Climate-related risk: Stress testing requirements in Asia Pacific

Introduction

Globally, we are seeing more extreme weather due to climate change. In 2022, intense and unprecedented early heat waves hit western Europe and the United States, with temperatures exceeding 40°C for the first time in several locations. This also led to extensive and fast-moving wildfires that have caused loss of life and significant damage to property.

The International Association of Insurance Supervisors (IAIS) has stated that climate change is a source of financial risk, having an impact on the resilience of individual insurers as well as on financial stability. An increasing number of insurance regulators around the world are introducing new regulations and guidelines in relation to climate risk management, which are often followed by the aspiration to measure the resilience of the insurance sector to such risks. A popular approach among insurance regulators in evaluating climate risk resilience is the introduction of scenario analysis. Regulators are also adopting other tools such as industry-wide questionnaires to understand the resilience of the insurance sector to climate risks.

To assess climate-related risks, many regulators have encouraged insurers to develop their own climate-related scenarios for own risk and solvency assessments (ORSA) and stress testing purposes. Notably, several regulators such as the Bank of England, Autorité de Contrôle Prudentiel et de Résolution and the Monetary Authority of Singapore (MAS) have developed a set of prescribed scenarios and have mandated insurers to conduct the analyses.

In 2021, we produced an article[1] discussing climate-related risks and regulatory stress testing requirements from the perspective of life insurers and reinsurers in Asia. This paper aims to provide an updated view of regulatory stress testing requirements for climate-related risk by Asian regulators in 2022, with an expanded scope to cover the regulatory requirements for both life and non-life insurers.

Recent regulatory stress testing exercises for the insurance industry in Asia-Pacific

Currently, regulatory stress testing aims to allow regulators and the financial services industry to develop a better understanding of climate-related risk and the plausible adverse impacts within financial systems and economies, with no capital requirements being imposed by the test results. However, these preliminary results may ultimately lead to insurers looking more closely at the capital implications from potential climate-related losses. A summary of recent industry-wide regulatory climate stress testing exercises in Asia-Pacific is outlined below.

SINGAPORE

Since 2021, the MAS has required life and non-life insurers to perform climate risk scenario testing within its Industry-Wide Stress Test (IWST) exercise to assess the climate risk exposure of Singapore's insurance sector.

The first IWST (IWST 2021) included a three-year climate baseline scenario focusing on transition risk prescribed by the MAS. It assumed a disorderly transition with quick actions taken by governments to tackle climate change. This resulted in a short-term decline in economic growth in all economies, with some sectors and countries harder hit.

In the latest testing, IWST 2022, three hypothetical and exploratory climate-related scenarios are considered over the period 2022 to 2050, i.e., Orderly Transition, Disorderly Transition and No Additional Policies. These scenarios are broadly consistent with the Phase II Network for Greening the Financial System (NGFS) scenarios published in June 2021 by NGFS. For all three scenarios, MAS has prescribed a set of stress factors covering macroeconomic, financial, physical risk-related and transition risk-related parameters which are applicable to both life and non-life insurers.

[1] Eng, P. & Chan, E. (November 2021). Climate-related risk: Stress testing requirements in Asia. Milliman White Paper. Retrieved 7 March 2023 from https://us.milliman.com/en/insight/climate-related-risk-stress-testing-requirements-in-asia.

TAIWAN

As part of the 2021 supervisory stress test, the Financial Supervisory Commission (FSC) requested non-life insurers to assess their solvency positions as at the end of 2020 under a scenario that Taiwan was hit by a series of the strongest typhoons, with stress factors calibrated by the FSC. The outcome of this test showed that the non-life industry as a whole is well capitalised to handle a series of adverse climate events. The non-life industry reported an average capital adequacy ratio of 422.3% and an average net worth ratio of 30.06% under this scenario, much higher than the statutory minimum requirements (i.e., 200% capital adequacy ratio and 3% net worth ratio). Although there are no further industry climate stress test requirements, it is noted that the FSC has required insurance companies to incorporate climate risk management into their ORSA exercises.

JAPAN

In 2021, the Financial Services Agency (FSA) and the Bank of Japan conducted a joint pilot climate scenario analysis which covers both the banking and non-life insurance sectors. This exercise involved three major players in each sector, with the FSA allowing the participants to conduct analysis with their own risk models under three scenarios published by NGFS, namely NetZero2050, Delayed Transition, and Current Policies. Stress factors are calibrated by the participants instead of being fully prescribed by the FSA. For the insurance sector, the FSA focused on acute risks attributed to typhoons and floods to assess the magnitude of climate-driven physical risks (i.e., the NetZero2050 and Current Policies scenarios), and the overall results indicated an increase in claim liabilities as temperatures rise. However, the FSA pointed out that the outcomes from the three insurers varied due to the non-uniformity of long-term assumptions and dissimilarities in their risk models.

