



Stress Testing and Scenario Analysis in Life Insurance... ... and Beyond

An overview of the Paper by the Stress and Scenario Testing
Working Party of the Institute & Faculty of Actuaries

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AGENDA

1. Introduction
2. Use and embedding
3. Communication
4. Scenario selection
5. Management actions
6. Insights from selected other industries
7. Conclusions

Introduction

BACKGROUND

Stress testing and scenario analysis has a long heritage as a tool for the prudent valuation and management of risk in life insurance:

- Asset liability matching
- Immunisation (originates from 1940s and 50s)
- Mismatching reserves, resilience test (1980s)
- Individual Capital Assessment, Risk Capital Margin (early 2000s)

Long-term life insurers were tested during the recession of the early 2000s and emerged relatively unscathed from the Global Financial Crisis of 2007/8, though the policy response continues:

- Banking regulation increasingly a bellwether for insurance
- Additional requirements for Global Systemically Important Insurers
- Quantitative easing and low long-term interest rates

Stress and scenario testing has an important role in Solvency II, for example:

- As an internal model validation tool
- As a key aspect of ORSA

OBJECTIVES

The objectives of this Paper are to:

- Provide an overview of current SST practices in life insurance (UK focus)
- Highlight selected areas that remain challenging
- Provide analysis and recommendations in these areas, to enhance effectiveness
- Draw on insights from selected other industries
- Consider how stress testing and scenario analysis might develop in future

Paper is essentially non-technical, and draws on the IFoA Life Insurance Stress and Scenario Testing Survey 2013 (the “Survey”), conducted in autumn 2013

<http://www.actuaries.org.uk/research-and-resources/documents/life-insurance-stress-scenario-testing-survey-2013-0>

More technical areas not covered include:

- Quantification of stresses and scenarios
- Calibration of scenario generators in stressed conditions

DEFINITIONS

Stress testing:

- Typically refers to shifting the values of individual parameters that affect the financial position of a firm and determining the effect on the firm's financial position

Scenario analysis:

- Typically refers to a wider range of parameters being varied at the same time. Scenario analyses often examine the impact of adverse events on the firm's financial position, for example, simultaneous movements in a number of risk categories affecting all of a firm's business operations, such as business volumes, investment values and interest rate movements

Both stress testing and scenario analysis are forward-looking analysis techniques, which seek to anticipate possible losses that might occur if identified risks crystallise.

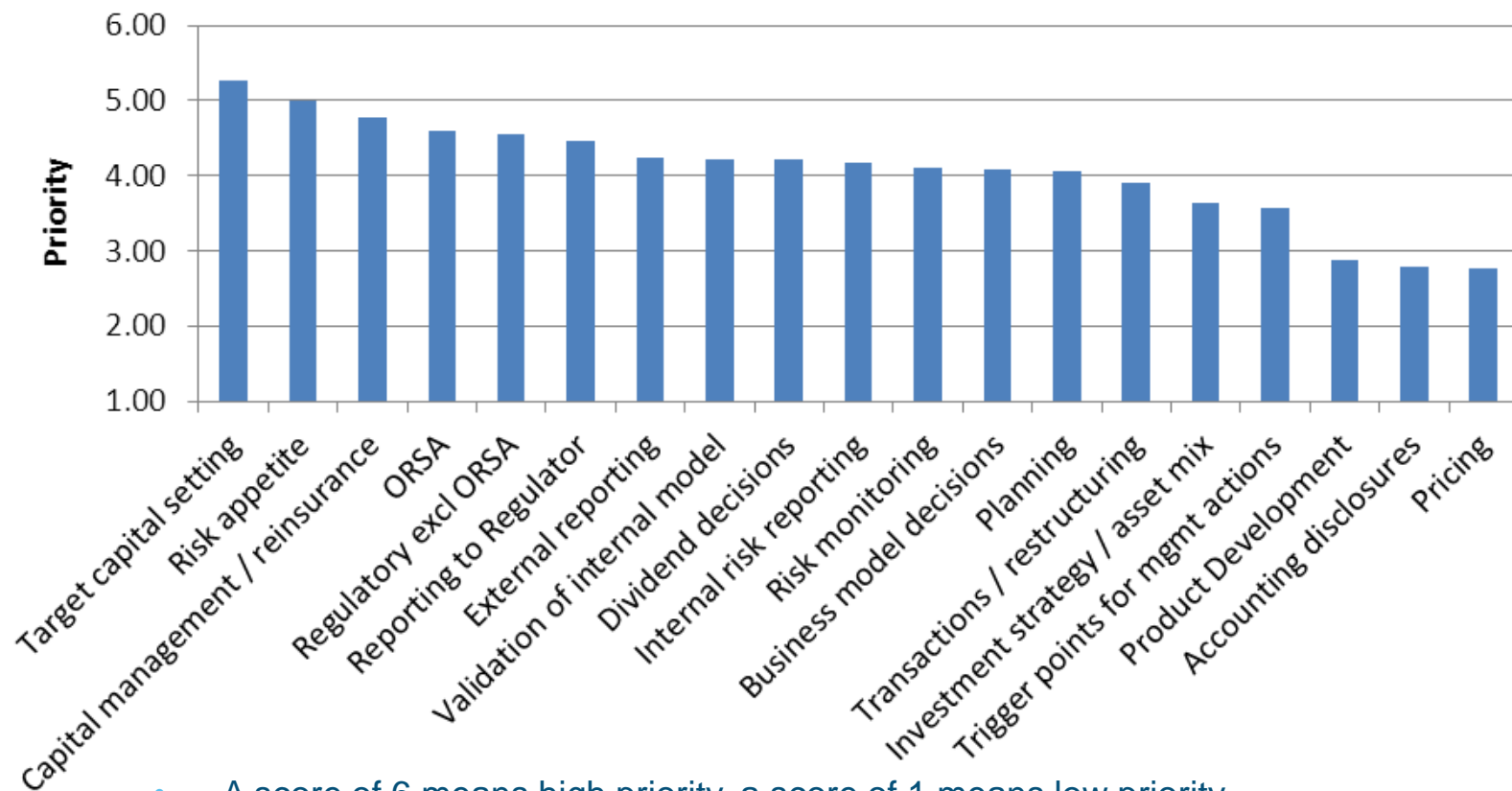
Reverse stress testing:

- Refers to stress tests and scenario analyses that test a firm's business plan to failure

Stress testing and scenario analysis also referred to as “stress and scenario testing” or “SST” in this paper.

Use and embedding

USE OF STRESS AND SCENARIO TESTING



- A score of 6 means high priority, a score of 1 means low priority
- Priority results shown above are the mean across respondents that provided a priority for that category

EMBEDDING

SST has great importance in informing key commercial decisions:

- Setting risk appetite, target capital and dividend decisions
- Informs capital management decisions e.g. reinsurance
- Used when contemplating changes to the firm's risk profile e.g. transactions / restructuring
- Strong evidence of embedding in risk-based decision-making

Increasing prevalence of stress and scenario testing frameworks. Benefits include:

- Clarifying roles, responsibilities and accountabilities
- Providing a structure around which more detailed plans can be built

Benefits are most likely to be realised when there is broad engagement from across the business.

KEY CHALLENGES

On a scale of 1 to 6, where 1 is not challenging and 6 is very challenging, the Survey asked participants to rate each of the following areas:

	Overall	Smaller firms	Larger firms
Lack of time / resources	4.3	4.3	4.4
Appropriate stress and scenario selection	4.0	4.4	3.4
Making SST relevant to business decisions	3.8	3.5	4.1
Recalibration of scenario generator under stressed conditions	3.5	3.7	3.2
Assessment of impact of selected stresses / scenarios	3.3	3.1	3.6
Presenting results / insights from SST in an effective way	3.3	3.3	3.4

LOOKING AHEAD

Looking ahead over 2 years (from H2 2013), firms highlighted in the Survey that they expected to see greater usage around:

- Risk monitoring, planning and capital management
- Reverse stress testing
- Internal model validation
- Regulatory-driven exercises

Additional thoughts from the Working Party:

- Moving from analysis to readiness – is there a boundary between reverse stress testing and recovery planning?
- Early warning indicators and trigger points for management actions
- Further consideration of the availability and effectiveness of management actions in stressed conditions
- Developments in macro level stress testing e.g. does “adding up” work across the industry if firms are making inconsistent assessments?
- Continued focus on firm-specific stress testing

Communication

COMMUNICATION

Key considerations on communication:

- Stress tests require a great deal of resource with engagement across the organisation and the success of the exercise will depend partly on how clearly and effectively the results are presented to the various audiences
- While retaining a consistent message is fundamental, communication should be tailored to each audience and presented in a way that suits them, adjusting for their requirements
- Exercises should be performed at the appropriate times to inform decision making, e.g. via linking to strategic planning exercises
- Results need to be produced on a timely basis and the appropriate balance between speed and accuracy needs to be struck to inform results are not out of date or no longer relevant when reported
- Recommendations should be clearly presented while acknowledging the degree of uncertainty and judgement applied

COMMUNICATION CHALLENGES

Challenges around communicating results include:

