



# Taking the Stress Out of Stress Testing

Phil Whittingham, European Risk Manager  
XL Group plc



# Agenda

- Purpose
- Types of Stress Test
- Challenges
- How Stress Tests fit into Risk Framework

# Purpose

- Tool for:
  - Assessing capital and liquidity requirements
  - Understanding the dynamics of the risk environment and therefore providing a tool for decision making
  - Challenging the output of the models
  - Informing senior management
- It is also a regulatory requirement and a key part of the forthcoming Solvency II regime

# Why stress tests?

- VaR provides a summary of risk through a single number(s). There are a number of limitations (see Taleb etc)
- Stress testing is tuning process to explore reactions to small (sensitivity) or drastic (stressed) changes in conditions

# Types of stress test

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

## An alternative view (US Federal Reserve)

- 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

- 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

- 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

- 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

- 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

- Starting point is when the business plan becomes unviable
- Intended to drive an understanding of what could bring the business down
- Starts with the unknown rather than the known 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

- 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

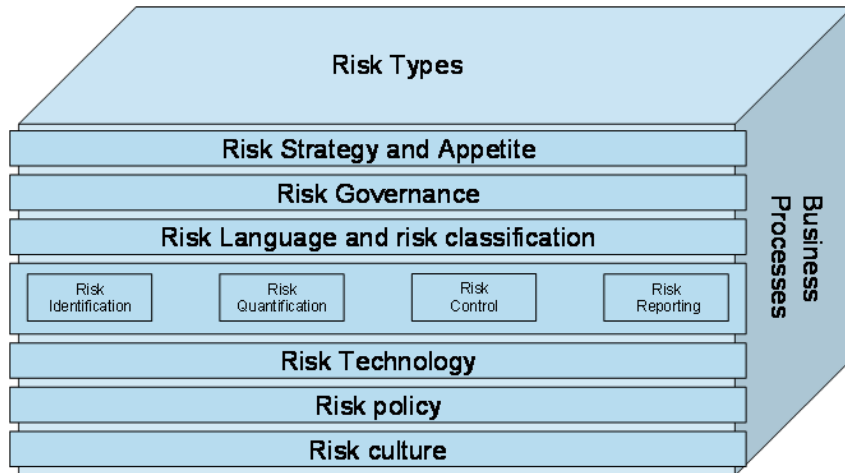
# Some challenges

- Balance between types of stress
- Group think / model think
- Filter process for selection
- Ownership
- Senior management engagement / involvement
- Frequency
- Flexibility of the process

# Reverse Stress - Some further challenges

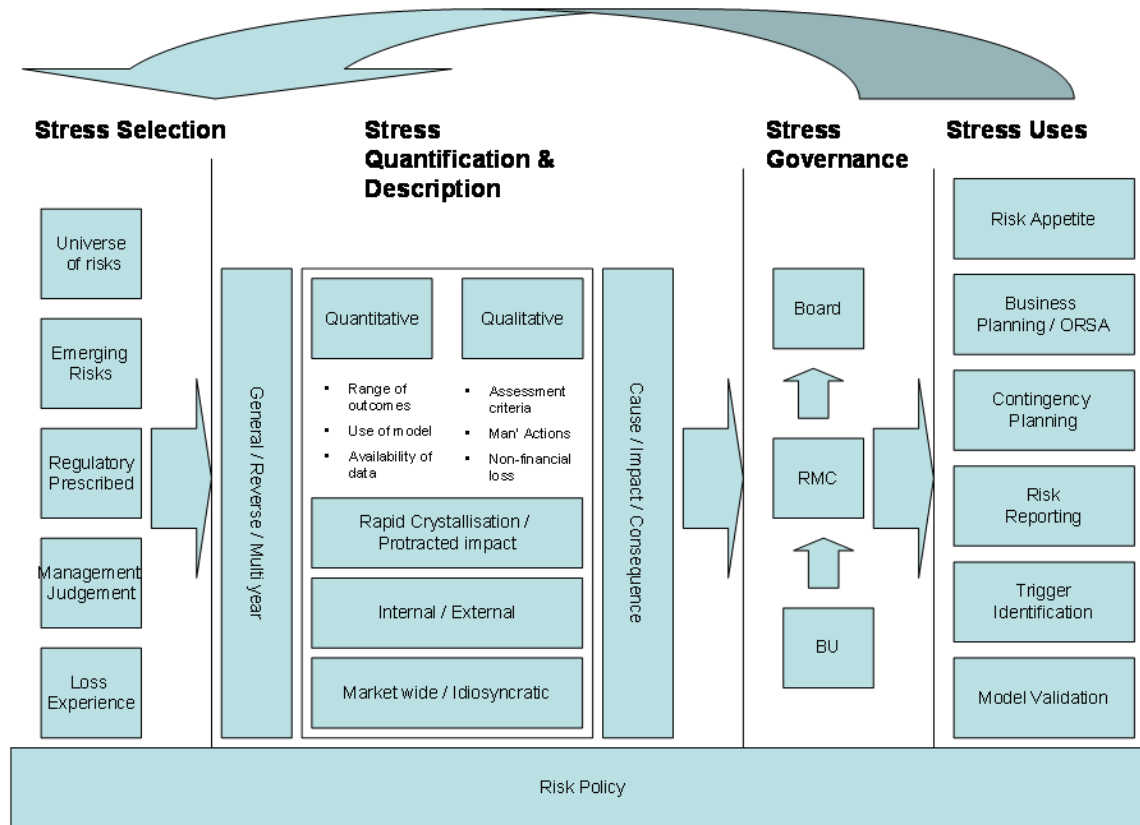
- Management time
- Level of detail
- Breadth of scope
- Legal Dimensions
- Contingency plan v extreme contingency plan

# Where does stress testing fit in the risk framework



- Form of quantification of risk
- Used to inform key business decisions
- Documented in risk policies
- Reported through risk governance structures
- All risk types
- Direct feed into the ORSA report (particularly the multi year and reverse stress tests)
- Drive data requirements

# Bringing the stress tests together



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