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of Actuaries

The Rise and Rise of Stress and Scenario Testing

Members of the Institute and Faculty of
Actuaries' Stress and Scenario Testing
Working Party



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Agenda

1. Overview of SST Working Party
2. The Rise and Rise of SST
3. Current techniques and topical issues in SST:
 - Scenario selection
 - Management actions
 - Improving effectiveness of SST
 - Early warning indicators
 - Insights from other industries and applicability to insurance
4. Next steps for the SST Working Party



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SST Working Party

- Formed in January 2013
- Members
 - David Leach (chair), Deloitte
 - David Harrison, Admin Re
 - Paul Hopkins, independent consultant
 - Barbara Illingworth, Legal & General
 - Dan McGouran, Aviva UK Life
 - Kin Muck, independent consultant
 - Anthony Plotnek, E&Y
 - Ed Rayfield, Friends Life
 - Jessica Sum, Aviva Group
 - Masimba Zata, LV=



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SST Working Party

- Terms of reference
 - Produce useful reference document for SST practitioners and stakeholders
 - Enhance understanding of SST, its strengths and weaknesses
 - Raise profile of SST
 - Promote more debate within the actuarial profession on SST
 - Bring insights on SST from outside the actuarial profession
 - Promote development of SST concepts and approaches
- Strategy and activity
 - Collate intelligence and data
 - Form conclusions on promising areas to investigate
 - Interact with other industry bodies, eg CRO Forum
 - Learn from other industries
 - Conduct more detailed work in areas of interest for paper in 2014



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SST Working Party

- Planned output
 - SIAS paper in 2014
 - Full SST Survey results presentation
 - Possible networking events, workshops, practitioner roundtables
 - This session!
- SST Survey
 - First stage of data collation
 - Conducted September/October 2013
 - 18 UK life assurers participated
- Early Warning Indicators Survey
 - Hot topic, seeking firms' views on PRA proposed EWIs
 - Conducted October 2013
 - 13 UK life assurers participated



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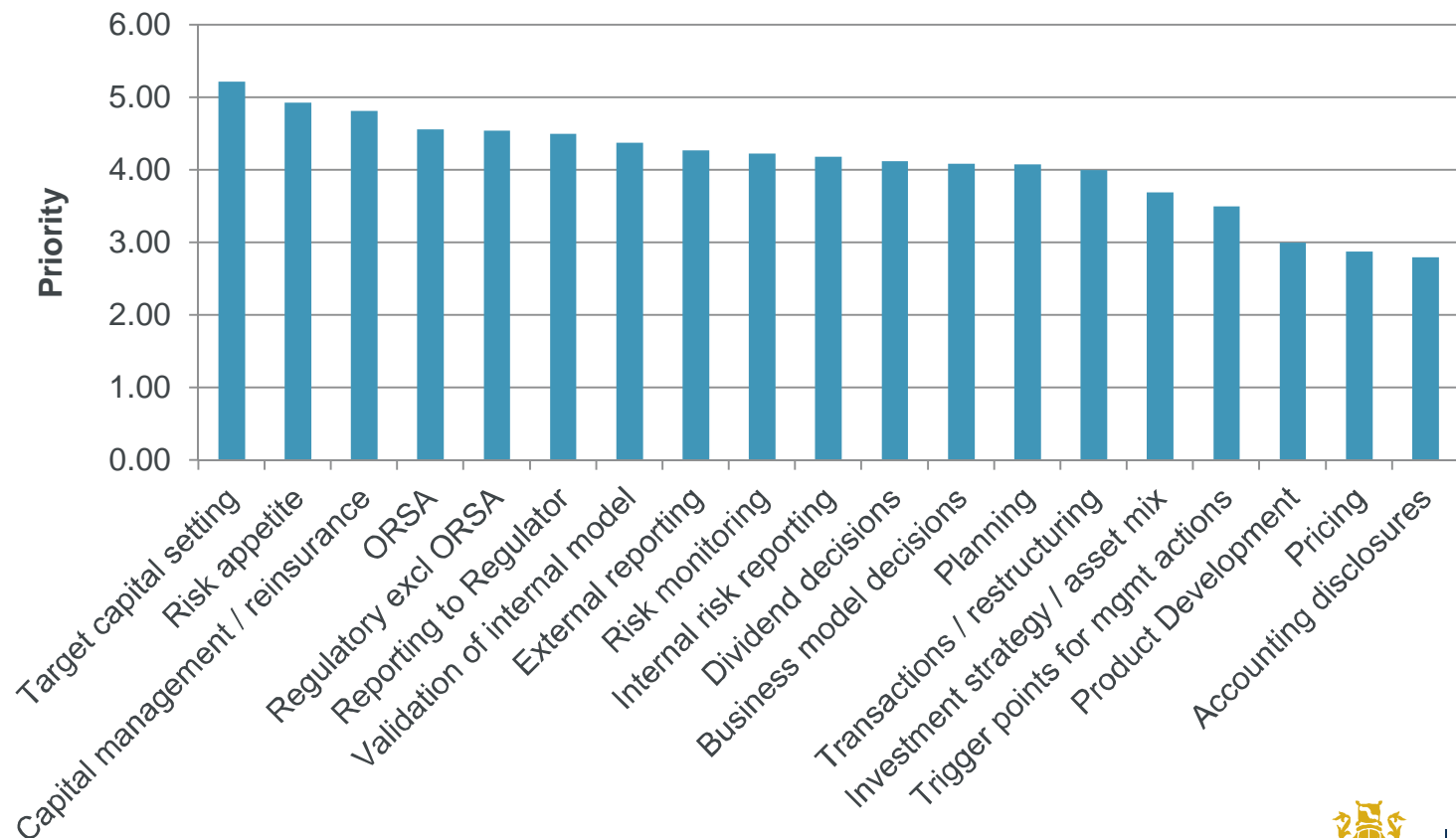
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A view from the UK life insurance industry

