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

<table>
<thead>
<tr>
<th>CCAR Post Stress Capital Analysis</th>
<th>DFA Stress Test</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Who conducts?</strong></td>
<td>Federal Reserve</td>
</tr>
<tr>
<td><strong>Which scenario should be used?</strong></td>
<td>FR Baseline</td>
</tr>
<tr>
<td></td>
<td>FR Adverse</td>
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<tr>
<td></td>
<td>FR Severely adverse</td>
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<tr>
<td></td>
<td>Company Baseline</td>
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<tr>
<td></td>
<td>Company Stress</td>
</tr>
<tr>
<td><strong>What capital actions are applied under each scenario?</strong></td>
<td>Capital actions proposed under the company Baseline scenario are applied in all scenarios</td>
</tr>
<tr>
<td><strong>Minimum ratios</strong></td>
<td>All applicable regulatory ratios must be maintained*</td>
</tr>
</tbody>
</table>

* 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.

<table>
<thead>
<tr>
<th>Report</th>
<th>Frequency</th>
<th>Data Collected</th>
</tr>
</thead>
<tbody>
<tr>
<td>FR Y-14A</td>
<td>Annually or Semi-Annual</td>
<td>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.</td>
</tr>
<tr>
<td>FR Y-14Q</td>
<td>Quarterly</td>
<td>Granular data on FIs’ various asset classes, including loans, securities and trading assets, and pre-provision net revenue (PPNR) for the reporting period</td>
</tr>
<tr>
<td>FR Y-14M</td>
<td>Monthly</td>
<td>Retail loan- and portfolio-level data and detailed address matching collection</td>
</tr>
</tbody>
</table>
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

\[
\text{Change in regulatory capital} = \text{Change in equity capital} = \text{Net income} = \text{Pretax net income} = PPNR - \text{Provisions} - \text{Other losses} - \text{Taxes} - \text{Other changes to net income}\]

- **Net capital distributions**
- **Deductions from regulatory capital**
+ **Additions to regulatory capital**

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Supervisory Models of PPNR, Losses, and Balances
Extraordinary items and valuation allowance
Different Assumptions in CCAR and DFAST
Based on Capital Rules
Net Income Before Taxes

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

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bills of</td>
<td>Percent of</td>
</tr>
<tr>
<td></td>
<td>dollars</td>
<td>average assets</td>
</tr>
<tr>
<td>Pre-provision net revenue (PPNR)</td>
<td>492.3</td>
<td>3.0</td>
</tr>
<tr>
<td>Other revenue</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provisions</td>
<td>481.7</td>
<td></td>
</tr>
<tr>
<td>Realized losses/gains on securities</td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>Trading and counterparty losses</td>
<td>113.0</td>
<td></td>
</tr>
<tr>
<td>Other losses/gains</td>
<td>26.1</td>
<td></td>
</tr>
<tr>
<td>Equals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net income before taxes</td>
<td>-138.5</td>
<td>-0.8</td>
</tr>
</tbody>
</table>
## Loan Losses

*Projected Loan Losses by Type of Loan, Severely Adverse Scenario*

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

Research and Development

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

Model Review and Validation

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

Publication

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

“Test Runs”

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

- Supervisory and Company-Run Stress Test Requirements for Covered Companies, October 2012.
- 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.
- Dodd-Frank Act Stress Test 2018: Supervisory Stress Test Methodology and Results, June 2018.