Stress Testing the Loan Portfolio

Regulatory Feedback you need to Hear

Loan Portfolio Stress Testing

Topics
I. Defining Stress Testing
II. Regulatory Examiners Expectations
III. Why Banks Don’t Stress Test
IV. Benefits of Stress Testing
V. How to Start Stress Testing the Loan Portfolio
VI. Incorporating Stress Testing Results
VII. Questions/Comments
Loan Portfolio Stress Testing

The Three Inherent Risks to all Financial Intermediaries

All financial intermediaries rent money from depositors (Liabilities) who then expect it back on demand or at maturity dates rarely more than a few years in the future. Banks then lend or invest that money in variety of instruments (Assets) with maturity dates as long as 30 years.

Economists call this difference in maturity terms “Maturity Transformation”

1. Credit Risk – The obligation to pay back depositors regardless of whether loans are repaid
2. Interest Rate Risk – The timing and size of changes in the rates that they receive from their “Assets” rarely match the timing and size of rate changes for their “Liabilities”
3. Liquidity Risk – Not enough cash will be generated from “Assets” to meet deposit withdrawals or contractual loan fundings
### Defining Stress Testing

#### Regulatory Defined Inherent Risk Types

<table>
<thead>
<tr>
<th>Types defined in Manual</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit risk</td>
<td>The risk to earnings or capital that arise from the potential that a borrower or counter party will fail to perform on an obligation</td>
</tr>
<tr>
<td>Liquidity risk</td>
<td>The risk to earnings and capital arising from a bank’s inability to meet its obligations when they become due, without incurring unacceptable losses</td>
</tr>
<tr>
<td>Interest rate risk</td>
<td>The risk to a financial institution’s condition resulting from adverse movements in market rates or prices, such as interest rates, foreign exchange rates or equity prices</td>
</tr>
<tr>
<td>Operational risk</td>
<td>Operational risk arises from the potential that inadequate information systems, operational problems, breaches in internal controls, fraud, or unforeseen catastrophes will result in unexpected losses</td>
</tr>
<tr>
<td>Legal risk</td>
<td>The risk arising from the potential that unenforceable contracts, lawsuits or adverse judgments can disrupt or negatively effect the operations or the condition of a financial institution</td>
</tr>
<tr>
<td>Reputation risk</td>
<td>The risk to earnings or capital from the possibility that negative publicity regarding the institution’s business practices, whether true or not will cause a decline in the customer base, trigger costly litigation, or result in revenue reductions.</td>
</tr>
</tbody>
</table>
Defining Stress Testing

Wikipedia Definition:

Instead of doing financial projection on a "best estimate" basis, a company may do stress testing where they look at how robust a financial instrument is in certain crashes, a form of scenario analysis. They may test the instrument under, for example, the following stresses:

1. What happens if equity markets crash by more than x% this year?
2. What happens if interest rates go up by at least y%?
3. What if half the instruments in the portfolio terminate their contracts in the fifth year?
4. What happens if oil prices rise by 200%?

This type of analysis has become increasingly widespread, and has been taken up by various governmental bodies (such as the FSA in the UK) as a regulatory requirement on certain financial institutions to ensure adequate capital allocation levels to cover potential losses incurred during extreme, but plausible, events. This emphasis on adequate, risk adjusted determination of capital has been further enhanced by modifications to banking regulations such as Basel II. Stress testing models typically allow not only the testing of individual stressors, but also combinations of different events.

Stress test definition:

The term stress testing describes a range of techniques used to assess the vulnerability of a portfolio to major changes in the economic environment or to exceptional but plausible events. Stress tests make risks more transparent by estimating the potential losses on a portfolio in abnormal markets. (1)

A simplified definition would be:

Stress testing is a way to perform sensitivity analysis using "What if" alternative scenarios

The Changing Regulatory Landscape

The Federal Reserve Board identified four key infrastructure components of an effective risk management program:

1. Active board and senior management oversight
2. Adequate policies, procedures and limits
3. Adequate risk measurement, monitoring and management information systems
4. Comprehensive internal controls

Lessons learned from the recent economic crisis

What is prompting regulators to expect more of financial institutions in the future?

