and policies described.

A. Principles of Supervisory Stress Testing

1. Independence

The proposed Policy Statement would have emphasized the use of independent supervisory models for assessing covered companies' capital

adequacy. Supervisory models developed internally and independently rely on detailed portfolio data provided by covered companies, but do not rely on models or estimates provided by covered companies to the greatest extent possible.

Commenters were divided in their views on the use of independent supervisory models. Several commenters expressed the view that the stress testing program should be tailored to each covered company, and recommended that the Federal Reserve consider increasing its reliance on firms' own models. A commenter expressed the view that the Board is not required to use DFAST stress testing results in the CCAR quantitative assessment in order to treat firms consistently, and recommended that the Federal Reserve use its own models for the DFAST assessment and covered companies' models for the CCAR quantitative assessment.

Other commenters strongly supported the principle of independence, and recommended that the Board maintain independently developed models separate from covered companies' models for use in the supervisory stress test. One commenter expressed the view that the Federal Reserve has an effective framework for carrying out stress tests of the largest firms, and another asserted that the failure of firms' internal models during the financial crisis showed the need for better model risk governance and a strong independent check on firm models.

The Board will maintain independence as a central principle of supervisory stress testing. Supervisory models provide an independent check on firm risk

management, and the use of consistent supervisory models in both the DFAST assessment and CCAR quantitative assessments is critical to ensuring that resulting capital requirements are based on a comparable assessment. Studies have found that covered companies' own models often produce materially different estimates of expected losses for the same set of portfolios.[8] As a result, relying on those models could result in material differences in the assessment of post-stress capital ratios across firms with similar risk profiles.

Independent models that are not specifically tailored to each individual institution are still appropriate for assessing risk, as such models do capture differences in risk when estimated on sufficiently granular data. Many of the supervisory models are estimated on a pooled set of loan- or securities-level data, and as a result, can capture differences in portfolio risk characteristics across firms in a consistent manner. Board staff regularly meets with covered companies and industry representatives to solicit input on how best to collect data, and the Board has in the past modified its information collection requirements based on feedback received.

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[8] *See* Financial Services Authority, 2012, "Results of 2011 Hypothetical Portfolio Exercise for Sovereigns, Banks and Large Corporates," January 25, available at http://www.fsa.gov.uk/static/pubs/international/2011hpe.pdf; and Simon Firestone and Marcelo Rezende, "Are Banks' Internal Risk Parameters Consistent? Evidence From Syndicated Loans," *Journal of Financial Services Research*, vol. 50, issue 2 (October 2016) pp. 211-242.

2. Robustness and Stability

Robustness and stability were described as key principles of supervisory stress testing in the proposed Policy Statement. Specifically, supervisory models should be robust and stable, such that changes in model projections over time are not driven by transitory factors.

The estimates of post-stress capital produced by the supervisory stress test provide information regarding covered companies' capital adequacy to market participants, firms, and the general public. Adherence to the principle of robustness and stability helps to ensure that changes in these model projections over time are not driven by temporary variations in model performance or inputs.

A commenter expressed concern about the inclusion of this principle, asserting that elevating stability to a central principle is likely to reinforce a tendency toward an excessively static stress test, and that incorporating new data in supervisory stress testing models could be important in capturing new risks.

In response to the comment, the Board is maintaining an emphasis on robustness and stability as key principles of stress testing. This emphasis is intended not to limit the dynamism of the stress test as a supervisory tool, but rather to ensure that any changes in model projections reflect underlying risk factors, scenarios, and model enhancements. Supervisory models will continue to be recalibrated with newly available input data each year, and these data will affect supervisory model projections, particularly when the data reflect evolving risks.

Generally, however, model recalibrations due to newly available data should not be the principal driver of year-over-year changes in results.

3. Conservatism

The proposed Policy Statement would have established conservatism as a central principle of supervisory stress testing. Commenters generally supported the principle, asserting that the massive economic costs of a financial collapse argue for a commitment to erring on the conservative side. Accordingly, the final Policy Statement will reflect the Board's commitment, given a reasonable set of assumptions or approaches, to use those results that result in relatively more significant losses or lower revenue, all other things being equal.

4. Other Principles of Supervisory Stress Testing

The Board sought comment on several other principles of supervisory stress testing described in the proposed Policy Statement. The proposed Policy Statement would have described a system of models designed to result in projections that are not only independent, robust and stable, and conservative, but also forward-looking, consistent and comparable across covered companies, generated from simpler and more transparent approaches, and able to capture the impact of economic stress. The Board did not receive comments specific to those proposed principles.

One commenter recommended that the Board incorporate counter-cyclicality as a stated principle of stress testing, noting that projected capital

losses in the stress tests have improved in recent years even as economic conditions have improved and scenario severity has increased. Improvements in projected post-stress capital in recent stress test cycles do not solely reflect the Board's principles of supervisory stress test modeling and scenario design. Rather, a number of factors drive projected capital losses in the supervisory stress test. Year-over-year changes in the supervisory stress test results reflect not only the scenarios and supervisory models, but also portfolio composition and risk characteristics and the starting capital positions of firms, which tend to be procyclical. The Board already strives to limit procyclicality in the supervisory stress test through scenario design, and describes that goal in its policy statement on scenario design. Accordingly, the final Policy Statement will reflect the principles of supervisory stress testing as proposed.

