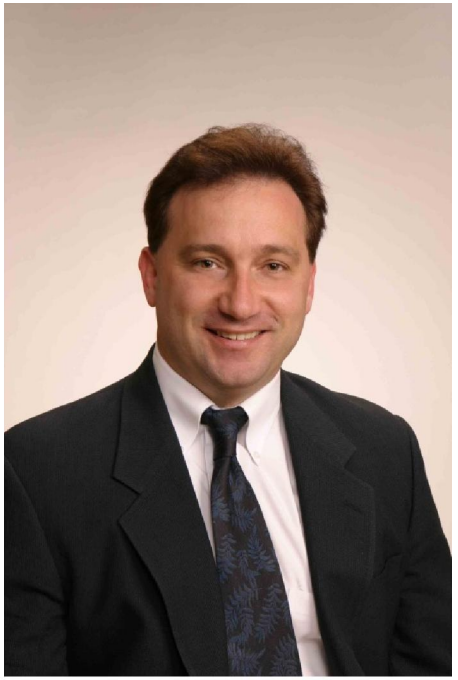
FRM Valuation & Risk Models
Principles for Sound Stress Testing Practices and Supervision



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“Principles for Sound Stress Testing Practices and Supervision” (Basel Committee on Banking Supervision Publication, Jan 2012). http://www.bis.org/publ/bcbs147.pdf.

Describe the rationale for the use of stress testing as a risk management tool.

- Provides forward-looking assessments of risk
- Overcoming limitations of models and historical data
  - Complements Value at Risk (VaR)
- Supports internal and external communication
- Feeds into capital and liquidity planning procedures
- Informs setting of a banks' risk tolerance; and
- Facilitates development of risk mitigation or contingency plans across a range of stressed conditions.

Describe weaknesses identified and recommendations for improvement in:

- Risk **governance**
- Stress testing **methodologies**
- Stress testing **scenarios**
- Stress testing handling of **specific risks** ….

… The use of stress testing and integration in risk governance

1. Integral part of governance, with *actionable* results impacting strategic decisions
2. Promotes risk identification and control; provide a complementary risk perspective to other risk management tools (VaR, EC); improve capital and liquidity management; and enhances internal and external communication
3. Stress testing programs should take account of views from across the organization and should cover a range of perspectives and techniques.

… The use of stress testing and integration in risk governance

4. Should be documented including assumptions and fundamental elements
5. Bank should have suitably robust infrastructure, flexible to accommodate stress test to appropriate level of granularity
6. Bank should maintain and update its stress testing framework

… Stress testing methodologies and scenarios

7. Should cover (shock) a range of risks factors
   - Firm-wide, business-specific, product specific
   - Typical metrics: Asset values, accounting/economic profit & loss (P&L), regulatory capital or RWA, economic capital, liquidity and funding gaps
8. Should cover range of scenarios, including *forward-looking*
   - Various time horizons
   - Include judgments ("failure of imagination" leads to underestimation)

… Stress testing methodologies and scenarios

9. Range of severities, including **reverse stress testing (starting from a known outcome; e.g., breaching regulatory ratios)**
10. Should take account of simultaneous pressures in **funding and asset markets, and the impact of a reduction in market liquidity** on exposure valuation.

… Stress testing handling of the following specific risks:

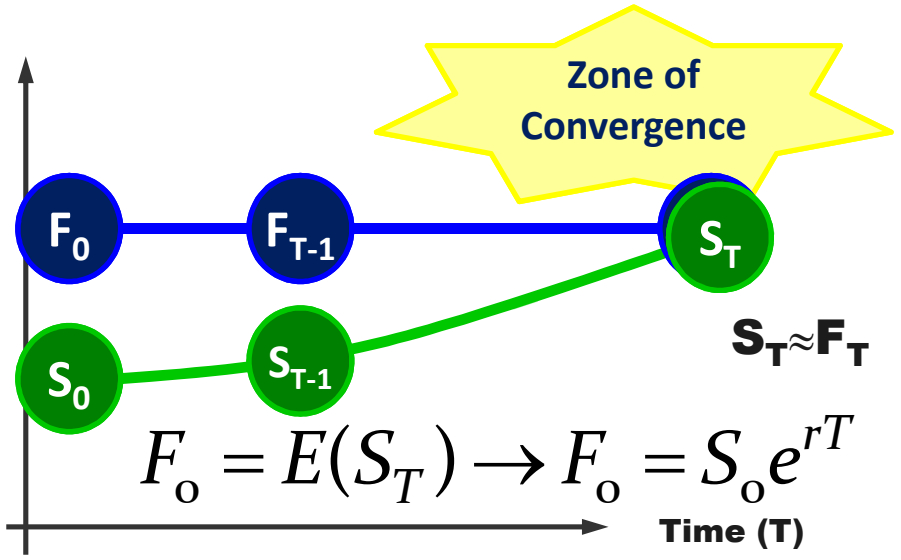
- Risks arising from the use of complex structured products
- Basis risk
- Wrong-way risk
- Pipeline risk
- Contingent risk
- Funding risk

- Risks arising from the use of complex structured products

- Should consider underlying assets, their exposure to systematic market factors, relevant contractual arrangements (embedded triggers), and impact of leverage (esp. subordination)
  - "Banks have mistakenly assessed the risk of some products (e.g., CDOs of ABS) by **relying on external credit ratings** or **historically observed credit spreads** related to (seemingly) similar products like corporate bonds with the same external rating. Such approaches can not capture relevant risk characteristics of complex, structured products under severely stressed conditions.

