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COVID-19: Lessons Learnt and Going Forward

IAA Online Joint Section Colloquium 2021 – Post Pandemic Actuary

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Agenda



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— We'll discuss —

1

IFoA COVID-19 Action Taskforce (ICAT)

2

Lessons learnt from a GI Industry View

3

Lessons learnt from an Enterprise View

4

Lessons learnt from an Individual Actuary View

5

Q & A

IFoA COVID-19 Action Taskforce (ICAT)

- Over the last year, the IFoA COVID-19 Action Taskforce (ICAT) has been a huge research project for the IFoA. ICAT is responsible for leading and coordinating the IFoA's response to the Coronavirus crisis.
- ICAT Highlights:
 - ICAT trialed a new way of working within the IFoA.
 - Generated 166 outputs in the last 17 months - all output can be found on the IFoA webpages.
 - Hosted a two-week webinar series with a range of thought leaders with over 20 sessions and more than 3,300 views.
 - ICAT Pandemic workstreams used actuarial skills to support SAGE to deliver the excess deaths work for the UK government SAGE scientific input.
 - This work has been extremely well received by DHSC/ONS/GAD, demonstrating the depth of the actuarial knowledge on the topic, our speed of responsiveness, and the value of the actuarial skill set when applied to epidemiological, demographic and medical issues.

Objectives of Risk 3 Scenario Modelling Work Stream

“What scenarios have companies been modelling during the pandemic? How will this impact the suite of scenarios that are modelled going forward? The research should look across Life, Pensions & GI areas. It should also consider and capture broader issues, such as societal impacts, the effect of changing government policy etc., to be as comprehensive as possible”.

- Help actuaries across various disciplines to model pandemics
 - What actuaries need to think about
 - Presenting simple approaches and tools
- Looking at COVID-19 scenario modelling for the next 2-3 years as well as future pandemic scenario modelling
 - For business planning & ERM
 - For pricing, reserving, valuations and capital work
- Looking at the international context for scenario modelling



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Lessons Learnt – General Insurance Industry

What the Industry Discovered During the Pandemic

- Underwriting
 - Global pandemics impact the GI industry through governmental lockdowns causing business and supply chain disruptions and subdued economic activity (impacting assets, Liabilities and operations).
 - Contractually silent exposures such as Business Interruption claims on Property policies can be of significant systemic impact.
 - Existing pandemic coverage such as Event Cancellation insurance may not have been adequately priced.
 - Limited ability to capitalise on pandemic insurance as a business opportunity for the future due to lack of governmental support (e.g., back-stop like Flood Re for Floods in the UK).
- Risk & Operations
 - Remote working is possible as long as the organisation has the infrastructure to address this risk.
 - Lack of internal scenario modelling for pandemics – still the case, however much more focus is placed now on modelling emerging risks in general.

What Happened to the GI Industry Due to COVID

- The impact of COVID was managed partially due to governmental and regulatory interventions such as the furlough scheme in the UK or insolvency restriction measures in many countries.
- Initial efforts to find holistic solutions mostly failed Lloyds Recover Re, Industry panel to add pandemic risk to Pool Re.
- Some solutions did work like Credit Insurance governmental backstops in UK or PRIA for BI claims in USA.
- Regulatory focus on climate risk as the pandemic highlighted further the importance of climate change impact.
- Claims reserving was done, operational process were amended, technology was updated but scenario modelling is still a way of.
- Some product innovation came into play like extreme risk parametric covers.
- Product development on supporting public-private or NGO solutions.

Lessons Learnt

- The world can ‘stop’ and the industry needs to be better prepared for this....
- The need to reprice risk and re-evaluate pricing methods post COVID.
- The need to review contractual wordings on coverages.
- The need to invest further in technology operationally and for underwriting.
- More effort is needed on scenario modelling on new extreme risks like pandemics.....

“We need to take the extreme scenarios that academics warn us about more seriously”. The pandemic wasn’t a shock. SARS, MERS and so on were warnings, and fitting an EVD would have told us what could happen. The Cambridge Centre for Risk Studies even produced a paper on a Brazil-derived pandemic. What they didn’t model was government shutdowns, which was a big miss. That “crazy” scenario about an island in the Canaries sliding into the sea and flooding the East Coast of the US isn’t looking that silly....!”

Nick Line, Chief Underwriting Officer

Markel International



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Lessons Learnt – Enterprise

COVID-19 Scenario Analysis

- At the heart of the Own Risk and Solvency Assessment (ORSA) is the forward-looking solvency assessment.
- In preparing forward-looking projections, firms will need to consider the impact of COVID-19.
- Base case scenario will need to reflect best estimate of the future experience.
- Stress and scenario testing is an important tool for both Management and the Regulator to ascertain whether insurers are sufficiently capitalised to absorb losses that could crystallise due to the emergence of various adverse real-world scenarios.
 - The stresses will need to allow for uncertainty in most material assumptions, ideally on a combined basis (multi-factor stresses).
- The next slides illustrates a high-level process for applying scenario analysis to pandemic risks.

