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Outcomes of the 2021 General Insurance Industry Stress Test.

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Summary/key findings

- The Reserve Bank of New Zealand – Te Pūtea Matua launched our first Insurance Industry Stress Test in April 2021 with the participation of the five largest New Zealand incorporated General Insurers.
- The stress test covered three independent, severe but plausible scenarios and considered their impact on insurers' profitability, balance sheet and solvency capital.
- The exercise highlighted the importance of reinsurance arrangements for the resilience of insurers under stress and potentially for financial stability. The 'severe weather events' scenario showed a large share of claims costs are borne by reinsurers while the 'reinsurance market stress' scenario showed the critical role reinsurance plays in providing New Zealand insurers capital support to meet solvency requirements.
- The weather scenario assumed three storm events in a year generating the worst industry annual losses in over thirty years. However, a warmer future climate will likely increase the intensity of storms in New Zealand further, leading to higher claims costs.
- The participating insurers had well developed internal capability to run stress tests.
- The exercise also helped us to develop our own capability and a framework for future insurance industry stress testing.
- The results of this stress test, as well as recent real world stresses (e.g. arising from covid-19 and low interest rates), are prompting us to explore more fully the capital management and other risk management options available to insurers.

Background

Stress tests serve an important purpose for regulators and financial entities by providing a forward looking lens on assessing the resilience of an entity's balance sheet to severe but plausible scenarios and the risks posed to financial stability more broadly.

In 2021 we expanded our regulatory stress test programme to include insurers for the first time. This first exercise, the 2021 General Insurance Industry Stress Test (GIIST), involved the five largest New Zealand incorporated general insurers who together accounted for over $5 billion in gross premium during the 2020 financial year, representing just over 70 percent of the New Zealand general insurance sector.

This test is not intended as a pass or fail exercise, instead its main purpose is to:

- assess the resilience, in particular the solvency, of the large General Insurers to severe but plausible stress scenario(s);
- improve stress test capability both in the industry and at the Reserve Bank; and
- establish a framework for our future insurance stress testing

A common scenario and set of assumptions allows us to compare results across insurers and aggregate the results to determine the effect on the sector, given the large market share of the participants.

Process and Governance

The GIIST process leveraged off the established process used for our bank stress testing. The results are those submitted by Insurers. They use their own models to determine the impact of the common scenarios on their balance sheet, profit and solvency margin.

The GIIST exercise, started with the establishment of an internal working group to develop the materials required for the stress test including the stress scenarios, instructions for insurers and the spreadsheet template for collating each insurer's results. We consulted with the United Kingdom's Prudential Regulation Authority (who are experienced in insurance stress testing) on some aspects of our scenario design. Our subject matter experts and internal committees that have oversight over insurance and financial stability matters reviewed the stress test materials.

We held meetings with insurers in March 2021 to discuss the stress test materials and their feedback was considered before the materials were finalised. Insurers presented their results and findings to us during August/September 2021. Each insurer's results were signed off by their respective Chief Financial Officer and Appointed Actuary, and had also been presented to their respective Boards or Board Risk Committees.

We carried out high level benchmarking and data quality checks using information from past regulatory returns, experience from stress periods such as the recent pandemic and overseas regulatory stress tests. The discussions we had with the insurers helped us to understand their approaches to stress testing, including how they consider mitigating actions, and to improve our understanding of their potential vulnerabilities to the fairly extreme scenarios. All insurers in this exercise appeared to have a well-developed capability for internal stress testing which they were able to leverage on for the purpose of the GIIST exercise.

The Stress Scenarios

We considered three separate, severe but plausible, scenarios to test key risks to General Insurers over a three year period and their ability to pay claims to policyholders under stress. The scenarios included a shock to the reinsurance market, an economic downturn and severe weather events. We decided against an earthquake event for this stress test given the real world experience insurers have had dealing with the recent Kaikōura and Canterbury earthquakes.

These scenarios were compared to a base financial case that was in line with the insurer's most recent business plans.[1] The stress scenarios are hypothetical and do not represent our view of the most likely future outcomes. The effective start date of the scenario was 1 April 2021.

Reinsurance Market Stress Scenario

The reinsurance shock envisaged a significant impairment of global reinsurance markets due to catastrophic events overseas. Reinsurance capital would be harder to find and the risk appetite of reinsurers would fall. This is assumed to lead to:

- **a ratings downgrade of reinsurers** – at the start of the scenario there is a two-notch rating downgrade for one reinsurer, of the insurer for which a two-notch downgrade has the largest impact on solvency, and a one-notch rating downgrade for all the other reinsurers the insurer is exposed to; plus

1 A combined scenario was also submitted but this did not offer any additional insights and has not been reported here.

- **an increase in reinsurance premiums** - in year one there is a 25 percent increase in premiums (non-proportional) or 10 percent decrease in commissions (proportional) effective next renewal or minimum notice period after 31 March 2021; plus
- **a reduction in reinsurance capacity** - in all years, the reinsurance capacity is limited to 90 percent of the amount of cover in 2020. Insurers were asked to apply the capacity reduction against each layer of their catastrophe reinsurance programme, and ignore the impact on the remainder of their reinsurance programme if it is not material.

Insurers with different reinsurance renewal dates to 31 March 2021 were asked to assume that their year one stress began at their reinsurance renewal date or alternatively their balance date. The reinsurance shock is additive to the base case.

Insurers use reinsurance to amongst other things, limit their exposure to risk, reduce the volatility in their financial results and improve their solvency position with respect to regulatory requirements. This scenario was intended to test insurers' reliance on reinsurance arrangements to support their existing business and their growth plans over and above these considerations.

Economic Downturn Scenario

This was a three-year economic shock designed to test insurers' resilience to a fall in the long and short term interest rates, negative short term interest rates, a widening in corporate bond spreads and falls in equity markets and real estate prices. The scenario assumes a significant disruption to the New Zealand economy over 12 months from a widespread domestic outbreak of COVID-19.

The peak of the stress occurs in year one, with equity markets and property prices falling 30 percent, the unemployment rate reaching 9 percent, and real Gross Domestic Product declining 4.5 percent. The appendix shows the full set of assumptions we provided.

Insurers were required to model the impact on assets and liabilities and secondary impacts such as changes to policyholder behaviour. Additional assumptions that insurers determined for their own modelling were discussed with us where they were critical to the results.