B.   Supervisory Stress Test Model Policies

The proposed Policy Statement would have established policies and procedures to guide the development, implementation, and use of all models used in supervisory stress test projections. These policies would have facilitated adherence to at least one of the governing principles described in the Supervisory Stress Test Model Policies section.

1. Disclosure of Information Related to the Supervisory Stress Test

The proposed Policy Statement included a policy of information parity, such that the Board does not disclose information related to the supervisory stress

test or firm-specific results to covered companies if that information is not also publicly disclosed. The proposed Policy Statement noted that increasing public disclosure can help the public understand and interpret the results of the supervisory stress test by facilitating evaluation of the quality of the Board's assessment, while promoting equitable treatment of covered companies.

Commenters were divided on the Board's proposed policy. A commenter recommended that the Board engage in a confidential supervisory dialogue with individual covered companies in specific instances, such as when the results of the supervisory stress test deviate from the results of the firm's company-run stress test. This commenter also requested that the Board share information about data deficiencies with firms. Another commenter supported the Board's proposed approach to disclosure of information related to the supervisory stress test.

The final Policy Statement retains the proposed policy of not disclosing information to covered companies that the Board does not also share with the public. This approach ensures that no single institution has access to information about the supervisory stress test that is not also publicly accessible by other institutions. For example, under this approach, firms newly subject to the supervisory stress test would have the same information as firms that have been subject to the supervisory stress test since its inception.

The Board will maintain its current practice of notifying covered companies of deficient data identified by the Federal Reserve, and providing covered

companies with the opportunity to remedy those deficient data. In addition, the Board plans to provide the public with more information about conservative assumptions applied to deficient data than it has in prior disclosures. The Board intends to provide in the annual disclosure of DFAST results the conservative loss rates that are applied to portfolios that cannot be modeled because of missing data.

2. Phasing in of Highly Material Model Changes

The proposed Policy Statement would have established the policy that the Board phase in the most material model changes over two years, in the interest of reducing model-driven volatility in stress testing results. Commenters were divided on the proposed policy. One commenter asserted that phasing in highly material model changes could delay incorporation of material new data into the modeling process. Another commenter requested that the Board phase in all material model changes over two years, as opposed to phasing in the most material model changes over two years.

In response to comments, the Board will continue to phase in the most material model changes over two years, so as not to introduce excess volatility to supervisory results. The Board has revised the final Policy Statement to include a description of the materiality threshold that generally determines the model changes subject to phase-in over two years. Specifically, in assessing the materiality of a model change, the Federal Reserve calculates the impact of using an enhanced model on post-stress capital ratios using data and scenarios from prior

years' supervisory stress test exercises. Under the final Policy Statement, the use of an enhanced model is considered a highly material change if its use results in a change in the CET1 ratio of 50 basis points or more for one or more firms, relative to the model used in prior years' supervisory exercises. In general, the phase-in threshold for highly material model changes applies only to conceptual changes to models. Model changes related to changes in accounting or regulatory capital rules and model parameter re-estimation based on newly available data are implemented with immediate effect. The Board will continue to evaluate the appropriateness of the threshold for the model phase-in, including the cumulative effect of all model changes in a given year.

3. Limiting Reliance on Past Outcomes

The proposed Policy Statement would have established a policy of limiting reliance on past outcomes, and minimizing the use of firm-specific fixed effects in supervisory models, to allow for the incorporation of events that have not occurred historically in supervisory stress test modeling. A commenter requested that, where applicable, the Board provide detail on, and examples of, firm-specific fixed effects. The Board is finalizing the policy as described in the proposed Policy Statement. In finalizing the notice of enhanced model disclosure,[9] the Board intends to expand its description of supervisory models that use firm-specific fixed effects in its enhanced model disclosure.

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[9] 82 FR 59547 (December 15, 2017).

4. Credit Supply Maintenance

The Board invited comment on its policy of credit supply maintenance, described in Section 2.7 of the proposed Policy Statement, as the assumption that firms' balance sheets would remain consistent or would increase in magnitude. Commenters generally supported the proposed policy. A commenter asserted that it is not sufficient to assume that firms maintain their asset size throughout the projection horizon, and that it is conservative and safer to assume some increase in firms' asset size. Another commenter expressed the view that the assumption of a flat or growing balance sheet is pivotal, as it reflects the role of banks in providing additional credit in a troubled economy.

