Messaging and Framing Uncertainty – Findings from the MUQ Working Party

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26 September 2016
Agenda

• Introducing the framework
• Practical case study
• The reserve uncertainty framework
• Summary and questions
Introducing the framework
Percentiles – caveat emptor

- Ultimates are estimates, and some practitioners illustrate this point by adding percentiles to show the range
- Percentiles also have to be estimated

- Percentiles are often more uncertain than the point estimate and frequently have no mention of their own accuracy
- We recommend you to think of the user and use qualitative methods and not to rely solely on percentiles
Australian connection

- Australian Appointed Actuaries have to consider the 75th percentile of the reserves and allowing for internal systemic risk was challenging

The Working Party generalised this starting point to create a framework across reserving risks
Framework aims

- Promoting **development of best practice** in measuring and communicating reserve uncertainty; by

- Supporting the generation of wider risk considerations
  - Breaking the problem down and structuring the thought process
One framework, two levels

- A skilled actuary will undertake comprehensive analysis and then communicate the material elements
Framework uses

By the actuary
- **Base structure** for their own internal framework
  - Record of areas considered
  - Governance and validation
  - Consistency, with little change needed from year-to-year
- **Articulation tool**
  - For example, to support communication to stakeholders
- **Pooling knowledge** and developing best practice in the profession
- **Training tool**

By the user
- **Awareness** of areas of uncertainty
- Provides **inspiration** for users to ask their actuaries powerful questions
Case Study
It’s over to you…
Case Study

James Nonactuary

Open your envelopes

David Supergrad
Martha Wiseperson
David Supergrad

- David uses Skyscanner.net to identify all flights from London that will arrive in Dublin between 2pm and 6pm on the day required.
- He then uses flightradar24.com for one week to sample all planes landing at Dublin from London, recording the scheduled landing time and actual landing time.
- He builds a model to simulate the 95th percentile delay between estimated landing time and actual landing time, which turns out to be 35 minutes.
- He identifies that even with a 35 minute delay the 3pm Harp Airways flight from LHR will arrive at 5.35pm at the latest which should give James enough time to get to the start of the dinner.
Case Study – The Results!

James is presented with two best estimates and two distributions

<table>
<thead>
<tr>
<th>David Supergrad</th>
<th>Martha Wiseperson</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 95\textsuperscript{th} percentile chance of getting to gala dinner on time is for James to leave London office at 1pm</td>
<td>• 90% chance of James getting to gala dinner on time if leaves London office at 11 am</td>
</tr>
</tbody>
</table>

“Bloody actuaries – is it 11 am or 1 pm – one’s two hours before the other.

Don’t tell me it can be one of a range of results, I’ve heard that one before!”
Results - Martha

Leave office at 11am - book 1pm flight

- Travel time to/from airport - Dublin
- Allowance for exiting Dublin airport and picking up Mrs Non Actuary
- Dublin airport strike contingency
- Normal flight time contingency
- Normal flight time
- Allowance for London security and check-in
- Travel time to/from airport - London

Key Points
1. Assumes travel by plane on British Airways
2. Flight times have been adjusted for seasonality and time of day
3. London meeting finishes at 11am
4. Gala Dinner starts at 7pm

Key Areas of Uncertainty
- Normal flight time is based on 1 year of data from Dublin airport website
  - Flight time Contingency of 0.5 hours based on 90th percentile
  - It is assumed that there will no extreme weather events impacting the flight
- 1 hour contingency allowed for possible Dublin airport strike, but there is limited data to base this on

Alternative flights

<table>
<thead>
<tr>
<th>Carrier</th>
<th>Scheduled departure</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA</td>
<td>1:00pm</td>
</tr>
<tr>
<td>Harp</td>
<td>3:30pm</td>
</tr>
<tr>
<td>BA</td>
<td>4:00pm</td>
</tr>
</tbody>
</table>

It is assumed that getting to/from the airport always takes exactly 1 hour
External influences

These are items that could potentially affect any travel time calculations.

