34TH ANNUAL GIRO CONVENTION
CELTC MANOR RESORT, NEWPORT, WALES

Estimating the IBNR from Year of Account Projections
Robert Murray and Rob Warren

Agenda
- Accident year basis v. year of account ("YOA") reserving
- Lloyd's annual accounting
- Methods for deriving claims IBNR estimates from YOA projections
- Our proposed method
- Next steps

Accident year reserving
Year of account reserving

Lloyd's syndicates operate on a YOA basis
But are now required to report on an annual accounting basis
Not all syndicates perform actuarial projections on accident year data
YOA projections may be used as a basis for determining annual accounting provisions
Lack of agreed or consistent method for determining claims IBNR

So what's the problem?

- Lloyd's syndicates operate on a YOA basis
- But are now required to report on an annual accounting basis
- Not all syndicates perform actuarial projections on accident year data
- YOA projections may be used as a basis for determining annual accounting provisions
- Lack of agreed or consistent method for determining claims IBNR

Why is this important?

Lloyd's Annual Report:

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unearned premiums</td>
<td>7,024</td>
<td>6,829</td>
</tr>
<tr>
<td>Claims outstanding</td>
<td>30,377</td>
<td>37,719</td>
</tr>
</tbody>
</table>

Claims outstanding includes:
- Reported outstanding claims
- IBNR claims

Signing actuaries may rely on the Managing Agents' assessment of unearned premiums and reported outstanding claims.
So appropriate IBNR assessment is crucial, but how is this done?
1. Actuarial judgement

2. Earned loss ratio = unearned loss ratio

Ultimate Premiums:

<table>
<thead>
<tr>
<th>Unearned Premiums</th>
<th>Earned Premiums</th>
</tr>
</thead>
<tbody>
<tr>
<td>= a% x Ultimate Premiums</td>
<td>= (1 - a%) x Ultimate Premiums</td>
</tr>
</tbody>
</table>

Ultimate Claims:

<table>
<thead>
<tr>
<th>Ultimate Claims</th>
<th>Reported Incurred Claims + IBNR</th>
</tr>
</thead>
<tbody>
<tr>
<td>= a% x Ultimate Claims</td>
<td>= (1 - a%) x Ultimate Claims</td>
</tr>
</tbody>
</table>

Ultimate Loss Ratio = Earned Premiums / Ultimate Premiums

Reported % = Reported Incurred Claims / Ultimate Claims

IBNR = Ultimate Claims x Earned Premiums / Ultimate Premiums - Reported Incurred Claims

IBNR = Ultimate Loss Ratio x Earned Premiums - Reported Incurred Claims

IBNR = Reported Incurred Claims x Earned % - Reported %

* Earned % = Earned Premiums / Ultimate Premiums
** Reported % = Reported Incurred Claims / Ultimate Claims
2. Earned loss ratio = unearned loss ratio

Pros:
- Very easy to apply

Cons:
- What happens in the event of large or catastrophic losses?
- Or when observed experience deviates from normal expectations?
- Lower than normal reported incurred claims higher than normal IBNR (and vice versa)
- Earnings may not be an appropriate measure of exposure
  - E.g. premium rate changes!
- Can generate wildly inappropriate IBNR claims
  - E.g. IBNR < 0 if (reported claims / ultimate claims) > (earned premiums / ultimate premiums)
- Inconsistent with accident year projections in cases where the best model is known (i.e. simulated data)

3. IBNR to outstanding claims ratio

Pros:
- The IBNR is independent from the estimate of ultimate claims

Cons:
- Possible to derive IBNR claims which are inconsistent with the actuary’s estimated ultimate
- Challenge of deriving the appropriate ratio
- Should IBNR be higher/lower just because reported outstanding claims are higher/lower than expected?
- Inconsistent with accident year projections in cases where the best model is known (i.e. simulated data)

4. Our proposed method

1. Assessment of an appropriate exposure development pattern
   - For claim numbers, consider the earned exposure over time
   - For claim amounts, the earned premiums should be adjusted for premium rate movements

2. Apply the following formula:

\[
\text{IBNR} = \frac{\text{Earned Exposure} - \text{Rep Inc DFM % Dev}}{\text{Ultimate Exposure}} \times \left( \frac{\text{Est Ult Claims} - \text{Reported Incurred Claims}}{1 - \text{Rep Inc DFM % Dev}} \right)
\]

- "Rep Inc DFM % Dev" represents the expected percentage development for the year of account in question as at the analysis date and is usually derived from chain ladder modelling.
- "Est Ult Claims" represents the actuary’s selected estimate of ultimate claims after all methods have been considered.
4. Our proposed method

Pros:
- Easy to apply
- Consistent with the selected model and estimated ultimate
- Focuses attention on the key issues:
  - Exposure
  - Development factor model
  - Initial expected loss forecast
- Replicates the IBNR from accident year models in cases where the best model is known (i.e. simulated data)
- An impossible estimate cannot be generated
  - unless an impossible model has been selected!

Cons:
- IBNR is dependent on the selected ultimate claims estimate
- Tricky to assess appropriate exposure?

5. Other methods

- Assessment of number of IBNR claims x average cost per claim
- Performing two analyses: one on a YOA basis and one on an accident year basis
- Any others?

Next steps

- Further tests against simulated and real data
- Please test and challenge our ideas
- Any other ideas in use in the market?
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