Several commenters encouraged the Board to assume that firms' balance sheets and risk-weighted assets (RWAs) stay constant, rather than grow, over the projection horizon.[10] Other commenters asserted that the flat-to-rising balance sheet assumption is not consistent with historical patterns, and requested that the Federal Reserve make the more realistic assumption that firms' balance sheets

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[10] On April 25, 2018, the Board issued a notice of proposed rulemaking, which would revise the Board's stress test rules and capital plan rule to use the results of the supervisory stress test to size a firm's stress capital buffer and stress leverage buffer. As part of the proposal, the Board proposed to revise section 2.7 of the Policy Statement relating to credit supply maintenance to provide that, in projecting a firm's balance sheet, the Federal Reserve will assume that the firm takes actions to maintain a constant level of assets, including loans, trading assets, and securities over the planning horizon. The proposal would also add a new section 3.4 to the Policy Statement regarding a simple approach for projecting risk-weighted assets (RWAs). In projecting RWAs under this proposed section, the Federal Reserve would generally assume that a covered company's RWAs remain unchanged over the planning horizon. Those changes are still being proposed and are not being finalized as part of this notice.

and RWAs grow smaller in a stressed environment, in order to reflect likely bank behavior.

The Board is finalizing the credit supply maintenance assumption as described in the proposed Policy Statement. The assumption that aggregate credit supply does not contract during the stress period is key to the aim of supervisory stress testing, which is to assess whether firms are sufficiently capitalized to both absorb losses during times of economic stress and continue to lend to households and businesses and meet their obligations.

5. Other Supervisory Stress Test Model Policies

The Board sought comment on several other supervisory stress test model policies described in the proposed Policy Statement. The proposed Policy Statement described policies and procedures related to soundness in model design, the treatment of the global market shock, incorporation of business plan changes, firm-specific overlays, treatment of missing or deficient data, and treatment of immaterial portfolios. The Board did not receive additional comments specific to those proposed policies and procedures.

C.   Principles and Policies of Supervisory Model Validation

Models used in the supervisory stress test are subject to ongoing review and validation by an independent unit within the Federal Reserve. The proposed Policy Statement described principles of model validation, central to the credibility of supervisory models and of the stress test exercise. The Board did

not receive comments on its principles of supervisory model validation and is
adopting the principles without change.

III. Administrative Law Matters

A. Use of Plain Language

Section 722 of the Gramm-Leach-Bliley Act (Pub. L. No 106-102, 113
Stat. 1338, 1471, 12 U.S.C. 4809) requires the Federal banking agencies to use
plain language in all proposed and final rules published after January 1, 2000. The
Board received no comments on these matters and believes the final policy
statement is written plainly and clearly.

B. Paperwork Reduction Act Analysis

In accordance with the requirements of the Paperwork Reduction Act of
1995 (44 U.S.C. 3506), the Board has reviewed the final policy statement to assess
any information collections. There are no collections of information as defined by
the Paperwork Reduction Act in the final policy statement.

C.   Regulatory Flexibility Act Analysis

The Regulatory Flexibility Act (RFA), 5 U.S.C. 601 et seq., generally
requires that, in connection with a proposed rulemaking, an agency prepare and
make available for public comment an initial regulatory flexibility analysis
(IRFA).[11]   The Board solicited public comment on this policy statement in a notice

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[11] *See* 5 U.S.C. 603, 604 and 605.

of proposed rulemaking[12] and has since considered the potential impact of this policy statement on small entities in accordance with section 604 of the RFA. Based on the Board's analysis, and for the reasons stated below, the Board believes the final rule will not have a significant economic impact on a substantial number of small entities.

The RFA requires an agency to prepare a final regulatory flexibility analysis (FRFA) unless the agency certifies that the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities. The FRFA must contain: (1) a statement of the need for, and objectives of, the rule; (2) a statement of the significant issues raised by the public comments in response to the IRFA, a statement of the agency's assessment of such issues, and a statement of any changes made in the proposed rule as a result of such comments; (3) the response of the agency to any comments filed by the Chief Counsel for Advocacy of the Small Business Administration in response to the proposed rule, and a detailed statement of any changes made to the proposed rule in the final rule as a result of the comments; (4) a description of an estimate of the number of small entities to which the rule will apply or an explanation of why no such estimate is available; (5) a description of the projected reporting, recordkeeping and other compliance requirements of the rule, including an estimate of the classes of small entities which will be subject to the requirement and type of professional skills

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[12] 82 FR 59533 (December 15, 2017).

necessary for preparation of the report or record; and (6) a description of the steps the agency has taken to minimize the significant economic impact on small entities, including a statement for selecting or rejecting the other significant alternatives to the rule considered by the agency.

The final policy statement outlines the key principles and policies governing the Board's approach to models used in supervisory stress testing. The final policy statement is intended to increase transparency around the development, implementation, and validation of these models. Commenters did not raise any issues in response to the IRFA. In addition, the Chief Counsel for Advocacy of the Small Business Administration did not file any comments in response to the proposed policy statement.

