Stress & Scenario Testing – A modern update
26 January 2021

IAA AFIR ERM Section presenting the IAA Risk Book Series

Moderated by: Annie Tay FIA CERA
REGISTRATION AND PARTICIPATION

- This webinar is free for all AFIR-ERM members, IAA section members and IAIS members.
About the speakers and moderator

**David Sandberg**, FSA, MAAA, CERA, FCA

- Insurance practitioner with over 30 years of experience in Financial Reporting, Solvency, Modelling, Experience Analysis, Government Relations and Reinsurance.
- Advisor to SDI Refinery, an InsurTech start up company & Senior Consultant with Charles Rivers Associates
- Co-author of the Risk Book chapter on Stress Testing for the IAA & Past Chair of the IAA Insurance Regulation Committee

**Nick Dexter**, FIA

- Senior Advisor at the PRA (the UK prudential regulator). He advises PRA senior management and supervision teams on technical areas such as Solvency II, IFRS 17, Climate Risk and insurance practice more generally
- Vice-chair of the IAA’s Insurance Regulation Committee and a member of their Climate Risk Task Force. Also member of the UK actuarial profession's Practising Certificates Committee, and the Financial Reporting Group which looks at IFRS reporting
About the speakers and moderator

Annie Tay FIA CERA - Moderator


- Advisor/Interim for conventional insurance companies and Insurance/Fintech investors

- INED for Audit and Risk Committees including for the IAA AFIR ERM Section and the Chartered Insurance Institute (CII).
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Agenda

- Background and Basics
- A Poll
- Stress Testing and Regulators
  - Climate Change
  - Banking Stress Tests
- Case Studies
  - Financial Reporting
  - AI and Big Data
- Q&A
- Close
RISK BOOK & Stress and Scenario Testing – Background & Basics
ERM Tools = Holistic Set

To manage Risk & Uncertainty

– Caution =

MIND THE GAP
Aspects of Risk and Uncertainty

Unhedgeable
Typical Categories for Insurance Modeled Risks

- Risks
  - Process risk (aka Brownian Motion or random walk)
  - Parameter risk (random or paradigm shifts)
  - Model risk

- The first illustrates a “risk”, which may be stochastically modeled. The third illustrates an “uncertainty,” which may be assessed through scenario analysis. The second depends upon the type of uncertainty involved
Stress & Scenario Testing

- Enable the Risk Management Process to Better Prepare for a Sustainable Future

Intertwined with:
- Model Governance
- Actuarial Function
- Actuarial Standards
- Catastrophe Risk
- Risk & Uncertainty
- Capital
- Operational Risk
Key Points - Stress & Scenario Testing Chapter

- Testing Needs to Follow a Disciplined Set of Principles

- This Includes Clarifying:
  - Objective (Micro vs. Macro Focus) & Options to Address Unfavorable Outcomes
  - Key Assumptions (How Will the Past be the same or be changed in the Future?)
  - Limitations
What Happens? Laser and a jelly bean

\[ \text{Laser} + \text{Jelly bean} = ? \]
What Happens?

\[ \text{+} \quad \text{= } \quad \text{=} \]
Stress Testing Results
Example of Past Successes

- New Brunswick Pension Plan in Canada – Testing for “normal” events
- Swiss Banking System (2007) – Testing for Macro Interdependencies
Looking ahead, the main potential source of risk to financial stability would be a substantial correction in the housing market, impacting on the balance sheets of authorized deposit-taking institutions through mortgage defaults. The concern would be a sharp jump in mortgage defaults …

Since reporting process had “the right lights on” APRA requested companies to run a stress test (30% one year reduction in housing prices + increase in defaults)

# RESULTS

<table>
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<th>Tests identified weaknesses</th>
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<td>Corrections were made to capital and concentration risks</td>
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**PMI**

**Australia’s rating** is higher than its parent rating.
Summary of Stress Testing

- A clear and graphic view is usually easier to understand than a complicated explanation.

- In this case, a scenario can be worth a thousand distributions.

A picture is worth a thousand words

A similar situation exists for statistical and probabilistic terms
Poll: COVID-19
Why regulators are enthusiastic supporters of Stress and Scenario testing

Nick Dexter, FIA

January 2021
Climate Change Insurance Assessments
Global Task Force on Financial Disclosures (TCFD)

Reasons why scenario analysis is a useful tool for organizations in assessing the potential implications of climate-related risks and opportunities:

- can help organizations consider possible outcomes that are highly uncertain, play out over the medium to longer term or have substantial potential disruptive effects
- can enhance organizations’ strategic conversations about the future
- help frame and assess the potential range of plausible business, strategic, and financial impacts
- help identify indicators to monitor the external environment and better recognize when the environment is moving toward a different scenario state
- assist investors in understanding the robustness of organizations’ strategies and financial plans and in comparing risks and opportunities across organizations.
The CRTF is issuing a series of papers focusing on our role in relation to climate-related risk and which focus on scenario testing:

- Paper 1 - Importance of Climate-Related Risk for Actuaries – published last year
- Paper 2 – Introduction to Climate-Related Scenarios - to be published shortly
- Paper 3 – Scenario Application to Financial Institutions and Insurance - to be published later in 2021
- Further papers are planned.
Supervisors should:

- require undertakings to integrate climate change risks in their system of governance, risk-management system and ORSA, in line with Solvency II

- expect undertakings to assess the long-term risks of climate change using scenario analysis to inform the strategic planning and business strategy

- expect undertakings to take a broad view of climate change risk, including all risks stemming from trends or events caused by climate change
2021 Climate Biennial Exploratory Scenario (BES)

The Climate BES has three objectives:

1) **Size exposures** of individual firms and financial system
   
   To shine a light on risks that are currently opaque

2) **Understand business model challenges** and likely responses
   
   To highlight where action is needed

3) **Improve firms’ risk management** and prompt a strategic view
   
   To build capability and prompt customer engagement

The Climate BES is **not** about capital adequacy
BES approach

- **Broader participation:** the BES will test the resilience of both the UK’s largest banks and insurers to climate-related risks.

