Best Estimate(s): who will get the best one?
Cognitive biases and expert judgement applied to P&C reserving

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About the speaker

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• Senior Consultant at Deloitte Conseil (France)
• Support in IFRS 17 projects for large insurance and reinsurance group
• Support for the Solvency 2 actuarial function of a large medical insurer

Deloitte Conseil – Actuariat

• One of the leading French consulting companies regarding IFRS 17 projects, Solvency 2...
Expert judgment under the pressure of biases
Aware of the unconscious

« Systematic errors are known as biases, and they recur predictably in particular circumstances »
D. Kahneman, Thinking, fast and slow (2011)

Objectives

• Increase awareness to cognitive biases
• Show, with simplified cases how they may influence actuaries’ decision
• Get a first measure of their impact

Expert judgment

• Influence of biases in Best Estimate calculation can be categorized as follows¹:
  • A priori insights of the actuary due to familiarity with data and models
  • Mistakes related to how probabilities are perceived
  • Management and company culture influence in the decision making process

Expert judgment under study
Actuary vs cognitive biases

**Approach**

- Statistical behavioral study of actuaries facing cognitive biases
  - Cases built for and through the biases
  - Practical reserving cases using Chain Ladder et Bornhuetter-Ferguson methods
  - Respondents unaware of the true purpose of the study
  - Claims and their development built in triangles through simulation

**Study process**

- Implementation of a simplified Excel reserving tool
  - Respondents perimeter of action limited to expert judgment decisions
    - Chain Ladder claims development factors selection
    - A priori ultimate loss ratio for BF method
- Biases’ influence hidden into the cases instructions or structure
  - Instructions/Cases in 2 versions randomly given to the respondents
  - Identical claims triangles (in terms of development) used in several cases
Expert judgment surrounded by biases
Overview of biases covered by the study

- Disponibility bias
  Memory as judge for probability

- Confirmation bias
  New information necessarily considered as supportive to the decision made

- Visibility illusion
  The obvious at the expense of coherence

- Anchoring
  Decision guided by information

- Statu quo
  No one in charge, no change

- Representativity bias
  Prejudice stronger than rationality
Expert judgment surrounded by biases

Anchoring: Indications to the decision

**Principle**
- When a figure is given to a person before making a decision, this figure tends to work as an « anchor » to the decision

**Mechanism**
- Benchmarked average LR given in the instructions (115% or 140%)

**Results**
- Average answers to the ULR for BF method: 118% vs 133%
  - Important anchoring effect
  - Comparison to control case: LR chosen by the respondents in a following case with the same development pattern different for 2/3 of them
Expert judgment surrounded by biases

Status quo: accept or reject first opinion?

**Status quo**

**Principle**
- Once a decision has been taken by someone, people will have a tendency not to take responsibility to go against this decision, even if it is an incoherent one

**Mechanism**
- Selection of coefficient for the CL method already performed
- 2 possible instructions: performing an estimation of reserves or a review of the estimate

**Results**
- 50% of respondents with « estimation » as instruction did not any coefficient of the selection
- All the respondents with « review » as instruction changed at least the coefficient « illogically » excluded
  - Key role of respondents’ commitment to the answer
Expert judgment surrounded by biases

Illusion of visibility: obvious over coherent

**Illusion of visibility**

**Principle**
- Unability to see an abnormal element due to familiarity or overconfidence in one’s judgment

**Mechanism**
- A development factor extremely high (>18) and one quite high (2,27) for the same development year
- A second use the same development factor with the exception of the very large one

**Results**
- Around 2/3 of respondents excluded the quite high coefficient in the second but not in the first
- Illusion of visibility effective: 78% of them did not exclude it during 1st selection

<table>
<thead>
<tr>
<th>Selection case 1/ case 6</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kept/Kept</td>
<td>39%</td>
</tr>
<tr>
<td>Kept/Excluded</td>
<td>48%</td>
</tr>
<tr>
<td>Excluded/Excluded</td>
<td>13%</td>
</tr>
</tbody>
</table>
Expert judgment surrounded by biases
Heuristic of availability: memory as probability

**Heuristic of availability**

**Principle**
- The probability associated to an event is higher when this event relates to a recent memory

**Mechanism**
- Estimation of level of claims for a certain type of insured events: terrorist attacks or industrial catastrophes
- Allegedly the claims associated to either of these events cost in average 16 millions per year

**Results**
- Significant effect of the emotion associated to terrorist attacks (in the time of the study)
- Due to recent industrial catastrophes, the effect could diminish or even turn the other way around
- Estimated claims around the historical mean for respondents with industrial catastrophes and by far higher than the historical average for more than 75% of respondents with terrorist attacks

<table>
<thead>
<tr>
<th>Claims</th>
<th>Industrial</th>
<th>Terrorist</th>
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<tbody>
<tr>
<td>&lt;10</td>
<td>0%</td>
<td>13%</td>
</tr>
<tr>
<td>10-15</td>
<td>13%</td>
<td>0%</td>
</tr>
<tr>
<td>15-18</td>
<td>75%</td>
<td>20%</td>
</tr>
<tr>
<td>18-20</td>
<td>0%</td>
<td>20%</td>
</tr>
<tr>
<td>20-25</td>
<td>13%</td>
<td>20%</td>
</tr>
<tr>
<td>&gt;25</td>
<td>0%</td>
<td>27%</td>
</tr>
</tbody>
</table>
To an unbiased expert judgment?
Ideas to limit cognitive bias effect

• By definition, even aware of the bias, an individual is not protected from it

• To reduce their effect, set up processes to avoid their specific circumstances to appear in the first place
Expert judgment facing heteronomy

Variability of reserving in its own

Individual judgment coherence
• Incoherence in the performance of two CL by the same person using the same data
• Gap of more than 40% between the two estimates for more than 25% of respondents
• On average the same person have 4 coefficients between its two estimates

Different actuaries, different judgments, different Best Estimates
• High coefficient of variation => variability of expert judgments and estimates using the same data
• Variability goes even higher when judgment is not conditioned

<table>
<thead>
<tr>
<th></th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
<th>Case 6</th>
<th>Case 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient of variation</td>
<td>38%</td>
<td>63%</td>
<td>43%</td>
<td>18%</td>
<td>45%</td>
</tr>
</tbody>
</table>

Gap between estimate case 3/case 7
Limited study of the expert judgment
A study with its own biases

Panel representativity

Case relevance

Measure relevance
Expert judgment overwhelmed by biases?
Room for unstudied and undiscovered biases

- Framing
  - Answers trapped in wording
- Collective statu quo
  - No intention for individual to break a group decision
- Small numbers rule
  - Running into conclusions
- Collective conservatism
  - Group more conservative than the individual
- Authority bias
  - Actuary’s authority, authority of its judgment
- First probability
  - Unconsidered probability if situation and the prejudices associated to look incoherent
Expert judgment surrounded by biases

Main references

Academic papers on cognitive biases


Non-life reserving papers


Mixing non-life reserving and cognitives biases

- Gibson L. (2008). Defence against the dark arts, a practical handbook for reserving actuaries. *General Insurance convention of the Institute of Actuaries and Faculty of Actuaries*
Thank you for your attention

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