COVID-19 Considerations in the ORSA

1. Assess Materiality of Pandemic Risks

- What are the current and anticipated exposures to pandemic risks? Do these have the potential to be material in the future?
- Allowing for the involvement of the Board and Management - Are stakeholders concerned?

Main Activities:

- Mapping pandemic risks into risk categories (integration into risk taxonomy)



Outcomes:

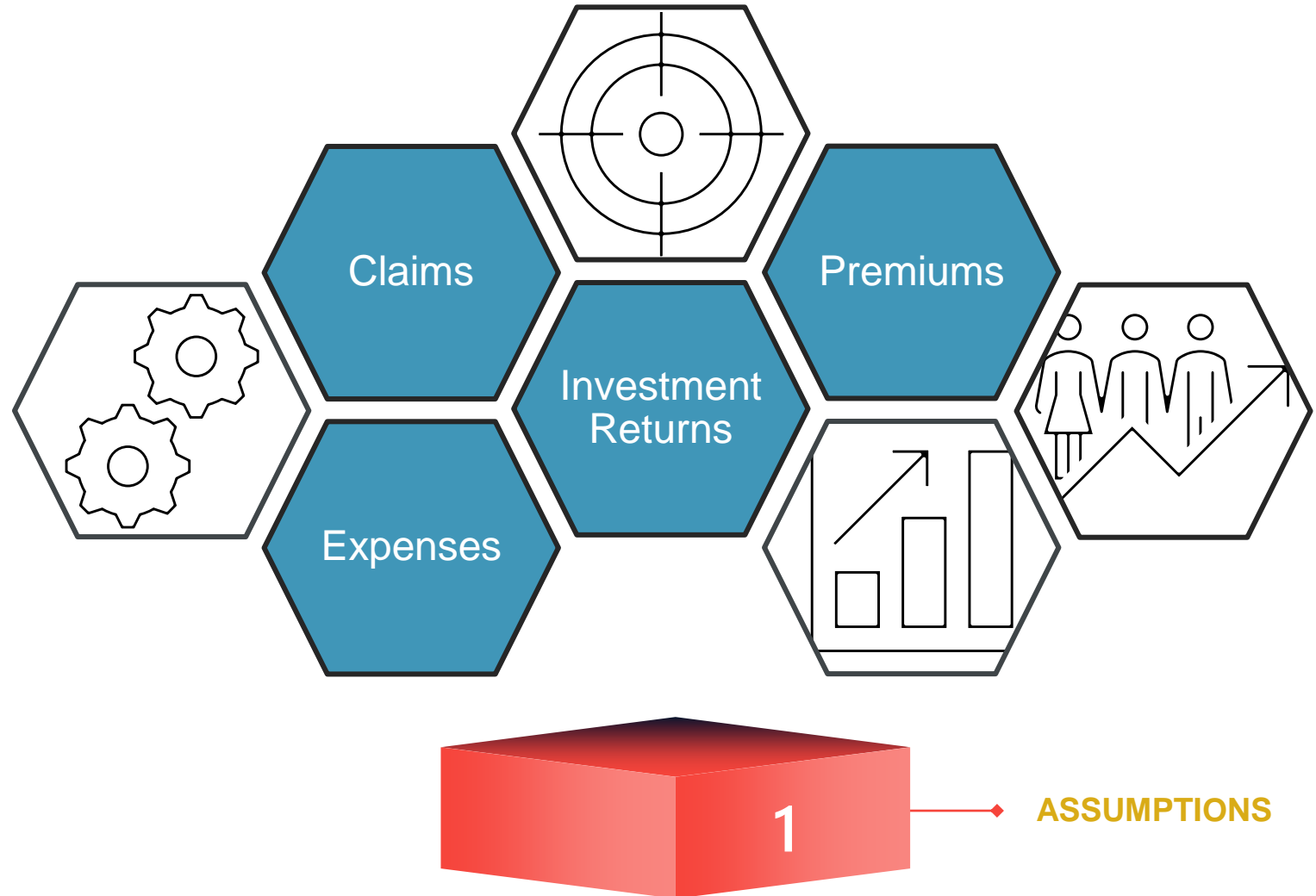
- 'Heat map' for Business Lines / Portfolios / most affected by pandemic risks

Impact	Very High (5)	5	10	15	20	25
	High (4)	4	8	12	16	20
	Medium (3)	3	6	9	12	15
	Low	2	4	6	8	10