- Range of survey responses indicating upward trajectory, e.g.
 - Increased emphasis on reverse stress tests / economic capital stress tests
 - Wider use in planning, risk monitoring and business functions
 - Increased regulatory focus
 - Validation of internal model
 - Strengthen link between strategic planning and ORSA/risk management/capital planning
 - Increased number of stresses and scenarios
- More board involvement expected
- SST evolving as use spreads in organisation
- All firms face challenges with SST, though not always in the same areas – suggesting working party role to spread insights and improvement ideas

“What is stress and scenario testing used for in your organisation?” (1-6)



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“Please rate the extent of involvement of the following groups at each stage of SST?”

	Risk identification	Setting stresses / scenarios
Risk (including actuarial function)	5.56	5.53
Specific stress & scenario testing committee / team	4.33	5.00
Capital management	4.71	4.62
Risk (separate from the actuarial function)	5.21	4.38
Board	3.09	4.23
Risk committee (or similar)	4.15	4.07
Strategy	3.29	3.71
Finance	3.20	3.44
Product development / marketing	3.14	3.33
Investment committee (or similar)	3.50	3.00
Investment / asset management	3.55	3.00
Pricing	3.11	2.88
Reinsurance	2.60	2.67
Internal audit	2.80	2.25
Claims / underwriting	1.75	1.50

Average scores across all respondents, where a score of 6 means very involved and a score of 1 means limited involvement



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What are the main challenges of SST in your organization?

Firm	a) Appropriate stress & scenario selection	b) Stressed calibration of scenario generator	c) Assessment of Impact of stress	d) Presenting results / insights effectively	e) Making SST relevant to business decisions	f) Lack of time / resources
A	3		5	3	4	4
B	4		3	4	4	4
C	2	3	3	3	2	4
D	5	5	2	2	3	4
E	5	2	3	3	3	4
F	2	2	3	5	3	6
G	5	2	4	3	4	5
H	4		2	2	5	5
I	5			3	1	3
J	5	2	2	2	4	4
K	3	4	2	5	5	5
L	6		3	4	4	5
M	4	4	5	4	4	5
N	3	6	3	3	4	3
O	5	5	5	4	4	4
P	3		3	2	5	3
Q	4	3	5	3	4	4
R	4	4	3	5	5	6

A score of 6 means very challenging, a score of 1 means not challenging



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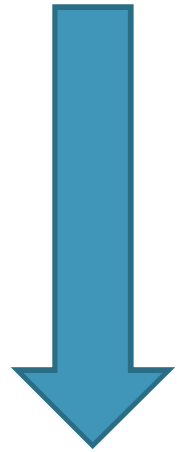
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Sources of information for setting scenarios

