BOARD OF GOVERNORS *of the* FEDERAL RESERVE SYSTEM

Stress Testing at the Federal Reserve

October 19, 2018

Stress Testing in the United States

- The financial crisis highlighted the importance of forward-looking capital adequacy assessment, rather than a point-in-time assessment.

- First use of stress testing as a supervisory tool began with 2009 Supervisory Capital Assessment Program (SCAP).

- Dodd-Frank Act (DFA) enacted in 2010 requires both supervisory and company-run stress tests.
  - DFA supervisory stress testing applies to financial institutions with assets greater than $50 billion.
  - Company-run stress testing applies to financial institutions with assets greater than $10 billion.

Stress Testing in the United States

- Recent legislation has changed the scope of the stress tests
  - Firms under $100 billion are no longer subject to the DFA supervisory stress tests, and were not included in the 2018 results.
  - These and other changes are currently being implemented, and are not reflected in the rest of this discussion.

Stress Testing and Capital Planning for Large Financial Institutions (LFIs)

- CCAR includes both a qualitative review of capital planning process and a quantitative component (post-stress capital analysis). Both are critically important elements of CCAR.
  - LFIs submit internal stress test results and capital plans.
  - Federal Reserve supervisors review the capital planning process.
  - Federal Reserve runs DFA supervisory stress test with LFIs' planned capital actions. LFIs must meet all applicable minimum capital ratios.

- LFIs with $50 billion or more in total assets must submit capital plans.
  - The Comprehensive Capital Analysis and Review (CCAR) qualitative assessment applies to firms with $250 billion or more in total assets or $75 billion or more in nonbank assets (large and complex).[1]
  - Smaller and less complex firms are subject to separate review and guidance.

[1] Supervisory expectations for these firms are addressed in SR letter 15-18, https://www.federalreserve.gov/supervisionreg/srletters/sr1518.htm

Stress Testing and Capital Planning for Large Financial Institutions (LFIs)

- The Federal Reserve is required by statute to run the Dodd-Frank Act Stress Test (DFAST).
  - Under DFAST, the Federal Reserve projects post-stress capital using stylized capital action assumptions.
  - These capital actions are based on historical dividends, contracted payments, and generally no repurchases or issuances.

- The Federal Reserve can object to a large and complex FI's capital plan and capital distributions for qualitative reasons, quantitative reasons, or both.
  - The Federal Reserve can object to a large and noncomplex FI's capital plan only for quantitative reasons.

CCAR Qualitative Assessment

- For each capital plan, the Federal Reserve evaluates:
  - The extent to which the underlying analysis captured and addressed potential risks.
  - The robustness of the capital planning process, including supporting risk identification, measurement and management.
  - The reasonableness of underlying assumptions and analysis.
  - Corporate governance and internal controls over the capital planning process.

- Expectations differ for FIs of different, sizes, scopes of operations, activities, and systemic importance.

Stress Testing Large and Complex LFIs: CCAR and DFAST

	CCAR Post Stress Capital Analysis		DFA Stress Test	
Who conducts?	Federal Reserve	Company	Federal Reserve	Company
Which scenario should be used?	FR Baseline FR Adverse FR Severely adverse	FR Baseline FR Adverse FR Severely adverse Company Baseline Company Stress	Annual • FR Baseline • FR Adverse • FR Severely adverse No mid-cycle	Annual • FR Baseline • FR Adverse • FR Severely adverse Mid-cycle • Company Baseline • Company Stress
What capital actions are applied under each scenario?	Capital actions proposed under the company Baseline scenario are applied in all scenarios	Proposed capital actions under the company Baseline scenario are applied in all scenarios, except for the company Stress scenario, in which the company Stress capital actions are applied.	DFA capital actions for all scenarios. These capital actions are based on historical dividends, contracted payments, and generally no repurchases or issuances.	DFA capital actions for all scenarios. These capital actions are based on historical dividends, contracted payments, and generally no repurchases or issuances.
Minimum ratios	All applicable regulatory ratios must be maintained*	All applicable regulatory ratios must be maintained*	No minimum ratios	No minimum ratios

* Supplementary leverage ratio was incorporated in CCAR 2017.

Federal Reserve Data Collection for Capital Assessments and Stress Testing (FR Y-14)

- Applicable to LFIs with total consolidated assets of $50 billion or more
- Data are used to support supervisory stress test models, capital assessment and for continuous monitoring
- Consists of the three reports: FR Y-14A, Q, and M.

Report	Frequency	Data Collected
FR Y-14A	Annually or Semi-Annual	Quantitative projections of balance sheet, income, losses, and capital across a range of macroeconomic scenarios, and qualitative information on methodologies used to develop internal projections of capital across scenarios.
FR Y-14Q	Quarterly	Granular data on FIs' various asset classes, including loans, securities and trading assets, and pre-provision net revenue (PPNR) for the reporting period
FR Y-14M	Monthly	Retail loan- and portfolio-level data and detailed address matching collection

Supervisory Stress Tests: Key Principles

- **Independence** is necessary (though not sufficient) for credibility.
  - To the maximum extent possible, supervisory stress tests should provide a truly independent assessment of banks' capital adequacy.
    - The Federal Reserve uses models developed internally and independently
    - These models rely on portfolio data provided by firms, but generally do not rely on models or estimates provided by firms

- **Consistency and comparability** of results supports cross-firm analysis and provides a valuable insight to supervisors and the market.
  - A standard set of scenarios, assumptions, and models promote comparability.