1. Examiners failed to take appropriate action even after repeatedly identifying weaknesses in troubled banks and credit unions.
2. Examiners and the Board of Directors didn’t understand the institution’s culture and the key motivators which led management to operate in an unsafe manner.
   a) Poorly designed incentive compensation plans.
   b) Institutions lacked the experience and expertise to offer the products they offered.
3. Congress and the press have been critical of the regulators
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Lessons learned from the recent economic crisis

1. Failed institutions didn't have a proper risk management program in place (internal audit, loan review, annual IT security reviews, or testing of the institution’s compliance with regulatory laws and regulations).

2. Risk management staff were not truly independent of the functions they were there to review or audit.

3. Many failed institutions entered new markets, offered new products, or started acquiring loan participations in an attempt to grow without implementing adequate controls to offset or mitigate the increased risk they were undertaking.

The Changing Regulatory Landscape

Lessons learned from the recent economic crisis

Common elements of institutions that experienced significant asset quality issues during the “economic crisis”.

1. Heavy concentration in other commercial real estate and acquisition, development, and construction (ADC) loans.

2. Experienced a period of tremendous growth funded with non-core funding sources (brokered deposits, mismatched FHLB Advances, internet CDs).

3. High level of technical exceptions in commercial real estate loans (CRE) portfolios.

4. Policy exceptions: Policies were adequate but the institution didn’t follow them.
The Changing Regulatory Landscape

Lessons learned from the recent economic crisis

Common elements of institutions that experienced significant asset quality issues during the “economic crisis”.

5. Inadequate policies and procedures
   a) Lack of adequate documented site inspections.
   b) Inadequate procedures to monitor construction loans.
   c) Placed too much reliance on the lead lender for participations purchased.
   d) Originated loans out of market or level of expertise.

6. Weak credit administration practices
   a) Inadequate appraisals
      • Use of “as completed” appraisals
      • Relyed on in-house appraisals performed by originating loan officer
   b) Inadequate analysis of borrower cash flows including failure to properly calculate global debt service ratios.
      • Placed too much reliance on net worth of guarantors.
      • Net worth doesn’t make loan payments, cash does.

7. Ineffective risk management programs - Loan review function failed to identify deficiencies in the institution’s underwriting policies and procedures and individual credits until it was too late.

8. Inadequate asset liability policies and procedures.

9. Allowance for loan losses calculation was not prepared in accordance with GAAP and regulatory guidelines.

10. Board failed to provide adequate oversight.
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Top Ten regulatory examination issues:

1. Enterprise risk management process
2. CRE classifications
3. Troubled debt restructurings
4. Strategic plans
5. Liquidity
6. Capital
7. Stress Testing
8. Commitment to internal audit
9. Compliance and Loan Review
10. Incentive compensation

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The Changing Regulatory Landscape

Dodd Frank Act
Signed
• July 21, 2010

Basel III
November 2010

SR 12-7
Statement to Clarify
Stress Testing
by Community
Banks
• 5/14/2012

SR 12-7
Statement to Clarify
Stress Testing
by Community
Banks
• 5/14/2012

FIL-49-2013
Annual Stress-Test
Reporting Template
• 10/21/2013

OCC 2013-33
Supervisory
Guidance
Community Bank
Stress Testing
• 10/18/2012

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History of the Basel Accords

Formerly, the Basel Committee consisted of representatives from central banks and regulatory authorities of the Group of Ten countries plus Luxembourg and Spain. Since 2009, all of the other G-20 major economies are represented, as well as some other major banking locales such as Hong Kong and Singapore.

Politically, it was difficult to implement Basel II in the regulatory environment prior to 2008, and progress was generally slow until that year’s major banking crisis caused mostly by credit default swaps, mortgage-backed security markets and similar derivatives. As Basel III was negotiated, this was top of mind, and accordingly much more stringent standards were contemplated, and quickly adopted in some key countries including the USA.

Three Pillars of Basel II

- **Pillar 1** Capital Requirements - of the new capital framework revises the 1988 Accord’s guidelines by aligning the minimum capital requirements more closely to each bank’s actual risk of economic loss.
- **Pillar 2** Supervisor Committee - Supervisors will evaluate the activities and risk profiles of individual banks to determine whether those organizations should hold higher levels of capital than the minimum requirements in Pillar 1 would specify and to see whether there is any need for remedial actions.
- **Pillar 3** Market Discipline - leverages the ability of market discipline to motivate prudent management by enhancing the degree of transparency in banks’ public reporting to shareholders and customers.