COVID-19 Considerations in the ORSA

2. Identify and Define a Range of Scenarios

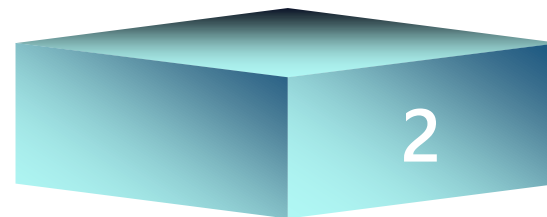
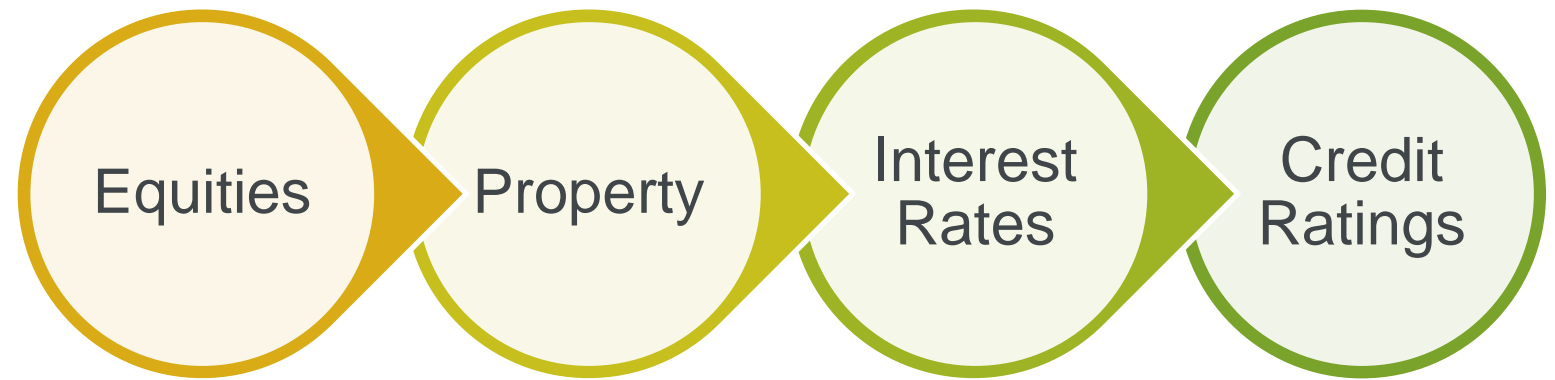
- What scenarios (and narratives) are appropriate given the exposures?
- Consider input parameters, assumptions, and analytical choices?
- Any reference scenario(s) should be used? or Lesson learnt from the past?



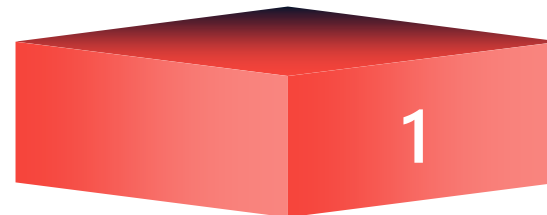
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MARKET IMPACTS

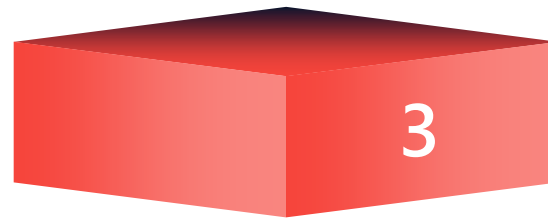


ASSUMPTIONS

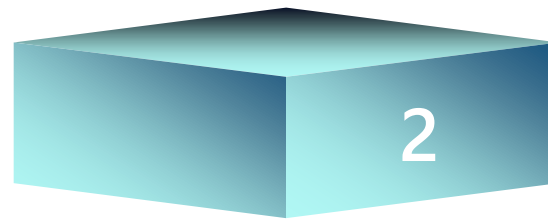
COVID-19 Considerations in the ORSA

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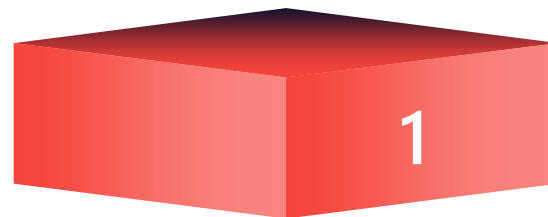
- What scenarios (and narratives) are appropriate given the exposures?
- Consider input parameters, assumptions, and analytical choices?
- Any reference scenario(s) should be used? or Lesson learnt from the past?



OTHER IMPACTS



MARKET IMPACTS



ASSUMPTIONS

RI

Ops
Risk

New
Business

COVID-19 Considerations in the ORSA

2. Identify and Define a Range of Scenarios

- What scenarios (and narratives) are appropriate given the exposures?
- Consider input parameters, assumptions, and analytical choices?
- Any reference scenario(s) should be used? or Lesson learnt from the past?

Main Activities:

- Define the needed scenario parameters:
 - Assumptions
 - Market Impacts
 - Other Impacts

Outcomes:

- Set of scenario parameters – per each scenario.