- Gradually stress and scenario testing results are becoming part of the regular management information produced within an insurance company. Keeping senior management engaged in the results becomes more challenging and requires more focus on the key messages and the recommendations
- Making results have sufficient focus on qualitative analysis compared to the quantitative analysis is often difficult
- Ensuring there is no implied 'false precision' in results whilst at the same time ensuring management have faith in the messages and recommendations arising from the analysis
- Given the wide range of stakeholders which often include external stakeholders it is important results are provided with appropriate context so as to avoid misinterpretation

Scenario selection

INTRODUCTION

Good practices in scenario selection is key to making the relevance of the stress and scenario testing exercise evident and easy to communicate. This means investing time in identifying and selecting relevant scenarios.

In the working party's survey responses a commonly cited example of something users of stress testing and scenario analysis found least useful was poorly calibrated or inappropriate stresses.

The paper discusses the following areas in relation to scenario selection

- Identification of risks
- Setting the strength of scenarios
- Benefits of governance in scenario selection
- The form of stresses and scenarios
- Metrics to be assessed in the scenario
- The value in repeating previous stress and scenario tests
- The relationship of stress and scenario selection and testing with economic capital
- Features of one possible framework for identifying risks - the PESTEL analysis

RISK IDENTIFICATION AND STRESS SPECIFICATION

- A successful stress and scenario identification exercise will engage functions from across the business to ensure breadth of scenarios:
 - Effective communication and focussed discussion is key to good identification
- The definition of stresses should be as clear and unambiguous as possible:
 - The point in time the stress or scenario begins, and how long it takes to be fully realised and/or how long it persists should be considered carefully as these can alter the plausibility, size of impact and ease of quantification
 - Scenarios which can be linked to specific causes are often interesting and bring stress testing to life. The power of setting out a plausible chain of events should not be overlooked in communicating the chosen scenarios
 - The definition of the stresses and scenarios should not ignore how these are to be quantified through models or proxy models
 - Useful scenarios should not be ruled out purely due to modelling considerations, even if they can only be quantified approximately
 - In a group structure a balance needs to be struck between prescribing absolute consistency in stresses and scenarios across all entities and allowing flexibility in interpretation to quantify impacts more efficiently thus allowing more emphasis to be placed on analysis

