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Market Risk: Stress Test Framework

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2nd Annual Stress Testing Modeling Symposium
Federal Reserve Bank of Boston

June 27, 2013

We know that …

- Trading book risk profile changes continuously
- Liquid risks move in and out rapidly, directional exposures tend to be small, non-linear risks are managed dynamically
- Illiquid risks can cause large losses especially when related to non-linear and wrong-way risks
- Credit products and counterparty risks caused large trading losses in 2008 crisis

Desirable Features

- An integrated risk measurement framework of market and credit risk, including default events and other gap risks
- Shock sizes reflect the different liquidities of the risks
- Multiple and innovative market scenarios
- Systematic reverse stress test
- Probabilistic interpretation of the stress test results
- Capture of non-linear, out-of-the-money and wrong-way risks
- Incentives for sound risk management practices

Reverse Stress Test Framework

- Simulate thousands of scenarios, each one with thousands of market and credit risk factors:
  - Including default events and other gap risks
  - Bootstrapping and re-assembling historical data to obtain new, forward-looking scenarios
- Adjust the size of the shocks to reflect the different liquidities of the risk factors
  - Estimate liquidities under stressed market conditions
- Evaluate the stress losses using full revaluation of positions
- Estimate portfolio loss at a specified confidence level

Example of Liquidity Adjustment

Investment Grade Corporate Bond

- General interest rate risk is liquid (Treasuries or swaps) – shock size 1-month move
- General credit spread risk is somewhat liquid (CDX, iTraxx) – shock size 3-month move
- Idiosyncratic credit spread risk is somewhat illiquid (single-name CDS) – shock size 1-year move
- Jump-to-default risk –1-year PD

Results

- Illiquid risks produce the largest losses in the stress test
- Default risk is an important driver of loss in low credit quality portfolios
- Incentives to seek risk liquidity
- No single or small number of scenarios is targeted
- The subset of the most harmful scenarios will change as the trading risk profile changes

Validation of the Framework

- Back test: would the framework have signaled losses of the magnitude observed in previous market crises?
- Alternative models: are the results ‘consistent’ with VaR, stressed VaR, IRC, CRM, other stress tests? Do we understand the differences?
- Economics: do the results correspond to our intuitive assessment of the risks?
- Sensitivity analysis: does the framework respond as expected to changes in the trading risk profile and assumptions?
- Incentives: does the framework lead to sound risk management actions?