DeRisk

CRISIL's insights and analyses of regulations, macroeconomic factors, guidance and trends affecting the insurance industry

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Revisiting the stress test

Older techniques to measure resilience have to be recast anew as shock boundaries are pushed

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Investment management and actuarial functions routinely measure the resilience of their assets and liability models by using stress-testing techniques. However, the current market volatility and challenges in liquidity/possible solvency in the industry are near-unprecedented.

That calls for a complete relook at tools and methods of stress testing used by insurers, superannuation funds and other financial institutions.

It is important to review what the insurance industry did in terms of stress-testing processes during 2019, especially because 2020 brought on the Covid-19 pandemic that is likely to transform practices going forward.

A glimpse into the stress-testing industry practices for insurers reveals key aspects typically emphasised until now (Exhibit 1), with a focus on maintaining business viability over a three-year period.

Exhibit 1: Aspects of stress testing picked by insurers

Scenario and shock generation

- Historic monthly stress and scenario analyses on current and plausible events
- Financial shocks on corporate bonds and sovereign spreads, interest rates, and equities (including private equities)
- Historical stress events. For example, the 1987, 2001, 2008 and 2011 financial crises; the 1918 Spanish flu; the 1999 Lothar & Martin storms; and, Hurricane Katrina.
- Market deterioration and credit condition shocks. For example, the widening of yields or spreads of residential or commercial mortgage-backed securities during 2008
- Policyholder behaviour including lapses and increased health issues affecting insurability

Stress-testing frameworks

- In-house crafted approach / proprietary internal capital and stress-testing framework to measure quantifiable risks, including operations
- Scenario generation and stress testing governed by enterprise risk management and asset liability management programmes
- Management and Control functions may also be involved in stress testing, including ongoing monitoring activities
- Other frameworks to deal with special aspects of stress testing (such as counterparty and credit risk frameworks)
- Preferred use of historic data over expert judgement, as the latter is more difficult to support. For example, since Spanish Flu (1917) data is usually not readily available, many global banks have used SARS (2003) data for internal shocks, rather than expert judgement.

Geographical differentiation

- Differentiated model risk management and stress-testing requirements across legal entities due to regulations and actuarial practices
- Specific methodologies of local entities to incorporate shocks in their models, including investment strategies (derivatives) and stress to portfolios
- Liquidity risk scenarios, assuming the closure of short-term debt markets, as well as additional calls on liquidity handled by the business units
- Reconciliation under a best estimate and systemic adverse scenarios for liquidity planning, liquidity sources and liquidity needs include cash, premium payments and claims expenses

Regulatory guidance

- Guidelines for US insurers and scenario generation around life annuities by the regulator National Association of Insurance Commissioners (NAIC)
- Pension funds and insurers in Europe followed the adverse scenarios tested in the European Insurance and Occupational Pensions Authority – EU pension funds stress tests and showed a shortfall of €180 billion[1].
- The Prudential Regulation Authority (PRA) in the United Kingdom (UK) requested the largest regulated life and general insurers to undergo a biennial stress test and report upon its impact on business decisions[2]
- In Canada, the Office of the Superintendent of Financial Institutions (OSFI)-regulated insurers provided evidence that stress testing is integrated into their internal risk management processes

[1] *https://www.eiopa.europa.eu/occupational-pensions-stress-test-2019_en*
[2] *https://www.bankofengland.co.uk/prudential-regulation/letter/2019/insurance-stress-test-2019*

Business environment navigation

The business environment has received a jolt from the pandemic and is likely to continue down an unpredictable path in the next 3-5 years. To address this, there is a rising need to measure accurately the likelihood and impact of diverse shocks that can affect investment funds and actuarial liabilities. This is clearly supported by regulatory review of stress-testing practices. For the banking industry in the US, for instance, these have focussed on three economic supervisory scenarios[3] - baseline, adverse and severely adverse.

For the insurance industry, there is a pending call by regulators to standardise measurement of shocks to assets and liabilities. This is required to reduce variability across insurers in their deployment of internal processes - evident from the diversity of approaches followed by insurers in 2019 (Exhibit 1), and non-standard shocks and scenarios.

At present there is no statutory stress testing requirement for insurers

As an example of this, the PRA in the UK requested large insurers in 2019 to undertake a biennial stress-testing exercise. In this exercise, the PRA defines four insurance shocks with a prescribed set of variables and assumptions/sensitivities for each, with the intention of bringing uniformity across the industry:

- IAS = Insurance Asset Shock
- IAS + fundamental spread increase
- IAS + longevity event
- IAS + longevity event (reverse longevity stress)

The IAS includes changes to interest rates (fall of 100 basis points, or bps), increases of credit spreads (ranging from AAA 150 bps to BB notches at 400 bps), equities (30% fall in value), and other variables including derivatives. For example, option values should move in line with an increase in implied volatility at all tenors and moneyness of 700 bps and swap values, in line with a decrease in the floating yield curve of 100 bps at all tenors.

