Chapter 3 - Financial Reporting

Introduction to Ratemaking and Reserving

Outline

Introduction

- Recall that in chapter 1, we learned what is LAE, which can be categorized into ULAE and ALAE
- It is important to know what is the unpaid LAE of a company, as this will directly affect the company's UW profit
- All development techniques that we learned in previous chapter, can be applied to ALAE as well
- In contrast, ULAE are not projected to ultimate for financial reporting, instead, estimate of unpaid ULAE are calculated directly

Introduction - Estimating ALAE

- Some companies do not keep records of case reserves of ALAE (only paid ALAE)
- Sometimes companies combine the claims data with ALAE and estimate the ultimate values
- However, not all line of business are suitable to use this approach, as the claims payment and LAE may be paid at a different point of time
- For example, third party liability, the LAE may be on an ongoing-basis during the investigation period, and before any claim payments being made

Example - Estimating ALAE

- Instead of using paid ALAE values for estimating the development, we can also use Paid ALAE-to-Paid Claims ratios to form the development triangle
- We look at an example on how to use ratio for computing unpaid ALAE

Example - Estimating ALAE - Multiplicative

- Given the following cumulative paid data:

AY	12	24	36	48	Selected Ultimate
1998		9,200	9,300	9,300	9,300
1999	8,000	8,900	9,060	9,060	9,060
2000	9,200	9,900	9,980		9,980
2001	8,300	9,400			9,520
2002	9,500				10,680

- And the cumulative paid ALAE data:

AY	12	24	36	48
1998		690	753	764
1999	500	760	853	861
2000	550	650	710	
2001	555	770		
2002	630			

Example - Estimating ALAE - Multiplicative (cont.)

- Estimate the indicated unpaid ALAE for AY2002 as of Dec 31, 2002. Assume that no further development of claims or ALAE after 48 months.
- First construct the ratio triangle:

Example - Estimating ALAE - Multiplicative (cont.)

- Then construct the link ratio triangle:

- Compute the unpaid ALAE:

Example - Estimating ALAE - Additive

- Instead of using multiplicative, we could also use additive in constructing "link ratio" triangle
- Using the paid-to-paid triangle, we construct the additive triangle:

- Note that the CDF here is summation, NOT multiplication

Example - Estimating ALAE - Additive (cont.)

- Compute the ultimate paid-to-paid ratio:

- Compute the ultimate ALAE and unpaid ALAE:

Estimating ULAE

- Generally there are two common different methodologies on estimating unpaid ULAE - Dollar Based vs Count Based
- Dollar Based Method:
  1. Paid-to-Paid Ratio Method (Classical Method)
  2. Kittel's Refinement to Classical Method
  3. Conger and Nolibos Method
  4. Mango-Allen Refinement
- Count Based Method:
  1. Classical Method
  2. Wendy Johnson Technique
  3. Mango-Allen Claim Staffing Technique
  4. Rahardjo
  5. Spalla

Paid-to-Paid Ratio Method

- There are four steps in paid-to-paid ratio method:
  1. Calculate historical ratios
  2. Review historical ratios for trends or patterns
  3. Select a raio of ULAE-to-claims
  4. Apply 50% of the selected ULAE ratio to case reserves and 100% to IBNR
- The following example illustrates the detail of this method

Example - Paid-to-Paid Ratio Method

You are given the following data of company XYZ as of Dec 31, 2008, estimate the Unpaid ULAE.

- Claim O/S = 603,000
- IBNR = 316,000

Calendar Year	Paid ULAE	Paid Claims
2004	14,352	333,000
2005	15,321	358,000
2006	16,870	334,000
2007	17,112	347,000
2008	17,331	391,000
2009	14,352	333,000

Example - Paid-to-Paid Ratio Method (cont.)

Wendy Johnson Method

- Two major drawbacks of using Dollar Based Method are:
  1. Does not regconize the fact that ULAE does not solely depend on claim amount
  2. Unpaid ULAE determined will fluctuate in response to changes in estimate of ultimate claims
- Data required for Wendy Johnson Method:
  1. Triangles of reported and closed counts
  2. Selected ultimate counts
  3. Paid ULAE
- Major steps:
  1. Estimate counts for newly reported and closed in each CY, counts remaining open at the end of each CY
  2. Select average ULAE per weighted count
  3. Project unpaid ULAE

Example - Wendy Johnson Method

Given the following data:

1. Reported and ultimate count:

AY	12m	24m	36m	48m	60m	Ult
AY1	2,133	2,252	2,266	2,271	2,271	2,271
AY2	2,037	2,149	2,174	2,182		2,184
AY3	1,620	1,675	1,681			1,694
AY4	1,239	1,307				1,323
AY5	1,248					1,310

2. Incremental closed count:

AY	12m	24m	36m	48m	60m
AY1	1,338	484	238	141	70
AY2	1,347	430	227	98	82
AY3	1,090	305	135	86	78
AY4	773	287	135	72	56
AY5	890	274	70	26	50

3. Paid ULAE for CY3, CY4 and CY5 are \$1,619, \$1,846 and \$1,867, respectively;
4. Trend factor for ULAE is 3% per year.