Severe Weather Events Scenario

The severe weather events scenario consisted of three storms occurring in a 12 months period. In this scenario, industry insured losses totalled $550 million excluding those covered by The Earthquake Commission. The scenario was intended to test insurers' financial capacity for severe weather. With climate change there is expected to be an increase in intensity of weather events in New Zealand.

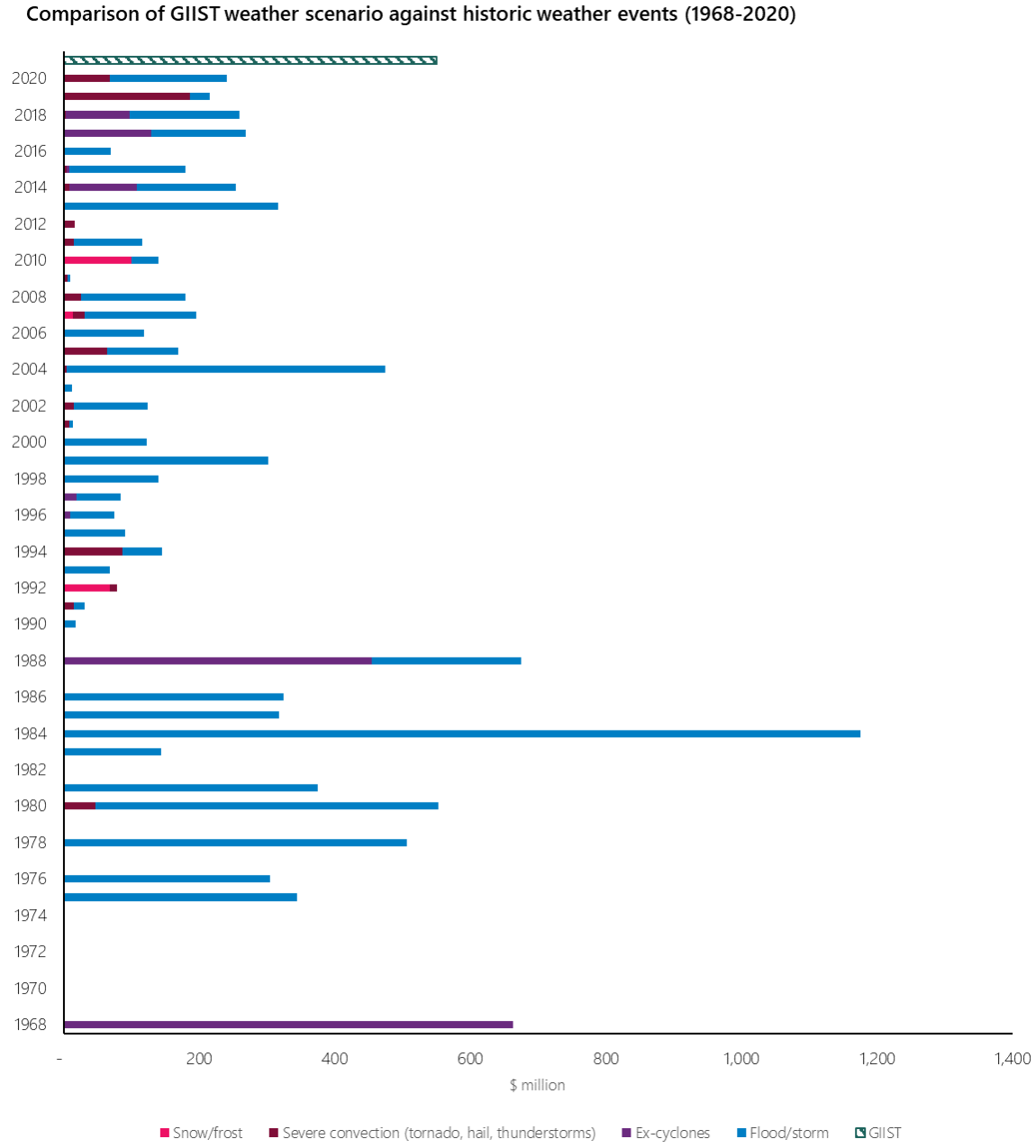
ID	Description & perils	Dates	Insured losses (excl. EQC)	Affected region(s)
1	Winter storm, slow moving (flooding - river, landslide)	1-5 August 2021	$300 million	All NZ but most severely in central NZ (Buller, Tasman, Nelson, Marlborough, Taranaki, Whanganui, Manawatu, Wellington, Wairarapa)
2	Severe convective storms (hail, tornado, wind, flooding - land run-off)	28 December 2021	$50 million	Northern NZ (Auckland, Waikato, western Bay of Plenty)
3	Extra-tropical cyclone on a S to SE track into eastern Bay of Plenty / East Cape region (flooding - river and coastal, wind, landslide)	12-14 February 2022	$200 million	North Island but most severely in northern NZ (Northland, Auckland, Waikato, Coromandel, Bay of Plenty, Tairawhiti, Hawkes Bay)

The storms were to be treated as separate weather events for reinsurance purposes. To provide comparability of results, insurers were asked to assume they had perfect foresight and all claims costs were identified in the same quarter as the storm. Insurers were allowed to make their own assumptions on the likely timing of the pay-out of the claim.

The weather shock is additive to the base case, i.e. these severe weather events are assumed to take place in addition to any weather events in the insurer's budgeted allowance for the year. All associated costs such as additional claims handling expenses, which are not in the base case, were also to be included. These events have been benchmarked against previous severe weather events in New Zealand adjusted for assumed growth in insured property values.[2] [3] The size of the expected losses would make it the worst year of claims in over 30 years as shown in Figure 1

2 The historic weather loss data was obtained from Insurance Council of New Zealand's website (icnz.org.nz/natural-disasters/cost-of-natural-disasters)
3 Assumed growth in insured property values based on Quotable Value/Reserve Bank of New Zealand Housing Data (rbnz.govt.nz/-/media/ReserveBank/Files/Statistics/Key%20graphs/graphdata.xlsx?revision=02627b72-fad7-435c-812d-ff0deeb56141)

Figure 1: Comparison of GIIST weather scenario against historic weather events (1968-2020)

