34TH ANNUAL GIRO CONVENTION
CELTIC MANOR RESORT, NEWPORT, WALES
Reserving through the soft market

How Can Actuaries Do Better This Time?

Kendra Felisky and Tony Goodall
Deloitte & Touche LLP
04 October 2007
Reserving as the market softens
How can actuaries do better this time?

Agenda

- The underwriting and reserving cycles
- Robust premium rate recording
- Understanding the business
- Methods for reserving in the soft market
- Discussion
The Underwriting and Reserving Cycle
Capital

- Tighter terms & conditions
- Reduced cover
- Disciplined underwriting

- Falling Rates
- Increased Competition
- Reduced capacity
- Falling Profits
- New Entrants
- Increasing Profits
- Reduced losses
- Retained Profits
- Debt Markets
- Outwards Reinsurance
- Exits from Market
- Reduced Capacity
- Reduced Competition
- Increased Rates
- Weaker terms & conditions
- Expanded cover
- Less disciplined underwriting
- Increased losses / lower premium level

The Actuarial Profession
making financial sense of the future
The Reserving Cycle

- **What is the reserving cycle?**
  - Distinct from the underwriting cycle…
    …but has a strong relationship with it
  - Clear cycle of over and under reserving
  - Visible across underwriting classes
  - More pronounced for funded business than accident year
  - More pronounced for longer tailed business

- **Why does the reserving cycle occur?**
  - Inappropriate use of historic trends and patterns due to the impact of the underwriting cycle
  - Inappropriate use of rating indices due to the impact of the underwriting cycle
  - Poor understanding of the business
  - Booked reserved differ from actuarial best estimate
  - Actuaries or management may deliberately choose to move away from best estimate figures at different stages of the cycle
The Reserving Cycle

Initial overstatement/(understatement) of ultimate claims estimates as a proportion of current ultimate estimates

The Reserving Cycle
Development pattern graph – Workers Compensation
The Reserving Cycle
Development pattern graph – Directors & Officers
The Reserving Cycle
Development pattern graph – Professional Indemnity
The Reserving Cycle

- What can be learned?
  - Regular communication with underwriters to understand change in mix of business
  - Advantage of paid chain ladder over incurred chain ladder
  - Need for robust rate indices with accurate recording and controls
  - Need for actuarial judgment in conjunction with statistical approach
  - Consistency year to year requires consideration of factors impacting underwriting and reserving cycles
  - Level of prudence may change dependent on underwriting cycle, which impacts reserving cycle.
Robust Premium Rate Recording
Robust Premium Rate Recording (1)

- Robust rate recording is essential for good reserving
  - Key piece of information used in the reserving process

- Non robust mechanism for capturing premium rates
  - Inaccurate recording of rates
  - Failure to allow fully for T&C changes
  - Lack of awareness as to what the rate index means
  - Danger: rate index is used inappropriately in the reserving exercise

- In a “soft” market, underestimation of the true drop in premium rates
- Danger: possible underestimation of reserves
Robust Premium Rate Recording (2)

- Historical concerns over approach to rate recording
  - Over dependence on underwriting staff
  - Failure to adequately break down rate movements
  - Inadequate allowance for T&C changes
  - Lack of consistency (both internal and external)
  - Inadequate allowance for new business
Robust Premium Rate Recording (3)

- **Lloyd’s Market Bulletin (May 2004)**
  - Aim to address the robust recording of rates

- **Current best practice:**
  - Risk by risk analysis
  - Rate change split into 5 components:
    - Pure rate
    - Underlying exposure
    - Attachment point
    - Terms and conditions
    - Claims inflation
  - Actuarial input into process
  - New/ renewal business
  - Nominated responsible person
  - Process for use of the information
Robust Premium Rate Recording (4)
So, what questions should you be asking yourself at the year-end?

- How are you currently capturing your premium rate change information?
- Do you have a robust mechanism in place?
- Are rate changes being considered in the 5 components:
  - Pure rate
  - Underlying exposure
  - Attachment point
  - Terms and conditions
  - Claims inflation
- Have you carried out any reasonableness checks on the level of rate movements?
- Has there been any actuarial input into the process?
- Are the rate indices being interpreted in the right way?
Understanding the Business
Reserving in Changing Markets
The “Blind” Actuary

- What if we ignore the underwriting and reserving cycles?
- What if we use only our data to reserve?
- Are we being professional if we do so?
Reserving in Changing Markets
The “Blind” Actuary

In incurred claims as at 31 March 2007:

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<th>7</th>
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</table>

- No adjustment for hard/soft market.
- No judgement used.
- Assume that all future underwriting years will exhibit the same characteristics as past underwriting years.
Reserving in Changing Markets
The “Blind” Actuary – Chain Ladder

- Massively under reserved in soft years.

- Could the BF method solve this problem…?

