Research Brief: The Impact of COVID-19

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Moderator: Annie Tay
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Co-lead of the COVID-19 Actuaries Response Group
Comparison with other pandemics and near-misses

Increasing severity?

Influenza (1918-19)
Estimates vary upwards of 17m deaths from around 300m to 500m global infections

Influenzas (1957-58 & 68-69)
Case fatality rate estimates, see:
https://www.tandfonline.com/doi/full/10.1586/eri.11.56

SARS (2003-04)
See: https://doi.org/10.1002/bimj.200710431,

MERS (2012)
See: https://www.who.int/emergencies/mers-cov/en/

MERS (2015)
See: https://www.who.int/emergencies/mers-cov/en/
https://doi.org/10.1186/s12938-017-0370-7

Ebolavirus (W. Africa, 2014)
See: https://doi.org/10.1186/s40249-015-0043-3,
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4153011/

Nipah virus

Measles (Global)

Influenza base reproductive rates based on UK transmission rate studies in the community – source: https://bmcinfectdis.biomedcentral.com/articles/10.1186/1471-2334-14-480
COVID-19 mortality: Italy

- As at 5 April, there were 130 000 diagnosed cases, and 16 000 deaths
- M:F mortality ratio over 150%
- The age effect is broadly similar to a normal mortality curve

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cases</td>
<td>Deaths</td>
</tr>
<tr>
<td>0-49</td>
<td>8,770</td>
<td>63</td>
</tr>
<tr>
<td>50-59</td>
<td>7,998</td>
<td>190</td>
</tr>
<tr>
<td>60-69</td>
<td>8,755</td>
<td>606</td>
</tr>
<tr>
<td>70-79</td>
<td>9,309</td>
<td>1,846</td>
</tr>
<tr>
<td>80-89</td>
<td>6,195</td>
<td>1,808</td>
</tr>
<tr>
<td>90+</td>
<td>887</td>
<td>273</td>
</tr>
<tr>
<td>Not known</td>
<td>135</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>42,049</td>
<td>4,786</td>
</tr>
</tbody>
</table>
What are the numbers? – Case Fatality Rate

\[
\frac{?}{?} = ?\%
\]

\[CFR = \text{Deaths} / \text{Cases} \text{ (meaning all infections, not just hospital admissions)}\]

There major problems estimating this:

- It is not known how many cases there are (i.e. ‘unconfirmed’)
- It is not clear what time lag effect to allow for
- It is not clear how many COVID-19 deaths there are (outside hospitals)
- It may also be the case that some COVID-19 deaths in hospitals are in respect of other causes

“… the CFR of COVID-19 appears to be lower than that of SARS (9.5%) and Middle East respiratory syndrome (34.4%), but higher than that of influenza (0.1%).”
What are the numbers? – Case Fatality Rate (2)

If we compare against normal seasonal flu, the CFR estimates for which suffer from the same problems, we may (optimistically!) allow for some of the above because they affect C19 and flu.

<table>
<thead>
<tr>
<th>CFRs (50+)</th>
<th>Normal flu</th>
<th>Central C19</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 50+</td>
<td>0.50%</td>
<td>4.3%</td>
<td>8.0%</td>
<td>2.1%</td>
</tr>
<tr>
<td>F 50+</td>
<td>0.50%</td>
<td>2.7%</td>
<td>5.1%</td>
<td>1.4%</td>
</tr>
<tr>
<td>M 50+</td>
<td>100%</td>
<td>900%</td>
<td>1600%</td>
<td>400%</td>
</tr>
<tr>
<td>F 50+</td>
<td>100%</td>
<td>500%</td>
<td>1000%</td>
<td>300%</td>
</tr>
</tbody>
</table>
Coronavirus: how diabetes, asthma and other underlying health conditions affect how you cope

The virus appears to hit those with certain medical conditions the hardest - what are they and how could they lead to complications?

- Are COVID-19 deaths largely just deaths ‘by another name’? – deaths ‘with’ not ‘from’ C19?
- Is there a socio-economic differential in the mortality rates? (e.g. looking at smoking, obesity)

Almost two thirds of critically ill coronavirus patients are overweight and 37% are under 60, NHS audit reveals

- Excess weight against chest makes it harder for muscles to draw in deep breath
- Weak immune system allows COVID-19 to spread to lungs and cause pneumonia
- These two factors may explain why two thirds of ICU coronavirus patients obese
- Comes as coronavirus death toll in UK rises to 281 and infections sit at 14,000
- Coronavirus symptoms: what are they and should you see a doctor?