Under regulations issued by the Small Business Administration (SBA), a "small entity" includes a depository institution, bank holding company, or savings and loan holding company with assets of $550 million or less (small banking organizations).[13] As discussed in the SUPPLEMENTARY INFORMATION, the final policy statement generally would apply to bank holding companies with total consolidated assets of $100 billion or more and U.S. intermediate holding companies of foreign banking, which generally have at least total consolidated assets of $50 billion or more. Companies that are subject to the final policy statement therefore substantially exceed the $550 million asset threshold at which

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[13] *See* 13 CFR 121.201.

a banking entity is considered a "small entity" under SBA regulations. Because the final policy statement does not apply to any company with assets of $550 million or less, the final policy statement does not apply to any "small entity" for purposes of the RFA.

There are no projected reporting, recordkeeping, or other compliance requirements associated with the final policy statement. As discussed above, the final policy statement does not apply to small entities.

The Board does not believe that the final policy statement duplicates, overlaps, or conflicts with any other Federal Rules. In addition, the Board does not believe there are significant alternatives to the final policy statement that have less economic impact on small entities. In light of the foregoing, the Board does not believe the final policy statement will have a significant economic impact on a substantial number of small entities.

List of Subjects in 12 CFR Part 252

Administrative practice and procedure, Banks, Banking, Federal Reserve System, Holding companies, Nonbank Financial Companies Supervised by the Board, Reporting and recordkeeping requirements, Securities, Stress Testing.

Authority and Issuance

For the reasons stated in the preamble, the Board of Governors of the Federal Reserve System amends 12 CFR chapter II as follows:

PART 252—ENHANCED PRUDENTIAL STANDARDS (Regulation YY)

1. The authority citation for part 252 continues to read as follows:

Authority: 12 U.S.C. 321-338a, 1467a(g), 1818, 1831p-1, 1844(b), 1844(c), 5361, 5365, 5366.

2. Appendix B to part 252 is added to read as follows:

Appendix B – Stress Testing Policy Statement

This Policy Statement describes the principles, policies, and procedures that guide the development, implementation, and validation of models used in the Federal Reserve's supervisory stress test.

1.   *Principles of Supervisory Stress Testing*

The system of models used in the supervisory stress test is designed to result in projections that are (i) from an independent supervisory perspective; (ii) forward-looking; (iii) consistent and comparable across covered companies; (iv) generated from simpler and more transparent approaches, where appropriate; (v) robust and stable; (vi) conservative; and (vii) able to capture the impact of economic stress. These principles are further explained below.

1.1 Independence

(a) In the supervisory stress test, the Federal Reserve uses supervisory models that are developed internally and independently (i.e., separate from models used by covered companies). The supervisory models rely on detailed portfolio data provided by covered companies but do not rely on models or

estimates provided by covered companies to the greatest extent possible.

(b) The Federal Reserve's stress testing framework is unique among regulators in its use of independent estimates of losses and revenues under stress. These estimates provide a perspective that is not formed in consultation with covered companies or influenced by firm-provided estimates and that is useful to the public in its evaluation of covered companies' capital adequacy. This perspective is also valuable to covered companies, who may benefit from external assessments of their own losses and revenues under stress, and from the degree of credibility that independence confers upon supervisory stress test results.

(c) The independence of the supervisory stress test allows stress test projections to adhere to the other key principles described in the Policy Statement. The use of independent models allows for consistent treatment across firms. Losses and revenues under stress are estimated using the same modeling assumptions for all covered companies, enabling comparisons across supervisory stress test results. Differences in covered companies' results reflect differences in firm-specific risks and input data instead of differences in modeling assumptions. The use of independent models also ensures that stress test results are produced by stress-focused models, designed to project the performance of covered companies in adverse economic conditions.

(d) In instances in which it is not possible or appropriate to create a supervisory model for use in the stress test, including when supervisory data are

insufficient to support a modeled estimate of losses or revenues, the Federal Reserve may use firm-provided estimates or third-party models or data. For example, in order to project trading and counterparty losses, sensitivities to risk factors and other information generated by covered companies' internal models are used. In the cases where firm-provided or third-party model estimates are used, the Federal Reserve monitors the quality and performance of the estimates through targeted examination, additional data collection, or benchmarking. The Board releases a list of the providers of third-party models or data used in the stress test exercise in the annual disclosure of quantitative results.

1.2. Forward-looking

(a) The Federal Reserve has designed the supervisory stress test to be forward-looking. Supervisory models are tools for producing projections of potential losses and revenue effects based on each covered company's portfolio and circumstances.

(b) While supervisory models are specified using historical data, they should generally avoid relying solely on extrapolation of past trends in order to make projections, and instead should be able to incorporate events or outcomes that have not occurred. As described in Section 2.4, the Federal Reserve implements several supervisory modeling policies to limit reliance on past outcomes in its projections of losses and revenues. The incorporation of the macroeconomic scenario and global market shock component also introduces elements outside of

the realm of historical experience into the supervisory stress test.

