Stress Testing Modeling Symposium

Market Risk: Trading and Counterparty Risk
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Overview

• The stress test for Market Risk covers potential loss in trading positions.

• The stress test approach consists of models for mark-to-market losses and jump to default risk.

• Mark-to-market losses:
  – Mark-to-market losses of trading positions
  – Credit valuation adjustment (CVA) loss for derivatives counterparty risk

• Loss from jump to default risk:
  – Incremental default risk for derivatives counterparty exposures
  – Incremental default risk of credit instruments
Objectives and Challenges

1. Specify a stress test scenario across all trading instruments and market risk factors in such a way that all firms conduct the stress test consistently and comparably.
   - Large number of instruments and risk factors in banks trading books.
   - Large potential for variability in how firms would interpret a scenario.

2. Develop a data reporting framework and an internal FR methodology to estimate potential losses using the data.
   - Constraints on data to be provided by the firms:
     - Data usable with available FR modeling resources.
     - Ability of firms’ internal data systems to provide the data.
     - All firms’ data can be used by the FR model without idiosyncratic adjustments to the data or the model.
Objectives and Challenges (continued)

• Approaches used in current FR stress test models:
  – Mark-to-market loss estimate uses data provided by banks on the *sensitivity* of the value of their positions to risk factor shocks.
    • The sensitivity data are produced by banks’ *internal models*
  – Default risk loss estimate is an output of a FR default risk model that uses bank provided *position data*. 
Mark-to-Market Losses of Trading Positions

• Mark to market loss is estimated using:
  
  – Measures of sensitivity with respect to risk factor changes
  
  – Risk factor shocks specified in the stress test scenario

  \[ \text{MtM Loss} = \text{Sensitivity measure} \times \text{Risk Factor Shock} \]

• The sensitivity measure captures non-linearity using grids of changes in risk factors of standardized sizes.
  
  – For example, change with respect to widening in spreads of: 50 BP, 100 BP, 500 BP.
Mark-to-Market Losses (continued)

Data:

• Banks provide sensitivity data using a template for a pre-defined set of risk factors.
  
  – FR Y14-Q Trading, PE and Other Fair Value Assets Schedules

• The risk factor shocks are specified by the FR.
  
  – Many thousands of risk factors.

  – Granularity of the risk factor specification removes significant ambiguity in how a stress test scenario is interpreted and implemented by the firms.
Mark-to-Market Losses (continued)

• The sensitivity measures are net sensitivity with respect to a risk factor.
  – Basis risk at a more granular level than the risk factor specification is not captured.
  – Some risk factor families are specified at a granular level.
    • But not in all cases.

• Questions:
  – What emphasis should the market risk stress test place on “directional risk,” vs. “basis risk?”
  – While basis risks can generate severe trading losses, are they a material solvency risk in a macroeconomic stress scenario?
Mark-to-Market Losses (continued)

Benchmark portfolios:

• One approach for evaluating the variability across firms in their modeling of the sensitivity data they provide for the stress test is the use of benchmark or control portfolios.

• Questions:
  – What are benefits and challenges of such an exercise?
  
  – How granular should such control portfolios be?
Derivatives Credit Valuation Adjustment (CVA)

• CVA loss is the MtM loss attributable to counterparty risk in a stressed environment for counterparties that have not yet defaulted.
  
  – CVA loss is determined by shocks in both counterparty exposures and counterparty credit spreads (i.e. implied PD and LGD).
  
  – The CVA Loss in the stress test is the difference between the initial value of CVA and the stress value of CVA.

• Like the MtM trading loss model, the CVA model uses:
  
  – Bank provided data on their exposures and sensitivities produced by their internal models
  
  – Risk factor shocks specified in the FR stress test scenario
Incremental Default Risk (jump to default risk)

- IDR is the tail risk of loss from jump to default in a portfolio above the market implied expected loss already reflected in mark to market values.
  - The shock to MtM values captures the risk of change in credit spreads – i.e. the shock to the mean of the default distribution
    - MTM Loss does not capture the tail risk of the default distribution.
  - Incremental default risk captures the tail risk from jump to default that is not captured in the MTM Loss.

- The IDR model in the stress test simulates a frequency distribution of defaults of the credit exposures in the trading book.

- The loss from jump-to-default in the stress test is a percentile (e.g. 95%) of the distribution of defaults.
  - The tail percentile is calibrated to the macroeconomic variables in the stress scenario (e.g. BBB spreads in the macroeconomic scenario).
Incremental Default Risk (continued)

Risk in long/short portfolios:

• The model captures correlation risk in portfolios with a mix of long and short exposures.
  
  – The model uses data on gross long and short positions – not the net position.

  – The degree to which long and short exposures offset each other is determined in the model.
    • In the tail of the default distribution, long exposures default at a higher frequency than the short exposures.