% with other serious ailments who die

- Cardiovascular disease: 10.5%
- Diabetes: 7.3%
- Chronic respiratory disease: 6.3%
- Abnormally high blood pressure: 6%
- Cancer: 5.6%
- No existing conditions: 0.9%
Greg Solomon  BScHons BAHons FASHK FASSIA FIA

Head of Life & Health, Peak Re
private hospital

out-of-pocket

insurer

government

traditional reinsurer

pandemic reinsurer

retrocessionaire

securitisation

(ditto)

state hospital

government
• Death
• ICU / Critical care
• Treatment
• Hospitalisation
• Diagnostics
• **Insurers not paying:**
  • some governments pay hospital costs
  • hospital bed capacity
  • cut-back on non-essential and elective procedures
  • exclusions (?)

• **Insurers are paying:**
  • death (yes)
  • medical (some)
  • critical illness (!)
  • catch-up on non-essential and elective surgery
  • new product innovations
Covid19-specific challenges:

- Allowing late premiums, early withdrawals, waive waiting period
- Clarifications on wordings (eg. CI)
- Control anti-selection / self-selection
- Underwriting during a lockdown
- In future, uninsurable because of damage during sickness?
- Pricing: how much? how long? or not?
- Online selling, both for agents as well as a separate channel;
- Signature process

The biggest problem with pandemics is that everything goes wrong at the same time:

- claims go up on many lines of business, equity markets crash, interest rates reduced, loan default, business confidence down, new business falls, liquidity demands, etc.
- Diversification? What diversification?!
• **Traditional risk reinsurance:**
  - Underlying risks transferred
  - Portfolio XOL might have infectious disease exclusions
  - Reduced impact from natural reduction in sum-at-risk with age

• **Portfolio pandemic reinsurance:**
  - previously available at 1-2% ROL
  - available in future, for me
  - likely increased demand
  - securitisation also possible
• Reinsurers are risk takers of last resort
• For many reinsurers, is a pandemic their peak risk?
• Many tools have been used to spread this risk around
• Claims spirals?
Ultimately, this all comes down to people – and insurance exists to help people with uncertain financial events. Given the scale of the Covid19 outbreak, we are those people. Every single person in this webinar will be affected in one way or another. As a profession, let’s step forward and do the right thing.
Max J. Rudolph FSA, CFA, CERA, MAAA
Rudolph Financial Consulting, LLC
Assets

• Under U.S Mild scenario (200,000 deaths) insurer balance sheet impact will mostly be assets

• Look for discontinuities
  – Rules of thumb will no longer hold
  – Use first principles for strategic planning

• Potential problems
  – Defaults
  – Long term low interest rates
  – Previous bets to pick up yield (e.g., BBB-)
  – Liquidity
Look Into Your Crystal ball

- Resilience/Sustainability
- Clustering
  - Multiple events – crop failure, natural disaster, wildfires
- Risk management
  - Scams/fraud
- Health care practices
  - Telemedicine
  - Supply chain for medicine
  - Isolation/mental health
- Best addressed with deterministic stress tests
  - CDC severe pandemic scenario
  - Negative rates
  - Stagflation
Why a Pandemic Could Recur Gray Rhino 2009

- Supply chain constraints
  - Health care
  - Food/Energy/Services
- Virus mutations build resistance to drugs
- At risk population (HIV, cancer, diabetes)
- Poverty and malnutrition
- Reaction time
  - Travel
  - Vaccines take 6-9 months to develop
R. Dale Hall, FSA, MAAA, CERA, FCA
Managing Director of Research, Society of Actuaries
COVID-19 Risk Management for Actuaries

- Broad mixture of liability, asset and operational risks
- Insurance company operations
  - Remote Work
  - Internet Service Provider and Virtual Private Network Capacity
  - Distributed Organizational Management

https://www.soa.org/resources/research-reports/2020/impact-coronavirus/
COVID-19 Risk Management for Actuaries

<table>
<thead>
<tr>
<th>Pandemic Modeling</th>
<th>Risk Management under new sets of scenarios</th>
<th>Risk-Based Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impacts to Variety of Lines of Business</td>
<td>Compounding risk events</td>
<td>New Era of Distribution</td>
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