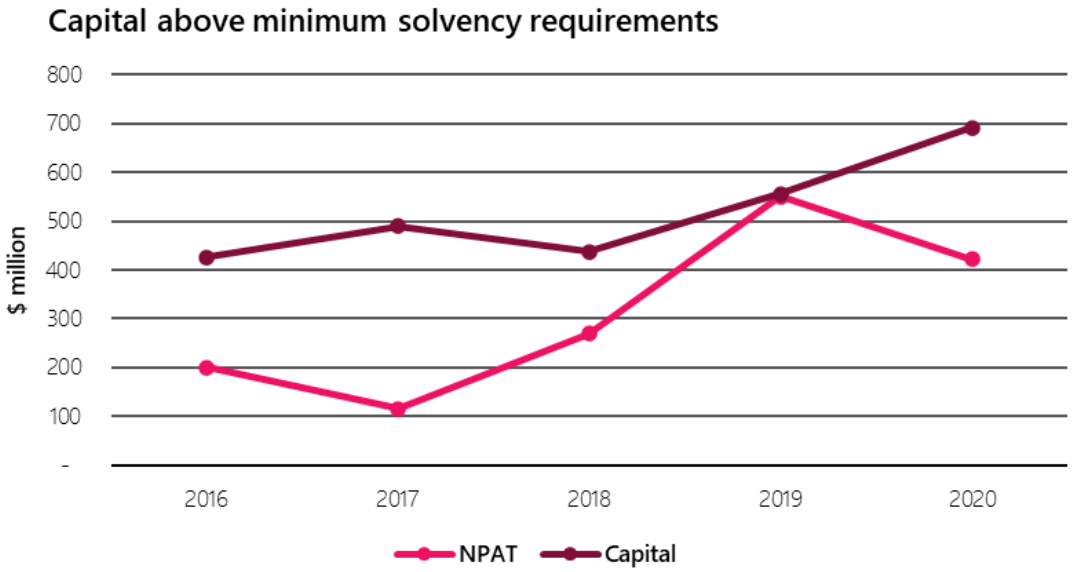


Overview of Results Before Mitigating Actions

The key metric for assessing the resilience of insurers in the stress test is the solvency margin. Insurers are required to maintain a minimum amount of solvency capital (minimum solvency capital) as determined by applying our solvency standard. This is comparable to the bank prudential requirement that banks hold an amount of capital above a regulatory minimum. The difference between actual solvency capital they hold and the minimum solvency capital they are required to hold is the solvency margin, which needs to be above $0.[4]

The aggregate solvency margin for the five insurers in this stress test has increased over the past two years as shown in the chart below which provides a larger buffer to withstand stress. This build up in solvency has occurred during a period of rising profits since 2017. The generation of profits allows insurers to pay dividends, grow new business and increase their solvency margin.

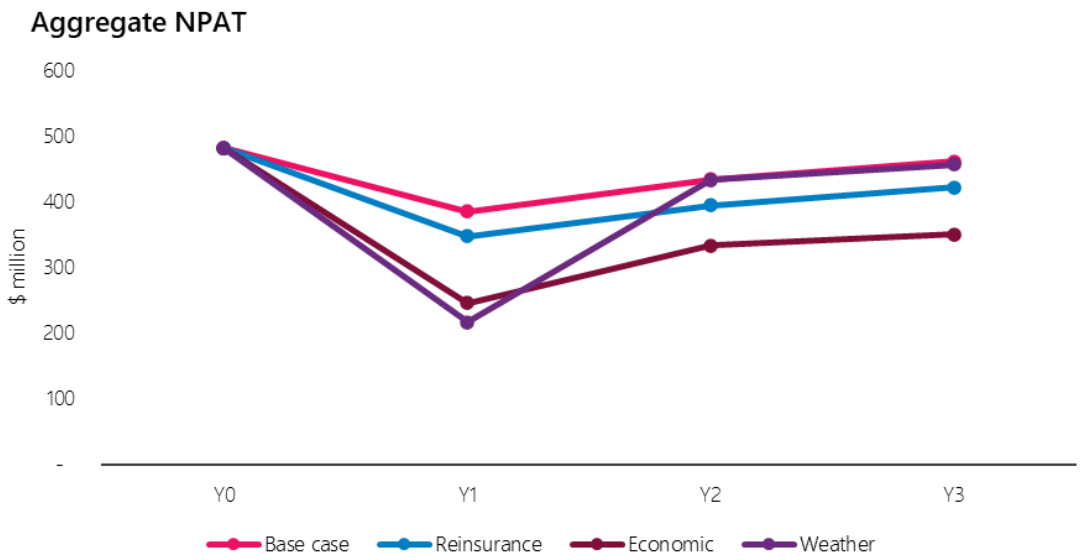
Figure 2: Aggregate insurer profitability and capital above minimum solvency requirements during 2016-2020



Under all stress scenarios aggregate profits remain positive throughout the three year period. However, profits are significantly lower in the economic and weather scenarios than those expected under the base case as illustrated in Figure 3. Aggregate net profit falls to 64 percent and 56 percent below the base case in the first year of the economic and weather scenarios respectively.

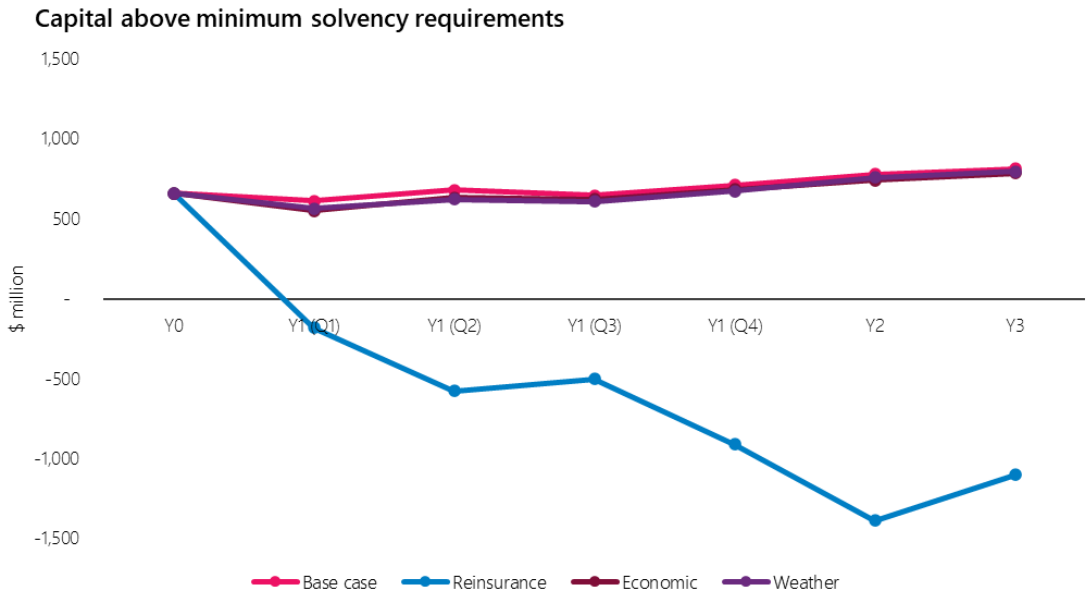
4 Where the Solvency Margin = Actual Solvency Capital - Minimum Solvency Capital as defined in the Solvency Standard for Non-life Insurance Business 2014 (incorporating amendments to November 2018)