1.3.   Consistency and comparability

The Federal Reserve uses the same set of models and assumptions to produce loss projections for all covered companies participating in the supervisory stress test. A standard set of scenarios, assumptions, and models promotes equitable treatment of firms participating in the supervisory stress test and comparability of results, supporting cross-firm analysis and providing valuable information to supervisors and to the public. Adhering to a consistent modeling approach across covered companies means that differences in projected results are due to differences in input data, such as instrument type or portfolio risk characteristics, rather than differences in firm-specific assumptions made by the Federal Reserve.

1.4.   Simplicity

The Federal Reserve uses simple approaches in supervisory modeling, where possible. Given a range of modeling approaches that are equally conceptually sound, the Federal Reserve will select the least complex modeling approach. In assessing simplicity, the Federal Reserve favors those modeling approaches that allow for a more straightforward interpretation of the drivers of model results and that minimize operational challenges for model implementation.

1.5. *Robustness and stability*

The Federal Reserve maintains supervisory models that aim to be robust and stable, such that changes in model projections over time reflect underlying risk factors, scenarios, and model enhancements, rather than transitory factors. The estimates of post-stress capital produced by the supervisory stress test provide information regarding a covered company's capital adequacy to market participants, covered companies, and the public. Adherence to this principle helps to ensure that changes in these model projections over time are not driven by temporary variations in model performance or inputs. Supervisory models are recalibrated with newly available input data each year. These data affect supervisory model projections, particularly in times of evolving risks. However, these changes generally should not be the principal driver of a change in results, year over year.

1.6. *Conservatism*

Given a reasonable set of assumptions or approaches, all else equal, the Federal Reserve will opt to use those that result in larger losses or lower revenue. For example, given a lack of information about the true risk of a portfolio, the Federal Reserve will compensate for the lack of data by using a high percentile loss rate.

1.7. Focus on the ability to evaluate the impact of severe economic stress

In evaluating whether supervisory models are appropriate for use in a stress testing exercise, the Federal Reserve places particular emphasis on supervisory models' abilities to project outcomes in stressed economic environments. In the supervisory stress test, the Federal Reserve also seeks to capture risks to capital that arise specifically in times of economic stress, and that would not be prevalent in more typical economic environments. For example, the Federal Reserve includes losses stemming from the default of a covered company's largest counterparty in its projections of post-stress capital for firms with substantial trading or processing and custodian operations. The default of a company's largest counterparty is more likely to occur in times of severe economic stress than in normal economic conditions.

2. Supervisory Stress Test Model Policies

To be consistent with the seven principles outlined in Section 1, the Federal Reserve has established policies and procedures to guide the development, implementation, and use of all models used in supervisory stress test projections, described in more detail below. Each policy facilitates adherence to at least one of the modeling principles that govern the supervisory stress test, and in most cases facilitates adherence to several modeling principles.

2.1. Soundness in Model Design

(a) During development, the Federal Reserve (i) subjects supervisory

models to extensive review of model theory and logic and general conceptual soundness; (ii) examines and evaluates justifications for modeling assumptions; and (iii) tests models to establish the accuracy and stability of the estimates and forecasts that they produce.

(b) After development, the Federal Reserve continues to subject supervisory models to scrutiny during implementation to ensure that the models remain appropriate for use in the stress test exercise. The Federal Reserve monitors changes in the economic environment, the structure of covered companies and their portfolios, and the structure of the stress testing exercise, if applicable, to verify that a model in use continues to serve the purposes for which it was designed. Generally, the same principles, rigor, and standards for evaluating the suitability of supervisory models that apply in model development and design will apply in ongoing monitoring of supervisory models.

2.2. Disclosure of Information Related to the Supervisory Stress Test

(a) In general, the Board does not disclose information related to the supervisory stress test or firm-specific results to covered companies if that information is not also publicly disclosed.

(b) The Board has increased the breadth of its public disclosure since the inception of the supervisory stress test to include more information about model changes and key risk drivers, in addition to more detail on different components of projected net revenues and losses. Increasing public disclosure can help the

public understand and interpret the results of the supervisory stress test, particularly with respect to the condition and capital adequacy of participating firms. Providing additional information about the supervisory stress test allows the public to make an evaluation of the quality of the Board's assessment. This policy also promotes consistent and equitable treatment of covered companies by ensuring that institutions do not have access to information about the supervisory stress test that is not also accessible publicly, corresponding to the principle of consistency and comparability.

2.3. Phasing in of Highly Material Model Changes

(a) The Federal Reserve may revise its supervisory stress test models to include advances in modeling techniques, enhancements in response to model validation findings, incorporation of richer and more detailed data, public comment, and identification of models with improved performance, particularly under adverse economic conditions. Revisions to supervisory stress models may at times have material impact on modeled outcomes.

(b) In order to mitigate sudden and unexpected changes to the supervisory stress test results, the Federal Reserve follows a general policy of phasing highly material model changes into the supervisory stress test over two years. The Federal Reserve assesses whether a model change would have a highly significant impact on the projections of losses, components of revenue, or post-stress capital ratios for covered companies. In these instances, in the first year

when the model change is first implemented, estimates produced by the enhanced model are averaged with estimates produced by the model used in the previous stress test exercise. In the second and subsequent years, the supervisory stress test exercise will reflect only estimates produced by the enhanced model. This policy contributes to the stability of the results of the supervisory stress test. By implementing highly material model changes over the course of two stress test cycles, the Federal Reserve seeks to ensure that changes in model projections primarily reflect changes in underlying risk factors and scenarios, year over year.