Although this is one step towards standardisation in an ask-provide environment from the PRA, there is no statutory stress-testing requirement for insurers at present.

In Exhibit 2, we present a selection of events more likely to have an impact on the insurance industry shocks for stress-testing purposes, along with corresponding opportunities and risks. We view 'evolving regulations' as a top event in the business environment, as these are likely to change significantly in the next 3-5 years. We also consider 'people skills' will have a potential impact on the ongoing effort to strengthen the stress-testing functions.

[3] *https://www.federalreserve.gov/bankinforeg/stress-tests/2016-Supervisory-Scenarios.htm*

Exhibit 2: Opportunities and risks around stress testing

Top events driving stress testing	Opportunities	Risks
Evolving regulations	Identification of regulation-driven opportunities, including engaging with regulators that can help navigate forecasting methodological challenges	Lack of readiness for new regulations may not improve operations or cause good commercial opportunities. This includes diverting of resource focus and cost increases.
Changing competitive landscape	Having the correct scenarios and making right decisions are crucial; competitors are learning, investing and collaborating with innovative start-ups, consultants, insure-techs and fintechs to get the approach right	Disruptive new methodologies, technologies arrive quicker than before and cause existing stress-testing practices to be less relevant and operationally inefficient
Technological developments	Modernisation of in-house technologies, processes and practices enhances the ability to address the stress-testing journey holistically	If the latest methodologies, tools and technologies are not deployed, there is a high risk of falling behind competitors, market and compliance
Genomics and underwriting	This will enhance the accuracy of underwriting and bring a positive effect in risk management, especially individualised products and more targeted pricing, including improvement in accessibility to various markets	The lower cost and greater availability of genomics information may lead to it becoming easier for consumers to access directly. This can lead to selection risk
Trade wars, pandemics and climate risk	Diversification helps insurers keep up with evolving de-globalisation, protectionism and go-green challenges. The measurement of impact of these beyond control forces are the new competitive advantages for insurers.	Capital cash flows may become more difficult across geographies; this may imply underlying difficulty to invest in private equity or other forms of sustainable investment. Political risk may increase due to protectionism.
Unemployment	The challenging environment can facilitate the development of new and relevant products for working-age people. This could be a positive shock for some innovative insurers.	The immediate effect of liquidity could lead to insolvency, thereby preventing non-critical services (such as insurance) to experience increased lapses
People skills	The inclusion of remote workforces can help reduce scarcity and competition to find skills and experience needed to deal with stress-testing initiatives	Failure to respond to new workforce trends, training and retention of talent will reduce insurers' ability to find creative solutions to measure and mitigate risk properly

Way forward for stress testing and scenario generation

Even the severely adverse scenarios provided by the regulators in 2019 could not predict what has been observed in the industry and business environment this year. This is why it is imperative to rethink the way scenarios are being developed and used for stress-testing purposes.

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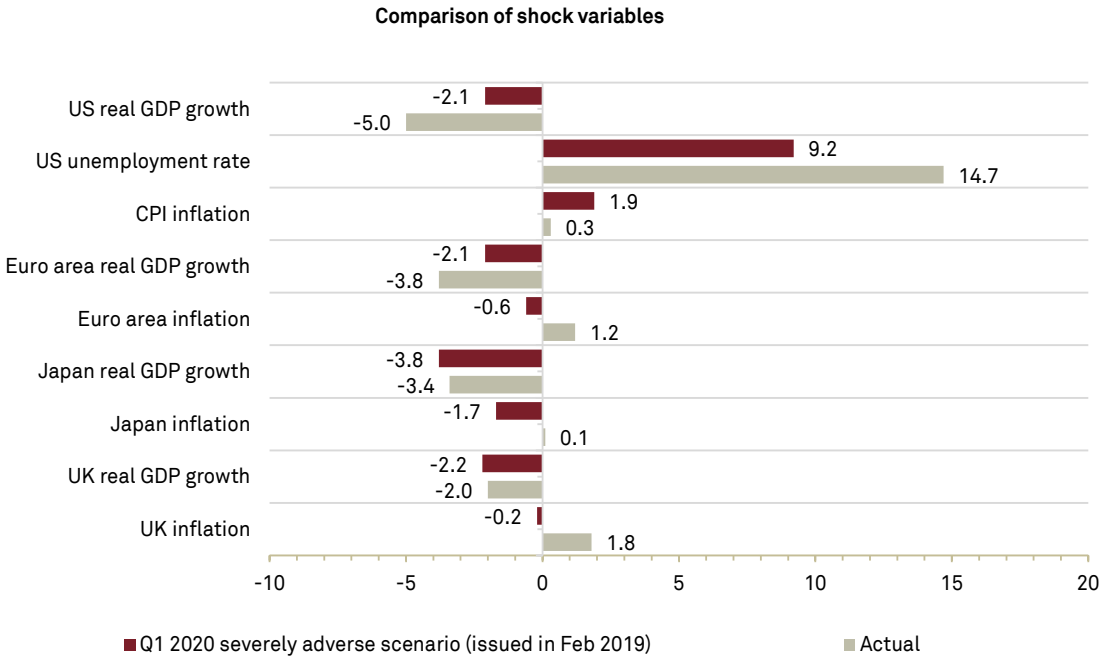
Exhibit 3 shows details of actual values[4] in the first quarter (Q1) of 2020 for key domestic and international economic variables, compared with the variable shock value from the severely adverse scenarios issued in February 2019[5].