Figure 3: Aggregate net profit after tax under the different scenarios over the stress test period



There was no material impact on the aggregate solvency margin under the economic and weather stresses. However, the reinsurance market stress scenario caused the aggregate solvency margin to fall well below the regulatory minimum. This was mainly caused by the requirement for insurers to hold significantly higher capital to cover the assumed 10 percent gap in reinsurance cover. All the insurers were able to apply significant mitigating action to restore their solvency margin above the regulatory minimum.

Figure 4: Aggregate insurer capital above minimum solvency requirements under stress scenarios (before mitigation actions)



Drivers of Results

Reinsurance Market Stress Scenario

This scenario had the most severe impact on insurers' capital position with the aggregate solvency margin falling below zero. This was primarily due to the need to hold more capital in lieu of less reinsurance, rather than a fall in profit.

The 10 percent reduction in the reinsurance capacity available to insurers had the largest impact on solvency margin under this scenario. This is because the lower capacity results in insurers having to retain more of the risks they had previously passed on to reinsurers. This results in insurers having to hold $1.9 billion in additional capital to cover their exposure to extreme events as required by the non-life solvency standard. A stylised example of how the 10 percent reduction in reinsurance capacity reduction impacts insurers can be found in the 'Box' section on page 13.

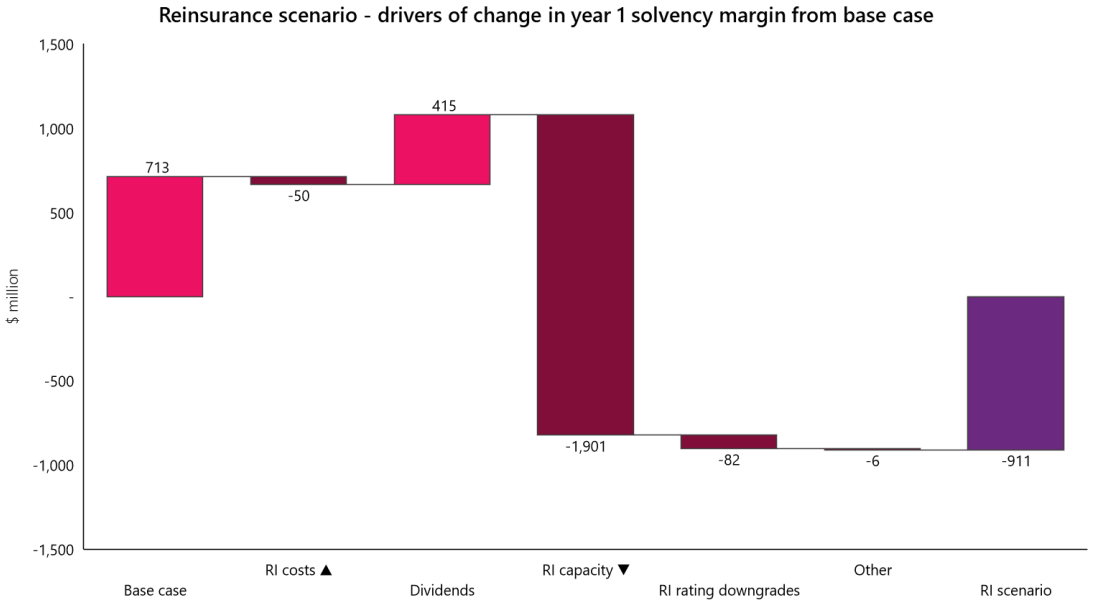
The reinsurers' financial strength rating downgrade resulted in insurers needing to hold more capital to cover the increased risk around reinsurance recoveries (known as the reinsurance recovery capital charge). This had a relatively smaller impact on the solvency margin (▼$82 million).

The third aspect of the stress, the increase in the cost of reinsurance premiums reduced both profitability and the solvency margin (▼$50 million). Neither the reinsurance capacity reduction nor the ratings downgrade had a material impact on the insurers' profitability.

The downward impacts on solvency were offset to an extent by the insurers paying out less in dividends than under the base case, leading to a ▲$415 million impact. However, this was not sufficient to prevent the insurers' solvency margin dropping below $0.

The overall impact of these changes at the end of first year can be seen in Figure 5 where the solvency margin falls from a surplus of $713 million in the base case to a deficit of $911 million in the reinsurance market stress scenario. The difference in the solvency margin under the base case and the reinsurance market stress scenario widens further by year three.

Figure 5: Change in capital above minimum solvency requirements at the end of the first year under the reinsurance market stress scenario