- **Robustness and stability** of supervisory models promotes model projections that reflect changes in risk factors, scenarios, and model enhancements.
  - Changes in supervisory projections should not reflect transitory factors.

Supervisory Stress Tests: Key Principles

- The stress tests are designed to be **forward-looking.**
  - Though supervisory models are estimated with historical data, projections seek to limit reliance on past outcomes and avoid a simple extrapolation of past trends.

- **Conservatism** reflects the use of assumptions or approaches that result in larger losses or revenue.
  - Uncertainty is inherent in supervisory modeling. Conservative approaches are used when there is not enough information to make a reasonable estimate for a portfolio or firm.

- **Focus on the ability to evaluate the impact of severe economic** stress results in the evaluation and selection of supervisory models based on their abilities to project outcomes in stressed economic environments.

Stress Scenario Design

- The Federal Reserve has published a policy statement on the scenario design framework for stress testing, including quantitative guides for formulating the path of key variables in the scenarios.

- The Federal Reserve Board is required to conduct stress tests under three scenarios: baseline, adverse and severely adverse. Firms are required to use the same macroeconomic scenarios for their company-run stress tests.

- Approach for developing the macroeconomic scenarios
  - The **baseline scenario** reflects the most recently available consensus views of the macroeconomic outlook.
  - The **severely adverse scenario** reflects the conditions of post-war U.S. recessions (the recession approach) with the unemployment rate as the primary basis for this scenario. The unemployment rate will reflect a rate observed in severe post-war U.S. recessions.
  - The **adverse scenario** is constructed by incorporating specific risks or by using a probabilistic approach.
    - Permits flexibility so that results provide most value to supervisors, given current economic conditions.

Stress Scenario Design (continued)

- Global market shock:
  - The market shock component is not included in the baseline scenario.
  - To enhance consistency and comparability, the Board provides thousands of specific risk factor shocks.
  - The challenge of this level of comprehensiveness is in creating shocks that are coherent and internally consistent.
  - The market shock is based on a combination of historical episodes and hypothetical events.
- Large counterparty default component (LCPD):
  - Firms with large trading or custodial operations are also required to assume the instantaneous and unexpected default of the firm's largest counterparty.

2018 Supervisory Scenario Highlights

- Severely adverse scenario
  - U.S. real GDP declines about 7 ½ percent, relative to pre-recession peak
  - U.S. unemployment rate increases almost 6 percentage points, to 10 percent
  - U.S. equity prices fall approximately 65 percent
  - Short-term U.S. Treasury rates fall and remain near zero

- Adverse scenario
  - U.S. real GDP declines slightly more than 2 percent
  - U.S. unemployment rate rises to 7 percent
  - U.S. equity prices fall approximately 30 percent
  - Short-term U.S. Treasury rates fall and remain near zero

- Modified market risk components for certain IHCs
  - Applies to firms with aggregate trading assets and liabilities in an amount equal to 10 percent or more of the firm's total assets, or of $50 billion or more
  - The Federal Reserve will apply specific loss rates to certain exposures, treated as an add-on to any macroeconomic scenario losses.
  - These loss rates are based on losses used in the global market shock and LCPD components in 2014-2017.

Calculating Post-stress Capital

<u>Change in regulatory capital</u>	
= Change in equity capital	
= Net income	
= Pretax net income	
= PPNR	Supervisory Models of PPNR, Losses, and Balances
- Provisions	
- Other losses	
- Taxes	
- Other changes to net income	Extraordinary items and valuation allowance
- Net capital distributions	Different Assumptions in CCAR and DFAST
- Deductions from regulatory capital	Based on Capital Rules
+ Additions to regulatory capital	

Net Income Before Taxes

Pre-tax Net Income as a Percent of Total Average Assets, All Firms, Severely Adverse Scenario

	2018	
	Billions of dollars	Percent of average assets
Pre-provision net revenue (PPNR)	492.3	3.0
Other revenue	0.0	
Less		
Provisions	481.7	
Realized losses/gains on securities	10.0	
Trading and counterparty losses	113.0	
Other losses/gains	26.1	
Equals		
Net income before taxes	-138.5	-0.8

Loan Losses

Projected Loan Losses by Type of Loan, Severely Adverse Scenario

	2018	
	Billions of dollars	Portfolio loss rates (percent)
Total loan losses	429.3	6.4
First-lien mortgages, domestic	34.3	2.7
Junior liens and HELOCs, domestic	15.4	4.9
Commercial and industrial	111.3	7.3
Commercial real estate, domestic	63.4	8.3
Credit cards	112.7	14.4
Other consumer	39.3	5.5
Other loans	52.9	4.0

