CCAR Stress Testing Basics

By: Michael Fadil
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Stress Testing – What is It??

“Stress testing is a useful method for determining how a portfolio will fare during a period of financial crisis”

www.investopedia.com

Can mean many things...
Generically, “Stress Testing” is Very Broad

- Can be applied to various risk types
  - Credit
  - Market
  - Liquidity
- Can be applied at many levels
  - Counterparty / Borrower
  - Portfolio
  - Enterprise
- Can be static or dynamic
  - Static – only changing one variable (sensitivity analysis)
  - Dynamic – model a scenario with inter-relationship across variables
- Methodology
  - Top Down vs Bottoms Up
- Results can be expressed differently
  - Risk based (EL, EC, VaR . . .)
  - Accounting based (Net Income, Regulatory Capital Ratios)
CCAR and Stress Testing

• CCAR = “Comprehensive Capital Adequacy Review”
  – All banks > $50B in assets
  – Regulator driven

• History
  – SCAP (Supervisory Capital Adequacy Program) : Q1 / Q2 2009
  – CCAR I : Nov 2010 – Feb 2011
  – CCAR II: Nov 2011 – Feb 2012
  – FDIC NPR Jan 23, 2012 Federal Register
  – Fed and FDIC NPRs are highly “harmonized”
  – $10 - $50B Banks have until fall of 2013 when required to “participate”

• Most bank ICAAPs are converging with CCAR framework
• I will use “stress test” to be synonymous with “CCAR”
NPR Requirements for Stress Testing

• Minimum of 3 economic scenarios
  – Baseline
  – Adverse
  – Severely Adverse

• Output (for each scenario, quarterly)
  – Pro forma Capital positions (Tier 1 Common and Tier 1)
  – Estimated “Losses” (Charge-offs) by exposure category
  – Pre-Provision Net Revenues (PPNR)
  – Aggregate Loan Balances
  – Total Assets and RWA
  – Allowance for Loan Losses
  – Potential Capital Actions

• Timeframe - 9 quarters

• Submissions
  – Annual CCAR (November – January, public disclosure early April)
  – Submission of additional stress test (July, public disclosure Oct)
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Economic Scenarios

• Requirements
  – A scenario must be consistent across all economic drivers
  – Need to augment Fed scenarios with additional economic inputs
  – Scenarios should be important to each bank’s specific risks

• Decision – Internally derived or use a third party?

• Internal
  – Resource considerations
  – Expertise

• Most banks are landing on outsourcing
  – Moody’s Economic and Consumer Credit Analytics (ECCA)

• Wide number of “off the shelf” scenarios
  – ECCA generates a full scenario aligned with the Fed adverse
  – ECCA framework allows clients to create their own scenarios
  – Moody’s economists will work with clients on customizations
  – Banks and Regulators like probabilities associates with scenarios
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Decomposing Capital Ratios

• Capital Ratios (Common and Total Tier 1)
  – Numerator is Core Capital
  – Denominator is RWA

• Core Capital
  – Tier 1 Common Equity
    » Retained Earnings
    » Common Stock
  – Total Tier 1 Capital
    » Tier 1 Common Equity, plus
    » Certain Preferred Shares
    » Certain Non-Controlling Interests

• RWA
  – Still Basel 1 RWA
  – Eventually will be Basel 2 / 3 RWA
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Losses

- Estimated “Losses” by exposure category
- Losses for CCAR Stress Testing are NCOs, not EL
- The two can be materially different

Assumptions

<table>
<thead>
<tr>
<th></th>
<th>PD = 2.00%</th>
<th>LGD = 50%</th>
<th>LGD timing = 70% year 1</th>
<th>EL = 1.00%</th>
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<td>15% qtr 2</td>
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<th>Defaults</th>
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<th>Q3</th>
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<td>Q4</td>
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</tr>
<tr>
<td>Total</td>
<td>2.00%</td>
<td>0.08%</td>
<td>0.11%</td>
<td>0.15%</td>
<td>0.18%</td>
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</table>

NCO ~ (PD / 4) * (LGD * Q1 LGD NCO)
NCO ~ (2.00% / 4) * (50% * 30%)
NCO ~ (0.50%) * (15%)
NCO ~ 0.075 ~ 0.08%

For the geeks in the group
Loss Forecasting Solutions

• Retail / Consumer
  – Top down
    » Credit Cycle
  – Bottoms up
    » Mortgage Portfolio Analyzer
    » Credit Card Portfolio Analyzer
    » Auto Portfolio Analyzer

• Wholesale / Commercial
  – Top down
    » Commercial Loan transition matrices
  – Bottoms up
    » RiskCalc
    » Credit Monitor
    » LossCalc
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PPNR / Loan Balances