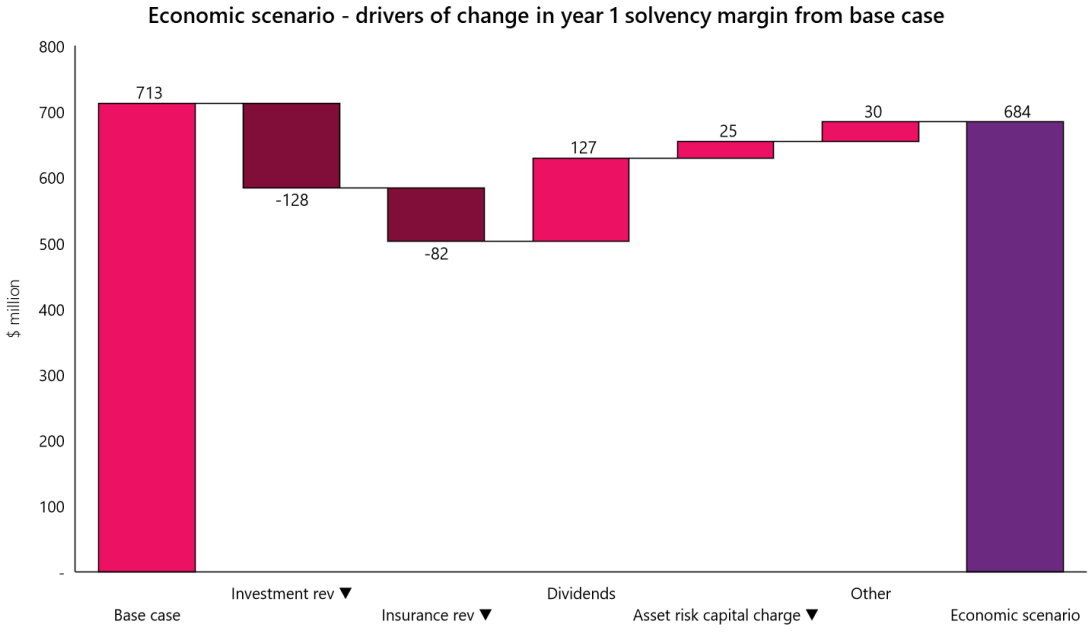
Economic Downturn Scenario

Under the economic stress scenario, the main drivers of lower profitability were the lower investment revenue and the lower insurance premium revenue. The lower investment revenue mainly reflected unrealised losses on insurers' equities exposures that were marked down due to the assumed 30 percent fall in the market. This lower profitability leads to a reduction in the actual solvency capital compared to the base case. The decline was somewhat offset by insurers paying out less dividends than under the base case.

The investment assets are worth less under the economic stress compared to the base case, ▼$115 million at the end of the first year. This leads to a reduction in the minimum solvency capital because of the lower Asset Risk Capital Charges.

The overall impact of these changes at the end of first year are seen in Figure 6 where there is a reduction in the solvency margin (▼$28 million). At the end of the three year period of the scenario the solvency margin is ▼$30 million from where it was expected to be under the base case.

Figure 6: Change in capital above minimum solvency requirements at the end of the first year under the economic downturn scenario



Severe Weather Events Scenario

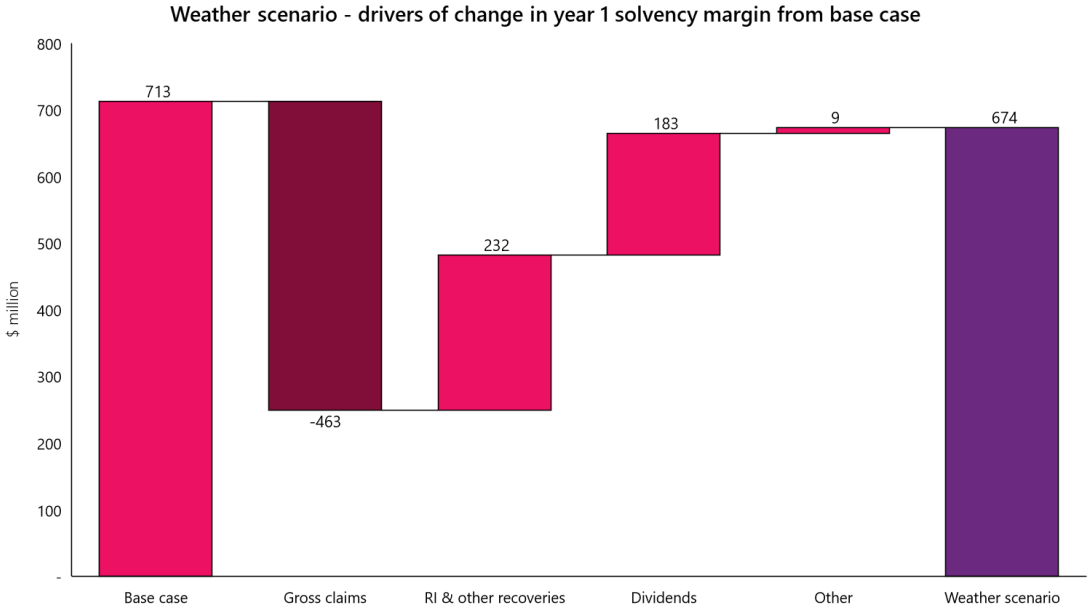
Under the weather scenario, the main driver of lower profitability and solvency was the increased gross claims that insurers experienced as a result of the severe storm events.

A large portion of the gross claims were borne by reinsurers. Insurers' reinsurance programmes comprise multiple reinsurance contracts spread across a number of reinsurance providers, which are designed to cover some of the losses arising from a number of events. Details of how these arrangements work can be found in the 'Box' section on page 13.

Insurers took action to reduce the effect of claims costs borne by them (i.e. after reinsurance and other recoveries) by again cutting dividends.

The overall impact of these changes at the end of first year are seen in Figure 7 where the solvency margin is ▼$39 million. At the end of the three year period of the scenario the solvency margin is ▼$19 million from where it was expected to be under the base case.

Figure 7: Change in capital above minimum solvency requirements at the end of the first year under the severe weather events scenario



All the insurers were able to accommodate the three storm events, plus the weather events assumed in the base case within the coverage of their reinsurance programmes, with the insurers bearing the share of the losses they retained.

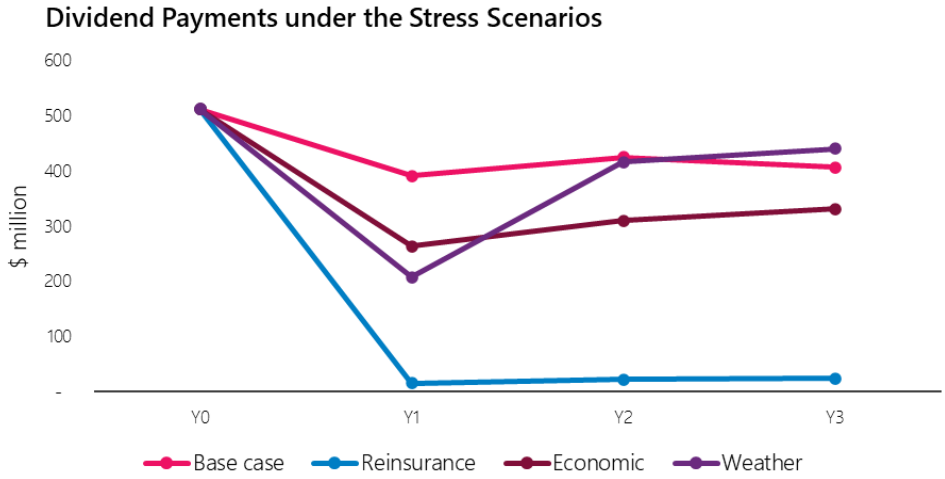
Mitigation Actions

Insurers provided their results before and after mitigating actions. These actions are choices firms made to address the loss impacts. They do not flow automatically from the modelling of the impact of the scenario and are not part of the base case. This is consistent with the approach taken in our bank stress tests where mitigating actions are used to improve the stress capital ratios.