Stress test requirements of Asian regulators

Many jurisdictions are developing new climate scenario and stress test frameworks or are improving their existing methodologies to incorporate second-round effects. The table in Figure 1 summarises the stress testing requirements for a number of jurisdictions in Asia-Pacific, covering the banking and insurance sectors.

FIGURE 1: STRESS TESTING REQUIREMENTS FOR SELECTED COUNTRIES IN ASIA PACIFIC

JURISDICTION	RELEVANT GUIDELINES	STRESS TEST REQUIREMENTS/DESCRIPTION	NEXT STEPS
SINGAPORE	The 2022 IWST guidelines incorporates a range of longer-term thematic climate scenarios, covering both physical and transition risks for selected insurers. These scenarios are broadly consistent with the Phase II NGFS scenarios published in June 2021. The 2020 Guidelines on Environmental Risk Management (Insurers) stipulate that insurers should include, where relevant, short-term and long-term environmental scenarios into their scenario analyses and stress testing.	The 2022 IWST considered three hypothetical and exploratory climate-related scenarios (Orderly Transition, Disorderly Transition, and No Additional Policies) over the 2022-2050 period. It is meant to complement the 2021 IWST, which only featured a shorter-term climate scenario. MAS has prescribed a set of stress factors covering macroeconomic, financial, physical risk-related and transition risk-related parameters which are applicable for both life and non-life insurers.	MAS announced that ongoing annual stress tests are likely to involve at least one climate scenario.
MAINLAND CHINA	The People's Bank of China (PBoC), along with six other government agencies, issued the Guidelines for Establishing the Green Financial System in 2016, which encouraged banks and other financial institutions to take environmental risks as an important factor when conducting credit asset quality stress tests. The PBoC issued the Guidelines on Environmental Information Disclosure for Financial Institutions in 2021, which require financial institutions to quantify the impact of environmental factors on their business models through scenario analysis or stress test methods. The China Banking and Insurance Regulatory Commission (CBIRC) issued guidelines on green finance for the banking and insurance industries in 2022, proposing the use of scenario analysis and stress testing for banks' post-loan funds as well as insurance investment funds to assess the climate risk exposures and impacts.	The PBoC completed the first phase of climate risk stress tests, covering 23 major banks in 2021, focusing on the assessment of the repayment capabilities of enterprises belonging to certain specified high-carbon industries (i.e., thermal power, steel and cement) when emission cost increases, as well as the subsequent impact on asset quality and capital adequacy of these banks. No regulatory climate risk stress test is required for the insurance industry at the date of this paper.	The PBoC will continue to improve the methodology of the climate risk stress tests for the banking industry by refining the stress scenarios, expanding the scope to cover other high-emission industrial sectors and exploring the possibility of carrying out climate risk-related macro scenario stress tests. The CBIRC will continue to improve the policies related to green finance in the banking and insurance industries, guiding banks and insurance institutions to strengthen internal control management and information disclosure and improve green finance standards and green finance statistics. It is expected that the CBIRC will require all the financial institutions to conduct supervisory stress tests, but no road map has been provided yet.

JURISDICTION	RELEVANT GUIDELINES	STRESS TEST REQUIREMENTS/DESCRIPTION	NEXT STEPS
TAIWAN	The FSC requires insurance companies to strengthen the identification of the sources and types of climate change risks in their 2021 ORSA reports, and to properly present the risks faced and actions taken. The FSC also requires insurance companies to establish a mechanism to assess climate-related risks and to identify climate-related opportunities, and to disclose such information in their sustainability reports or official websites. The first disclosure is expected to be published at the end of June 2023. The FSC expects insurance companies to consider using scenario testing and stress testing as one of their risk management tools to assess climate risks. The FSC also anticipates the insurance industry will include analyses using mild and severe scenarios, as well as short-term and long-term scenarios.	Banks operating in Taiwan will undergo a mandatory climate-change stress test in 2023 to measure the impact of a range of possible environmental catastrophes on their asset portfolios.	It is expected that the FSC will extend the supervisory stress tests to cover the whole financial industry (including life insurers). Details of the exact timeline and scenarios have not yet been released, but the regulator has indicated that the insurance industry will need to participate in the mandatory climate-change stress test in future.
HONG KONG	The Insurance Authority (IA) has explicit requirements for companies under Hong Kong's Group-Wide Supervision (GWS) framework to disclose their approaches to managing climate-related and environmental risks and the potential impact of material climate-related and environmental risks to the supervised group at least annually.	The Hong Kong Monetary Authority (HKMA) launched a pilot climate risk stress test (CRST) in 2021 and plans to undertake another CRST in two years' time. No regulatory climate risk stress test is required for insurance companies at the time of this paper.	The IA expects insurers to consider climate risks in future ORSA reporting if it is a material risk to the company. Further guidelines in relation to climate risk management will be provided to the industry in the near future.
MALAYSIA	A Climate Change and Principle-based Taxonomy guideline and an exposure draft of Climate Risk Management and Scenario Analysis have been published by Bank Negara Malaysia (BNM) to facilitate financial institutions in assessing climate-related risks within their risk management processes.	BNM has scheduled the launch of an industry-wide climate risk stress testing exercise in 2024, and has released a discussion paper setting out BNM's proposed framework and elements for the stress testing exercise.	BNM is encouraging financial institutions to take climate–related risk considerations into account in their risk management. For the 2024 stress testing exercise, BNM will refine the key elements based on the industry response by the end of 2023.