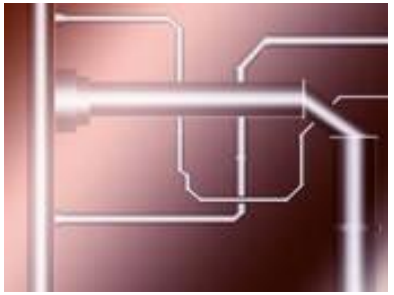
- Basis risk

- The effectiveness of risk mitigation techniques should be systematically challenged.
  - Performance of risk mitigating techniques, like hedging, netting and the use of collateral, should be challenged…



- Pipeline risk

- Should cover pipeline and warehousing risks
  - Many of the risks associated with pipeline and warehoused exposures emerge **when a bank is unable to access the securitization market** due to either bank specific or market stresses
    - Warehousing and pipeline risk refers to the event where originating banks are unable to off-load assets due to unexpected changes in market conditions. Involuntary holding of these assets expose the bank to losses due to declining values of these assets.



- Contingent risk

- Another weakness of the models was that they did not adequately capture contingent risks that arose either from legally binding credit and liquidity lines or from reputational concerns related, for example, to off-balance sheet vehicles.
  - Had stress tests adequately captured contractual and reputational risk associated with off-balance sheet exposures, concentrations in such exposures may have been avoided

- Funding risk

- With regard to funding liquidity, stress tests did not capture the systemic nature of the crisis or the magnitude and duration of the disruption to interbank markets. For a more in-depth discussion of the shortcomings of liquidity stress tests, see the Basel Committee's Principles for Sound Liquidity Risk Management and Supervision (September 2008).

Describe stress testing principles for banks within: Use of stress testing and integration in risk governance

1. Stress testing should form an integral part of the overall governance and risk management culture of the bank. Stress testing should be actionable, with the results from stress testing analyses impacting decision making at the appropriate management level, including strategic business decisions of the board and senior management. Board and senior management involvement in the stress testing program is essential for its effective operation.
2. A bank should operate a stress testing program that promotes risk identification and control; provides a complementary risk perspective to other risk management tools; improves capital and liquidity management; and enhances internal and external communication
3. Stress testing programs should take account of views from across the organization and should cover a range of perspectives and techniques.

Describe stress testing principles for banks within: Use of stress testing and integration in risk governance

4. A bank should have written policies and procedures governing the stress testing program. The operation of the program should be appropriately documented
5. A bank should have a suitably robust infrastructure in place, which is sufficiently flexible to accommodate different and possibly changing stress tests at an appropriate level of granularity
6. A bank should regularly maintain and update its stress testing framework. The effectiveness of the stress testing program, as well as the robustness of major individual components, should be assessed regularly and independently.

Describe stress testing principles for banks within: Stress testing methodology and scenario selection

7. Stress tests should cover a range of risks and business areas, including at the firm-wide level. A bank should be able to integrate effectively, in a meaningful fashion, across the range of its stress testing activities to deliver a complete picture of firm-wide risk.
8. Stress testing programs should cover a range of scenarios, including forward-looking scenarios, and aim to take into account system-wide interactions and feedback effects.
9. Stress tests should feature a range of severities, including events capable of generating the most damage whether through size of loss or through loss of reputation. A stress testing program should also determine what scenarios could challenge the viability of the bank (reverse stress tests) and thereby uncover hidden risks and interactions among risks.
10. As part of an overall stress testing program, a bank should aim to take account of simultaneous pressures in funding and asset markets, and the impact of a reduction in market liquidity on exposure valuation.

Describe stress testing principles for banks within: Specific areas of focus

11. The effectiveness of risk mitigation techniques should be systematically challenged.
12. The stress testing program should explicitly cover complex and bespoke products such as securitized exposures. Stress tests for securitized assets should consider the underlying assets, their exposure to systematic market factors, relevant contractual arrangements and embedded triggers, and impact of leverage, particularly as it relates to the subordination level in the issue structure.
13. The stress testing program should cover pipeline and warehousing risks. A bank should include such exposures in its stress tests regardless of their probability of being securitized
14. A bank should enhance its stress testing methodologies to capture the effect of reputational risk. The bank should integrate risks arising from off-balance sheet vehicles and other related entities in its stress testing program.
15. A bank should enhance its stress testing approaches for highly leveraged counterparties in considering its vulnerability to specific asset categories or market movements and in assessing potential wrong-way risk related to risk mitigating techniques.

Describe stress testing principles for banks within: Principles for supervisors

16. Supervisors should make regular and comprehensive assessments of a bank's stress testing program.
17. Supervisors should require management to take corrective action if material deficiencies in the stress testing program are identified or if the results of stress tests are not adequately taken into consideration in the decision-making process.
18. Supervisors should assess and if necessary challenge the scope and severity of firm-wide scenarios. Supervisors may ask banks to perform sensitivity analysis with respect to specific portfolios or parameters, use specific scenarios or to evaluate scenarios under which their viability is threatened (reverse stress testing scenarios).

Describe stress testing principles for banks within: Principles for supervisors

19. Under Pillar 2 (supervisory review process) of the Basel II framework, supervisors should examine a bank's stress testing results as part of a supervisory review of both the bank's internal capital assessment and its liquidity risk management. In particular, supervisors should consider the results of forward-looking stress testing for assessing the adequacy of capital and liquidity.
20. Supervisors should consider implementing stress test exercises based on common scenarios.
21. Supervisors should engage in a constructive dialogue with other public authorities and the industry to identify systemic vulnerabilities. Supervisors should also ensure that they have the capacity and skills to assess a bank's stress testing program.