Dividend Actions

The aggregate solvency position of the insurers under each of the three stress scenarios included the benefit of insurers' assumption of swift and material reductions in dividends.

Figure 8: Comparison of dividend payments under the base case and the stress scenarios



In the real world, reductions in dividends in response to adverse experience may be delayed or smaller than implied by target capital levels, and so will continue to be a focus for supervisors of any stressed insurers.

Note that the reduction in dividends (against the base case) were included in the pre-mitigating results as insurers argued these would be automatically trigger by falling profits and/or lower solvency. However, this may not be the case in practice and the classification of dividend actions will be reviewed for future stress tests

Additional Mitigation Actions

Insurers did not require any significant additional mitigating actions in the economic downturn and severe weather event scenarios, beyond the cuts to dividends that were sufficient to maintain solvency margins above target levels.

Whilst not requiring additional mitigating actions in the severe weather event scenario, insurers did indicate that more of these climate change related events would likely lead to repricing of policies. General insurers write insurance policies that cover a period of one year at a time, enabling them to adjust to the impacts of climate change and reprice for increasing risk as the impacts becomes clearer. A warmer future climate will probably increase the severity of storms in New Zealand, leading to increased claims costs, and in turn higher insurance premiums. This could have implications for insurance take-up and financial stability, and the physical and transition risks from climate change will be a focus of our industry stress testing over the coming years.

In the reinsurance market stress scenario, the reduced dividend payments on their own were not sufficient to rectify the aggregate solvency levels that were below the minimum amounts required. All insurers took further mitigating actions in this scenario. Insurers took the view that an event of this severity would be obvious quickly and that mitigating actions could be prepared and brought to bear in the first quarter of the stress. The aggregate solvency margin is above the minimum for all quarters after mitigating actions.

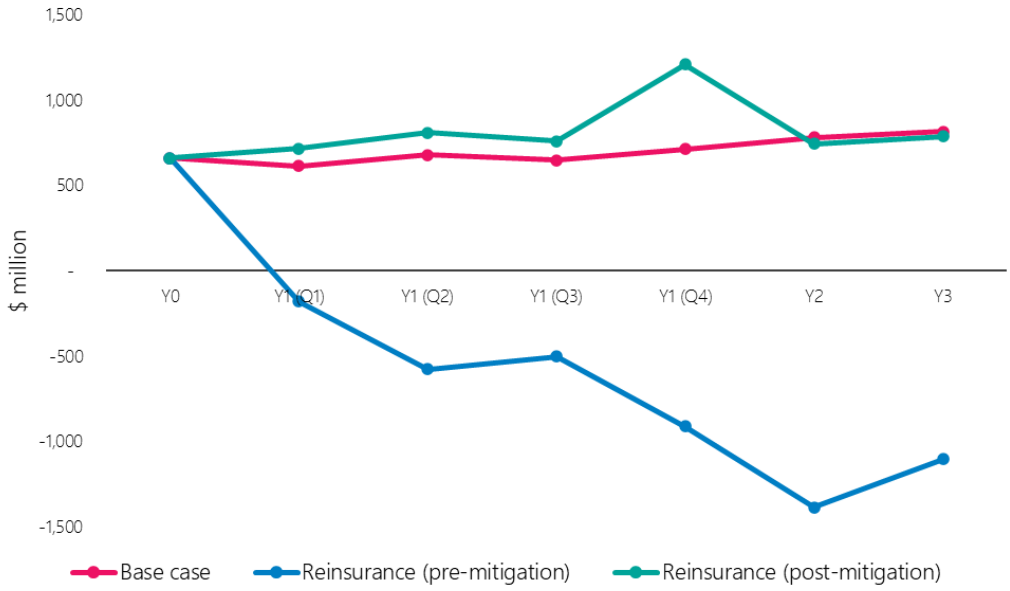
Injections of capital, mainly from offshore and particularly foreign parent holding companies, and reduction of the volumes of business written were the main mitigating actions modelled by insurers to rectify this situation. Figure 9 shows the impact of these actions on the insurers' solvency levels. In the first year alone the injection of additional capital and the change in the

catastrophe risk capital charge flowing from lower business volumes provided an increase of $2.3 billion to the aggregate solvency margin.

The reduction in business volumes modelled by insurers included a retreat from areas with exposure to higher seismic risks. This could have flow on effects to the banking sector, which for example relies on insurance for mortgage lending, and therefore have implications for financial stability.

The results highlight the importance of a strong and open reinsurance market to the New Zealand economy and to offshore capital support in times of stress.

Figure 9: Aggregate insurer capital above minimum solvency requirements under reinsurance market stress scenarios (before and after mitigation actions)



Conclusions

Assessing the Resilience of Insurers

The exercise was successful in providing an assessment of the five largest insurers' resilience to three different types of stress scenarios.

- The reinsurance market stress scenario highlighted insurers' reliance on reinsurance arrangements and the need for significant and timely mitigating actions if these arrangements were to be disrupted. This scenario had the most significant impacts out of the three scenarios considered.
- General Insurers' balance sheet appears to be well positioned to offset a severe economic downturn. The ability to reduce the dividends that would ordinarily be paid out, potentially provides an additional buffer.
- Reinsurance arrangements and reductions to dividends prevented significant falls in the insurers' capital under the severe weather events scenario. Insurers benefited significantly from their catastrophe reinsurance arrangements, which are put in place to mitigate much larger impacts expected from a very severe earthquake.

- At an aggregate level the insurers place a significant reliance on their ability to reduce the dividends they would ordinarily pay-out and also their ability to obtain capital injections particularly in the reinsurance market stress scenario. The stability of New Zealand General Insurance market is reliant on foreign capital support for both insurers and reinsurers. Here there are some similarities to the banking system's reliance on stable offshore funding and capital support.

Stress Testing Capability

All the insurers in this exercise appear to have a well-developed capability for stress testing and run a programme of regular internal stress tests. Insurers were able to leverage this capability during the GIIST exercise. The exercise was also useful for us to develop the capability of Reserve Bank staff.