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Dodd-Frank Act – The biggest changes in financial regulations in decades

While this legislation targets banks of certain size, the entire industry should be prepared for increased expectations as financial regulators become accustomed to seeing stress testing as part of risk management framework. Bank management will find it harder to demonstrate sufficient risk management processes without incorporating some elements of stress testing.

Requirements coming from Dodd-Frank:

1) Federal Reserve to provide at least three different sets of conditions for firms to stress test against

2) Federal Reserve to do annual stress test on bank holding companies over 50 billion in assets and non-bank financial firms under Federal Reserve supervision

3) Above firms required to do their own semi-annual stress tests

4) All other banks with assets greater than 10 billion required to do annual stress test
The Changing Regulatory Landscape

Dodd-Frank Act – The biggest changes in financial regulations in decades

1. 2 Years after passage, more than 100 rules not yet finalized
2. 9,000 pages of new or expanded regulations
3. Major Provisions of Act include:
   • Systemic Supervision (FSOC)
   • Increased Bank Supervision
   • **Consumer Financial Protection Bureau**
   • Limits on Bank Investments
   • Stricter Regulations on Mortgage loans
   • Deposit Insurance increased permanently to $250k
   • Interchange and Debit Card Processing

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Dodd-Frank Act

PROGRESS IN SELECT CATEGORIES
Many rules still need to be finalized in areas such as securities regulation, consumer protection, mortgage reforms, and establishing how the government will close failing large financial institutions. Number of rules required under Dodd-Frank finalized as of Sept. 3, in select categories:

<table>
<thead>
<tr>
<th>Category</th>
<th>Finalized</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset-Backed Securities Offerings</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>Banking Regulations</td>
<td>4</td>
<td>44</td>
</tr>
<tr>
<td>Consumer Protection</td>
<td>7</td>
<td>22</td>
</tr>
<tr>
<td>Credit Rating Agencies</td>
<td>3</td>
<td>48</td>
</tr>
<tr>
<td>Derivatives</td>
<td>14</td>
<td>90</td>
</tr>
<tr>
<td>Executive Compensation/Corporate Governance</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>Mortgage Reforms</td>
<td>6</td>
<td>21</td>
</tr>
<tr>
<td>Orderly Liquidation Authority</td>
<td>16</td>
<td>49</td>
</tr>
</tbody>
</table>

1. Securitizers such as credit default swaps whose value is derived from other securities
2. Closing failing large banks
3. Taxpayer bailouts

Source: Denise Thode & Wardenell
Frank Porpea and Denny Staffet, USA TODAY
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Stress Testing and Capital Planning

The OCC expects every bank, regardless of size or risk profile, to have an effective internal process to (1) assess its capital adequacy in relation to its overall risks, and (2) to plan for maintaining appropriate capital levels. Stress testing can be a prudent way for a community bank to identify its key vulnerabilities to market forces and assess how to effectively manage those risks should they emerge.

If the results of a stress test indicate that capital ratios could fall below the level needed to adequately support the bank’s overall risk profile, the bank’s board and management should take appropriate steps to protect the bank from such an occurrence. This may include establishing a plan that requires closer monitoring of market information, adjusting strategic and capital plans to mitigate risk, changing risk appetite and risk tolerance levels, limiting or stopping loan growth or adjusting the portfolio mix, adjusting underwriting standards, raising more capital, and selling or hedging loans to reduce the potential impact from such stress events.

John C. Lyons Jr
Senior Deputy Comptroller and Chief National Bank Examiner

Sound risk management practices should include an understanding of the key vulnerabilities facing banks. For several years, supervisors have used the term “stress testing” in guidance and handbooks to refer to and encourage banks to incorporate this practice. Well-managed community banks routinely conduct interest rate risk sensitivity analysis to understand and manage the risk from changes in interest rates. Many community banks, however, do not have similar processes in place to quantify risk in loan portfolios, which often are the largest, riskiest, and highest earning assets.

