

# Stressing the insurance sector: modelling Covid-19

*NZ Society of Actuaries*

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# Plan

# Purpose

- February 2020 pandemic is coming.
- Least regrets = need to understand:



Could an insurer fail?  
Is there any systemic risk?



# Design

- Sector-wide but at insurer level
- Useful outputs:
  - drivers of potential (adverse) impacts
  - leading indicators of emerging stress
  - “worst case”



# Design

- Reverse stress test:
  - wide range of scenarios
- Not a forecast or prediction
- Limited data to develop the model
- Feedback mechanisms and improvements:
  - extra data, refine assumptions, add modules

# Uncertainty

- Multiple dimensions, wide range of magnitudes



illness and death



Government response



economy



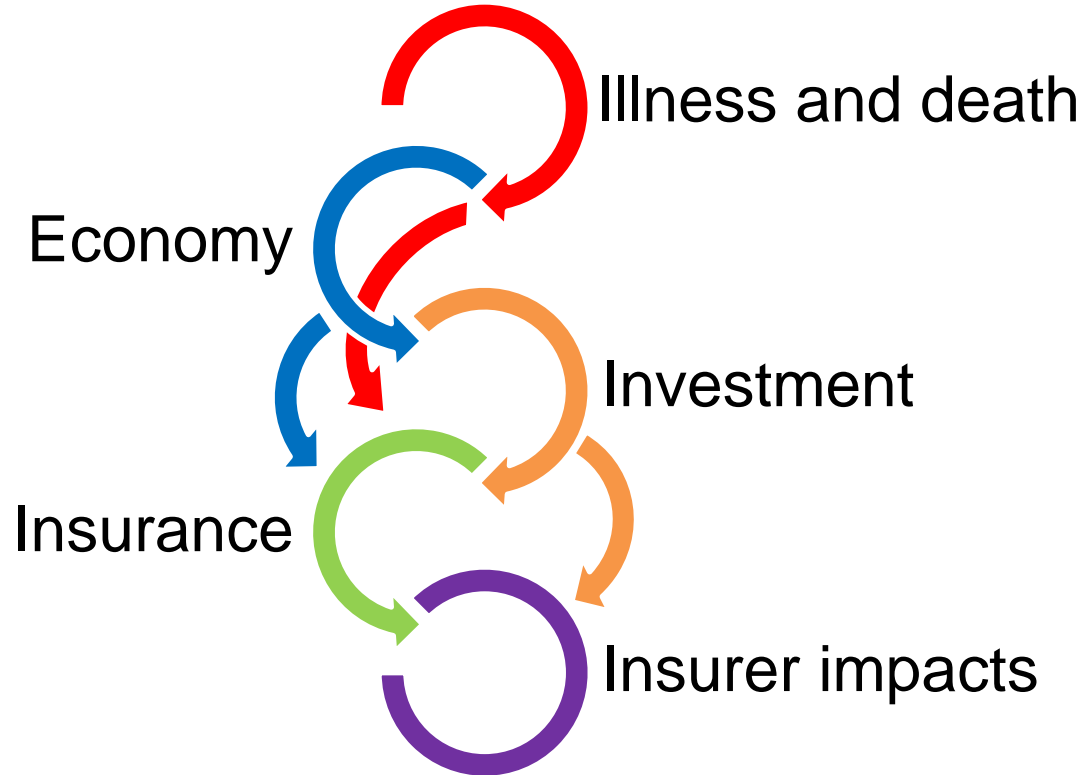
investments



insurance (claims)