Given our intention to improve stress test capability in the wider insurance industry, we have included details of these stress scenarios as an appendix to this article, so that other insurers could consider these for their internal stress testing.

Framework for Future Reserve Bank Insurance Stress Testing

The GIIST has also been successful in establishing a framework for future insurance industry stress tests. Whilst the framework drew from our bank stress testing, specific templates and instructions for insurance had to be designed from scratch. We will use the feedback provided by insurers to help further refine these templates in future stress tests.

BOX – How Reinsurance Works to Preserve Insurer Capital and Prevent Larger Losses in the Stress Test

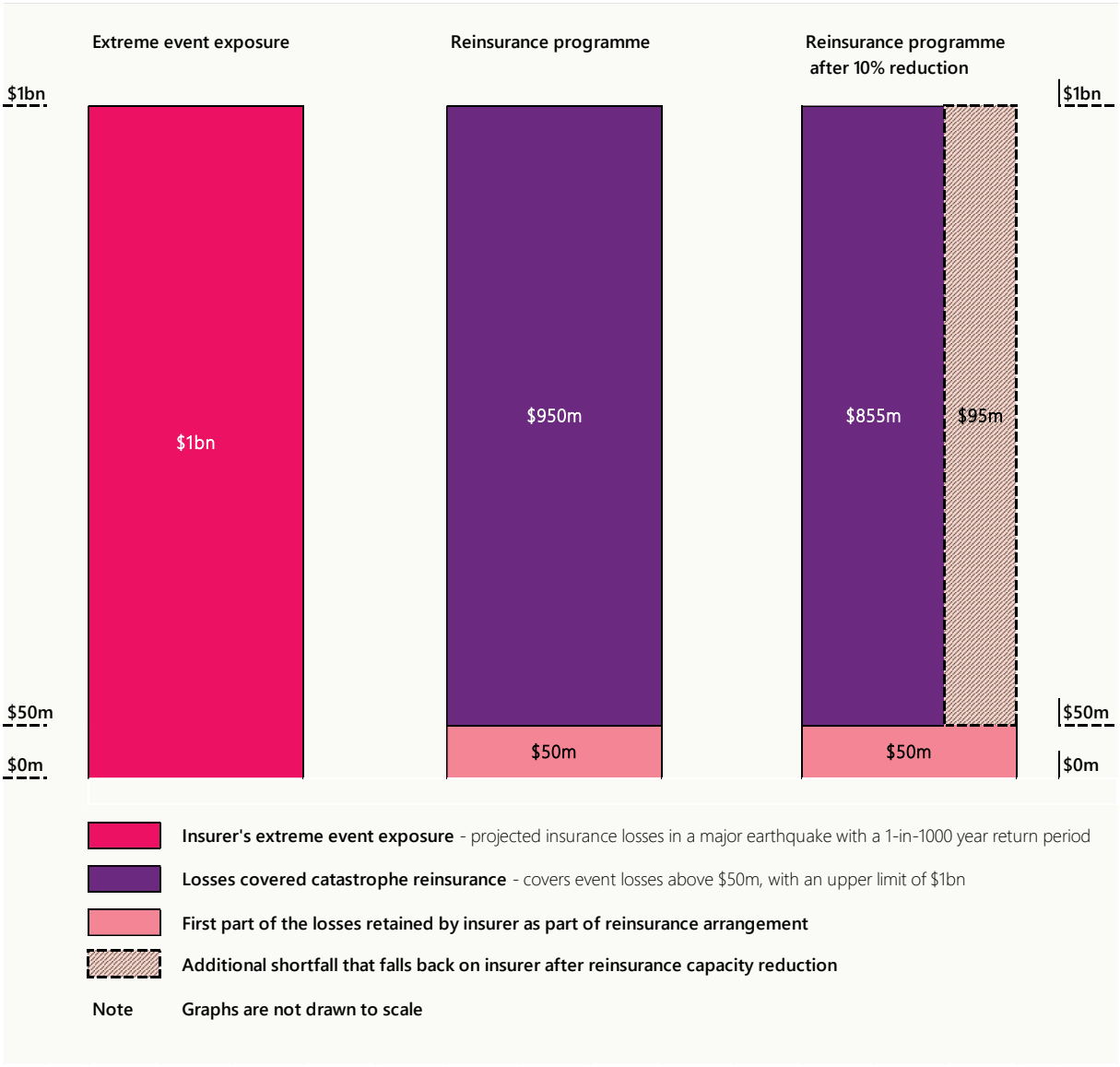
Reinsurance Market Stress Scenario

Insurers' reliance on reinsurance contracts is highlighted by the scenario of a 10 percent reduction in reinsurance capacity. This is shown in the stylised example below.

Our non-life solvency standard requires that insurers are able to withstand the insurance losses from a major earthquake with a 1-in-1000 year return period. The insurance losses are to be the greater of an earthquake affecting Wellington only (defined as a 50km radius from the Beehive) or affecting anyplace other than Wellington. In this stylised example, the insurance losses of $1 billion would be covered by the purchase of $1 billion in catastrophe reinsurance cover as shown in the first box. The insurer will still be liable for the first part of claims costs - $50 million in this example, as shown in the second column.

If 10 percent of the reinsurance capacity is no longer available then there is a $95 million 'gap' in their reinsurance cover, shown in the third column. This means the insurer would bear a further $95 million of the cost of a $1 billion catastrophe event. Under the non-life solvency standard this leads to an immediate $95 million increase in the required minimum solvency capital, and hence a corresponding decline in their solvency margin of $95 million. This gap of $95 million is equivalent to the $1.9 billion aggregate solvency impact at the end of the first year, we saw in Figure 5.

Figure 10: Stylised example of how 10 percent reinsurance capacity reduction impacts insurers



In our stress scenario, additional cover is not available, so the gap needs to be met by either physical capital, for example through an injection of $95 million or increased profits, albeit this takes time, or by reducing the capital requirement. In the latter case, some insurers modelled reducing their exposure to high seismic risk areas as a potential mitigating action.