The OCC, however, does consider some form of stress testing or sensitivity analysis of loan portfolios on at least an annual basis to be a key part of sound risk management for community banks. Community banks that have incorporated such concepts and analyses into their credit risk management and strategic and capital planning processes have demonstrated the ability to minimize the impact of negative market developments more effectively than those that did not use stress testing.
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New Guidance on Stress Testing – 10/18/2012

Stress Testing Methods and Approaches

**Transaction stress testing** is a method that estimates potential losses at the loan level by assessing the impact of changing economic conditions on a borrower’s ability to service debt.

**Portfolio stress testing** is a method that helps identify current and emerging risks and vulnerabilities within the loan portfolio by assessing the impact of changing economic conditions on borrower performance, identifying credit concentrations, measuring the resulting change in overall portfolio credit quality, and ultimately determining the potential financial impact on earnings and capital.

**Enterprise-level stress testing** is a method that considers multiple types of risk and their interrelated effects on the overall financial impact under a given economic scenario. These risks include, but are not limited to, credit risk within loan and security portfolios, counterparty credit risk, interest rate risk, and changes in the bank’s liquidity position.

**Reverse stress testing** is a method under which the bank assumes a specific adverse outcome, such as suffering credit losses sufficient to cause a breach in regulatory capital ratios, and then deduces the types of events that could lead to such an outcome. This type of analysis (e.g. a “break the bank” scenario) can help a bank consider scenarios beyond normal business expectations and challenge common assumptions about performance and risk mitigation strategies.
Regardless of the testing method used, an effective stress test has common elements that a community bank should consider. These include

- asking plausible "what if" questions about key vulnerabilities;
- making a reasonable determination of how much impact the stress event or factor might have on earnings and capital; and
- incorporating the resulting analysis into the bank’s overall risk management process, asset/liability strategies, and strategic and capital planning processes.

Appendix B - Constructing a Basic Portfolio Level Stress Test into three sections:

**Section 1  Estimated Loan Portfolio Stress Losses**

**Objective:** This section estimates the potential loan losses over a two-year stress test horizon for the entire loan portfolio. There are four components in this section.

- Loan Portfolio Categories
- Quarter-End Loan Portfolio Balances
- Stress Period Loss Rates
- Stress Period Losses
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New Guidance on Stress Testing – 10/18/2012

Section 2  Estimated Impact on Earnings

Objective: This section estimates the potential impact to net income from the stress scenario over the two-year period. There are five components in this section.

- Pre-provision Net Income
- Provision Expense to Cover Stress Losses
- Provision to Maintain an Adequate ALLL
- Income Tax Expense (Benefit)
- Net Income

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New Guidance on Stress Testing – 10/18/2012

Section 3  Estimated Impact of Stress on Capital

Objective: This section estimates the hypothetical impact on capital of the stressed environment. The example uses Tier 1 capital and the Tier 1 leverage ratios to help analyze the potential change in capital caused by a stress scenario. Banks can also review the changes in other relevant capital measures, such as the potential change in the common equity ratio, to assess the results of the stress test. This section has five components.

- Tier 1 Capital
- Net Change in Tier 1 Capital
- Adjusted Tier 1 Capital
- Quarterly Average Assets
- Tier 1 Leverage Ratio
## The Changing Regulatory Landscape

### 1. Estimated Loan Portfolio Stress Losses

<table>
<thead>
<tr>
<th>Loan Portfolios from Call Report Schedule RC-G</th>
<th>Quarter End as of Date $ Balances</th>
<th>Two-Year Stress Period Loss Rate %</th>
<th>Two-Year Stress Period $ Losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loans Secured by type of Real Estate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Construction and Development</td>
<td>100</td>
<td>20%</td>
<td>20</td>
</tr>
<tr>
<td>b. Farmland</td>
<td>50</td>
<td>8%</td>
<td>4</td>
</tr>
<tr>
<td>c. 1–4 Family Housing</td>
<td>100</td>
<td>4%</td>
<td>4</td>
</tr>
<tr>
<td>d. Multifamily Housing</td>
<td>75</td>
<td>16%</td>
<td>12</td>
</tr>
<tr>
<td>e. Nonfarm Nonresidential Property</td>
<td>100</td>
<td>8%</td>
<td>8</td>
</tr>
<tr>
<td>Agriculture Production and Farmer Loans</td>
<td>40</td>
<td>6%</td>
<td>2.4</td>
</tr>
<tr>
<td>Consumer Loans</td>
<td>60</td>
<td>14%</td>
<td>8.4</td>
</tr>
<tr>
<td>Commercial and Industrial</td>
<td>50</td>
<td>4%</td>
<td>2</td>
</tr>
<tr>
<td>All Other Loans</td>
<td>25</td>
<td>4%</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>600</strong></td>
<td><strong>61.8</strong></td>
<td></td>
</tr>
</tbody>
</table>

