Communicating actuarial concepts with real-world examples from the COVID-19 pandemic

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 *Andrea Munley, GI Actuary, with input from within the COVID-19 workstream, demonstrates how real-life examples from the COVID-19 pandemic can be used to bring actuarial concepts to life in a simple way for a wide and diverse range of audiences*

Actuaries spend a lot of time thinking about how to communicate their analysis and findings. Actuarial concepts can seem academic and dry to wider audiences, and it can be difficult to link the maths and statistics to real-world impacts in a compelling way. Even actuaries themselves can struggle to visualise the relationship between the numbers and the world around them. This disconnect can lead to the audience underestimating the seriousness of the risks being communicated.

It is easier to communicate to an audience if you can find examples which are relevant to their lives and of which they have first-hand experience. Part of the issue when visualising risks is that many of the risks with the biggest potential impact are rare, so rare that they might not previously have occurred in the lifetime of the audience.

The pandemic and its impacts are a powerful source of relevant real-world examples which actuaries can use to illustrate the concepts involved in their work. The global nature of the pandemic and its far-reaching consequences mean that examples drawn from the pandemic can be relevant for a wide and diverse range of audiences, including audiences without actuarial training.

Below are some suggested simple examples which can be used as a starting point for these conversations.

Transition risk

Climate change literature splits the risks associated with climate change into three categories: physical, liability and transition.

- Physical risk is the easiest to conceptualise: the risk of extreme weather events such as a flood or hurricane.
- Liability risk isn't much more difficult to understand: the risk that legal action may be brought against an entity for failing to avoid or mitigate climate risks. There are historical examples in the legal actions brought against tobacco companies for continuing to sell cigarettes after knowing they cause cancer.

- Transition risk is defined as the risk of adverse impacts caused by the transition to a low carbon economy. This is more difficult to conceptualise because it is possible for a transition to occur without negative impacts, either because it is an improvement for all concerned, or because the potential negative impacts were minimised through careful management.

This means that any example chosen to illustrate transition risk is open to the rebuttal that it could be neutralised by acting differently. For example, a typical scenario described in the literature is the risk to petrol producers and car manufacturers from a sudden switch to electric vehicles. The obvious rebuttal is that this risk could be minimised by a transition period and clear signposting from the government that a change was coming. The same arguments can be used for almost any example that can be thought of.

However, in a world bounded by limited resources (money, time, human capital, resources), it will be impossible to perfectly foresee and fully avoid the downsides of every transition that takes place. Add in disagreements about the best course of action, entities attempting to exploit the situation for their own benefit, the tendency of panic to spread rapidly, etc. and it can be seen that transition risk in the aggregate will lead to negative impacts in the future, although exactly which transitions will go badly is uncertain.

The actions taken by individuals and organisations around the world make the difference between transitions which are as smooth as possible, with negative impacts minimised, or "disorderly transitions". However, it has been difficult in the past to visualise what this actually means.

The COVID-19 pandemic is a striking example of a disorderly transition. Trends which already existed (shift to working from home, delivery services, online "telehealth" provision) have accelerated. This has led to negative impacts for some which could have been avoided in a planned transition (deaths of delivery workers, collapse in medical health provision and routine screening appointments, "digital divide" with some families unable to access online services).

No government around the world has responded perfectly and often time has been wasted on minor political disagreements. There has been a lack of data to inform good decision making, so even people who are trying to make the best decisions for the greater good have been unsure what they should do. Existing inequalities have grown.

The world is currently living through one disorderly transition, and this experience illustrates just how bad further disorderly transitions could be.

The negative impacts experienced during the COVID pandemic may well reappear in a disorderly climate change transition. When organisations are tempted to delay and prevaricate on climate change, the example of the COVID transition can be used to illustrate the downside of that approach, and it will focus minds in a way that would have been difficult to achieve six months ago.

Second order effects

Second order effects are harder to predict than first order effects and so generally less attention is paid to their mitigation. However, they can affect the final outcome significantly.

A COVID-19 example is the fast-changing travel and border situation when lockdown began. Many people who hadn't been directly affected by the disease were nevertheless caught up in travel disruption and in some cases stranded far from their homes and families. A risk assessment of travelling just before the lockdowns might have focused on the risk of contracting COVID-19 and decided that travel was appropriate where that risk was low. However, for many

people the far greater impact turned out to be the cancelling of flights and closing of borders, something which many people did not view as a credible possibility until it actually happened.