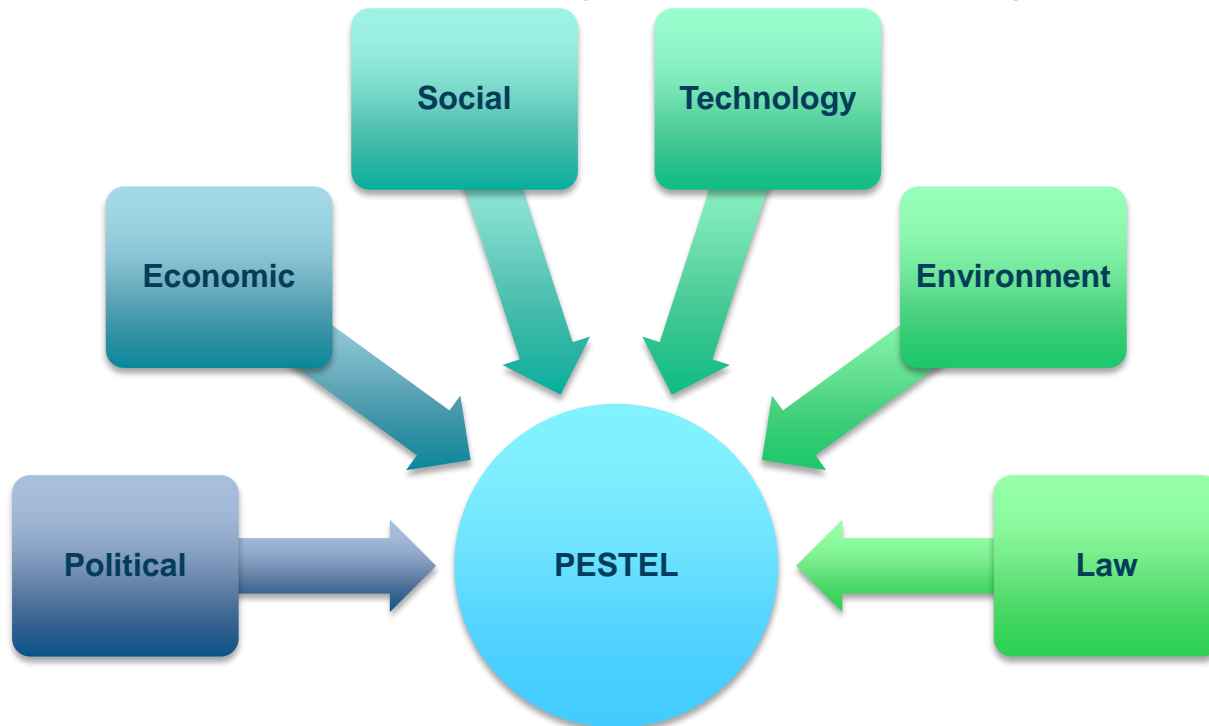
SCENARIO SELECTION

- In the scenario identification process it can be useful to raise a number of questions, for example:
 - What drives the profitability of the company and what are the under-pinning assumptions in the overall strategy?
 - What were the big drivers for analysis of change in any of the recent metrics of interest?
 - Which models are relied upon for providing analysis and information? Model weakness or limitation lists may provide opportunities for a scenario analysis to examine the materiality of things that are not quantified by the model
 - What do market or investment reports tell the SST practitioner?
 - What information is available from the product development area?
 - Peer analysis and analysis across industries to understand scenarios that have caused challenges for other insurers and other businesses

- As part of scenario selection it is also important to consider which metrics the scenario will be tested against. The consideration of which metric or metrics to prioritise in the analysis of stresses and scenarios should depend on the key metrics used by the business and should pay regard to the intended use and time horizon of the stress and scenario testing exercise.

SCENARIO SELECTION TOOLS

- There are a number of ways to approach the scenario identification process. The challenge is often to ensure a sufficiently broad range of scenarios are identified, but there are tools and frameworks that can assist identifying scenarios across a range of scenario types.
- An example is the PESTEL analysis, which provides a framework for identifying scenario risks against Political, Economic, Social, Technological, Environment and Legal factors.



PRIORITISATION OF STRESSES AND SCENARIOS

- Once the stresses and scenarios have been identified, decisions on which tests to prioritise for evaluation and analysis should be made:
 - In practice it may not be possible to evaluate and analyse every identified stress or scenario in detail
 - Defining a framework for prioritisation will provide a structured approach and may assist in justifying the decisions made
- Prioritisation of stresses and scenarios may take their probability into account:
 - Assigning probabilities can help to give an indication of the effort that might be worth expending in managing the risk
 - Probabilities may be useful in refining the stress or scenario to maximise impact or plausibility
 - They can also help to provide further context for the impact when communicating results
 - However assigning a probability to a stress or scenario can be subjective and is not necessarily essential to a successful scenario analysis
- Carrying out regular stress and scenario testing exercises:
 - Re-running only a prescribed set of tests will mean that changing conditions and emerging risks do not get sufficient attention
 - However repetition of some tests is useful for comparability across exercises and to assist in measuring performance in risk management and mitigation

RELATIONSHIP WITH REQUIRED ECONOMIC CAPITAL

- Stress testing and scenario analysis is closely related to Required Economic Capital (REC) calculation. They are both broadly looking at the same thing; what happens when conditions change materially.
- Probabilities and impacts of stresses and scenarios can be a useful check on the required economic capital model (if they are independent of it).
- Where independence is less of a concern, stresses used in the required economic capital calculation may assist in quantifying the impacts of stresses and scenarios for the stress testing and scenario analysis exercise.
- Stress testing and scenario analysis should complement the REC model:
 - It can be used to cover areas the REC model does not, such as more complex scenarios and stresses that interact in ways not captured by the model
 - Or it can examine the scenarios typically driving the REC results in more detail

Management actions

INTRODUCTION

The Survey showed that management actions are widely used within stress testing and scenario analysis and firms take significant financial credit for these actions. Having a well articulated, justifiable set of management actions is a core part of a stress and scenario testing framework.

The key points identified in the paper when considering management actions are:

- The specifics of a scenario should be considered when setting management actions applied
- Management actions used should be consistent with the internal model and other reporting measures
- The evolution of a scenario and the response should be considered to avoid taking too much credit for management actions
- The management actions should link into the firms ability to monitor and respond to events
- Not all firms quantify actions, but where possible it is recommended that they are quantified
- Documentation and governance are key to demonstrate the thought process followed
- The stress and scenario testing should link with the risk management framework

- Some management actions are also described with some of the key challenges to their use in SST

LINKING MANAGEMENT ACTIONS TO SCENARIOS

- Survey responses showed that firms did not always link the management actions to the scenarios. This can result in potential issues when assessing the scenarios and there can be a lack of understanding about what will actually occur in a particular scenario.
- Linking the management actions to the particular scenario provides benefits and avoids pitfalls
 - Not all actions will cover all scenarios – some firms may miss this
 - The management actions may interact with the stress – reducing effectiveness
 - The firm's governing bodies will need to sign up to the actions taken so they feel they can actually be taken in practice
 - Firms will need to be comfortable with the TCF aspects of any management actions
 - Often firms implicitly set management actions which cover many stresses which may miss subtleties of a scenario

The paper lists some potential management actions that were provided in response to the Working Party's survey. Some potential challenges to the actions have also been listed.