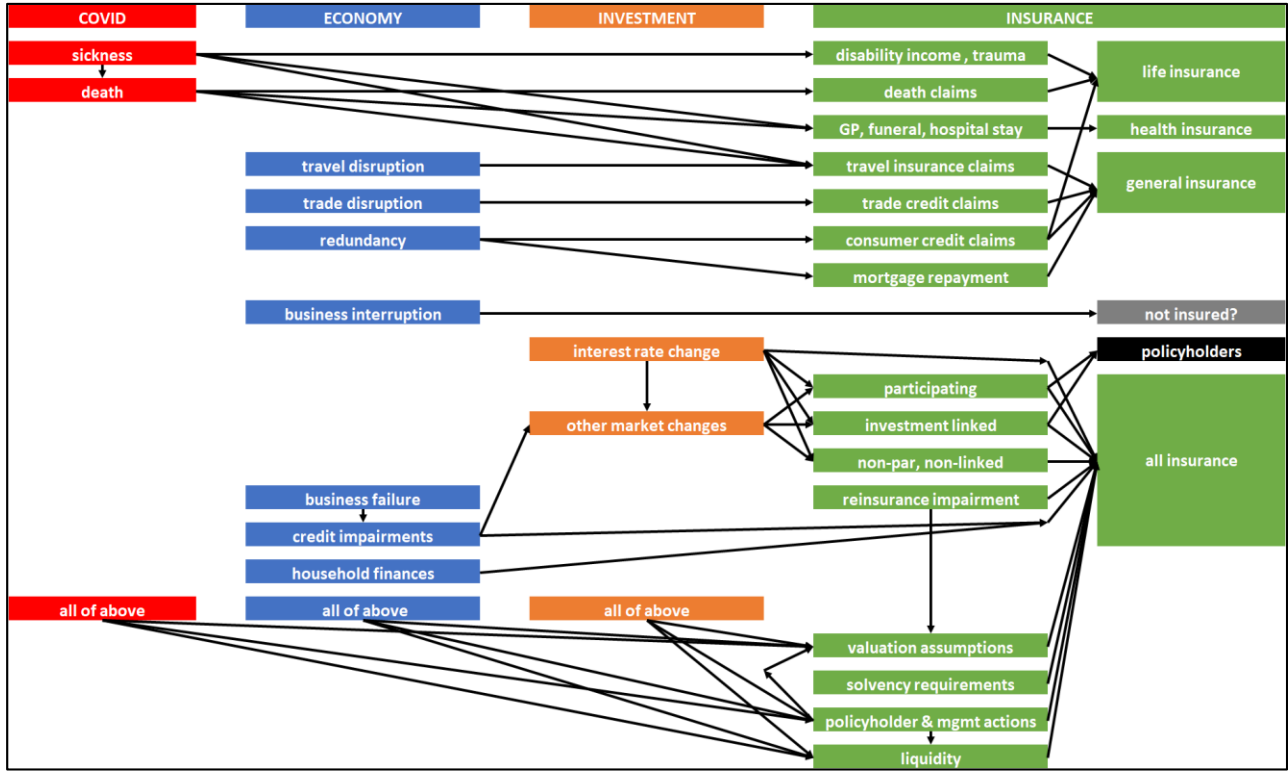


# Conceptual model





# Complex







# Build



# Data and assumptions

- Data:
  - insurer / solvency / monthly returns, FCRs
  - updated from insurer discussions and reports
- Assumptions:
  - scenario (applies to all relevant insurers)
  - insurer (applies to all scenarios)
  - fill data gaps and roll forward position



# Developing scenarios

- 8 scenarios covering spectrum:  
between very optimistic and “worst case”
- Informed by (amongst others):
  - NZ Treasury scenarios
  - RBNZ bank stress test scenarios
  - RBNZ solvency standards
  - international (regulators, rating agencies, etc)



## Covid module

- March 2020 some (limited) data on covid-19
- Public health responses highly uncertain
- Epidemiological models highly uncertain
- Narrative to assist assumption setting:
  - impact on health sector (secondary effects)
  - government responses (health and economic)



# Covid module

- Key assumptions:
  - infection rate
  - serious illness as % infected
  - deaths as % infected
- Secondary effects  $\uparrow$  serious illness and deaths



# Covid module



Scenario	Cases	NZ deaths
Strong containment	5,000	25
Severe	125,000	1,000
Very severe	250,000	3,500
NZ flu pandemic plan	2 million	40,000
4 other scenarios	varies	varies



# Economy module

- Key assumptions:
  - unemployment rate
  - equity market
  - ~~interest rates~~
- Interest rate complications:
  - time varying, long vs short durations, hedging
  - licence conditions