It should be noted that Figure 1 is not an exhaustive list of jurisdictions in Asia-Pacific with climate-related risk regulations or guidelines for financial institutions or with announced plans to issue them. In general, regulators in Asia-Pacific have focused on stress and scenario testing as the starting point for risk assessment for financial institutions, and banks have been at the forefront of these developments. There is also a general tendency for regulatory activity to be focused on non-life insurers ahead of life insurers.

Where are Asian insurers with their climate-related risk assessments?

A number of insurers across Asia-Pacific have started to conduct qualitative and/or quantitative climate-related risk assessment exercises, and many adopt a phased approach. Often, insurers will first conduct a qualitative analysis combined with narratives to understand how climate risk will impact their financials in various climate pathways, followed by considerations of potential mitigation plans. Quantitative analysis normally begins with a simple and high-level approach, which is subsequently refined to be more robust and granular.

Non-life insurers often focus on assessing climate-related catastrophe risks (i.e., acute physical risk) applicable to their underwriting portfolio. In the data collection process, insurers have started collecting climate-related risk data, which includes, but is not limited to, meteorological, geographic, and socioeconomic data. Non-life insurers have also invested in improving the climate-related catastrophe risk assessment system or loss predictive models to better model the risks. Companies have been analysing the accumulated climate-related catastrophe risk exposure and the loss experience attributed to extreme weather events such as earthquakes and typhoons. Some companies have started to conduct stress testing to assess their potential risk exposure and the impact on their solvency positions under various short-term and long-term climate-related risk scenarios in order to improve their understanding of the risks.

In contrast, life insurance business is long-term in nature, and life insurers are greatly exposed to transition risks as a result of the large amount of assets held by the companies to back their liabilities. Market risk is a key risk of most life insurers. Therefore, it is not surprising that life insurers often prioritise the modelling of how transition risks will impact their balance sheets. Life insurance business is also exposed to chronic physical risk through the long-term effects of temperature increase on mortality and morbidity. However, it is worth noting that there are widely varying opinions across research papers in developing the appropriate stress parameters on mortality and morbidity rates under various climate pathways, and therefore this area remains a challenge for many life insurers. As a result, the number of insurers that have incorporated physical risk into quantitative climate stress testing is relatively limited.

For countries with strong regulatory push on incorporating climate risk management into the enterprise risk management (ERM) framework, insurers are more likely to perform more in-depth climate stress testing exercises and include such analyses in their ORSA. For example, MAS[2] has commented that since 2021 many insurers have incorporated climate risk scenarios as part of their ORSA on top of the MAS-prescribed climate risk stress testing. Several regulators and market organisations across Asia Pacific, such as the Singapore Stock Exchange, Hong Kong Stock Exchange and Hong Kong Monetary Authority, have also made Task Force on Climate-Related Financial Disclosures (TCFD) requirements compulsory in the near future. The TCFD was created by the Financial Stability Board to improve and increase disclosure of climate-related financial information. Under TCFD requirements, climate-related scenario analysis is recommended, which has led to an increasing number of insurance companies starting to perform climate-related scenario analysis.

There are numerous ways in which climate risk scenarios can be developed. We would propose the following steps in developing the scenarios.