Severe Weather Events Scenario

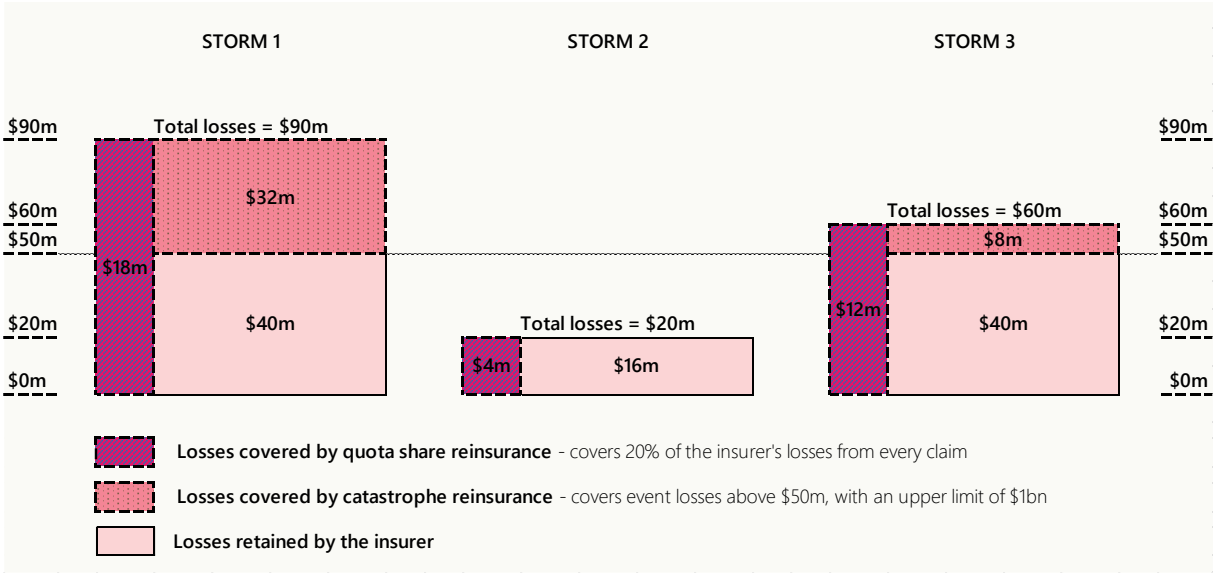
The stylised example below shows how an insurer's reinsurance protection is likely to work during the three severe weather events.

The first storm event leads to total policyholder claims of $90 million. This is covered in the first instance by the quota share reinsurance agreement that pays out 20 percent ($18 million) of all claims incurred by the insurer. The second reinsurance policy for this event, the catastrophe reinsurance cover, triggers once claims exceed $50 million (of which $40 million is borne by the insurer and $10 million is covered by the quota share reinsurance cover). This second reinsurance policy refunds the insurer $32 million. In summary the insurer pays $40 million and reinsurers pay $50 million of claims from the first weather event.

The second and third storms are less severe. Only the quota share arrangement provides reinsurance cover in the second one as the claims cost, including those covered by the quota share reinsurance does not exceed $50 million. In the third and final storm the quota share reinsurance and the catastrophe reinsurance collectively cover $20 million of the $60 million of claims from the event.

This stylised example illustrates how a number of smaller weather events that are not large enough to trigger some or all of the insurer's reinsurance arrangements could potentially lead to higher claims cost being borne by the insurer than a few large events even if the total claims is the same.

Figure 11: Stylised example of how reinsurance helps reduce losses borne directly by an insurer during the severe weather events scenario



Appendix A – Economic Downturn Scenario Assumptions

Economic variables – New Zealand	Year 1	Year 2	Year 3
OCR level[5]	-0.50%	-0.50%	-0.50%
Real GDP growth rate, annual average	-4.5%	0.0%	2.5%
Unemployment rate, annual average	9.0%	8.0%	7.0%
CPI Inflation, annual average	1.25%	1.25%	1.25%
Interest rate and swap curves, absolute fall all tenors	-75bps	-75bps	-75bps
Corporate credit spreads (increase from opening)[6]:			
AAA	+150bps	+115bps	+75bps
AA	+170bps	+125bps	+95bps
A	+200bps	+150bps	+110bps
BBB	+300bps	+225bps	+145bps
BB and lower or unrated	+400bps	+315bps	+205bps
Derivative options, change in value	+700bps	+400bps	+350bps
Equity markets (change in value YoY)	-30%	+0%	+10%
Real estate markets residential/commercial (YoY)	-30%	+0%	+5%

[5] Insurers that have the capability were asked to model negative interest rates, whilst those without were asked to set an interest rate floor of zero

[6] Any investment asset not specifically mentioned above including bonds issued by Supranational institutions were to be stressed as if it were a corporate bond (i.e. applying the interest rate and the credit spread stresses relative to their credit rating) when it is sensible to do so, otherwise applying the corresponding percentage change as if it were an equity valuation.

Appendix B – Glossary

Term	Description
Actual Solvency Capital **(ASC)**	The licensed insurer's capital (e.g. issued and fully paid-up ordinary shares, retained earnings) less any deductions from that capital (e.g. intangible assets, deferred tax assets) as set out in the non-life solvency standard.
Asset Risk Capital Charge	This Charge reflects the exposure of the licensed insurer to losses on investment assets and financial risks to the licensed insurer arising from other exposures. It also reflects the risks to the insurer from having large exposures to a single counterparty.
Catastrophe Risk Capital Charge	A charge intended to protect the licensed insurer's solvency position from its potential exposure to extreme events (e.g. earthquakes, floods or storms, that results in unexpected large or extreme losses).
EQC	The Earthquake Commission constituted under section 4 of the Earthquake Commission Act 1993.
GIIST	General Insurance Industry Stress Test
Minimum Solvency Capital **(MSC)**	The sum of a number of risk capital charges set out in the non-life solvency standard.
Non-life Solvency Standard	Solvency Standard for Non-life Insurance Business 2014 (incorporating amendments to November 2018) (available for download from here)
NPAT	Net profit after tax
Reinsurance	Reinsurance is a form of insurance for insurance companies, where in return for paying a premium the reinsurance company will take on and agreed portion of the insurance companies claims.
Reinsurance Recovery Risk Capital Charge	This charge reflects the exposure of a licensed insurer to losses arising from failure to fully recover on reinsurance contracts, including losses due to reinsurer failure and contract dispute.
Risk Capital Charges	Risk capital charges set out the amounts of capital licensed insurers are required to hold against certain risks they are exposed to. These risks are set out in the non-life solvency standard.
Solvency Margin **(SM)**	The licensed insurer's actual solvency capital less the minimum solvency capital they are required to hold.