### 2. Estimated Impact of Stress on Earnings

<table>
<thead>
<tr>
<th>Descriptions</th>
<th>Previous Two Years Actual</th>
<th>Pro Forma Stress Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Provision Net Income</td>
<td>34.5</td>
<td>30</td>
</tr>
<tr>
<td>Less Provision to Cover Two-Year Losses</td>
<td>12</td>
<td>61.8</td>
</tr>
<tr>
<td>Less Provision to Maintain Adequate ALLL</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Income Tax Expenses (Benefit)</td>
<td>5.5</td>
<td>(14.6)</td>
</tr>
<tr>
<td><strong>Net Income</strong></td>
<td><strong>16.5</strong></td>
<td><strong>(27.2)</strong></td>
</tr>
</tbody>
</table>

### 3. Estimated Impact of Stress on Capital

<table>
<thead>
<tr>
<th>Descriptions</th>
<th>Previous Two Years Actual</th>
<th>Pro Forma Stress Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 1 Capital $</td>
<td>88</td>
<td>88</td>
</tr>
<tr>
<td>Net Change in Tier 1 Capital from Stress Period (Net Income from Step 2)</td>
<td>N/A</td>
<td>(27.2)</td>
</tr>
<tr>
<td>Adjusted Tier 1 Capital $</td>
<td>88</td>
<td>60.8</td>
</tr>
<tr>
<td>Quarterly Average Assets $</td>
<td>800</td>
<td>738</td>
</tr>
<tr>
<td>Tier 1 Leverage Ratio %</td>
<td>11%</td>
<td>8.2%</td>
</tr>
</tbody>
</table>
The FDIC is issuing this notice to describe the reports and information required to meet the reporting requirements under Section 165(i)(2) of the Dodd-Frank Wall Street Reform and Consumer Protection Act for covered banks with total consolidated assets between $10 billion and $50 billion.

The results of the stress test must include, under the baseline, adverse, and severely adverse scenarios:

- Description of types of risk included in the stress test
- Summary description of the methodologies used
- Explanation of the most significant causes for the changes in regulatory capital ratios
- The use of the stress test results

Pop Quiz:

How would you answer the following question:

It took Rob 5 hours to travel to Madison, did he take the most direct route?
Conference of State Bank Supervisors (CSBS)

In October 2010 released a white paper titled The Case for Stress Testing at Community Banks: Enhancing the risk management framework to ensure economic viability

This highlighted 9 stress points to consider:

1. Increase in non-performing assets
   a. Concentrations by loan type or industry
   b. Securities portfolio (TRUPS, Fannie, Freddie)
   c. Economic slowdown
   d. Collateral depreciation

2. Contagion
   a) Weakness from one loan type spreading to another sector
   b) Downstream impact from the loss of a major employer or industry

3. Widespread deterioration in a portfolio due to a “rouge” or incompetent lender

4. Long-term effects from changes in underwriting practices

5. Changes in borrowing terms or collateral requirements
The Changing Regulatory Landscape

Conference of State Bank Supervisors (CSBS)
This highlighted 9 stress points to consider:

6. Stress in funding from reputational risk – negative press, regulatory enforcement, etc.
7. Funding outflows in a stressed environment
8. Operational risk
9. Impact on the holding company from a stress event at the bank – Can the holding company serve as a source of strength for the bank or will the stress at the bank spread to the holding company?


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In a recent survey of 316 community banks conducted by RMA
• Only 42% of banks conducted stress tests
• Only 10% stress tested consumer portfolios
• The majority of participants perform worst-case assumptions during the underwriting or renewal phase of individual credits with no portfolio-level testing

50% of respondents represented institutions with less than $500 million in total assets.