Decreasing
importance

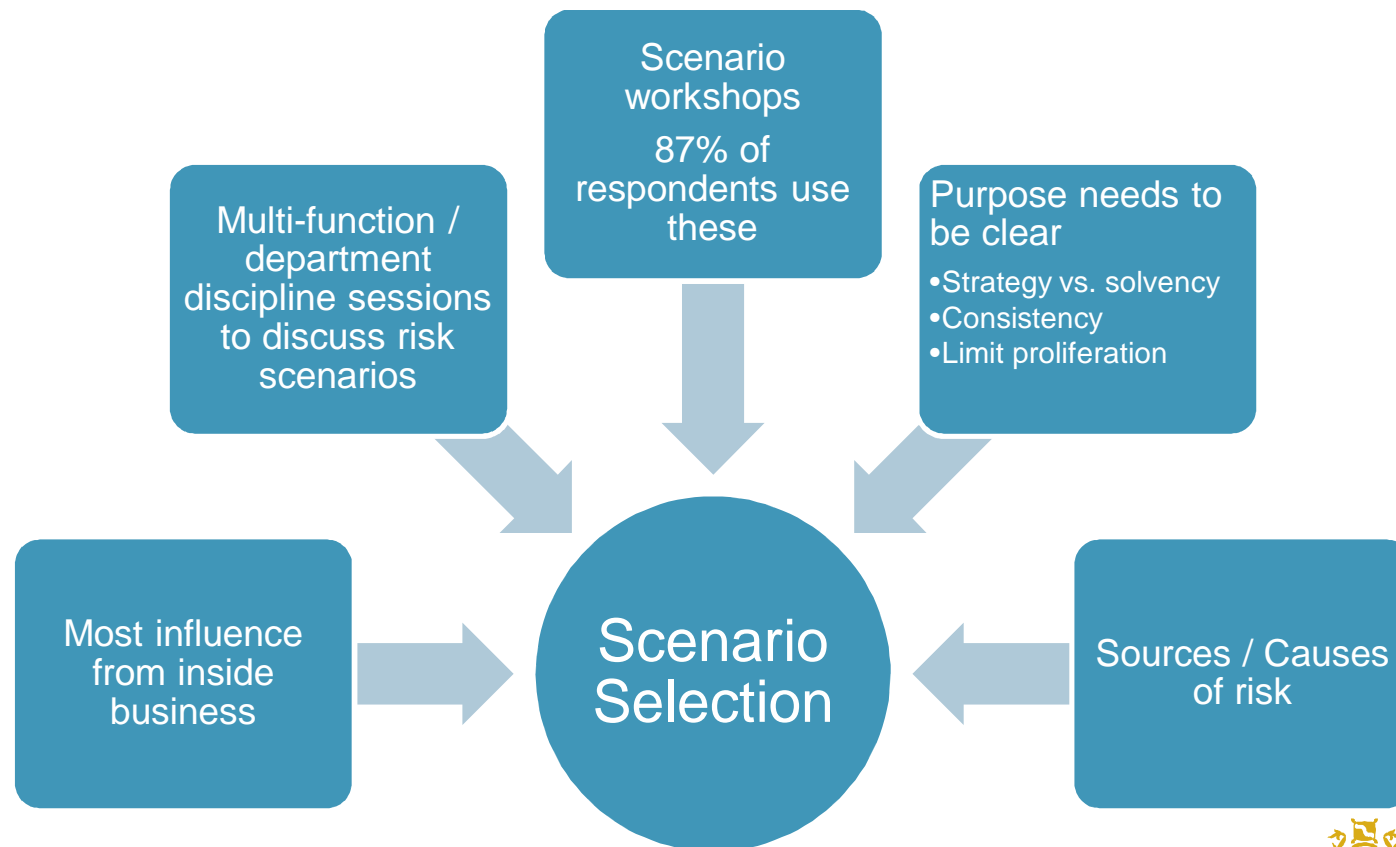


- Internal experts
 - Management
 - Benchmarking
 - Peer analysis
 - External experts (academics, etc.)
 - Analysis from ratings agencies, banks
-
- Regulatory requirements for stress and scenario testing
 - Influence what SST is performed
 - Do not generally restrict the SST that firms wish to perform
 - Generally seen as moderately improving understanding and management of the business



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Selection of tests and metrics – stand-out points and thoughts



Selection of tests and metrics – stand-out points and thoughts

How extreme?

