



**FINANCIAL SERVICES COMMISSION**

**STRESS TESTING**

**FOR**

**GENERAL INSURANCE COMPANIES**

## **Stress Testing for General Insurance Companies**

Stress tests are a necessary tool in assisting an insurer to manage its risks and maintain adequate financial resources to deal with those risks. Stress tests can be used to identify and quantify the impact of different stress scenarios on an insurer's expected future financial position, in the broad sense.

For the purposes of this paper, the term "stress testing" includes both sensitivity testing and scenario testing. Both approaches are undertaken by insurers to provide a better understanding of the vulnerabilities that they face under atypical conditions. They are based on the analysis of the impact of unlikely, but not impossible, adverse scenarios. These stresses can be financial, operational, legal, involve liquidity or be related to any other risk that might have an economic impact on the insurer.

Specifically, a sensitivity test estimates the impact of one or more moves in a particular risk factor, or a small number of closely linked risk factors, on the future financial condition of the insurer.

An example of a sensitivity test is the resiliency testing done in the U.K. and Australia. A scenario test, by comparison, is a more complicated type of test, which contains simultaneous moves in a number of risk factors and is often linked to explicit changes in the view of the world. Scenario tests often examine the impact of catastrophic events on an insurer's financial condition, particularly in a defined geographical area, or simultaneous movements in a number of risk categories affecting all of the insurer's business lines or trading operations, e.g., underwriting volumes, equity prices and interest rate movements.

Stress tests are a tool for examining what might happen in a particular stress scenario. However, it should be noted that they do not predict what will happen.

The business of insurance is based on dealing with uncertainty. Therefore, an insurer needs to consider a wide range of possible outcomes that may affect its current and expected future financial position. Stress tests are a necessary risk management tool for both insurers and supervisors to ascertain whether insurers are financially flexible to absorb possible losses that could occur under various scenarios. All the effects of stress testing, both direct and indirect, on both sides of the balance sheet should be taken into account.

Stress tests are a necessary tool for insurance management. Such tests should be a fundamental element of an insurer's overall risk management framework and capital adequacy determination.

Stress tests are appropriate tools for insurers to use in assessing the risks to which they are subject and in ascertaining their own limits on the risks that they are prepared to take. They should help the insurer in making decisions as to

whether, and what, action is needed to ensure that it is not taking undue risks from its own or the supervisor's and policyholders' perspective. For many insurers, this may require a cultural change in their approach to risk management.

It is expected that prudent, well-managed insurers would undertake stress testing as a matter of good corporate governance, which should result in better internal controls, governance and risk management. To be truly effective, stress tests should be considered as a fundamental element in an insurer's overall risk management framework, rather than being viewed simply as a helpful tool for capital allocation purposes or as a way to monitor performance. The use of such tests should not be seen as a regulatory burden.

Stress testing should contribute to the understanding that the board and management has of the risks facing the insurer. To accomplish this, the board and management must understand the assumptions underlying the stress testing, as well as the results. Also, stress tests can help an insurer to develop and assess alternative strategies for mitigating its risks.

Specifically, such tests should be appropriate to the insurer's own risk profile. For example, stress tests should reflect the fact that each insurer does not underwrite the same classes of risks, accept the same level of risks, have the same distribution systems, employ the same reinsurance arrangements, have the same distribution of assets by investment type/grade or have the same operational systems and controls.

The stress testing should address significant adverse threats to the future financial condition of the insurer, rather than just mildly uncomfortable possibilities, so as to truly test the insurer's exposure and the sufficiency of its technical provisions and capital. To better inform the board and management of the insurer's exposure to risks, it is useful to determine how adverse a risk must be for it to impair the insurer's financial position. The insurer should use stress testing for strategic planning and for contingency planning.

### ***The supervisory process***

The FSC should receive the results of the most material stress tests and the critical assumptions underlying them, and have access to the results of all tests.

### ***Required expertise***

Each insurer should have access to the expertise and technology required to design and perform stress tests. This may involve a specialised risk management unit, actuarial personnel or external consultants.

Various individuals within the insurer, such as risk managers, finance personnel, actuaries and business line managers, should be involved in designing the stress tests. It may also be useful to consider other views, for example, those of the

FSC, external consultants, the accounting and actuarial professions, the reinsurance industry and rating agencies.

Those involved in designing the stress tests should have:

- a mix of expertise, which includes actuarial, accounting, economic, legal and financial expertise;
- a thorough understanding of the business of the insurer;
- the ability to identify risks that could potentially have a material adverse impact on the insurer's financial position; and
- the ability to undertake an analysis of how much of an impact these risks could reasonably have and the understanding of the various models that can be used.

Those carrying out the testing must have the ability to analyse and effectively communicate the results. Regardless of the level of expertise of those involved in designing the stress tests, a level of independence should exist to ensure that an adequate set of tests has been designed that is appropriate to the risk profile of the insurer. The decisions about the factors to be considered and the tests undertaken should be made, if possible, by those who are not involved in the corresponding business decisions. For a small insurer, it may be difficult to fully separate the decisions on stress testing from those involved in business operations.

In turn, insurers would be expected to be able to understand the results of the stress testing and to determine whether any aspect of their operations should be changed, given this knowledge.

### ***Designing stress tests***

It is appropriate that each insurer design its stress tests considering its own risk profile and the complexity of its business. It is likely that this will lead to variation among insurers as to the extent and nature of the tests performed.

Various considerations are likely to determine the nature and extent of tests required. They include the insurer's:

- solvency position;
- lines of business and distribution systems
- current position within the market
- current position within the group
- investment policy
- business plan

- general economic conditions

For example, an insurer with a low solvency position should conduct more extensive or more frequent stress tests. An insurer within a larger corporate group should test the effects of possible changes resulting in constraints to accessing additional capital.