## **Credit risks module**

- Investment and other assets:  
excluding related party
- Key assumptions:  
impairment rates by asset type and rating  
credit spreads for fixed interest by rating  
duration for fixed interest





# Group contagion module

- Key assumptions:
  - impairment rates by type of counterparty
  - financial support provided by insurer
- Include debt and equity assets
- Exclude insurance-related

# Investment module

- Key assumptions:
  - credit risks (impairment & spreads)
  - equity and property market falls
  - policyholder assets and insurer discretions
  - allowance for March 2020 crash
- Insurer/shareholder share of investment losses
  - adjust for participating, investment linked



## Life insurance module - death

- Mortality adjustment (from population):
  - age
  - pre-existing conditions
  - cover (weighting)
- Solvency calculations for pandemic risk
- Reinsurance (incomplete info)
- Long-term impacts not modelled



## Life insurance module – other

- Disability income new claims:  
incidence, termination rates
- Changed termination rates claims in payment
- Trauma?



# Credit insurance module

- Assumptions:
  - death, redundancy rates
  - claim size (% of sum insured)
  - unearned premium offset (if applicable)
- Complications:
  - exclusions, redundancy cover limit,
  - stand-down effect on instalment benefits



## Credit insurance

- Trade credit insurance:  
NZ branches small, not modelled
- Mortgage repayment insurance:  
NZ branches in run-off, not modelled



# General insurance module - travel

- Claims:  
but lots of exclusions
- Premium refunds:  
unearned premiums
- Catastrophe reinsurance limited
- Assumptions:  
claims in excess of unearned premiums



## General insurance - other

- Business interruption:  
mostly excluded, not modelled
- Motor:  
reduced claims, not modelled
- Event cancellation:  
limited cover, not modelled



## Health insurance

- Previous analysis (e.g. Cole 2006):
  - surgical claims deferred
  - limited cover for death, public treatment, and vaccines
- Not modelled

# Reinsurance module

- Impairment:
  - pandemic-related claims
  - existing reinsurance assets
- Global risks matter:
  - claims, investment, retrocession
- Assumptions:
  - sector-wide not specific reinsurers



# Operational risks module

- Difficult to assess
- Assumptions:  
    higher under more severe scenarios



# Management actions module

- Capital injections
- BAU profits (roll-forward and future)
- Dividends (prior to restrictions)
- Customer support:
  - cover suspension, premium discount
  - consider impact on premiums and claims
  - adjust for take-up, funding by reduced claims

# Liquidity module

- Net cashflows:
  - BAU
  - stressed
- Liquid assets:
  - allow for stressed net cashflow



# **X Not modelled**

- Favourable impacts (mostly)
- Global impacts (other than reinsurance)
- Long-term impacts on health and death
- Interest rates (other than credit spreads)
- Customer behavior (lapses, renewal, NB)
- Tax



Use

## Calculations

- Stressed net assets
- Stressed solvency margin:
  - impact on net assets
  - impact on risk charges
- Stressed solvency ratio
- Stressed liquidity position



## Outputs

- By insurer, scenario, module
- Absolute and relative impacts by component
- (Roughly) what would it take to cause solvency distress?
- Group insurers with similar sensitivities to prioritise supervision activity
- Traffic lights to rate the risks





## Results

Likely solvency breach	1 insurer
Risk of insolvency:	
high redundancy claims	4 insurers
very large investment losses <i>(worse than GFC)</i>	6 insurers
high life insurance claims <i>(if covid uncontained)</i>	16 insurers
other	1 insurer
Insolvency from covid very unlikely	42 insurers

## Results

- Good resilience
- Few insurers vulnerable to plausible outcomes
- More insurers vulnerable in extreme scenarios:
  - widespread illness and deaths >> 1 per mille
  - very deep recession
  - reinsurer failure



# Closing



# Review

- Highlighted some deficiencies in data
- Careful communication important:
  - limitations, guide on impacts not definitive
  - not a forecast
- Initial development took a few weeks
- Further updates
- Useful for monitoring