



STRESS TESTING OVERVIEW LONDON AND BERMUDA SIG

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Agenda



1	Purpose of stress tests
2	Overview of regulatory requirements
3	Types of stress tests
4	Challenges

Purpose of stress testing



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- VaR provides a summary of risk through a single number(s). There are a number of limitations (see Taleb etc)
 - Stress testing is a tuning process to explore reactions to small (sensitivity) or drastic (stressed) changes in conditions.
 - Stress tests are a tool for:
 - Assessing exposure, capital and liquidity requirements (also helping drive appetite etc)
 - Understanding the dynamics of the risk environment and therefore providing a tool for decision making
 - Challenging the output of the models
 - Informing senior management (i.e. good old risk-based decisions)
 - Stress testing is also a regulatory requirement and a key part of the forthcoming Solvency II regime / current BMA regime

Overview of Regulatory (Solvency II) Requirements



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- Solvency II mandates that stress tests should be undertaken. Two key purposes are set out:
 - As part of the risk management framework and for their own value as a risk management and decision tool
 - As a model validation tool to challenge the output of the stochastic models (internal model)
 - Solvency II does not mandate the stress tests to be undertaken but it does mandate the types of stress test to be undertaken, to include:
 - Sensitivity tests – these are part of the work typically undertaken in the internal model work stream
 - General stress tests by risk category – typically done through RDS, liquidity and other stress tests
 - Reverse stress tests – these are a new concept
 - Multi year stress tests – these are new concept

New Regulatory (Solvency II) Requirements



Firms need to consider **reverse stress tests** which are specifically defined as ‘stress tests and scenario analyses that test the company’s business plan to failure’. Based on European regulation for Solvency II – level 3 guidance on Systems of Governance.

To that end, the *firm must*:

1. identify a range of adverse circumstances which would cause its business plan to become unviable and assess the likelihood that such events could crystallise; and
2. where those tests reveal a risk of business failure that is unacceptably high when considered against the *firm’s risk appetite or tolerance*, adopt effective arrangements, processes, systems or other measures to prevent or mitigate that risk.” (UK FSA)

In other words, reverse stress testing is NOT necessarily about running out of capital.

New Regulatory (Solvency II) Requirements



Firms need to consider **multi-year stress tests** which are ‘a projection of a company’s capital resources and its required capital resources over a time horizon of 3 to 5 years, taking account of its business plan and the impact of relevant adverse scenarios’. Based on European regulation for Solvency II – level 3 guidance on Systems of Governance.

Types of stress test



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- Sensitivity
 - Historical
 - Customised (“historical +”)
 - Multi year
 - Reverse stress tests
 - (Regulatory prescribed)

An alternative view (US Federal Reserve)



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- Simulating shocks that we think are more likely than historical observation suggests
 - Simulating shocks that never occurred
 - Simulating shocks that suggest that statistical patterns could break down in certain circumstances
 - Simulating shocks that suggest that reflect the fact that a structural break could occur in the future (systemic) (Berkowitz 1999)

Sensitivity tests



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- Move factors (e.g. correlations, loss ratios etc)
 - Identifies sensitivities (ie gives us a view on importance of getting things right)
 - Need to change individual factors as well as combination of factors

Historical Tests



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- Select a historical event to understand what would happen to the portfolio if that event happened today
 - Data rich but occasionally missing data around risk factors
 - Selection of appropriate historical event
 - When is the start and end of an event (e.g. market crash)?
 - Produces a number not a VaR so hard to assess the likelihood of the outcome

Customised Test



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- Historical events may not always be appropriate
 - Customised events tailor them to the portfolio in question
 - There is a trade off between the factors included and the time to produce
 - More time consuming and complex than historical stress test

Multi year stress tests



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- Applies “what if” and factor changes to the future business plan to understand impact on cash flows and business plan viability
 - Longer time horizon = greater subjectivity
 - Needs robust documentation but can help support management actions

Reverse stress tests



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- Starting point is when the business plan becomes unviable
 - Intended to drive an understanding of what could bring the business down
 - Starts with the known rather than the unknown so conceptually easy but in reality challenging. Therefore time consuming.
 - Leads to extreme contingency planning and also linked to the concept of living wills

Internal model and reverse stress tests



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- Not all reverse stress tests can be modelled
 - But there are exceptions
 - Testing combination events through changing correlations and working back
 - Examining shifts (e.g. yield curve)
 - Validation events derived through subjective judgement to understand where on the distribution it falls

Some challenges



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- Balance between types of stress
 - Group think / model think
 - Filter process for selection
 - Ownership of stress tests
 - Senior management engagement / involvement
 - Frequency (link also to model use) and timing
 - Flexibility of the process (see next slide also)
 - Own view versus regulatory requirements
 - Documentation and evidence
 - Timely governance
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Some further challenges arising from the internal model



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- Definition of internal model and model scope
 - Use of stress tests – part of model or validation tool?
 - Standards applicable: data and expert judgement

Reverse Stress - Some further challenges



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- Management time
 - Level of detail
 - Breadth of scope
 - Legal Dimensions
 - Contingency plan v extreme contingency plan

Conclusions



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- Stress tests are a useful risk management tool
 - Selection and getting the balance of effort / benefit is key
 - Regulators will continue to drive stress tests

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