- What level of stress is useful?
- How to allow for known unknowns and (worse) unknown unknowns

Interaction with internal model

- Consistent or complementary?
- Some firms plan to use SST to validate the Internal Model
- For others the challenge will be whether the stress tests are consistent with the internal model

Assigning probabilities

- More companies do than don't
- Some companies only do for certain stresses
- Recognition that difficult and not always meaningful
- Consistency with internal model?



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Management actions - insights

Most firms surveyed show stress impacts pre and post management actions

Variation in extent and type of management actions allowed for in quantification of post stress position

- None
- Board pre-approved only
- Additional actions for stresses
- All actions identified as available

Relatively common:

- WP actions e.g. EBR, bonus rates
- ALM, hedging, reinsurance
- Dividend reductions

Most firms surveyed identify additional mitigating actions that are not quantified

- Closure to new business
- Cost reduction
- Hedging / ALM
- De-risking staff pension scheme
- Introduction of charges on WP / UL business
- Review margins in basis

Often, management actions do not depend on the cause of the stress



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Management actions - challenges

What management actions are useful, realistic, or too extreme?

How do firms link to risk appetite and strategy?

Are plans joined up with recovery and resolution plans?

How to demonstrate that management actions are implementable in practice, under stress, and within the required timescales?

How / whether to quantify more complex actions

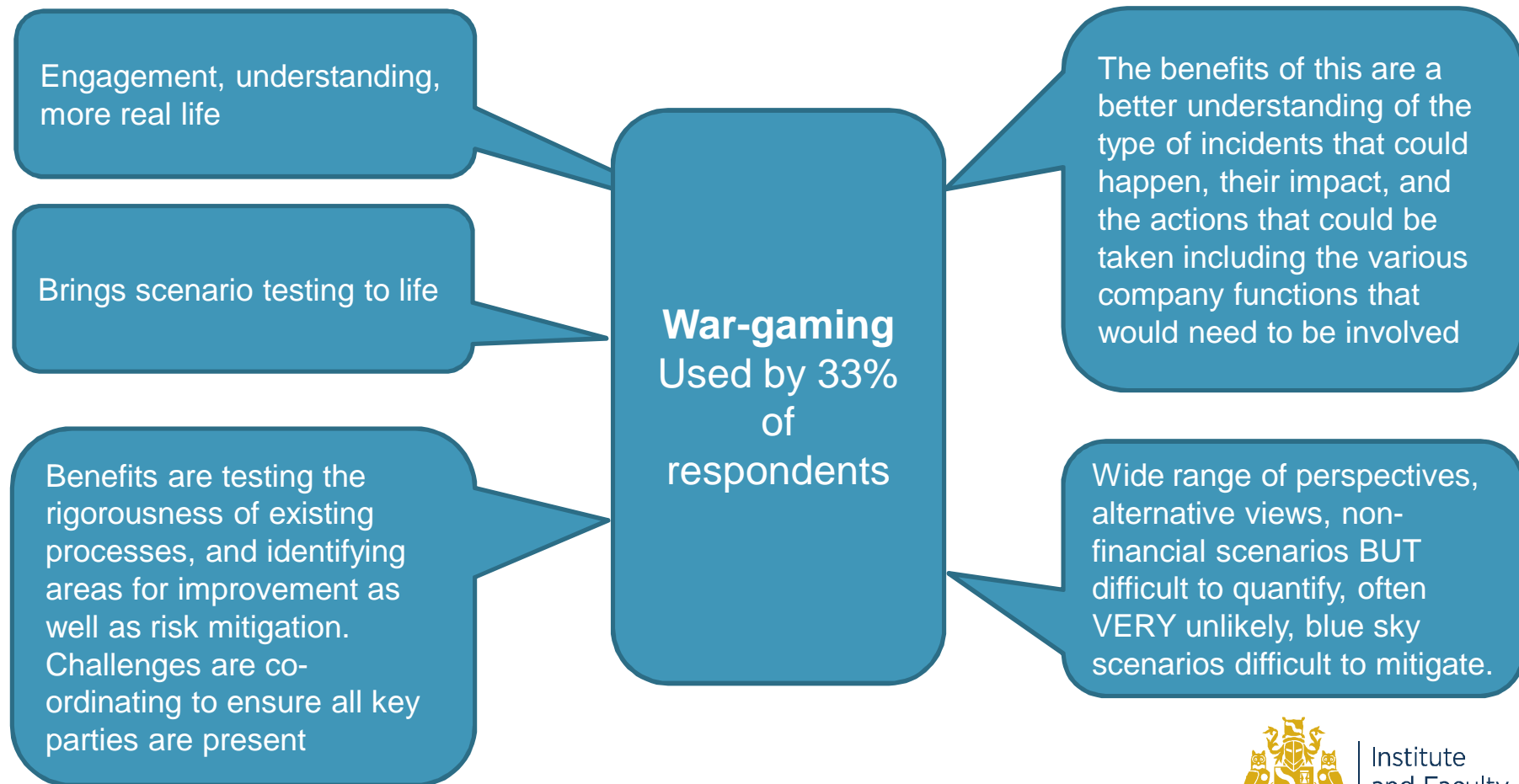
Do actuaries, Boards, regulators etc all have the same understanding



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Wargaming

(testing the firm's response in a simulated crisis holistically, including dimensions such as information flow, speed, organisation, leadership and communication)



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Are users getting what they want from SST processes?

What users find most useful?

- Insight and better understanding of risk enabling better business decisions
- Users generally see value in process

What users find least useful?

- Extreme scenarios – poor reliability of results
- Poorly-reasoned and prescribed scenarios

What do users want more of?

- Targeted analysis, insight and explanation (see “Less”)
- Range and frequency of tests and “sensible” tests

What do users want less of?

- Highly technical results and copious data
- Irrelevant regulator-driven tests

Is the journey more useful than the destination?



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Improvement ideas (not all from survey)

- More use of 1 in 7 followed by 1 in 200 type scenarios i.e. ability to cover SCR following a moderate shock – more engaging for decision makers?
- More agile systems and processes, less reliance on slow, rigid frameworks
- Communication:
 - Formal reports will not always be the best medium
 - Rationalising modelled outcomes, focussing on insights
- More focus on forward looking perspective
- Broader reverse stress tests – challenging the business model
- Improving allowance for management actions – which ones are reasonably left unquantified when assessing the impact of a shock?
- More challenging scenario workshops?
- Wargaming?



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EWIs (as defined by PRA)

- Letter of 23rd May “Monitoring levels of capital and early warning indicators” from Julian Adams
- PRA concern that internal model calibrations will weaken over time after IM approval, and 99.5% confidence level requirement will not be maintained
- From September 2013 insurers must be able to discuss performance of internal models against EWIs
- Initial calibration such that 10% of insurers “fail”
- Life excl WP EWI = $SCR / pMCR$ threshold 300%
- Non-life EWI = $SCR / pMCR$ threshold 175%
- Life WP “simple” EWI = $SCR / pMCR$ threshold 125%
- Life WP “alternative” EWI = SCR / X threshold 200%

Where $X = 15\% \times \text{Cost of guarantees} / \text{Moneyness of Guarantees}$

$+10\% \times \text{size of the free assets} + 2\% \times \text{Non-Profit Liabilities}$



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Survey of Reactions to 3 Statements

1. Appropriateness

The PRA's EWIs (simple formulaic EWI and alternative WP EWI) are appropriate to our business

2. Clarity of use

Our company is clear about how the PRA intends to use the results of the EWI exercise

Number of Responses	Agree		Disagree			Not Sure
	Strongly				Strongly	
1) Appropriate to Business			3	4	5	1
2) Use is Clear		1	1	2	6	3
3) Improve Risk Management				7	5	1

3. Impact on risk management

The inclusion of Early Warning Indicators into the prudential regime will improve risk management outcomes in our organisation



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Key Issues Raised on Appropriateness

- Understanding that regulator might want to consider measures not dependent on internal model – but this does not mean that EWIs cannot be risk sensitive
- Taking more risk will move firms away from the EWI threshold – EWIs could encourage firms to take more risk
- EWIs only apply to liability side of balance sheet and not asset side – better ALM would result in a firm moving closer to the EWI threshold
- EWIs do not work for heavily reinsured business, and increasing reinsurance would reduce the indicator
- EWIs do not take account of split of risk between policyholder and firm
- EWIs vary significantly by line of business but threshold is based on an “average” business mix
- EWI does not work well for closed WP funds distributing estate
- EWI reduces as interest rates reduce



Key Issues Raised on Clarity of Use and Role in Risk Management

Clarity of Use

- How will EWIs impact firms before / after Solvency II implementation?
- Would a breach of the EWI threshold trigger a capital add-on?
- Or are the thresholds trigger points for discussion on the internal model?
- Will regulators accept that there are sound reasons for an EWI to be at an unusual level and set firm-specific EWIs going forwards?
- Will these indicators extend to standard formula firms?