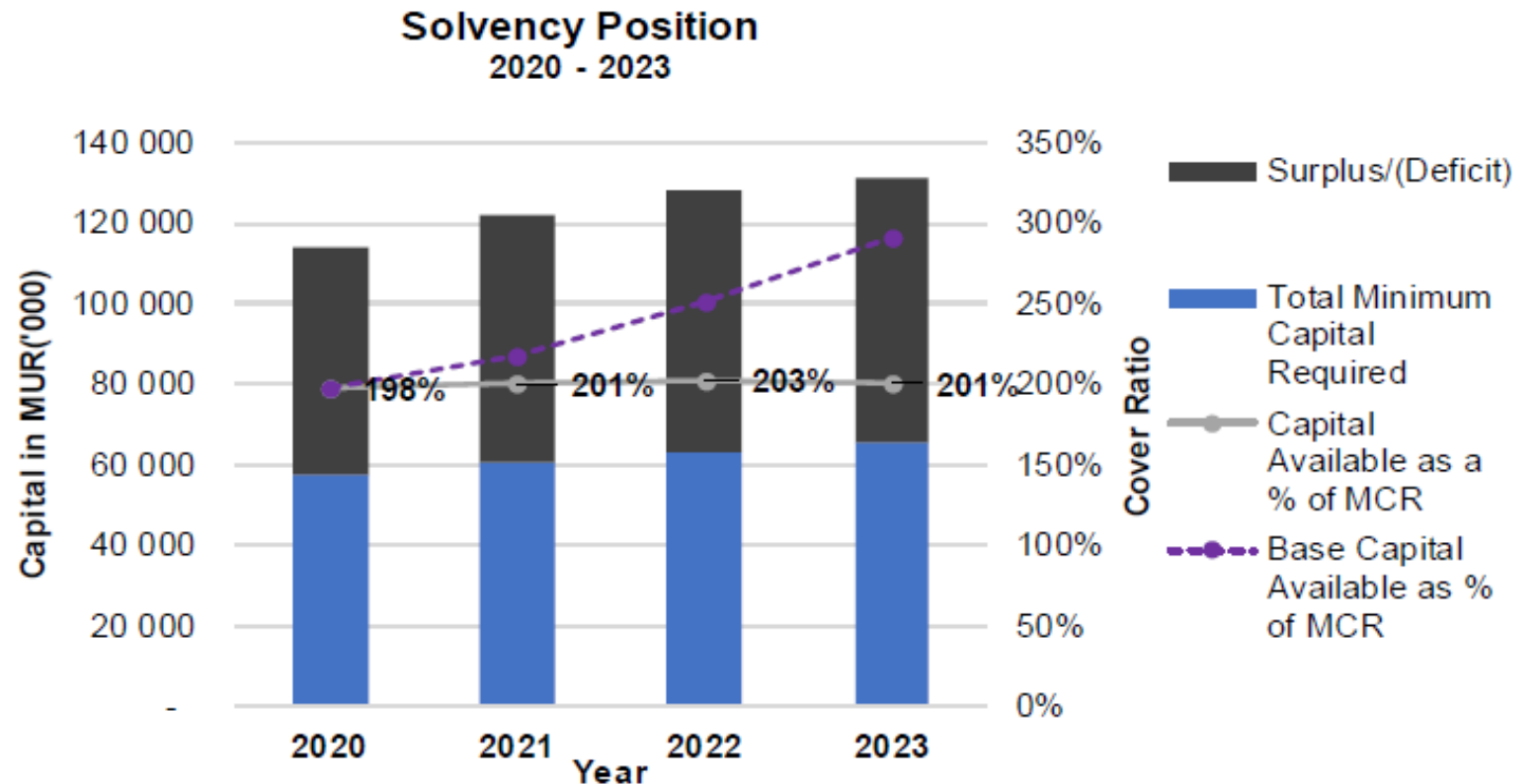
COVID-19 Considerations in the ORSA

3. Evaluate the Impacts

- Evaluate the potential effects on the Company's strategic and financial position under each of the defined scenarios.
- If parameters have been derived using expert judgement, allow for the calibration of parameters taking a stated confidence level.

Main Activities:

- Perform Analysis and analyse impact of the stress on solvency position taking into consideration any Regulations (for e.g. MCR):



COVID-19 Considerations in the ORSA

4. Identify Management Actions

- Use the results to identify applicable, realistic decisions to manage the identified risks and opportunities.
- What adjustments to strategic/financial plans would be needed?

Main Activities:

- The output from the ORSA will, therefore, inform the decision as to whether the strengthening of solvency is required and how this will be achieved (for example, through a capital injection or other balance sheet optimisation techniques).
- The ORSA process is also a useful tool for identifying areas in the underlying processes where enhancement or further development is required to provide the Board and Senior Management with a more accurate perspective on the adequacy of its available capital.
- Institute comprehensive internal-reporting for decision-taking and on-going monitoring, for example, updating the scenario analysis results every quarter and reporting the results to the RAC.