Assume that there is no development after 60m, estimate the unpaid ULAE.

Example - Wendy Johnson Method (cont.)

- Compute the ratio of *Reported Count to Ultimate Count* and select a ratio for each development years

Example - Wendy Johnson Method (cont.)

- Using the selected ratio and formula below to complete the square:

$$\text{Rpt}_t = \text{Rpt}_{t-1} + \frac{\text{Ult} - \text{Rpt}_{t-1}}{1 - S_{t-1}} \times \{S_t - S_{t-1}\}$$

Example - Wendy Johnson Method (cont.)

- Or, we could compute the incremental reported count using

$$\text{Rpt}_t = \frac{\text{Ult} - \text{Rpt}_{t-1}}{1 - S_{t-1}} \times \{S_t - S_{t-1}\}$$

Example - Wendy Johnson Method (cont.)

- Note that newly reported count is the sum of diagonal of the incremental triangles and open count for CY3 is the difference of total reported to date and total closed to date. For example,

$$\text{Open}_{CY3} = (2,266 + 2,149 + 1,620) - (1,338 + 484 + 238 + 1,347 + 430 + 1,090) = 1,108$$
$$\text{Newly Reported}_{CY3} = 1,620 + 112 + 14 = 1,746$$

- For other CYs, we can compute the open count using

$$\text{Open}_{CY_t} = \text{Open}_{CY_{t-1}} + \text{Newly Reported}_{CY_t} - \text{Closed}_{CY_t}$$

Example - Wendy Johnson Method (cont.)

- Compute the newly reported count, open count, closed count and weighted count for all CYs. Weighted count is defined as the weighted average of newly reported, open and closed count (where the weights are usually calculated from claims department data). Assume that the weights for newly reported, open and closed count are 20%, 70% and 10%:

Example - Wendy Johnson Method (cont.)

- Compute the trended average ULAE for histroical years:

- Using simple average for latest 2 years, compute the selected avg. ULAE:

Example - Wendy Johnson Method (cont.)

- Using the selected avg. ULAE, project the unpaid ULAE for all CYs:

Claim Liabilities - Introduction

- Claim liabilities include:
  1. Case reserves
  2. Provision for future development on case reserves
  3. Provision for reopened claims
  4. Provision for IBNYR (also known as pure IBNR)
  5. Claims handling expenses (ALAE and ULAE)
- It should includes all accident years
- In most countries, actuaries are required to estimate the CL on both gross and net of reinsurance basis

Example - Claim Liabilities

- The following table is a typical example of how the estimate of unpaid claims is being presented

AY	Ult	Paid	C. Estimate	IBNR	Est. Unpaid Claims
Prior Year			1,500	0	1,500
AY1	33,595	32,936	0	659	659
AY2	29.790	28.782	0	1,008	1,008
AY3	26,196	24,652	848	696	1,544
Total	89,581	86,370	848	2,363	3,211

- If the estimated unpaid loss adjustment expenses is 600 then the total estimate of unpaid claims is 3,811
- This estimate does not contain adjustment for time value of money or risk margins

Premium Liabilities - Introduction

- Premium Liabilities - Estimated value of claim and expense payments to be made after the accounting date
- Include an amount for future claims and all future LAE, expenses incurred in maintaining unexpired policies
- Two common approaches in determining PL:
  1. Premium approach
  2. Claims approach
- *Remark: Most companies define PL or CL as 75th percentile, which is the best estimate plus risk margin. Risk margin is beyond the syllabus of SOA/CAS exam, students who are interested with this can check out on Mack Method, Bootstrap Method and Stochastic Chain Ladder*

Premium Approach

- Deferred Acquisition Cost - Acquisition cost incurred as premium is written but earned and expensed over the term of the policy
- Under US statutory accounting, all DAC should be fully earned and expensed at inception of the policy
- So

$$\text{PL} = \text{UPR} - \text{DAC} - \text{Profit Margin}$$

- This method is less common compared to claims approach

Claims Approach

- Estimate the future claims and LAE as well as expenses incurred in maintaining unexpired policies
- Future claims may be estimated as unearned premium multiplied by an expected loss ratio
- Usually expected claims includes ALAE
- We shall look at a simplified example, to estimate the PL on gross of reinsurance basis

Example - Claims Approach

- Given the following:

LOB	UEP	AY1	AY2	AY3	BF Expected AY3	Business Plan
Property	882	73.00%	70.00%	74.00%	73.00%	70.00%
Automobile	876	68.00%	70.00%	71.00%	72.00%	70.00%

- We can choose the average of these loss ratio as expected loss ratio for unearned premium and compute the expected claims:

Example - Claims Approach (cont.)

- The selected LR above typically include ALAE and exclude ULAE
- Assume that the ULAE ratio is 10%. Then the ULAE for these two LOBs are:

Example - Claims Approach (cont.)

- Now we need to consider the maintenance expense and incentive commissions (again, these are usually presented as a percentage of unearned premium)
- Assume that the maintenance expenses and commissions are 5.3% and 3.6%
- Premium liabilities is defined total claims and expenses. So for these two LOBs: