8.1.2 Reinsurance

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In a reinsurance contract, a primary insurer cedes some or all of its risk to a reinsurance company. Because insurers are eligible to receive reimbursement from their underwritten policies, reinsurance serves as a type of recoverable.

Common reinsurance treaties are quota share and excess of loss.

Types of Reinsurance Treaties

In a reinsurance agreement, the primary insurer and reinsurer have to decide how to share or allocate the risk.

Under ***quota share*** contracts, both parties share a percentage of the total risk. Quota share reinsurance is similar to the application of coinsurance. An example of quota share reinsurance is a 70%/30% agreement, for which the primary insurer pays 70%, and the reinsurer pays 30% of any claims arising from the covered risks.

Under ***excess of loss*** reinsurance, the reinsurer is responsible for all claim amounts above the primary insurer's retention. This is similar to a deductible provision. Excess of loss reinsurance works differently depending on the basis: **per risk**, **per occurrence**, or **stop-loss (aggregate)**.

- Per-risk excess of loss reinsurance covers claims for a single policy.
- Per-occurrence excess of loss reinsurance covers claims resulting from one occurrence or event that impacts multiple policies.
- Aggregate excess of loss reinsurance covers aggregate losses within a specific policy period.

Considerations for Data Analysis

The techniques discussed earlier for estimating unpaid claims can be applied to analyze claims experience based on gross, ceded, or net of reinsurance perspectives.

However, the choice between analyzing gross, net, or ceded data may hinge on factors such as the volume and quality of the available data, characteristics of the ceded program, and an actuary's individual preferences.

To ensure a thorough analysis, consistent assumptions, and proper validation, actuaries should consider the following throughout the estimation process:

1. **Comparing net and gross data**. To help ensure the accuracy of the data for analysis, actuaries should start by checking whether net claim and net premium data are less than or equal to the gross data.

2. **Quota share analysis**. For quota share arrangements, a development triangle using the ratio of net-to-gross claims helps test and validate the quota share percentage by year. Ratios should align with available insurer information and net-to-gross premium relationships.

3. **Excess of loss analysis**. With excess of loss arrangements, examining large claims to check that retentions and limits for ceded claims match reinsurance contracts can help verify the accuracy of ceded and net claim triangles.

4. **Consistent assumptions**. Key assumptions, particularly those based on actuarial judgment, should remain consistent between gross and net or gross and ceded analyses. Unreasonable discrepancies, such as a larger tail factor for net claims than gross claims, should be avoided.

5. **Net claim development patterns**. Net claim patterns are often constrained due to coverage limitations, resulting in net claim development patterns that are equal to or less than gross claim development patterns.

Example 8.1.2.1 [CAS Exam 5 2011 Q33]

(1.5 points) Given the following information:

Accident Year	Gross Reported Claims (000s)			
	12 months	24 months	36 months	48 months
2006	$55,963	$62,679	$66,439	$66,439
2007	$57,584	$62,191	$65,922	$65,922

Accident Year	Net Reported Claims (000s)			
	12 months	24 months	36 months	48 months
2006	$50,367	$50,870	$51,125	$51,125
2007	$37,430	$40,424	$42,849	$42,849

- An insurer has either a quota share reinsurance contract or an excess of loss reinsurance contract in place each accident year.

a. Analyze the gross and net reported claims to determine which type of reinsurance was purchased for each accident year. Explain your reasoning.

b. Briefly explain how the selection of tail factors of both net and gross reported claims should be impacted by the presence of an excess of loss reinsurance contract.

Solution to (a)

We are given both gross and net reported claims for Accident Years (AY) 2006 and 2007 and are asked to identify whether each year's results reflect a Quota Share (QS) or Excess of Loss (XoL) reinsurance arrangement.

Step 1: Compute Net-to-Gross Ratios

Calculate the ratio of net to gross reported claims at each maturity:

Accident Year	Ratio of Net to Gross Claims			
	12 months	24 months	36 months	48 months
2006	50,367 / 55,963 = 0.90	50,870 / 62,679 = 0.81	51,125 / 66,439 = 0.77	51,125 / 66,439 = (
2007	37,430 / 57,584 = 0.65	40,424 / 62,191 = 0.65	42,849 / 65,922 = 0.65	42,849 / 65,922 = (

Step 2: Analyze Ratio Patterns and Interpret

AY 2006 – Excess of Loss (XoL):

- The declining ratio pattern over time (0.90 → 0.81 → 0.77) suggests that as more large losses are reported, a greater portion is ceded to the reinsurer.
- This is consistent with an **excess of loss** arrangement, where claims above a certain retention are ceded to the reinsurer. In early development, smaller losses dominate (net ≈ gross), but as large claims emerge, they get capped or ceded, reducing net.

AY 2007 – Quota Share (QS):

- The ratio is flat at 0.65 across all maturities, indicating that a constant 35% of claims is ceded, regardless of claim size or development.
- This reflects a **quota share** arrangement, where a fixed percentage (e.g., 35%) of every dollar of loss is transferred to the reinsurer.

Solution to (b)

Net Reported Claims Tail Factor

- The net tail factor is typically lower than the gross tail factor in the presence of XoL reinsurance.
- This is because large claims in later development periods (which contribute significantly to tail development) may exceed the retention limit and thus are partially or entirely ceded to the reinsurer.
- As a result, the net triangle exhibits flatter development in later maturities compared to the gross triangle, requiring a smaller tail factor to project to ultimate.

Gross Reported Claims Tail Factor

- The gross tail factor is unaffected by reinsurance, including XoL.
- Gross reported claims reflect the total losses incurred, regardless of whether portions are recoverable from reinsurance.
- Therefore, the gross development — including tail — continues normally and should be selected based on the observed development pattern, independent of the reinsurance structure.

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