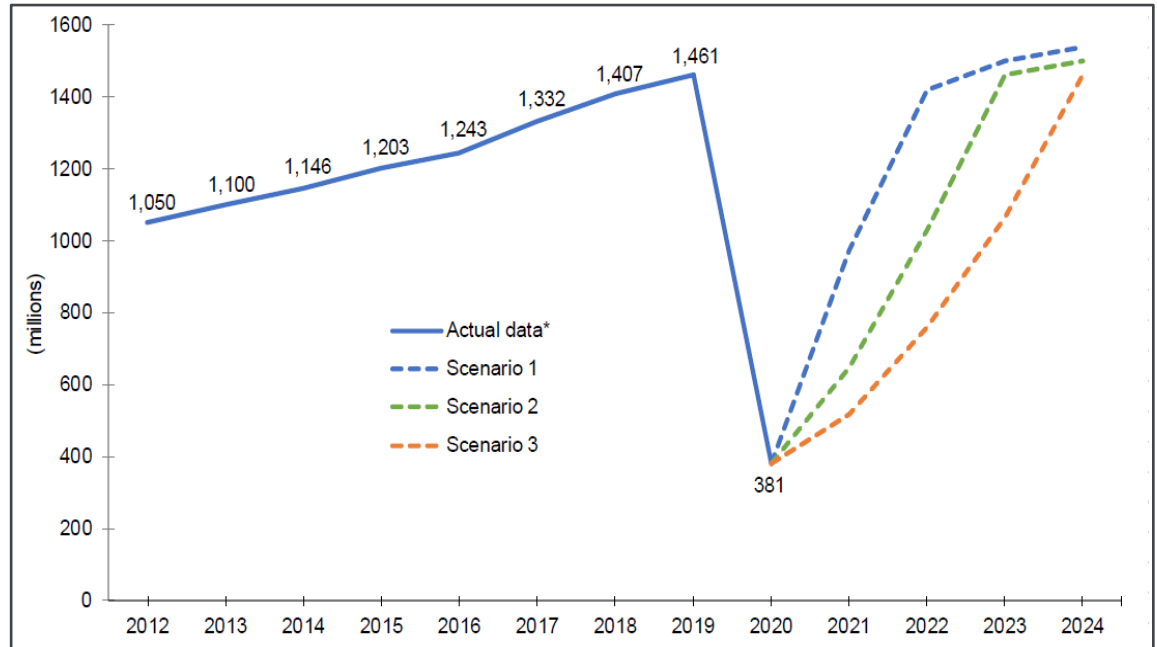
COVID-19 Scenario Analysis

- We will consider the effect of COVID-19 on the liability side of the balance sheet by offering a perspective on the forecast of key classes of business for general insurers.
 - This would allow the analysis of the impact of severe events or sequence of events on the financial state of firms.
 - For each key business class, three scenarios are put forward as summarised below. They should not be regarded as predictions as they only provide a basis for discussing and analysing the possible impacts.

Scenarios	Optimistic	Best Case	Worst Case
Description	Government restrictions are very effective.	Government restrictions are quite effective.	Government restrictions are not that effective.
Duration of lockdown	3 months.	6 months.	9 months.

Travel

- The United Nation World Tourism Organisation presented 3 forward-looking scenarios which point to a return of international tourism to pre-pandemic levels.
- Scenario 2 shows international tourism modestly bouncing back in 2021 to levels which are still less than half of those in 2019. This assumes a gradual reversal of the pandemic by the second half of the year, including the rollout of COVID-19 vaccines, a significant improvement in global traveller confidence and major lifting of travel restrictions.
- It is expected that future claims will be significantly lower than average until government-imposed lockdowns are lifted and demand for travel rises again.



Scenarios	Optimistic	Best Case	Worst Case
Description	Government restrictions are very effective and demand for travel rises quite fast.	Government restrictions are quite effective and demand for travel rises moderately.	Government restrictions are not that effective and demand for travel rises very slowly.
Impact on Premium Volume	A reduction of 5% in premium volumes.	A reduction of 10% in premium volumes.	A reduction of 25% in premium volumes.

Motor

- The knock-on effect from government-imposed lockdown is that there has been a significant reduction in the number of motor insurance claims as many drivers are no longer on the road.
- With fewer miles driven and fewer cars on the road, frequency rates should decrease considerably, improving loss ratios in the near term.
- However, decreased accessibility of mechanics and the shortage of spare parts due to supply chain disruption has caused severity inflation and additional costs for property damage perils.
- For third party damage claims, insurers have also observed increased credit hire periods from third parties. The pandemic has led to additional costs of cleaning such as cost of protection kits, sanitization of vehicles and workspaces.
- Some possible impacts of COVID-19 are presented below. While these estimates should not be considered as predictions, they provide some insights on the potential order of magnitude on premium reduction and losses that could eventuate from different scenarios.