Governance of the Supervisory Stress Test

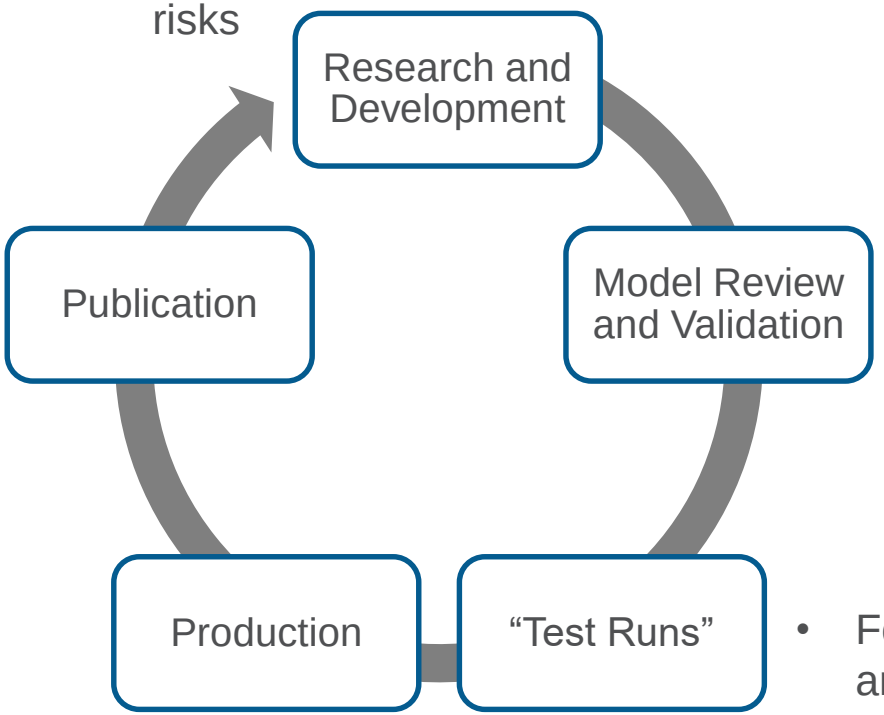
- The process follows supervisory expectations for banks' model risk management (SR 11-7).

- Oversight is by a small group of senior staff from across the Federal Reserve System, the Model Oversight Group, which
  - directs model development and implementation; and
  - evaluates the reasonableness of assumptions and results and engages in extensive vetting of results with supervisory modeling teams, using a variety of benchmarks.

- A separate group conducts an independent review and validation of model soundness and controls, which
  - ensures, together with the MOG, that identified weaknesses are remedied prior to using the model; and
  - promotes internal transparency of model status and results.

DFAST Cycle

- Develop and enhance models
- Conduct performance testing
- Explore new data sources and emerging risks



- Discuss stress test results with Governors and other internal stakeholders.
- Publish results and overview of methodology.

- Independent review of conceptual soundness and controls
- Must address key weaknesses before using model for production

- Implement approved models to produce supervisory estimates.
- Extensive vetting of outcomes for reasonableness, using multiple benchmarks

- Formal testing of all models and processes to identify weaknesses
- Conduct extensive vetting of assumptions, approaches, and outcomes.

Liquidity Stress Testing

- The Federal Reserve launched the Comprehensive Liquidity Assessment and Review (CLAR) Program in 2012.
  - Applies to LISCC firms, complement to LCR and NSFR.
  - An annual horizontal assessment with quantitative and qualitative elements.

- CLAR assesses the adequacy of firms' liquidity positions:
  - Utilizes measures of funding concentrations beyond those captured in LCR.
  - Supervisors also assess the adequacy of firms' internal liquidity stress tests.
  - CLAR does not include a specific quantitative minimum.

- LISCC firms with weak liquidity positions under CLAR are directed to improve their practices, and as warranted, their liquidity positions.
  - Done through supervisory direction, rating downgrades, and enforcement actions.
  - Knowledge gained through CLAR also provides a macro-prudential perspective on the systemic importance of liquidity vulnerabilities and funding concentrations.

Resources

- http://www.federalreserve.gov/bankinforeg/stress-tests-capital-planning.htm
- Supervisory and Company-Run Stress Test Requirements for Covered Companies, October 2012.
- Policy Statement on the Scenario Design Framework for Stress Testing, November 2013.
- Federal Reserve Supervisory Assessment of Capital Planning and Positions for Large and Noncomplex Firms (SR 15-19), December 2015.
- Federal Reserve Supervisory Assessment of Capital Planning and Positions for LISCC Firms and Large and Complex Firms (SR 15-18), December 2015.
- Comprehensive Capital Analysis and Review 2018: Summary Instructions for LISCC and Large and Complex Firms, February 2018.
- 2018 Supervisory Scenarios for Annual Stress Tests Required under the Dodd-Frank Stress Testing Rules and the Capital Plan Rule, February 2018.
- Dodd-Frank Act Stress Test 2018: Supervisory Stress Test Methodology and Results, June 2018.
- Comprehensive Capital Analysis and Review 2018: Assessment Framework and Results, June 2018.
- Stress Testing Policy Statement, December 2017.