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Why Banks Don’t Stress Test

Listed below are some of the common reasons financial institutions are not stress testing their portfolios

1. Inadequate MIS systems
2. Insufficient data
3. Staffing/resource constraints
4. Failure to understand process
5. Unclear on how to incorporate process into the overall risk management framework
6. Examiners have not required them to do it yet

Benefits of Stress Testing

There are several advantages to implementing stress testing

1. Identification and mitigation of risks
   a) Changes to underwriting policies
   b) Portfolio concentrations
   c) Credit oversight and loan losses
2. Proactive management of loan portfolio
3. Understanding impacts to Allowance for Loan and Lease Loss Reserve (ALLL) and capital requirements
Benefits of Stress Testing

Identification and mitigation of risks
Converting to a NAICS coding system

RMA Mission Statement
RMA is a member-driven professional association whose sole purpose is to advance sound risk principles in the financial services industry.

Financial Ratio Benchmarks includes: NAICS codes
Nineteen classic financial statement ratios, clearly defined.
Common-size balance-sheet and income-statement line items, arrayed by asset and sales size.
More than 769 industries are presented using the 2007 North American Industry Classification System (NAICS) codes.

Benefits of Stress Testing
Identification and mitigation of risks
Converting to a NAICS coding system

111150 Corn Farming - This industry comprises establishments primarily engaged in growing corn (except sweet corn) and/or producing corn seeds.

Advantages of Using NAICS codes
1. Comparative Analysis
2. Concentration Analysis
3. Loan Portfolio Segmentation
4. Stress Testing
Benefits of Stress Testing

Identification and mitigation of risks

By identifying areas of concentrations in your loan portfolio, you will be able to develop scenarios that highlight risks and help you proactively mitigate risk.
Benefits of Stress Testing

Identification and mitigation of risks

To build a stress testing process, you need to understand the basic components:

1. Data - the “What”
2. Systems – the “How”
3. Personnel – the “Who”
4. Results – the “Where”
How to Start Stress Testing the Loan Portfolio – Components

Understanding the Data – How complete is your data?

1. Do you capture data that allows you to segment your portfolio into meaningful categories
   1. Does your financial institution use standard business codes – for example NAICS codes
   2. Do you have collateral type indicators
   3. Do you track geographical data for real estate collateral
2. How complete and accurate is the data in your systems of record
3. Do you have a MIS system that integrates data together from multiple systems of record

How to Start Stress Testing the Loan Portfolio – Components

Understanding the Systems – How are you processing the data?

1. What tools are you using to calculate loan grades
   1. Does your system grade with objective and subjective characteristics
   2. What categories are you going to use in your “what if” scenarios
   3. How are you going to adjust the financial input used in your grading system based on the specific scenario
2. How do you compare stress test results with actual results
3. How are you documenting the logic behind your stress tests
How to Start Stress Testing the Loan Portfolio – Components

Understanding the Systems – How are you processing the data?

Building the “What if” Scenarios
1. Changes in Revenue
2. Changes in Expenses
   – Interest Rate Changes
3. Changes in Collateral Values
   – Collateral Types
   – Geographic Factors
4. DFAST parameters

DFAST Stress Testing

- Dodd-Frank Act Stress Test = DFAST
- Quarterly required stress tests for $10-$50 billion banks
- Projects multiple variables
  – GDP
  – Interest rates
  – Housing growth
  – Employment
- Sets baseline forecast for comparison
- Establishes 2 potential stress events
  – Adverse event
  – Severely adverse event
DFAST Stress Testing

Why should I care about DFAST Scenarios?

Focus on what is keeping you up at night

DFAST Scenario Narrative

Baseline Scenario:
- Moderate expansion in economic activity.
- Real GDP growth accelerates while the unemployment rate edges down to 5.25% by the fourth quarter of 2017.
- CPI inflation averages just over 2% per year.
- Short term Treasury rates begin to increase in the second quarter of 2015 and rise steadily thereafter reaching over 3% by year-end 2017.
- Both equity and property prices would appreciate, albeit at a modest rate, through 2016.
- Equity prices, nominal house prices, and commercial property prices all rise steadily throughout the scenario.
- The outlook for international variables features an expansion in activity, albeit one that proceeds at different rates across the four countries or country blocks being considered.
DFAST Scenario Narrative

**Adverse Scenario:**

- Weakening in economic activity combined with an increase in U.S. inflationary pressures that cause rapid increase in both short- and long-term U.S. Treasury rates.
- Bank funding costs react strongly to rising short-term rates. Commercial deposits should be viewed as being unusually drawn to institutional money funds, which re-price promptly. Consumer deposits should also be assumed to be drawn to higher-yielding alternatives.
- House prices and commercial real estate prices decline by approximately 13% and 16%, respectively to their level in the third quarter of 2014.