The insurer should consider what events are material, having regard to their impact and likelihood or plausibility. This, in part, will be a function of the insurer's size, complexity, solvency position and the nature of its operations and will depend on the insurer's risk tolerance.

The insurer should be able to withstand circumstances that are reasonably foreseeable, albeit unlikely, including events for which it is providing specific coverage.

### ***Modelling techniques used in stress testing***

Various modelling techniques are used in stress testing. The use of a particular risk model will depend on the insurer's circumstances and approach to risk assessment and risk management.

Common methods used are based on static or dynamic modelling and deterministic or stochastic approaches. In its basic form, static modelling implies that the analysis of the insurer's financial position is at a fixed point in time, whereas dynamic modelling takes into account developments over a certain time period. Deterministic models examine the financial impact if a certain scenario occurs, whereas stochastic models also take into account the probability of various scenarios occurring.

A simple example of a static deterministic stress test is where an insurer, in determining its appropriate capital level, examines the effects of loss ratios on its balance sheet. The loss ratio is the risk variable, and the impact on net assets is the resultant exposure. Such tests do not take into account the actual probabilities of the different loss ratios occurring.

Stochastic models are more advanced techniques. They are based on probabilities that predict how key financial parameters interact with each other over time, and generate a distribution of outcomes based on simulations of those parameters in the future. One of the advantages of stochastic modelling is that it provides an indication of the range and the likelihood of different financial outcomes occurring. This is useful in achieving a particular level of confidence in the solvency level, e.g., a 0.5% risk of ruin. Stochastic models are useful, and at times essential, where the insurance contracts contain both embedded options and financial guarantees. In these circumstances, it is likely that stochastic modelling will be needed for financial statement purposes as well as for stress testing.

### ***Complexity of scenarios and interactions among risks***

The complexity of stress tests should be driven by the circumstances of each insurer. Straightforward tests, with simple assumptions that cover the major risks, may be more useful than complex modelling that is difficult to understand or to validate. However, it would be expected that a prudent, well-managed insurer would regularly examine the quality and content of such tests, and seek to improve the methodology over time.

Risks are seldom totally independent or totally related. The insurer should examine the correlations among various risks to assess the effects they may have on the stress testing models and assumptions used. It is important that the extent of correlation that is assumed to apply in the future is not understated. There is evidence that in adverse situations, previously low levels of correlation can increase. Determining interdependency requires judgement, as there may be no historical data that throws meaningful light on new social and economic conditions.

The correlation and the interdependency among risks should be regularly evaluated. While the frequency of such evaluation should normally be fixed in advance, it may need to be done more frequently in times of crisis. The correlation analyses are required to ensure that the interrelationship of risks is taken into account. For example, if an insurer was affected by a major catastrophe, other parties on which it is dependent may also have been affected, such as:

- reinsurers on which the insurer is reliant to meet claims
- intermediaries which generate future business
- other service providers, who may be unable to meet their contractual obligations or provide a full service

One stress may lead to another (e.g., cause and effect chains) and thus one may have to look at multiple risks. There are normally consequent effects, often in less-measurable risks, which should be taken into account when determining scenarios. An example is a regulatory requirement to augment, rather than just replenish capital depleted by the stress conditions. These interactions may not occur immediately but may evolve over time.

Determining the extent of dependencies that exist can be complex. A degree of prudence and pragmatism will be required when making judgment. This is particularly the case when determining tail-dependencies.

### ***Modelling management actions***

Stress testing should generally consider the extent and effectiveness of options available to management in reacting to emerging risks. It is possible for a stress test to show a possibility of failure if no management action is assumed, but then

be able to demonstrate that with appropriate and timely management action, it is possible for an insurer to maintain a satisfactory financial condition.

There are many areas within an insurer's business that do not lend themselves easily to quantitative modelling, especially those that depend on the competence of and actions taken by an insurer's board and management.

When incorporating management actions into the stress testing, the following procedures should be followed:

- the impact of the stress event should be quantified and reported, without incorporating any management actions;
- careful consideration should be given to the time it would take for management to recognise and respond to the problems, given the terms and conditions of policies and practices to be adjusted and the extent and effectiveness of options open to management to act in response to the stress event; and
- the type and timing of the management actions that should be incorporated in the stress test projection and then be quantified and reported.

#### ***Limitations of stress tests***

As a concept, stress testing is relatively straightforward. However, the application of this technique in practice is more complicated. Some of the difficulties are:

- determining what risk factors to stress
- establishing how such factors should be stressed
- establishing what range of values should be used
- determining the time horizon that such tests should consider
- analysing the results meaningfully and making informed judgments.

Another factor that insurers need to consider is that stress tests usually require good information systems and compatibility across business units, to properly analyse the interrelationships of risks. Internal communication flows among an insurer's business units are therefore important, particularly if there is not a dedicated resource area to undertake stress tests.

The extent to which parameters and variables are reliable should be reflected in the interpretation of results and resulting recommendations.

Reviews should occur regularly to ensure that they remain relevant to the changing risk profile of the insurer and external market conditions.

### ***Reporting to board and management***

It is essential that the assumptions and results be presented in a manner that can be understood by an insurer's board and management and acted upon.

A report to the board and management should be prepared at least annually, unless stress testing is being performed less frequently.

The timing of the report may depend on the urgency of the matters reported and on the desirability of integrating stress testing into the insurer's financial planning cycle.

In some cases, a change in the insurer's circumstances since the last regular stress testing investigation may be so significant that to delay further testing and reporting to the time of the next regular report would be imprudent. In such a case, stress testing should be undertaken, and results reported, on an interim basis.

*Source: IAIS Guidance Paper: "Stress Testing by Insurers"*