Scenarios	Optimistic	Best Case	Worst Case
Description	Government restrictions are very effective, and lockdown remains in force only for the next 3 months. As a result, impact on mileage is for a short duration because of Government imposed lockdown.	Government restrictions are quite effective, and lockdown extends over the next 6 months. As a result, impact on mileage is for a moderate duration because of Government imposed lockdown.	Government restrictions are not that effective, and lockdown extends over the next 12 months. As a result, impact on mileage is for a longer duration because of Government imposed lockdown.
Impact on Premium Volume	A reduction of 3% in premium volumes due to premium rebates and policyholders "shopping around".	A reduction of 5% in premium volumes due to premium rebates and policyholders "shopping around".	A reduction of 10% in premium volumes due to premium rebates and policyholders "shopping around".
Impact on Losses	15% decrease in frequency and an increase of 0% in severity. A reduction of 5% in total claims cost.	20% decrease in frequency and an increase of 5% in severity taking into consideration the impact of inflation for Motor Third Party Liability. A reduction of 10% in total claims cost.	30% decrease in frequency and an increase of 10% in severity taking into consideration the impact of inflation for Motor Third Party Liability. A reduction of 15% in total claims cost.

Marine

- Marine insurance has been impacted by COVID-19 in the sense that border restrictions have led to disruption in the supply chain. As a result, there has been a decline in trade and transportation volumes. Preliminary data from the World Trade Organisation (“WTO”) suggest that, in November 2020, global imports and exports were still 16% compared to the same period for November 2019 figures.
- In the light of the above, with reduced international trade pulse, it is expected that both premium volumes and future claims will be significantly lower until production resume and lockdown measures will be eased in major economies. The key aspect to consider here is inflation as the cost of the insured transport might increase, especially due to supply chain disruptions. Consequently, companies would need to ensure that the premium they are charging factors in the above argument.

Scenarios	Optimistic	Best Case	Worst Case
Description	Government restrictions are very effective and lockdown in major economies are lifted in the next 3 months.	Government restrictions are quite effective and lockdown in major economies are lifted in the next 6 months.	Government restrictions are not that effective and lockdown in major economies are lifted in the next 9 months.
Impact on Premium Volume	A reduction of 5% in premium volumes.	A reduction of 10% in premium volumes.	A reduction of 15% in premium volumes.
Impact on Losses	A reduction of 10% in claims.	A reduction of 15% in claims.	A reduction of 20% in claims.

Health

- Many insurers learned the lessons from the SARS outbreak of 2003 and introduced exclusion clauses for communicable diseases and epidemics/pandemics into most non-life products. COVID-19 has caused a massive acceleration in the use of telehealth. Additionally, a key conclusion of a survey conducted by the Max Bupa Health Insurance survey was that before COVID-19, only 37% millennials were particular about having a health plan that covered diseases like Coronavirus and now, 60% want such a comprehensive cover.
- Estimates on losses have not been provided but rather impact on premium volumes presented. Again, the companies would need to factor in any inflationary effects that could drive up the cost of claims associated with treatment and ensure that the premium they are charging factors in this.

Scenarios	Optimistic	Best Case	Worst Case
Description	Government restrictions are very effective and a low demand for health insurance is observed.	Government restrictions are quite effective and a moderate demand for health insurance is observed.	Government restrictions are not that effective and a high demand for health insurance is observed.
Impact on Premium Volume	An increase of 5% in premium volumes.	An increase of 10% in premium volumes.	An increase of 25% in premium volumes.

Conclusion

- Given the ongoing Coronavirus pandemic, both shareholders and regulators are interested to see the results of such an exercise to gain assurance about the firm's resilience to "extreme" events should they crystallise in the future.
- This presentation provides a starting point on how short-term insurers can prepare for stress and scenario testing for some key classes of business.
- It should be emphasised that Management should engage with various functions and levels of hierarchy during the stress and scenario process to formulate scenario(s) which are relevant to the organisation taking into consideration the firm's risk appetite set by the Board and any such requirements as determined by the Regulator of the country in which the organisation is operating.





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Lessons Learnt – Individual Actuary

Anti-Goldilocks Principle

- Unlike other Coronavirus outbreaks e.g., MERS and SARS, COVID-19 is hard to control:

Long Infectivity
Period

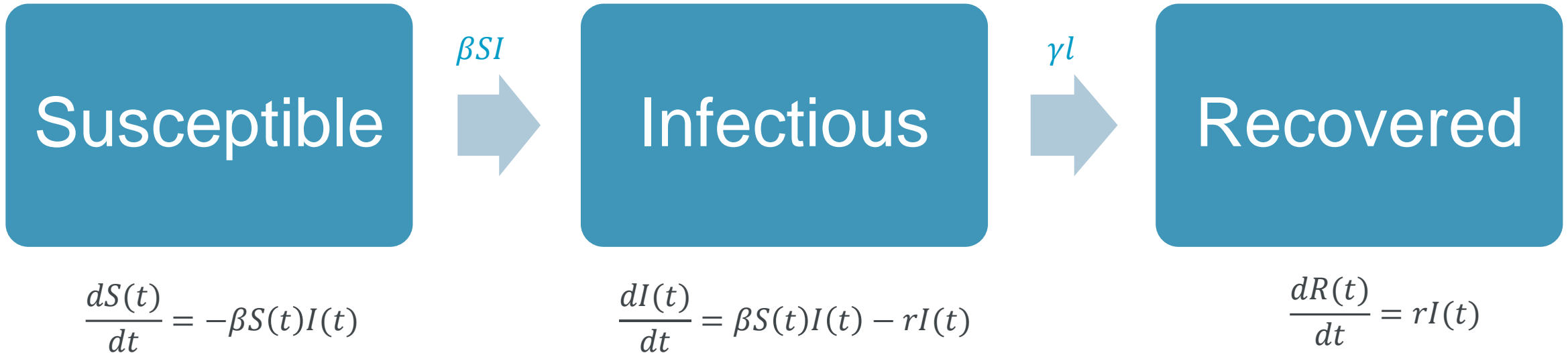
Mild/Asymptomatic
in Majority of
Cases

Serious in
Significant Portion
of Cases

Contagious

All Models are Wrong – Some are Useful

- Deterministic Compartmental Models:



- N : Total population size
- S : Proportion of susceptible individuals
- I : Proportion of recovered individuals
- R : Proportion of Recovered individuals

Variable Definition

Variable	Description	Unit
β	Transmission rate	$\frac{1}{\text{people} \times \text{days}}$
r	Recovery rate	$\frac{1}{\text{days}}$
t	Time	<i>days</i>
S	Number of susceptible people	<i>people</i>
I	Number of infected people	<i>people</i>
R	Number of recovered people	<i>people</i>
N	Total number of people	<i>people</i>

Source: Transmission Rate In Partial Differential Equation In Epidemic Models

By Alla Eladry

Simplifying Assumptions

- Relative short period of infectivity.
- Total population remains constant.
- Homogeneous mixing.
- Recovery rate and transmission rates are all the same.

All Models are Wrong – Some are Useful

- Stochastic Models:

Develop Suitable
Population Model

Develop an Individual
Based Model

Reproductive Number

- Basic Reproductive Number
 - Average number of secondary cases per primary case in a completely susceptible population.
- Effective Reproductive Number
 - The expected number of secondary cases per primary case at time t , considering intervention measures in place.
- Instantaneous Reproductive Number
 - the average number of secondary cases that each infected individual at time t would infect, if the conditions remained as they were at time t .

Serial Number

- Generational Number
 - The time between primary case exposure and secondary case exposure.
- Serial Number
 - The time between onset of symptoms in the primary case and onset of symptoms in secondary case.

Assume β is the infectious contact rate, γ is the recovery/removal rate, y_t is the number of cases at time t and (g_1, \dots, g_M) is the probability density for serial number.

Formulas

- Basic Reproductive Number:

$$R_0 = N \frac{\beta}{\gamma}$$

- Effective Reproductive Number:

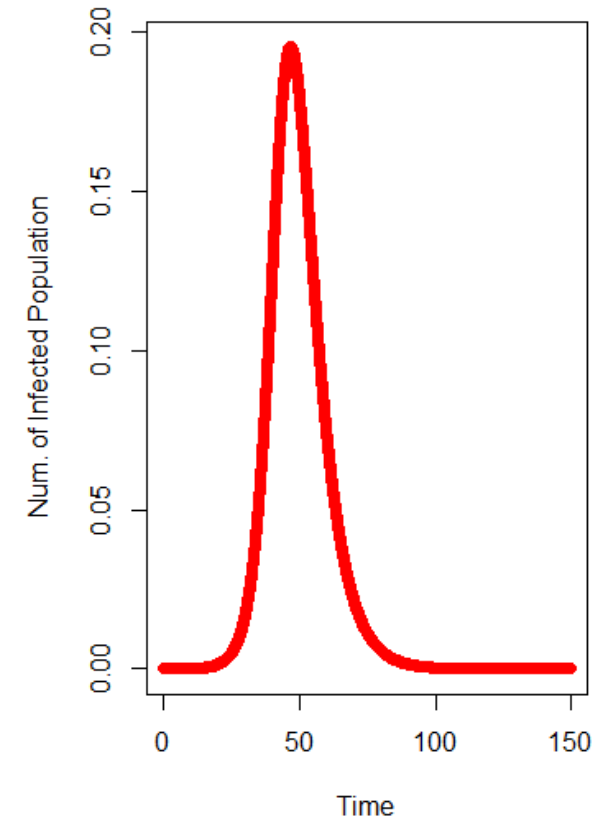
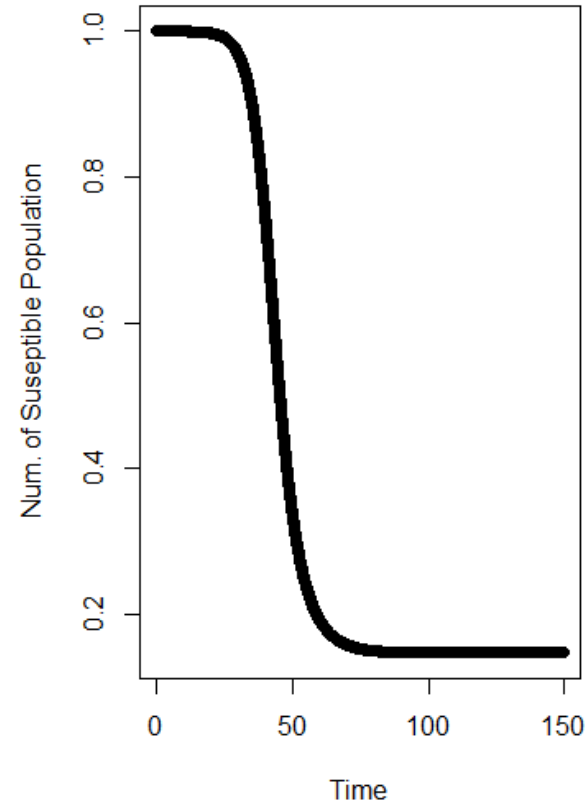
$$y_t = R_e(t-1)g_1y_{t-1} + \dots + R_e(t-M)g_My_{t-M} = \sum_{i=1}^M R_e(t-i)g_iy_{t-i}$$

