Supervisory Stress Test
Modeling of Operational Risk

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Disclaimer: The views expressed in this discussion are those of the author and do not necessarily reflect the position of the Federal Reserve Bank of Richmond or the Federal Reserve System.
Outline

• Modeling Challenges
• Current Approaches
• Policies and Principles We Focus On
• Refining the Panel Model
• Historical Simulation Model
• Conclusion
Modeling Challenges

• No structural model to explain ops risk
  – Risk of building a complicated “black box”
  – Need for more intuitive and simpler approaches

• The relationship with macro is hard to capture
  – There’s evidence of the relationship, but it is hard to model

• Data quality
  – Challenges in timely reporting of tail losses
  – Differences in reporting of loss dates
  – Short time series sample

• Capturing risk that a bank may not have experienced
  – Need for integrating the industry experience
Current Approach

Ref: DFAST 2016 Supervisory Stress Test Methodology and Results

• Average of results from two models:
  1. Panel regression model
  2. Historical simulation model
• Plus results from legal reserve increase model
• Panel regression model:
  – Loss frequency is a function of macro and firm-specific variables
  – Loss severity is a firm-specific historical average loss
• Historical simulation model – modified in CCAR2016
  – Simulated loss distribution
• Modeling by loss event types.
Policies & Principles for Modeling Choices

• Policies and Principles – 2015 Stress Testing Symposium

• Stress focused
  – Project outcomes in stressed environments

• Simpler and more transparent
  – Simulation model: Avoid adding a parametric structure
  – Panel model: Avoid adding variables with weak intuition and impacts on results

• Comparability
  – Scaling the industry loss experience rather than relying only on firm’s individual loss history

• Robustness and Stability
  – Simulation model: The industry loss data improves stability
  – Panel model: The relationship between industry losses and the macro is more robust than for individual banks
Changes to the Panel Model Considered for CCAR2017

• Model the aggregate loss amount rather than separately loss frequency and severity.

• Two steps: (i) model the relationship of industry losses with macro; (ii) scale industry forecasts to a bank
  – Step 1: Time series regression - the relationship between the industry losses and the macro
  – Step 2: Panel regression - scale industry loss forecasts to a bank. The scaling factor is total assets.

Examples of considered alternatives:

• One-step panel regression. Cons: results unstable

• Quantile regression. Cons: results depend on the choice of quantile

• Modeling statistically transformed loss data. Cons: may lead to instability of results for banks with short data sample
Simulation Model- in CCAR2016

Modeling Concept
• Simulated 9Q loss distribution
• Stress results: percentiles linked to the frequency of severe recessions
• The industry tail losses are relevant to all banks

Modeling the loss tail
• Tail Frequency: a combination of individual tail frequency and industry frequency scaled using asset size
• Tail severity: one industry tail scaled using asset size
Conclusion

In modeling choices we focused on:

• Simplification – new panel model
• Stability – less reliance on volatile individual firm data
• Stress focused – sensitivity to macro and accounting for the industry experience
• Comparability - scaled industry data