- **Qualitative assessment:** Perform a deep-dive analysis into the company's asset and liability portfolios; identify areas of vulnerability via a look-through of the company's strategy, business profile and risk register, and drill down into each to describe how climate-related factors could influence them.
- **Define initial climate taxonomy:** For transition risk, the assets can be classified into geography, class, sector and industry to assess their climate risks. Counterparties can be assessed to ensure their goals align to a lower-carbon economy. Liabilities can also be grouped by geography and class to assess each exposure to physical risks such as rising sea levels and increasing frequency and intensity of tropical cyclones.
- **Visualise a scenario:** A "what if" approach can be used to qualitatively assess the key drivers and pathways to achieve a lower-carbon economy. Companies can refer to some reference scenarios published by various organisations, e.g., the scenarios published by NGFS, which are based on a framework exploring the transition pathway and the strength of the response. The time horizon for climate risk scenarios usually spans more than 20 years as it would need to allow sufficient time for impacts of the climate pathways to materialise. Insurers would then need to consider how to adjust existing models to project over such long horizons or, as a starting point, they could keep most elements static other than climate risk stress factors to simplify things.
- **Identify key risk factors for quantitative assessment**:
  - **Asset**: Identify key climate risk factors that impact asset values (both physical risk and transition risk) and determine the appropriate level of granularity of stress parameters (e.g., at asset, sector or country level) and time horizon (e.g., short-term vs. long-term).
  - **Liability:** Identify key climate risk factors impacting liability values and determine the appropriate level of granularity and horizon, including which perils are to be considered relevant (e.g., heat waves, floods, diseases etc.). It is imperative that insurers have the modelling capabilities to estimate the impact of these perils on insurance losses.

[2] MAS (31 May 2022). View Documents: Information Paper on Environmental Risk Management (insurers). Retrieved 7 March 2023 from https://www.mas.gov.sg/publications/monographs-or-information-paper/2022/information-papers-on-environmental-risk-management.

- **Calibrate the stress factors:** Data for financial variables are widely available. However, as historical data is rarely relevant, expert judgement is required. Although much public data is available, including academic research and government reports, which can be used as a reference for this process, calibrating stress factors particularly over a long time horizon remains a challenge for many insurers. We earlier highlighted challenges in determining mortality and morbidity stress factors where there are widely varying opinions within various academic research papers. In addition, care should be taken to ensure that the interactions of stress factors are logical and consistent, noting the complexities which could result in an unintentional overestimating or an offsetting effect.
- **Model the scenario:** The modelling approach taken will be based on the pathway, risk factors and time horizon being considered. The model is expected to be able to project the future asset performance and impacts on the balance sheet before and after any mitigation actions.
- **Propose management actions:** Insurers could propose management actions to mitigate the climate stresses such as modifying investment strategies and determining both quantitative and qualitative impacts of management actions. As climate risk management tools will likely evolve over time as the understanding of the risks deepens, management actions will be expected to change.

Concluding remarks

Currently regulatory stress testing is largely at the exploration phase. It helps regulators to:

- Understand the resilience of the financial system to the physical and transition risks associated with different climate pathways
- Enhance the industry's capacity on climate risk modelling
- Increase the awareness of the industry on the potential adverse impacts of climate risk on their balance sheets
- Develop risk-mitigating measures in areas such as underwriting, pricing and business development strategy

The insurance industry is still working to further develop scientifically based methodologies and capacity to perform climate-related stress testing. Given recent trends globally, we can reasonably expect increasing regulatory oversight in this area going forward. Stress testing and scenario analysis are only a part of the climate risk management process, but it is a good starting point for companies that have yet to start their own climate risk management journeys.

Milliman has recently published a number of papers on how companies can update their risk management frameworks to include considerations of climate-related risk. Recent relevant papers include the following:

1. Extreme weather events in Europe for 2022 and beyond, by Tarik Aouragh, Niccolò Basetti Sani Vettori, Mohamed Benkhalfa, Christoph Krischanitz, Ian Penfold, Eugenio Portales, Antoine Rainaud, Giuseppe Semeraro, Anandi Shah, José Silveiro, Martijn van Rooijen, and Menno van Wijk (March 2023).
2. Developing climate risk scenarios for Solvency II ORSA, by Grzegorz Darkiewicz, Diana Dodu, Michał Krzemiński and Daniele Zinicola (October 2022).
3. Causal modelling: A possible application considering climate risk and asset returns, by Chris Beck, Adél Drew, Lewis Duffy, Tatiana Egoshina and Russell Ward (October 2022).
4. Sustainable investing for insurers, by Josh Dobiac, Clement Bonnet, Clara Yan (Robeco) and Denis Resovac (Robeco) (May 2022).
5. Building a climate risk management framework for U.S. P&C insurers, by Stephen R. DiCenso and Kathryn Kern (May 2022).
6. Climate risk management and opportunities for life insurers, by Neil Cantle et al. (November 2021).

These papers provide practical information and guidance to companies on how to update polices and processes to embed climate risk into their ERM frameworks.

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