

8.1.0 → Overview

- overview → Salvage & Subrogation (S&S) are two of the most common types of recoveries for insurers. When an insurer pays an insured for a claim denoted a total loss, the insurer acquires two rights to the damaged property.
- In this section, we will discuss Salvage & Subrogation, followed by an overview of reinsurance.
- note that the course text addressed this topic before evaluating reserving techniques (which we covered in section 2.2). However, it is a natural choice for us to cover reserving methods first, followed by other related topics.

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### 8.1.1 → Salvage & Subrogation

- overview → Salvage & Subrogation (S&S) are standard recovery mechanisms for insurers:

- Salvage refers to proceeds from selling damaged property that the insurer collects.
- Subrogation refers to the insurer's right to recover claim payments from a third party responsible for damages or injuries.

- Generally speaking, Salvage is commonly associated with property coverage + settles more quickly than Subrogation. This is b/c Subrogation is often linked to liability coverage that takes years to settle.

#### → Data Considerations

- Insurers vary in how they process + track S&S:

- Some insurers track S&S estimates + payments separately for various recovery types (i.e. salvage, subrogation, deductibles, + collateral sources).
- others consolidate claim data across all recovery types; often, they only record payments w/o estimating any case outstanding.
- Some consider recoveries as negative claim payments + avoid maintaining distinct recovery data.

- Due to the variety of different methods across the industry, it is essential that before performing any analysis, one accurately understands the insurer's approach + what data has been recorded.

#### → Estimating S&S recoveries

- unpaid S&S can be estimated by projecting ultimate S&S + then subtracting received (paid) S&S:

$$\begin{aligned} \text{Unpaid S&S} &= \text{Ultimate S&S} - \text{Received S&S} \\ \text{or using reported S&S:} \\ \text{Unreported S&S} &= \text{Ultimate S&S} - \text{Reported S&S} \end{aligned}$$

- The development technique is a common approach to estimating ultimate salvage & subrogation. Another common approach is the ratio method, which makes use of the ratio of S&S to paid claims + then uses those ratios in conjunction w/ ultimate claims to estimate ultimate S&S.
- To illustrate the ratio method, consider the scenario below.

#### → Examples

- You are given the following information as of December 31, 2008:

| Accident Year | Paid Claims Gross of S&S | Selected Ultimate Claims Gross of S&S | Ratio of Received S&S to Paid Claims | Development Factor to Ultimate for S&S Ratio |
|---------------|--------------------------|---------------------------------------|--------------------------------------|----------------------------------------------|
| 2006          | \$15,513                 | \$17,000                              | 0.361                                | 1.000                                        |
| 2007          | 15,568                   | 17,250                                | 0.379                                | 1.007                                        |
| 2008          | 9,441                    | 16,500                                | 0.286                                | 1.300                                        |

Use the ratio method to estimate the recoverables for salvage and subrogation (S&S) for accident years 2006 - 2008.

- Step 1 → For each accident year, calculate the received S&S by multiplying the paid claim gross of S&S by the ratio of received S&S to paid claims:

$$\begin{aligned} \text{Ay 2006 received S&S} &= 15,513 \times 0.361 = \$5,601.19 \\ \text{Ay 2007} &= 15,568 \times 0.379 = \$5,800.57 \\ \text{Ay 2008} &= 9,441 \times 0.286 = \$2,700.13 \end{aligned}$$

- Step 2 → Next, for each accident year, calculate the ultimate S&S by taking the product of the selected claims gross of S&S by taking the ratio of received S&S paid claims, + then multiplying by the development factor to ultimate:

$$\begin{aligned} \text{Ay 2006 ultimate S&S} &= 17,000 \times 0.361 \times 1.000 = \$6,137.00 \\ \text{Ay 2007} &= 17,250 \times 0.379 \times 1.007 = \$6,583.51 \\ \text{Ay 2008} &= 16,500 \times 0.286 \times 1.300 = \$6,134.70 \end{aligned}$$

- Step 3 → Use the equation from above to calculate the unpaid S&S for each accident year:

$$\begin{aligned} \text{Ay 2006 unpaid S&S} &= 6,137.00 - 5,601.19 = \$535.81 \\ \text{Ay 2007} &= 6,583.51 - 5,800.57 = \$782.94 \\ \text{Ay 2008} &= 6,134.70 - 2,700.13 = \$3,434.57 \end{aligned}$$

- Thus, the total estimate of unpaid S&S for Ay 2006-2008 is \$4,654.62.