Exhibit 3: Severely adverse scenario variables (issued in Feb 2019) vs actuals for Q1 2020



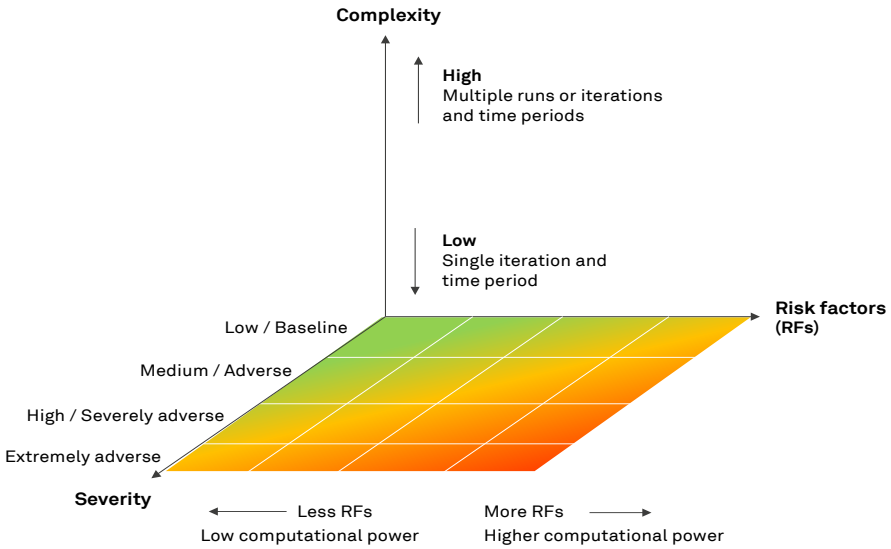
For example, the 2019 severely adverse scenario from the US Federal Reserve had a shock in gross domestic

product (GDP) of -2.1% for Q1 2020, while the actual fall for that period was -5.0%[6]. The GDP value of the US represents ~17.5% of the world economy. It was worth $21.2 trillion in 2019 and is expected to end at levels of 2018 (~$25 trillion) in 2020. Similarly, the unemployment rate in the 2019 severely adverse scenario had a 9.2% shock compared to the 14.7% actual released for the month of March 2020.

Exhibit 4 shows a three-dimensional representation of the scenarios universe for stress testing with the axes representing a number of risk factors, complexity and severity. Prior to 2020, the internal and regulatory scenarios for stress testing focused on shocks to a relatively small number of risk factors, in a single iteration, and with varying degrees of severity. But, as shown in the exhibit, this picture is now changing rapidly on all three dimensions.

[4]Q1 2020 actual values pooled from central banks and statistics agencies, including the US Bureau of Economic Analysis and the US Bureau of Labor Statistics
[5]https://www.federalreserve.gov/newsevents/pressreleases/bcreg20190205b.htm
[6]According to official data from the World Bank and projections from Trading Economics.

Exhibit 4: New dimensions of stress testing and shock design



Dimensions explained:

1. **Risk factors:** This can be understood as multiple variables interacting with the model output that needs to be stress tested. For example, the PRA stress-testing exercise mentioned in the previous section incorporated a shock by adding the longevity risk factor to the IAS baseline scenario. Multiple risk factors require more computational power.
2. **Complexity**: Multiple Monte Carlo runs (iterations) and time periods (horizons) may be required to expand risk management views on model performance. This added complexity would require better scenario management tools.
3. **Severity**: Previous shocks for stress testing only incorporated 2-3 scenarios to measure model robustness. For example, in February 2020, the US Fed provide a baseline, an adverse, and severely adverse scenarios only. Going forward, the regulators should consider an extreme and new scenario that includes at least an event with 0.005% / year probability.