(c) In general, phase-in thresholds for highly material model changes apply only to conceptual changes to models. Model changes related to changes in accounting or regulatory capital rules and model parameter re-estimation based on newly available data are implemented with immediate effect.

(d) In assessing the materiality of a model change, the Federal Reserve calculates the impact of using an enhanced model on post-stress capital ratios using data and scenarios from prior years' supervisory stress test exercises. The use of an enhanced model is considered a highly material change if its use results in a change in the CET1 ratio of 50 basis points or more for one or more firms, relative to the model used in prior years' supervisory exercises.

2.4. Limiting Reliance on Past Outcomes

(a) Models should not place undue emphasis on historical outcomes in predicting future outcomes. The Federal Reserve aims to produce supervisory

stress test results that reflect likely outcomes under the supervisory scenarios. The supervisory scenarios may potentially incorporate events that have not occurred historically. It is not necessarily consistent with the purpose of a stress testing exercise to assume that the future will be like the past.

(b) In order to model potential outcomes outside the realm of historical experience, the Federal Reserve generally does not include variables that would capture unobserved historical patterns in supervisory models. The use of industry-level models, restricted use of firm-specific fixed effects (described below), and minimized use of dummy variables indicating a loan vintage or a specific year, ensure that the outcomes of the supervisory models are forward-looking, consistent and comparable across firms, and robust and stable.

(c) Firm-specific fixed effects are variables that identify a specific firm and capture unobserved differences in the revenues, expenses or losses between firms. Firm-specific fixed effects are generally not incorporated in supervisory models in order to avoid the assumption that unobserved firm-specific historical patterns will continue in the future. Exceptions to this policy are made where appropriate. For example, if granular portfolio-level data on key drivers of a covered company's performance are limited or unavailable, and firm-specific fixed effects are more predictive of a covered company's future performance than are industry-level variables, then supervisory models may be specified with firm-specific fixed effects.

(d) Models used in the supervisory stress test are developed according to an industry-level approach, calibrated using data from many institutions. In adhering to an industry-level approach, the Federal Reserve models the response of specific portfolios and instruments to variations in macroeconomic and financial scenario variables. In this way, the Federal Reserve ensures that differences across firms are driven by differences in firm-specific input data, as opposed to differences in model parameters or specifications. The industry approach to modeling is also forward-looking, as the Federal Reserve does not assume that historical patterns will necessarily continue into the future for individual firms. By modeling a portfolio or instrument's response to changes in economic or financial conditions at the industry level, the Federal Reserve ensures that projected future losses are a function of that portfolio or instrument's own characteristics, rather than the historical experience of the covered company. This policy helps to ensure that two firms with the same portfolio receive the same results for that portfolio in the supervisory stress test.

(e) The Federal Reserve minimizes the use of vintage or year-specific fixed effects when estimating models and producing supervisory projections. In general, these types of variables are employed only when there are significant structural market shifts or other unusual factors for which supervisory models cannot otherwise account. Similar to the firm-specific fixed effects policy, and consistent with the forward-looking principle, this vintage indicator policy is in place so that

projections of future performance under stress do not incorporate assumptions that patterns in unmeasured factors from brief historical time periods persist. For example, the loans originated in a particular year should not be assumed to continue to default at a higher rate in the future because they did so in the past.

2.5. Treatment of global market shock and counterparty default component

(a) Both the global market shock and counterparty default components are exogenous components of the supervisory stress scenarios that are independent of the macroeconomic and financial market environment specified in those scenarios, and do not affect projections of risk-weighted assets or balances. The global market shock, which specifies movements in numerous market factors,[14] applies only to covered companies with significant trading exposure. The counterparty default scenario component applies only to covered companies with substantial trading or processing and custodian operations. Though these stress factors may not be directly correlated to macroeconomic or financial assumptions, they can materially affect covered companies' risks. Losses from both components are therefore considered in addition to the estimates of losses under the macroeconomic scenario.

(b) Counterparty credit risk on derivatives and repo-style activities is incorporated in supervisory modeling in part by assuming the default of the single

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[14] *See* 12 CFR part 252, appendix A, "Policy Statement on the Scenario Design Framework for Stress Testing," for a detailed description of the global market shock.

counterparty to which the covered firm would be most exposed in the global market shock event.[15] Requiring covered companies subject to the large counterparty default component to estimate and report the potential losses and effects on capital associated with such an instantaneous default is a simple method for capturing an important risk to capital for firms with large trading and custodian or processing activities. Engagement in substantial trading or custodial operations makes the covered companies subject to the counterparty default scenario component particularly vulnerable to the default of their major counterparty or their clients' counterparty, in transactions for which the covered companies act as agents. The large counterparty default component is consistent with the purpose of a stress testing exercise, as discussed in the principle about the focus on the ability to evaluate the impact of severe economic stress. The default of a covered company's largest counterparty is a salient risk in a macroeconomic and financial crisis, and generally less likely to occur in times of economic stability. This approach seeks to ensure that covered companies can absorb losses associated with the default of any counterparty, in addition to losses associated with adverse economic conditions, in an environment of economic uncertainty.