<table>
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<tr>
<th>Year</th>
<th>Blind Ultimate Claims</th>
<th>Latest Estimated Ultimate</th>
<th>Absolute Difference</th>
<th>% Difference</th>
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<td>2001</td>
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Reserving in Changing Markets
The “Blind” Actuary – Bornhuetter-Ferguson Ultimate

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</table>

- Selected ULRs based on 1993-1998 average.
- Still under reserved on soft years.
Understanding the business

- The importance of understanding the business
  - validate appropriateness of statistical methods
  - gain confidence of underwriting colleagues
  - recommendation of GRIT
  - improve pricing methods

- Important to understand changes in historical mix of business
  - RAD vs LOD vs CMD
  - Changes in underlying exposure
  - Inception date profile
  - Geographical mix
  - Concentration of account
  - Currency profile
  - Loss profile
  - Changes in personnel

- External consultants used to build ‘Underwriting Bibles’ to
  - facilitate understanding of business
  - document changes in business mix
  - useful guide for new staff
  - quick reference for internal and external actuarial staff
Understanding the business
Risk code mix

Premium income Split by Risk Code

Year of Account

The Actuarial Profession
making financial sense of the future
Understanding the business
Currency mix

Signed Premium Split by Currency

Year of Account

USD JPY GBP EUR CAD AUD

Understanding the business
Concentration of account

Proportion of Premium Income that Can be Explained by Top 5 Assureds

Year of Account
Understanding the business

Average Contract Length
Understanding the business
Inception date mix

Inception Date Split by Quarter

- October 1 - December 31
- July 1 - September 30
- April 1 - June 30
- January 1 - March 31
Method 1: Understanding the business

Description of method

- Insurance companies change various aspects of their business and policy terms and condition in light of a hard or soft market
- These changes are usually subjective
- This Method would involve looking closely at the specifics of the business and making adjustments
- Examples of changes include:
  - Average inception period
  - Average coverage length
  - Risk Code mix
  - Currency mix
  - Concentration of account
Method 1: Understanding the business

Example

The table below gives an example of the kind of changes that might take place in a company.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Hard</th>
<th>Soft</th>
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</thead>
<tbody>
<tr>
<td>Average Coverage Length (days)</td>
<td>402</td>
<td>402</td>
</tr>
<tr>
<td>Average Day of Inception</td>
<td>15-Jan</td>
<td>15-Jan</td>
</tr>
<tr>
<td>Average Exposure (days from 1 Jan)</td>
<td>215</td>
<td>215</td>
</tr>
<tr>
<td>Risk Code Mix</td>
<td>PI (30%), DO (30%), Banks (40%)</td>
<td>PI (28%), DO (28%), Banks (44%)</td>
</tr>
<tr>
<td>% Claims Made Policies</td>
<td>20%</td>
<td>20%</td>
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<tr>
<td>Concentration of Account</td>
<td>15%</td>
<td>16%</td>
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</table>
Method 1: Understanding the business
Example – lagging patterns

Adjusting development patterns for changes to average inception

<table>
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<tr>
<th>Year</th>
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<th>2:3</th>
<th>3:4</th>
<th>4:5</th>
<th>5:6</th>
<th>6:7</th>
<th>7:8</th>
<th>8:9</th>
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<td>1.00</td>
<td>1.00</td>
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Method 1: Understanding the business
Example – Bornhuetter Ferguson

<table>
<thead>
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<th>Year</th>
<th>ULR Based on Inc Link Ratio</th>
<th>Blind &quot;a priori&quot; ULR</th>
<th>PI</th>
<th>DO</th>
<th>Banks</th>
<th>Concentration</th>
<th>Revised &quot;a priori&quot; ULR</th>
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<td>25%</td>
<td>25%</td>
<td>65%</td>
<td>85%</td>
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</tbody>
</table>
Method 1: Understanding the business

- There is an obvious lag in Soft development, this is because:
  - Average inception being later in the year
  - Average coverage period being longer
Method 2: Hard and soft patterns

Description of method

Overview of method
Within a class of business, recognising the different cumulative paid or incurred development patterns:
- for hard market years
- for soft market years

Steps to building the model
1. Identify which years are classed as hard and soft
2. Fit a basic chain ladder models separately to both hard and soft years
3. For recent years estimate where you are in the cycle then blend between the two patterns
Method 2: Hard and soft patterns
Development pattern graph – Casualty Class
Method 2: Hard and soft patterns

Method Illustration

Illustration of method

- The cumulative incurred claims triangle below has been split into hard (red) and soft (green) years
- A simple link ratio model can be estimated separately for hard and soft years
- The patterns can be applied to recent underwriting years dependant on whether they have been identified as hard or soft

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
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<td></td>
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<tr>
<td>2000</td>
<td>15.5</td>
<td>138.3</td>
<td>345.2</td>
<td>639.0</td>
<td>720.8</td>
<td>777.3</td>
<td>786.6</td>
<td>792.0</td>
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<tr>
<td>2001</td>
<td>4.3</td>
<td>67.1</td>
<td>215.0</td>
<td>574.4</td>
<td>648.9</td>
<td>642.9</td>
<td>641.9</td>
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</tbody>
</table>

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Method 2: Hard and soft patterns

Blending patterns

- We have estimated hard and soft market incurred development patterns.
- Dependent on where we are in the soft/hard market the patterns can be blended.