Going forward, internal and regulatory shocks may have to include unlikely but plausible events. The challenge would be to make an appropriate selection of the shock to be used for stress testing. The internal and regulatory scenarios for stress testing will increase in complexity and severity, leading to the need of more computational power due to the increased number of runs, horizons and risk factors. As shown in Exhibit 4, the stress testing practices have traditionally covered the green and amber areas – that is, a limited number of iterations and risk factors for low-high severity. New stress testing practices (for example, post-pandemic) are to incorporate more risk factors, complexity, severity, and iterations for a time period (area in red).

Insurers will continue to navigate some of the new opportunities brought by the evolving top events in the business environment (mentioned in Exhibit 1). This will push for new types of scenarios which are likely to be used in the industry and lead the way forward in the selection of shocks and scenarios for purposes of internal stress testing. Regulators may also continue to seek common ground in developing standardised approach and principles for stress testing (for example, EIOPA and their 2019 Methodological Principles on Stress Testing[7] published in Q1 2020).

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In fact, on June 17, 2020, the PRA released feedback[8] to general and life insurers for both, the 2019 stress test (see Exhibit 1 above) and the one done in April 2020 in light of the Covid-19 pandemic.

The release of the three additional Covid-19 scenarios from the Fed on June 25, 2020, with varied recovery curves – U-, V- and W-shaped recovery paths – showed a 25% percentile, which was only 0.3% above the CET1 minimum required ratio of 4.5%.

Other regulatory bodies that have evolved their stress-testing frameworks include Autorité de Contrôle Prudentiel et de Résolution (ACPR) in France and the Monetary Authority of Singapore (MAS), which have instituted climate-risk stress testing for insurers this year.

[7] *https://www.eiopa.europa.eu/sites/default/files/publications/methodological-principles-insurance-stress-testing.pdf*
[8] *https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/letter/2020/insurance-stress-test-2019-feedback.pdf?la=en&hash=BF3DF52210D9CBAF6FED788E35DB8530A74B5337*

While the results showed resiliency in the industry to severe shocks in both the tests, it also highlighted areas that needed improvement, particularly around design, shocks, capabilities, risk factors, data quality, and tools to evaluate some scenarios (for example, on climate risk).

The design and adoption of new shocks (e.g. those in the red area shown in Exhibit 4) may drive changes at the interactions between risk factors, severity and complexity of scenarios.

Exhibit 5: Incorporating new scenarios in stress testing

Risks	New shocks/scenarios in focus
Ecosystem	• Consumer behaviour shocks and rationality, genomics underwriting including lapsation and persistency of policies • Competitors' financial status • Systemic risks such as trade wars, de-globalisation and cash-flow restrictions
Financial	• Credit risk downgrades and derivative risks • Liquidity and solvency scenarios • Interbank Offered Rate (IBOR) and Euro Overnight Index Average (EONIA) replacement may simplify stress testing efforts
Insurance	• Longevity of risk and pandemic events • Transversal risk factors • Premiums and reserves volatility
Operational	• Catastrophic events and climate shocks • Legal impact from IBORs and EONIA transition • Modernisation of in-house technologies including new people skills

Source: CRISIL

Exhibit 5 above shows a set of risk factors the insurance industry has to consider as part of the shock design activities. Since these risks factors will add complexity in the stress testing risk management function, they are candidates for being part of the red area identified in Exhibit 4. Each of these risk factors interact and percolate differently in the cash-flows and is an important component in assessing the business resiliency.

Conclusions and how CRISIL can help

Insurers are reshaping their task forces to develop and adopt new scenario generation methodologies and tools that can help them deal with stress testing initiatives under the prevailing business environment. It may not be feasible for banks and insurers to consider all potential Covid-19 scenarios to model market risk.

However, they should consider a good number of possible scenarios, ensuring that extreme situations and intermediate expectations are tested, while modelling the pandemic's impact on their capital requirement based on market risk[9].

As more scenarios are becoming standard practices, insurers will have to navigate this transformation. For example, the scenarios used in reverse stress testing, unlike in traditional stress tests, do not have to meet the 'extreme but plausible' standard[10]. Creativity will be the new key skill required to generate scenarios.

Our experts can help you navigate the challenging environment, by providing support to the scenario generation and scenario expansion initiatives for your business functions. We are currently using our proprietary Scenario Expansion Manager stress-testing platform (click here for details) to help financial institutions deal with this new environment.

[9] *https://www.crisil.com/en/home/our-analysis/reports/2020/05/modelling-market-risk-for-pandemics.html*
[10] *https://www.cftc.gov/system/files?file=2019/05/02/cftcstresstest042019.pdf*

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