Unforeseen consequences

Almost all decisions taken can have unforeseen consequences. Good risk management tries to consider the potential for these and mitigate as much as possible.

During lockdown farmers had to pour away milk even while supermarkets ran short, due to difficulties matching supply and demand, and supply chain breakdowns.

A further example is Britain's reliance on migrant labour for crop picking. While most people realised that border closures could potentially lead to shortages of food imported from abroad, the risk to crops grown domestically was not immediately obvious to people outside the farming industry.

Pooling of risk breakdowns

Many of the models used by actuaries rely on statistical independence of the units in the system. This is clearly not true in times of stress where many people experience the same negative event simultaneously. At these times there will therefore be more uncertainty in actuarial projections.

Systemic risk

The interconnected and global world offers a multiplicity of choice and options to the average consumer which were not available in the past. The downside of this is that problems spread faster and have further reaching impacts in a more connected system. However, when a system is running well it can be difficult to imagine how quickly and how seriously it could go wrong. It can also be difficult to understand that the mitigation options which would help for a local problem may be unavailable during a systemic shock.

An example is the increase in flour consumption during lockdown. In normal circumstances a home baker whose local supermarket was out of flour would have many other options: another supermarket, Amazon Prime, borrow from a friend, etc. However, the shortages affected all these other options simultaneously. This starkly illustrated that the average consumer is utterly dependent on supply chains and that the seemingly wide range of options is illusory: they are all dependent on the same supply chains. Once the chains break down there is very little an ordinary person can do to mitigate.

Furthermore, if they do manage to find a mitigation option it is likely to also be discovered by many of the other affected people, who will likewise be searching for a solution. The mitigation option will therefore quickly become overwhelmed.

The same type of interconnectivity issue can be seen at an international level in the shortages of medical protective equipment and the fierce competition of governments around the world to secure supplies for their own health systems.

Risk vs. Uncertainty

These are subtly different. Known risks often get more attention as it is easier to strategise responses to a specific risk. Entities need to consider what the next event may be and pay attention to that as well as managing current risks. There is also a danger in concentrating too much on the event just past: in the current situation looking away from climate change to focus on pandemic response is a major risk.

This can be illustrated by asking what people were focusing on six months ago as the biggest risks to their organisations - pandemics were almost certainly not at the top of the list. This

demonstrates the importance of looking for the risks which are missing from the current list, and making sure the organisation has robust plans in place to deal with them if they manifest.
Neil Cantle's recent blog on risk registers provides more insight on how to do this.

Correlation of tail events

Tail events are often correlated so several negative events may take place simultaneously. This means that looking at the value at risk (or other risk measures) of a single extreme scenario can lead to underestimating the potential for loss and provide false reassurance. It isn't enough to analyse single risk scenarios; interrelated events must also be considered.
A simple COVID-19 example is that the pandemic affected the stock market, so people/companies lost money just as they needed it most to cover the slump in revenue or loss of paid work.
As a further example, a question for insurance companies to consider, and to ask their business customers during risk management conversations, is how they would have coped if the pandemic had happened exactly as it did but there were also major power cuts and/or phone network outages? Much of the success of the response to the pandemic has been heavily reliant on the internet. Things would have been even worse if that had been affected too, which is a not implausible scenario.

Learning from others

It is a human tendency to feel relieved when lightning misses rather than planning what to do if it strikes next time. However, strikes which miss are useful events to use when planning for the future.
For example, countries which were badly affected by the SARS epidemic learnt many lessons on how to respond to pandemics, but countries who were less impacted didn't improve their pandemic responses to the same extent.
Most countries improve their response for the next time after suffering a disaster, but it shouldn't be necessary to actually experience the disaster before being able to prepare for the next one.
Part of resilience planning is looking for examples of potential future threats and seriously considering the response rather than falling back on "that couldn't happen here". India experienced several extreme weather events during lockdown and had to coordinate a disaster response while socially distancing.
There were floods in Britain in January and February. If those floods had instead happened in March then Britain would have found itself in a similar position to India, managing the lockdown and flood relief efforts simultaneously.
It would be useful for organisations to consider how they would respond to weather events/grid outages/etc. under their current working conditions.
Actuaries can help with this by keeping abreast of what is happening in the world at large and regularly updating their models to include new potential risks.