A distinction is made between those actions which may impact policyholder benefits (primarily with-profits business) and those which impact shareholders. Where policyholder benefits are impacted the justification and governance will be tougher

EVOLUTION OF STRESSES AND POTENTIAL RESPONSES

It can be important to think about the evolution of a scenario and how responses might occur as the scenario evolves. This can provide insights as to what might happen in practice.

Linking can assist both understanding how the firm will react in practice and ensure that appropriate credit is taken for the actions – ie avoid taking too much credit due to delay in response to a particular situation.

The paper suggests a potential classification of actions into categories which describe the nature of the response depending on how far the scenario has evolved:

- **Strategic static actions** which are taken in advance to change something where the results of stress testing and scenario analysis reveal a breach of the insurer's risk appetite
- **Dynamic actions** which can be taken concurrently with or in quick response to the scenario. In practice this will always be imperfect, so allowance will need to be made for reduced effectiveness
- **Static actions** which attempt to improve the situation post-event
- **Strategic static actions** post event which may put the firm on a strategic new direction

Considering the evolution of the stress will highlight the need for effective monitoring - for example solvency and ALM.

LINKS TO RISK MANAGEMENT AND THE USE TEST

Linking stress testing and scenario analysis to risk management and the Use test is both best practice but also potentially very informative. As we move towards Solvency II this will be a key requirement.

- Quantification of the value of management actions is important to understand how a scenario will evolve and the financial impacts that are likely to ensue
 - Not all firms quantify the actions – but there can be justification for this
- Risk management requires understanding the evolution of the stresses and the firm's response, with the need to ensure that the actions are actually available and will be taken
- Evolution of the scenario can also help with recovery planning
- Monitoring systems will need to be able to flag emerging scenarios in a timely manner – again linking in to the risk management framework
- Understanding scenarios may highlight that certain actions in response to certain scenarios are unpalatable and a firm may wish to take pre-emptive actions to avoid having to take the actions that might be required
- There may be insights in relation to the use of the risk management framework and how it is expected to operate in practice – which may result in recommendation of improvements to make the frameworks more practical

Insights from selected other industries

INTRODUCTION

- Motivations:
 - To identify themes and learning points with relevance to insurance
 - Is insurance keeping up with latest developments?
- Focus on:
 - Industries that have seen recent developments in SST
 - Regulated sectors
 - Breadth e.g. including financial and non-financial
- Industries considered:
 - Banking
 - Social housing
 - Nuclear power
- Many other industries use SST and potentially interesting (though not covered by paper):
 - Oil exploration
 - Gas / security of supply e.g. 2014 European stress tests
 - Electricity e.g. OFGEM Project Discovery (2009)
 - Manufacturing
- Potential for actuaries to engage with and influence the debate in other industries

FINDINGS

- Similar principles used across industries selected
- Increasing use of reverse stress testing
- Similar challenges / focus areas:
 - Combination events
 - Ensuring the exercise is action-oriented
 - Contingency actions
 - Benchmarking and review

UK CORPORATE GOVERNANCE CODE

- Broad relevance – all companies with a Premium listing of equity shares on the London Stock Exchange
- Reflects findings of Sharman Inquiry
- Code includes requirement for “viability statement” in the strategic report to investors
- Broader and longer-term assessment of solvency and liquidity
- Risks that would threaten the business model, future performance, solvency or liquidity of the company
- Qualitative and quantitative analysis
- “Stress and sensitivity analysis” will often assist the directors in making their statement”
- “This may include analysis of reverse stress, starting from a presumption of failure and seeking to identify the circumstances in which this could occur”
- UK insurers should be well placed given ORSA
- Other industries may be interested in insurers’ experience with ORSA?

Conclusions

CONCLUSIONS

Key features of effective stress testing and scenario analysis:

- Roles and responsibilities agreed and understood
- Governance and Board involvement
- Multi-disciplinary input
- Appropriate range of stresses and scenarios, reflecting the firm's business model
- Effective modelling
- Early warning indicators, trigger points
- Realistic contingency actions
- Moving from analysis to readiness
- Clear communication

Many industries face similar challenges.

Potential for actuaries to engage with and influence the debate in other industries, especially building on ORSA experience.