<table>
<thead>
<tr>
<th>Year</th>
<th>Incurred % developed</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hard</td>
<td>Soft</td>
</tr>
<tr>
<td>1</td>
<td>8%</td>
<td>2%</td>
</tr>
<tr>
<td>2</td>
<td>48%</td>
<td>15%</td>
</tr>
<tr>
<td>3</td>
<td>75%</td>
<td>44%</td>
</tr>
<tr>
<td>4</td>
<td>105%</td>
<td>77%</td>
</tr>
<tr>
<td>5</td>
<td>108%</td>
<td>87%</td>
</tr>
<tr>
<td>6</td>
<td>105%</td>
<td>91%</td>
</tr>
<tr>
<td>7</td>
<td>104%</td>
<td>93%</td>
</tr>
<tr>
<td>8</td>
<td>103%</td>
<td>94%</td>
</tr>
<tr>
<td>9</td>
<td>102%</td>
<td>96%</td>
</tr>
<tr>
<td>10</td>
<td>101%</td>
<td>97%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weighting %</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard</td>
<td>75%</td>
</tr>
<tr>
<td>Soft</td>
<td>25%</td>
</tr>
</tbody>
</table>

- In this example the 2007 underwriting year would be assumed to be 6% developed at the end of the first development year.
- This is based on a 75% hard market and 25% soft market weighting.
Method 2: Hard and soft patterns

Testing the method

- The chart below shows that the difference in the patterns when using only hard or soft years is quite substantial.
Method 2: Hard and soft patterns

Advantages
- Easy to use/understand
- Pragmatic way of allowing for the reserve cycle
- No need for underlying business diagnostics
- Chain ladder method is widely used and understood

Disadvantages
- Not all hard/soft markets are the same
  - Pure rate change from hard to soft
  - Terms and conditions change from hard to soft
  - Contract certainty
  - Poor underwriting
- Position in the underwriting/reserving cycle needs to be estimated
Method 3: Benchmarking

- **Soft market can lead to:**
  - Businesses writing new classes of business
  - Underwriters accepting non-standard risks to achieve income targets
  - Underwriters accepting different mixes of business within each reserving class

- **Benchmarking**
  - Can provide an additional estimate for more recent years
  - Can act as a reasonableness check

- **Key is to:**
  - Understand the underlying business being benchmarked
  - Understand the business underlying the benchmark

- **Sources**
  - Association of British Insurers
  - Rating Agencies
  - Lloyd's
  - External consultants
Method 4: More complex methods (1)

Curve Fitting

- **First introduced as an alternative to chain ladder back in 1979:**
  - Method proposed by David H Craighead
  - No allowance for reserving cycle
  - Single curve fitted to all years
  - Based on cumulative development data
  - Used a Weibull distribution

- **Extension of curve fitting method:**
  - Define parameters of curve in relation to a premium rating index
  - Extend to create a whole continuum of fitted curves
  - Need to make use of a wider family of curves
Method 4: More Complex methods (2)

Curve Fitting

Percentage Developed 1993 - 1998

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Method 4: More complex methods (3)

Curve Fitting

Advantages of method

- Allows for reserving and underwriting cycles
  - Allows for additional data as compared to chain ladder method, e.g. premium rates
- Provides a set of additional estimates to consider
- Fully automated
- Subjectivity removed from initial curve fit

Limitations to method

- Can be complicated
- Does not take account of underlying business characteristics
- May produce spurious results – need to overlay judgement
- Future and past reserving cycles may exhibit different characteristics
- Reliance on accuracy of premium rates
- Lack of historical data may cause a problem
Discussion
Discussion

- **Reserve Cycles**
  - How are people allowing for the impact of the “reserve cycle” in their reserving exercises?
  - Where do people think we are in the underwriting cycle, do we feel terms and conditions / coverage are widening?

- **Premium Rate Indices**
  - Where do we think the market is in terms of having robust rate recording?
  - How are people factoring in changes in Terms and Conditions into their indices?

- **Understanding the Business**
  - Are people considering “Underwriting Bibles” as part of their reserving analyses?
  - What do we think are the most useful bits of additional information to support the reserving analysis?

- **Reserving Methods**
  - What methods are people using themselves to improve reserving in the soft market?