- What time of day is he travelling and does this change how the past data can be used?
- That time of year is he travelling and does this change how the past data can be used?
- Baggage handlers at Dublin airport have planned a strike so that it will take much longer than usual for bags to arrive after a flight
- Whether everyone is going to Dublin at the same time, which could affect travel times or availability of aircraft
The reserving uncertainty framework
Reserve Uncertainty Framework

We want to keep improving: feedback is welcome
The framework document

Reserve Uncertainty Framework
MUQ working party 2016

Rights

The aim of a reinsurance is to encourage predictability of the long-term nature uncertainty, typically structured as a no-loss, no-win scenario. Although the Reserves are not always able to determine the exact size or extent of the losses, the Reserves are expected to determine the amount and type of reserves required to achieve their objectives. The foundation of a framework is to define the methodology for establishing the reserves. This framework should be designed and used to determine the reserves set aside for the years in which they are expected to be needed.

The purpose of this framework is to provide a structured approach to the establishment of the reserves and the determination of the reserves. The framework is intended to ensure that the reserves are established in a consistent and comprehensive manner.

Underwriting Risk

- How much of the reserves is covered in each year?
- How long does the reserve need to be maintained?
- How does the reserve perform across different years?
- How does the reserve perform across different exposure?

Exposures

- What is the total number of reserves?
- How long does the reserve need to be maintained?
- How does the reserve perform across different exposure?
- How does the reserve perform across different years?

Priming Risk

- How much of the reserves is covered in each year?
- How long does the reserve need to be maintained?
- How does the reserve perform across different years?
- How does the reserve perform across different exposure?

26 September 2016

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Framework Example – Brexit

External influence
- Brexit

Process changes
- Recognised in data

ENIDs/grey swans
- Solvency II

Expenses
- Changes

Other
- Expenses
- ENIDs/grey swans
- Underwriting
- Pricing
- Exposure monitoring
- Data
- Control risk
- Communication
- Reserving cycle
- Lack of knowledge
- Expert opinion
- Behaviour

Random
- Parameter
- Model

Expenses
- Internal process

External influences
- External
Framework Example – Driverless Cars

ENIDS/grey swans
- Electric, driverless cars

Exposure monitoring
- Accumulation of risk
- Mix of business

Parameter
- Selection

Behaviour
- Herd mentality
- Loss aversion
Our website

- The full framework to download
- References and our work from last year
- Past presentations

Type “MUQ” into the IFoA search bar


26 September 2016
Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenter.
Appendix
Case Study

James Nonactuary, CFO, BigInsCo is planning to attend the GIRO Gala Dinner in Dublin (7pm, 22 September) to see what all his actuaries get up to in their spare time.

A week before he is due to attend he approaches David Supergrad and Martha Wiseperson, two members of his actuarial team with the following problem…

James wants to travel to Dublin on the day of the Dinner.

At what time will he need to leave the London office (next to Liverpool St station) to be pretty certain of making the start of the dinner?

James rushes off to a meeting shouting “be realistic, tell me I need to leave the day before and I’ll have to spend most of the next day in the Guinness museum!” and asks for a response two days before the seminar.

Taking into account what will be important for James, put together a short list of things Martha needs to consider to come up with her estimate.

You can assume that getting from the London office to the entrance of any London airport always takes exactly 1 hour and from the exit of Dublin airport to the conference centre always takes exactly 1 hour
Case Study

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Taking into account the inherent uncertainties of such a journey, put together a short list of things Martha needs to consider to come up with her estimate.

You can assume that getting from the London office to the entrance of any London airport always takes exactly 1 hour and from the exit of Dublin airport to the conference centre always takes exactly 1 hour.
Underwriting Risk

Underwriting risk in this context is the risk that the wrong question is being answered – essentially that the terms and conditions of the question are different to what the actuary assumes at the start of the process.

- James expects you to know (but doesn’t tell you) that Mrs Nonactuary is accompanying him to the dinner and he needs to pick her up from the hotel in Dublin.
- James has a British Airways frequent flyer account, so he doesn’t like flying on any other airline as he wants to collect Avios.
Communication

Communicating with all related areas to find out additional relevant information.

- James’s PA could tell you that he has an important meeting that day that is due to finish at 11am
- Internal travel assistants may have a preferred supplier for all travel that must be used
- Has anyone had to do this calculation before for James? If so, what was the outcome of the model and what actually happened?
ENIDs/Grey Swans

Events that could affect travel time that haven’t been reflected in the past data and may not have been considered:

- GIRO gets moved to London due to flooding at the Dublin conference centre
- A bomb threat shuts down Heathrow Airport so that all flights are suspended or delayed on the day of travel
- Heavy fog in London means that only half the usual flights can take off and land from any airport
- One of the airlines on the London-Dublin route goes bankrupt and can no longer fly