    (c) The full effect of the global market shock and counterparty default

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[15] In addition to incorporating counterparty credit risk by assuming the default of the covered company's largest counterparty, the Federal Reserve incorporates counterparty credit risk in the supervisory stress test by estimating mark-to-market losses, credit valuation adjustment (CVA) losses, and incremental default risk (IDR) losses associated with the global market shock.

components is realized in net income in the first quarter of the projection horizon in the supervisory stress test. The Board expects covered companies with material trading and counterparty exposures to be sufficiently capitalized to absorb losses stemming from these exposures that could occur during times of general macroeconomic stress.

2.6. Incorporation of business plan changes

(a) The Federal Reserve incorporates material changes in the business plans of covered companies, including mergers, acquisitions, and divestitures over the projection horizon, in the supervisory stress test projections. The incorporation of business plan changes in the supervisory stress test is a requirement of the capital plan rule,[16] and captures a risk to the capital of covered companies. Allowing for the inclusion of mergers, acquisitions, and divestitures is forward-looking, as the Federal Reserve seeks to capture material impacts on a covered company's post-stress capital that may arise from a business plan change in the course of the projection horizon.

(b) The incorporation of business plan changes in supervisory projections is consistent with the purpose of a stress testing exercise, corresponding to the principle about the focus on the ability to evaluate the impact of severe economic stress. In CCAR specifically, the Board evaluates whether covered companies have the ability to complete firm-projected capital

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[16] 12 CFR 225.8(e)(2).

actions in the supervisory stress test, while remaining above post-stress

minimum capital and leverage ratios. Business plan changes, such as mergers,

acquisitions, or divestitures, may have material impacts on these firm-projected

capital actions and on the projected ability of a covered company to make

planned capital distributions and maintain capital ratios above regulatory

minima.

(c) A consistent methodology for modeling of business plan changes is

applied across covered companies. The data that are available about

characteristics of assets being acquired or divested are generally limited and less

granular than other data collected by the Board in the Capital Assessments and

Stress Testing (FR Y-14) information collection. Projections of the effects of

business plan changes may rely on less granular information and may result in a

simpler modeling approach than supervisory projections for legacy portfolios or

businesses.

2.7. Credit Supply Maintenance

(a) The supervisory stress test incorporates the assumption that aggregate

credit supply does not contract during the stress period. The aim of supervisory

stress testing is to assess whether firms are sufficiently capitalized to absorb

losses during times of economic stress, while also meeting obligations and

continuing to lend to households and businesses. The assumption that a balance

sheet of consistent or increasing magnitude is maintained allows supervisors to

evaluate the health of the banking sector assuming firms continue to lend during times of stress.

(b) In order to implement this policy, the Federal Reserve must make assumptions about new loan balances. To predict losses on new originations over the planning horizon, newly originated loans are assumed to have the same risk characteristics as the existing portfolio, where applicable, with the exception of loan age and delinquency status. These newly originated loans would be part of a covered company's normal business, even in a stressed economic environment. While an individual firm may assume that it reacts to rising losses by sharply restricting its lending (e.g., by exiting a particular business line), the banking industry as a whole cannot do so without creating a "credit crunch" and substantially increasing the severity and duration of an economic downturn. The assumption that the magnitude of firm balance sheets will be fixed or growing in the supervisory stress test ensures that covered companies cannot assume they will "shrink to health," and serves the Federal Reserve's goal of helping to ensure that major financial firms remain sufficiently capitalized to accommodate credit demand in a severe downturn. In addition, by precluding the need to make assumptions about how underwriting standards might tighten or loosen during times of economic stress, the Federal Reserve follows the principle of consistency and comparability and promotes consistency across covered companies.

2.8. Firm-Specific Overlays and Additional Firm-Provided Data

(a) The Federal Reserve does not make firm-specific overlays to model results used in the supervisory stress test. This policy ensures that the supervisory stress test results are determined solely by the industry-level supervisory models and by firm-specific input data. The Federal Reserve has instituted a policy of not using additional input data submitted by one or some of the covered companies unless comparable data can be collected from all the firms that have material exposure in a given area. Input data necessary to produce supervisory stress test estimates is collected via the FR Y-14 information collection. The Federal Reserve may request additional information from covered companies, but otherwise will not incorporate additional information provided as part of a firm's CCAR submission or obtained through other channels into stress test projections.

(b) This policy curbs the use of data only from firms that have incentives to provide it, as in cases in which additional data would support the estimation of a lower loss rate or a higher revenue rate, and promotes consistency across the stress test results of covered companies.