DFAST Scenario Narrative

**Severely Adverse Scenario:**

- Substantial weakening in economic activity, characterized by a deep and prolonged recession.
- Unemployment rate increases by 4% from its level in third quarter 2014 peaking at 10% in the middle of 2016.
- Short-term interest rates remain near zero through 2017; long-term Treasury yields drop to 1% in fourth quarter of 2014 and then edge up slowly over the remainder of the scenario period.
- Significant reversal of recent improvements to the U.S. housing market. House prices decline by 25% during the scenario period relative to their level in the third quarter of 2014, while commercial real estate prices are more than 30% lower during the scenario period.
- Corporate financial conditions tighten significantly in 2015 and the yield on investment grade corporate bonds is higher than the baseline until the fourth quarter of 2016.
- U.S. corporate credit quality deteriorates sharply.
DFAST Stress Testing

Unemployment Rate
DFAST Scenarios

CPI Inflation Rate

DFAST Stress Testing
How to Start Stress Testing the Loan Portfolio – Components

<table>
<thead>
<tr>
<th>Business Category</th>
<th>Business Type</th>
<th>Actual 2015</th>
<th>Baseline 2015</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Estate</td>
<td>Residential Land</td>
<td>$200,000</td>
<td>$250,000</td>
<td>$50,000</td>
</tr>
<tr>
<td>Finance</td>
<td>Consumer Loans</td>
<td>$100,000</td>
<td>$150,000</td>
<td>$50,000</td>
</tr>
<tr>
<td>Retail</td>
<td>Retail Establishments</td>
<td>$200,000</td>
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How to Start Stress Testing the Loan Portfolio – Components

[Diagrams showing actual and baseline regulatory classifications]

- Actual Regulatory Classifications
  - Pass
  - Special Mention
  - Substandard
  - Loss
  - Delinquency

- Baseline Regulatory Classifications
  - Pass
  - Special Mention
  - Substandard
  - Loss
  - Delinquency
How to Start Stress Testing the Loan Portfolio – Components

Understanding the Personnel – Who is involved in administrating and reviewing stress test?

1. Who is going to be responsible for deciding shocks or scenarios
   a) Where are they getting the economic information to create tests
   b) Are the sources being used consistent from period to period
2. Who is involved in the different steps of the process
   a) Senior Management
   b) Board
   c) C-level management

How to Start Stress Testing the Loan Portfolio – Components

Understanding the Results – Where are results incorporated?

1. Changes in underwriting or loan review policies
   a) Concentrations
   b) Limit Setting
2. Are results used in the allowance provisioning calculations
3. Strategic or business planning processes
How to Start Stress Testing the Loan Portfolio - Design

Data
- Understanding available data and data sources
- Normalizing data into useable format
- Capture/update missing data
- Define Scenario variables

System
- Create and document “What If” scenarios.
- Adjust grading inputs with scenario changes
- Grade portfolio based on new criteria

Results
- Reports generated that highlight differences
- Analyze and incorporate results into processes
- Proactively manage loan portfolio

Keys to designing a successful stress test

1. Start simple
   a) Don’t design complex tests that require data that you don’t have a way to capture or store
   b) You don’t need 2,000 data points to stress test

2. Garbage “In” Garbage “Out”
   a) Focus on data from the systems of record
   b) Make sure you can break results into usable information

3. Try to eliminate manual processes and data manipulation

4. Just Do It – If you wait until you have designed the perfect process, you will never get started
Incorporating Stress Testing Results

Stress tests can be utilized in a variety of ways. These include:

1. Risk Management
   a) Changes in underwriting and loan review policies
   b) Proactive management of loan portfolio
   c) Concentrations / Set limits

2. Capital Planning
   a) Impact on ALLL provisions
   b) Contingency plans

3. Strategic or business planning processes

Questions

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