• Pre-Provision = ALLL changes are excluded here
• Revenues and expenses must align to loss scenario
• Revenue Forecast
  – Net Interest Income
    » Loans
      – Balances
      – Fixed / Floating Mix
      – Terms
      – Riskiness
    » Funding mix
    » Yield curve
  – Fee Income
• Expense Forecast
  – Generally derived from activity based costing
  – Need to acknowledge semi-fixed nature of many costs
• Generally least sophisticated of banks “models”
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Total Assets / RWA

• Loan balances will be primary driver for total assets
• Straight-forward application of Basel 1 RW to various asset classes and loan types
• RWA
  – Currently requires only Basel 1
  – Additional Basel RWA calculations will happen
• Banks are implementing regulatory capital engines
  – Thinking ahead of integration into CCAR stress testing
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Change in Loan Losses Reserves

• Change in ALLL = Provision = Impact on Net Income
• Accounting treatment for ALLL is in flux
• Most banks ALLL is not 100% formulaic
  – Must treat it as such for this exercise
• Challenge for adverse and severely adverse scenarios
  – Banks can look at ALLL as coverage of future losses
  – ALLL will not be a function of perfect foresight regarding NCOs
  – ALLL at any future point will be conditional
    » Adverse scenario to that point of analysis
    » Thereafter, expected baseline given the economic path to that point
• Change in reserves can be a material earnings lever
  – Since earnings affect capital, ALLL changes are material
  – Increasing scrutiny from Regulators in process
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Capital Actions

- Dividends
- Dividend changes
- Capital issuances
- Capital repurchases
- High level views regarding acquisitions and divestitures
- Mostly discretionary actions of bank but with constraints
Visualization of Integrated Stress Test

- Treasury Positions
- Pre Provision Net Revenue (PPNR)
- Loan Balance Forecasts
- CRE Loss Forecasts
- Residential Mortgage Loss Forecasts
- Retail Loss Forecasts
- Business Banking Loss Forecasts
- Employment / Unemployment
- HPI
- Key Commodity Prices
- Monetary Policy
- Retail Sales
- Interest Rates
- GDP
- Regional / Metro Valuations
- Operational Loss Forecasts
- Market Risk Loss Forecasts

Capital Plan

Economic Stress / Economic Scenario

Moody's Analytics
Other Important Considerations

• Data, data, and more data

• Documentation
  – Component models – especially weaknesses
  – Capital Plan

• Formal governance

• Executive level communication and interaction
  – Executive Management
  – Board of Directors
Conclusions

• CCAR is huge – dividends and other capital actions
• Enterprise-wide challenge
  – Treasury
  – Risk
  – Finance
  – LOBs
• Banks > $50B are *generally* in pretty good shape
• Banks between $10B and $50B are in various states of preparedness
• Few “off the shelf” / integrated solutions
• CCAR will continue to evolve
<table>
<thead>
<tr>
<th>DATA, MODELING &amp; SOFTWARE SOLUTIONS</th>
<th>USAGE</th>
<th>WHOLESALE LENDING</th>
<th>RETAIL LENDING</th>
<th>DEBT</th>
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<tr>
<td></td>
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<td>Commercial &amp; Industrial</td>
<td>Domestic Residential</td>
<td>Other Retail Lending</td>
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<td>Public Firm Historical EDF Data:</td>
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<tr>
<td>Default Recovery Database (DRD)</td>
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<td>Credit Research Database (CRD):</td>
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<td>Structured Finance (Loan By Loan, non-corporate)</td>
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<td>Case-Shiller Indices: historical, projected &amp; aggregated</td>
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<td>Default Pre-Payment Loss Curve (DPLC): securitized assets only, projected &amp; aggregated data</td>
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<td>Credit Forecast.com: historical, projected &amp; aggregated</td>
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<td>Moody’s Financial Metrics: historical, projected &amp; loan level</td>
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<td>Credit Cycle: Custom, Aggregated Level Model</td>
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<td>Mortgage Portfolio Analyzer (MPA &amp; MPA, UK)</td>
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<td>Moody’s Financial Metrics Scorecards (PM Scorecards): Ratings Based</td>
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**Definitions:** PD: Probability of Default; LGD: Loss Given Default; EL: Expected Loss; EAD: Expected At Default

**Note:** Custom solutions available across all asset classes

**PLAT FORM**

**CREDIT CYCLE:** Web-based platform that houses and aggregates stress testing models and analytics

**SCENARIO ANALYZER:** Integrated software solution that consolidates enterprise-wide stress testing data, modeling results, capital requirements and regulatory reporting