Role in Risk Management

- EWIs not risk based – they will not lead to better risk management outcomes
- Model governance arrangements already in place
- Unintended consequences e.g. avoid de-risking programmes
- Well designed EWIs would play a useful role (not the ones currently proposed)
- Desire for IFoA to engage constructively with PRA to propose better EWIs
- Yet another metric to monitor / manage – EWI could itself become the source of a risk event i.e. another regulatory rule for the firm to avoid breaking



Conclusions on EWIs

- Desire for IFoA to engage with PRA to propose improvements to EWIs
- Main objective to make EWIs risk-based while still independent of IM
- Need to get the right balance between simplicity and appropriateness
- Even with enhancement, EWIs will always be a crude tool – but keep on increasing complexity and end up with an internal model!
- Firms are seeking clarification from PRA on use of EWIs and whether an EWI threshold breach could trigger automatic capital add-ons

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Overview

- Stress and Scenario Testing also conducted in other industries, including:
 - Banks
 - Energy
 - Engineering
- Lessons can also be learnt from other insurance regimes around the world
- The working party is gathering any useful insights that can be applied to actuarial work



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Banking – regulatory focus on SST

- Bank Of England – A Framework for Stress Testing the UK Banking System – A Discussion Paper (October 2013)
 - Combination of bespoke and standard stress tests
 - Forward looking perspective
 - Bank expects to use a suite of models to estimate the impact of stress scenarios
 - Over time, stress testing will seek to capture the effects of various feedback and amplification mechanisms
- US Federal Reserve – Capital Planning at US Holding Companies: Supervisory Expectations and Range of Current Practice (August 2013)
- PRA Anchor Scenario (June 2013)
- Financial Stability Board – Principles for an effective Risk Appetite Framework – Consultative Document (July 2013)
- Financial Stability Board – Recovery and Resolution Planning for Systemically Important Financial Institutions – Guidance on Recovery Triggers and Stress Scenarios (July 2013)
- Financial Stability Board – Recovery & Resolution Planning – Making the Key Attributes Requirements Operational (November 2012)



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Deepwater Horizon explosion and oil spill

- Some conclusions from the 2010 Deepwater Horizon crisis:
 - Regulator did not expect BP to have stress tested the impact of a disaster of such magnitude
 - Stress tests based on historical data and limited to common incidents. This led to standard practices being used to deal with this extreme incident
 - Practices at the time did not devote sufficient time to understanding the risks fully, uncovering the breadth of potential impacts and crafting responses to match those impact
 - Off-the-shelf solutions were heavily depended upon
 - Limited use of assigning probabilities to unusual scenarios – mainly qualitative analysis
 - Disjoint between executives' expectations of risk management practices and “shop floor”
 - Cost-cutting cited as a reason for not implementing certain risk management practices
 - Bayesian approach (quantitative and qualitative risk measures) recommended in aftermath
- Issues most relevant to insurance:
 - Inability or unwillingness to meet the cost of implementing SST recommendations
 - What is a reasonable cost to predict and mitigate a catastrophic but unlikely event?
 - The difficulty in deriving meaningful probabilities to assign to events
 - How many Deepwater crises need to occur before there is credible calibration data?
 - The role of management



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Tentative areas for further investigation and enquiry

And the survey says...

- (6) Promoting understanding of best practice and techniques / benchmarking
- (3) Setting global economic scenarios
- (1) Sensible allowance for management actions under each scenario
- (1) Practical, value add insight
- (1) Proxy Modelling

Thoughts from Working Party:

- CRO Forum SST Survey and Paper expected shortly
- Focus topics for IFoA SST Working Party SIAS paper (late 2014):
 - Industry comparisons and improvement ideas
 - Scenario selection approaches
 - Management actions
 - Communication
 - Insights from other industries



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Questions

Comments

Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenter.



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