2.9. Treatment of Missing or Erroneous Data

(a) Missing data, or data with deficiencies significant enough to preclude the use of supervisory models, create uncertainty around estimates of losses or components of revenue. If data that are direct inputs to supervisory models are

not provided as required by the FR Y-14 information collection or are reported erroneously, then a conservative value will be assigned to the specific data based on all available data reported by covered companies, depending on the extent of data deficiency. If the data deficiency is severe enough that a modeled estimate cannot be produced for a portfolio segment or portfolio, then the Federal Reserve may assign a conservative rate (e.g., 10th or 90th percentile PPNR or loss rate, respectively) to that segment or portfolio.

(b) This policy promotes the principle of conservatism, given a lack of information sufficient to produce a risk-sensitive estimate of losses or revenue components using information on the true characteristics of certain positions. This policy ensures consistent treatment for all covered companies that report data deemed insufficient to produce a modeled estimate. Finally, this policy is simple and transparent.

2.10   Treatment of Immaterial Portfolio Data

(a) The Federal Reserve makes a distinction between insufficient data reported by covered companies for material portfolios and immaterial portfolios. To limit regulatory burden, the Federal Reserve allows covered companies not to report detailed loan-level or portfolio-level data for loan types that are not material as defined in the FR Y-14 reporting instructions. In these cases, a loss rate representing the median rates among covered companies for whom the rate is calculated will be applied to the immaterial portfolio. This approach is

consistent across covered companies, simple, and transparent, and promotes the principles of consistency and comparability and simplicity.

3. Principles and Policies of Supervisory Model Validation

(a) Independent and comprehensive model validation is key to the credibility of supervisory stress tests. An independent unit of validation staff within the Federal Reserve, with input from an advisory council of academic experts not affiliated with the Federal Reserve, ensures that stress test models are subject to effective challenge, defined as critical analysis by objective, informed parties that can identify model limitations and recommend appropriate changes.

(b) The Federal Reserve's supervisory model validation program, built upon the principles of independence, technical competence, and stature, is able to subject models to effective challenge, expanding upon efforts made by supervisory modeling teams to manage model risk and confirming that supervisory models are appropriate for their intended uses. The supervisory model validation program produces reviews that are consistent, thorough, and comprehensive. Its structure ensures independence from the Federal Reserve's model development function, and its prominent role in communicating the state of model risk to the Board of Governors assures its stature within the Federal Reserve.

3.1. Structural independence

(a) The management and staff of the internal model validation program are structurally independent from the model development teams. Validators do not report to model developers, and vice versa. This ensures that model validation is conducted and overseen by objective parties. Validation staff's performance criteria include an ability to review all aspects of the models rigorously, thoroughly, and objectively, and to provide meaningful and clear feedback to model developers and users.

(b) In addition, the Model Validation Council, a council of external academic experts, provides independent advice on the Federal Reserve's process to assess models used in the supervisory stress test. In biannual meetings with Federal Reserve officials, members of the council discuss selective supervisory models, after being provided with detailed model documentation for and non-public information about those models. The documentation and discussions enable the council to assess the effectiveness of the models used in the supervisory stress tests and of the overarching model validation program.

3.2. Technical competence of validation staff

(a) The model validation program is designed to provide thorough, high-quality reviews that are consistent across supervisory models.

(b) First, the model validation program employs technically expert staff with knowledge across model types. Second, reviews for every supervisory

model follow the same set of review guidelines, and take place on an ongoing basis. The model validation program is comprehensive, in the sense that validators assess all models currently in use, expand the scope of validation beyond basic model use, and cover both model soundness and performance.

(c) The model validation program covers three main areas of validation: (1) conceptual soundness; (2) ongoing monitoring; and (3) outcomes analysis. Validation staff evaluates all aspects of model development, implementation, and use, including but not limited to theory, design, methodology, input data, testing, performance, documentation standards, implementation controls (including access and change controls), and code verification.

3.3. Stature of validation function

(a) The validation program informs the Board of Governors about the state of model risk in the overall stress testing program, along with ongoing practices to control and mitigate model risk.

(b) The model validation program communicates its findings and recommendations regarding model risk to relevant parties within the Federal Reserve System. Validators provide detailed feedback to model developers and provide thematic feedback or observations on the overall system of models to the management of the modeling teams. Model validation feedback is also communicated to the users of supervisory model output for use in their deliberations and decisions about supervisory stress testing. In addition, the

Director of the Division of Supervision and Regulation approves all models used in the supervisory stress test in advance of each exercise, based on validators' recommendations, development responses, and suggestions for risk mitigants. In several cases, models have been modified or implemented differently based on validators' feedback. The Model Validation Council also contributes to the stature of the Federal Reserve's validation program, by providing an external point of view on modifications to supervisory models and on validation program governance.

By order of the Board of Governors of the Federal Reserve System, February 22, 2019.

Ann Misback,
Secretary of the Board.