- Instantaneous Reproductive number:

$$\hat{R}(t) = \frac{y_t}{\sum_{s=1}^t g_s \cdot y_{t-s}}$$

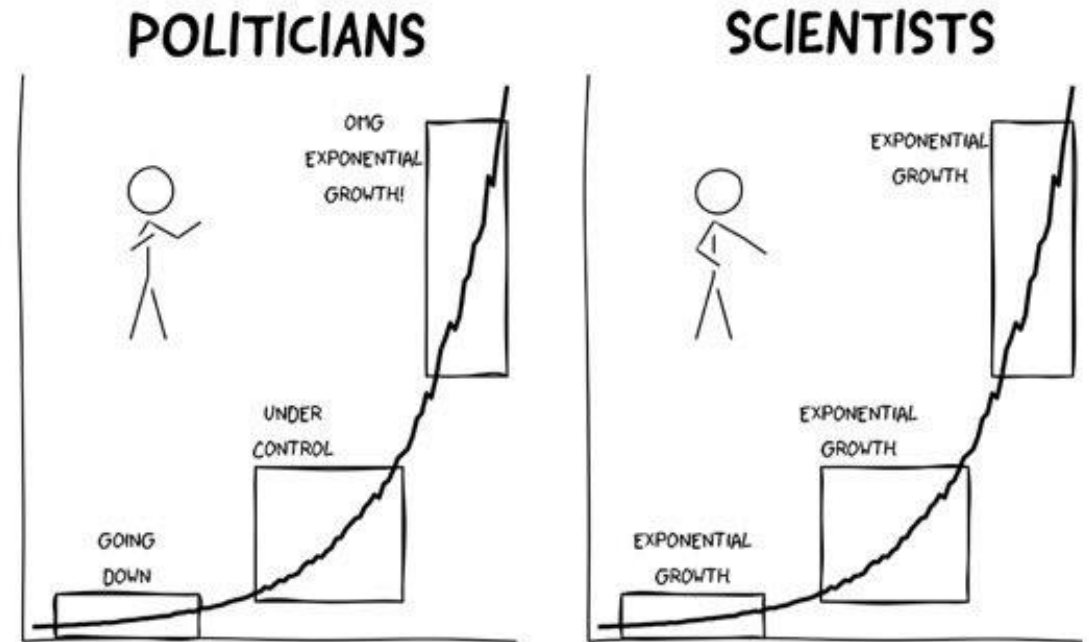
Useful Models Can Give The Wrong Message

- Message intended (UK) :
Let's flatten the curve to avoid overwhelming the healthcare system.
- Implicit Message: Once enough people are infected the pandemic is over.



Interpreting Data

- How to compare countries
- How to balance risk
 - Economy vs Health
 - Health vs Personal Freedom



Appendix

- Output from the IFoA COVID-19 Action Taskforce (ICAT) Risk 3 Workstream:
 - [COVID-19 and Future Pandemic Scenario Modelling for Property and Casualty \(P&C\) Insurers and Reinsurers](#)
 - [Pandemic impact on the insurance and pension industry](#)
 - [General Insurance Pandemic Scenario Modelling: Constructing a Simplified Exposure-Based Realistic Disaster Scenario \(RDS\)](#)
 - [Forecasting Disease Spread: A Review of Some of the Available Methods Including References](#)
 - [Introduction to Reproductive Number \(R\) & Its Calculation](#)
 - [Factors Impacting COVID-19 Outcomes by Country & Relevant Data references for Actuaries to Use in Scenario Modelling](#)
 - [Scenario Modelling of COVID-19](#)
 - [COVID-19 Scenario Modelling: Healthcare Sector Scenarios](#)

Questions

Comments

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