Ongoing Monitoring of Stress Test Models

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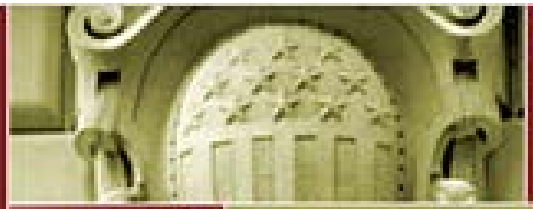

Background and Disclaimers

- Model Risk Management Group, an internal advisory team
  - Implementing industry standards and best practices for model risk management into the Federal Reserve's internal stress testing operations
- Today I will discuss issues and approaches related to ongoing monitoring of stress test models
- This presentation is not intended to represent specific guidance for any firm relative to their CCAR, DFAST, or any other models

The views expressed in this presentation are my own and do not necessarily represent the views of the Federal Reserve Bank of Boston or the Federal Reserve System.

Role of Ongoing Monitoring in Model Risk Management

- During development, a model framework is subject to extensive conceptual soundness reviews and performance testing
- However, the operating environment is constantly changing
- A model that has been in production for some time may require adjustment, redevelopment, or replacement
- ***Ongoing Model Monitoring***
  - periodic review of a production model that considers the current economic and financial environment
  - incorporates information that has become available since the model was developed
  - the goal is to affirm the model's ability to continue meeting the model objectives.

Ongoing Monitoring Objectives

- Assess the accuracy of model forecasts using recent data and evaluate the continued stability of the model
- Evaluate the economic and business environment to determine if changes to the model theory, specification, assumptions, or input data are warranted
  - If the model were developed from ground-up today, how would it be different?
- Ensuring conditions or limitations on the use of the model that were identified during development and/or validation continue to be met

Challenges related to Monitoring Stress Test Models

- Model purpose emphasizes accurately projecting likely outcomes in stressed economic environments (as opposed to “normal” or baseline economic environments)
- Data acquired subsequent to model development (“out-of-time” observations) are not likely to be from stressed environment
- Incorporating a broad variety of testing and analysis increases the effectiveness of ongoing model monitoring
- Ongoing monitoring of stress test models may place less emphasis on performance testing and more emphasis on risk identification relative to other evaluation of other models

Elements of Ongoing Monitoring: Performance Testing

- ***Performance Testing (aka Outcomes Analysis)*** are primarily quantitative analyses intended to evaluate a model's ability to produce accurate and stable estimates and forecasts
- Could consider trends in recent performance using updated data
  - May indicate regime shift or small sample issues if trends exist in "out-of-time" data
- Could replicate developmental testing using updated data
  - May be less comprehensive than development testing
  - May include additional testing informed by risk monitoring

Elements of a Monitoring Program: Risk Monitoring

- ***Risk Monitoring*** analyses are evaluations of the economic, regulatory, and business environment to determine whether they are consistent with the environments assumed by the model
- Conducted at a high-level and incorporating new, relevant information about the economic relationships being modeled and the use of the model
- Forward- and backward- looking
  - E.g. Has a previously immaterial portfolio grown significantly recently and a model become more important?
- May include some operational elements
  - Review of new versions of vendor models or software platforms
  - Review of input data sources or upstream models for changes
- Informs the structure of performance testing and gives it context

Elements of a Monitoring Program: Limitations Monitoring

- ***Limitations Monitoring*** evaluates the current usage of the model to ensure that it is consistent with the limitations and conditions identified during development and validation
- Ensure that the model is only being used for what it was designed to do and under conditions in which it is expected to perform well
  - E.g. A model that is designed to make 9-quarter forecasts should not be used for longer-range planning, requires monitoring usage and generated reports
  - E.g. A model may be limited to use in positive interest rate environments, which requires monitoring rate levels
  - E.g. A model may be limited to a certain number of instruments due to software or hardware limitations, which requires monitoring portfolio sizes
- Performance Monitoring and Risk Monitoring may identify additional limitations that could be considered
  - For example, if inaccurate forecasting is identified for certain portfolios, additional limitations may be imposed