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

MtM Loss = Sensitivity measure X 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.