- **Extended modelling horizon:** the BES will use a 30-year modelling horizon because need a much longer timeframe than normal.

- **Integrated climate and macro financial variables:** pathways for temperature, emissions, and climate policies provided.

- **Counterparty-level modelling expectations:** assess the vulnerability of individual counterparties’ business models to the underlying climate-related risks.
BES will test resilience to physical and transition risks in three scenarios

These will build on the NGFS reference scenarios, released in June 2020.
Banking Stress Testing
Stress testing is now a critical element of risk management for banks and a core tool for banking supervisors and macroprudential authorities.

Stress testing is integral to banks’ risk management and banking supervision, in that:

- it alerts bank management and supervisory authorities to unexpected adverse outcomes arising from a wide range of risks, and

- provides an indication to banks and supervisory authorities of the financial resources that might be needed to absorb losses should large shocks occur.
Stress testing frameworks should:

- have clearly articulated and formally adopted objectives,
- should include an effective governance structure
- should capture material and relevant risks and apply stresses that are sufficiently severe

Stress testing should be used as a risk management tool and to inform business decisions

Resources and organisational structures should be adequate to meet the objectives of the stress testing framework

Stress tests should be supported by accurate and sufficiently granular data and by robust IT systems

Models and methodologies to assess the impacts of scenarios and sensitivities should be fit for purpose
Banking Stress tests - The UK example

In the UK, we run two types of concurrent stress scenarios to ensure that policymakers can explore different vulnerabilities.

- The **annual cyclical scenario** assesses risks to the capital adequacy of the banking system associated with the state of the financial cycle. Policymakers can respond to that assessment in a number of ways, including through system-wide or bank-specific capital buffers.

- The **biennial exploratory scenario** probes the resilience of the system to risks that policymakers judge to be emerging threats to financial stability and individual banks, but may not necessarily be linked to the financial cycle. This scenario can provide a useful tool for assessing and communicating current and future challenges facing the financial sector.
Banking Stress Tests – key features

The Bank of England’s annual cyclical scenario has **three key features:**

- It is explicitly **countercyclical**. The scenario severity and associated capital buffers vary systematically with the state of the financial cycle.

- It improves **consistency with the capital framework** as it informs buffers-setting to deal with future stress events and ensures systemically important banks are held to higher standards. It helps to set the system-wide countercyclical capital buffer (CCyB) and bank by bank buffers (PRA Buffer), serving both sets of macro and micro prudential objectives.

- It is a **comprehensive approach**, using a range of analytical tools, that enhance our own, and firms’ modelling capabilities. It ensures that participating banks continue to play an important role in producing their own projections of the impact of the stress.
The UK’s stress-testing framework delivers a broad range of benefits.

- It is an integrated, regular process for decision-making around bank and system-wide capital adequacy. This helps deliver greater consistency in policymakers’ assessment of capital adequacy across institutions.

- It helps the Bank of England’s accountability to Parliament, and the wider public, against its financial stability objectives.

- It strengthens the supervisory approach, with a richer evidence base to inform supervisory judgements.

- It enhances public confidence in the banking system, and disclosure improves market discipline in the financial system. And

- Improves risk and capital management practices within banks.
Case Study – Financial Reporting
Use to Understand Key Fin Statement Uncertainties

- Will reported volatility be real or artificial?
- Transition issues – New starting points for margins and liabilities. How to set up appropriate comparisons/expectations?
- Impact on Reinsurance
- Impact on Product Design
- Impact on Business Mergers
The Financial Market Today

Protectionist measures: Capital flow restrictions, trade barriers, hurdles for foreign investment, etc.
### Is Capital the Answer or is it a Process?

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<th>Insurance</th>
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<th>Mining</th>
<th>Energy</th>
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<td>Transportation service interruption</td>
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<td>Fraud, Reg. Compliance Failure, Strategic Failure</td>
<td>Online Security Breach</td>
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<td>Mis-Selling or Pricing</td>
<td>Rogue Trader</td>
<td>Mine Collapse</td>
<td>Oil Spill, gas plant fire</td>
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What is the Traditional Value Equation?

Value of Put Option –

(Babbel / Merrill Journal of Risk & Insurance 2005)
Case Study – The world of Big Data and AI
Stress Testing & Big Data / AI

- Discipline Macro Concerns
  - Define the System Under Investigation
  - Stress Testing a Model vs. Stressing a Financial Outcome
- Assess Spurious Correlations – Finding the Gap
- Use to Prioritize Resources
- Plan for the Future
  - Is change just an Efficiency or a Transformation/Disruption?
Where Can Value be Created for Private Insurance?

1. Mean or Average Cost of Risk
2. Cost of Volatility of Risk (Capital)
3. Cost of Uncertainty about Mean & Volatility
4. Cost to Build, Sell, Service and Monitor Product
Key Considerations

1. How to Distribute?
2. Better Customer Experience
3. Better Data for Pricing, Reserving, Claim Management, U/Wing
4. Re Design Products
5. Re Design Regulation
Thank you