- Given the following data as of December 31, 2010:

| Accident Year | Cumulative Paid Claims Gross of Salvage and Subrogation |           |           |           |
|---------------|---------------------------------------------------------|-----------|-----------|-----------|
|               | 12 months                                               | 24 months | 36 months | 48 months |
| 2007          | \$12,200                                                | \$13,260  | \$13,280  | \$13,280  |
| 2008          | \$12,180                                                | \$13,300  | \$13,320  |           |
| 2009          | \$12,880                                                | \$14,040  |           |           |
| 2010          | \$11,980                                                |           |           |           |

  

| Accident Year | Cumulative Received Salvage and Subrogation |           |           |           |
|---------------|---------------------------------------------|-----------|-----------|-----------|
|               | 12 months                                   | 24 months | 36 months | 48 months |
| 2007          | \$3,074                                     | \$4,670   | \$4,720   | \$4,746   |
| 2008          | \$3,098                                     | \$4,558   | \$4,602   |           |
| 2009          | \$3,180                                     | \$4,732   |           |           |
| 2010          | \$2,858                                     |           |           |           |

- Assume no further development after 48 months.

- Use all-year simple averages for all factor selections.

Use a ratio approach to estimate unpaid salvage and subrogation recoveries for accident year 2010.

#### → Step 1: Create the S&S ratio triangle

- For each year, divide the cumulative received S&S by the gross paid claims at each development period. This yields the ratio of S&S to paid claims.

| Accident Year | Ratio of Received S&S to Gross Paid Claims |                      |           |           |
|---------------|--------------------------------------------|----------------------|-----------|-----------|
|               | 12 months                                  | 24 months            | 36 months | 48 months |
| 2007          | 3,074/12,200 = 0.252                       | 4,670/13,260 = 0.352 | 0.355     | 0.357     |
| 2008          | 3,098/12,180 = 0.254                       | 0.343                | 0.345     |           |
| 2009          | 0.247                                      | 0.337                |           |           |
| 2010          | 0.239                                      |                      |           |           |

- Next, compute the age-to-age development factors for the table of ratios by dividing the value in each cell by the value in its cell directly to its left. Since the problem specifies using all-year simple averages for factor selection, we will allow that approach. This yields the selected factors for each maturity range: 12-24, 24-36, + 36-48.

| Accident Year | S&S Ratio Age-to-Age Development Factors |                     |       |        |
|---------------|------------------------------------------|---------------------|-------|--------|
|               | 12-24                                    | 24-36               | 36-48 | 48-Ult |
| 2007          | 0.352/0.252 = 1.398                      | 0.355/0.352 = 1.009 | 1.006 |        |
| 2008          | 0.343/0.254 = 1.347                      | 1.008               |       |        |
| Average       | (1.398+1.347+1.365)/3 = 1.370            | 1.009               | 1.006 |        |
| Age-to-Ult    | 1.370 x 1.009 x 1.006 = 1.390            | 1.014               | 1.006 | 1.000  |

- Thus, the ultimate S&S ratio is 0.339 x 1.310 = 0.7715.

(for 2010)

#### → Step 2: Devote the gross paid claims triangle

- Using the same cumulative paid claims triangle, divide each cell value by the value immediately to its left to obtain the age-to-age development factors for the 12-24, 24-36, + 36-48 month periods. Then, calculate the average for each period to determine the selected factors.

| Accident Year | Paid Claims Age-to-Age Development Factors |                       |       |        |
|---------------|--------------------------------------------|-----------------------|-------|--------|
|               | 12-24                                      | 24-36                 | 36-48 | 48-Ult |
| 2007          | 13,260/12,200 = 1.087                      | 13,280/13,260 = 1.002 | 1.000 |        |
| 2008          | 13,300/12,180 = 1.092                      | 1.002                 |       |        |
| 2009          | 1.090                                      |                       |       |        |
| Average       | 1.090                                      | 1.002                 | 1.000 |        |
| Age-to-Ult    | 1.091                                      | 1.002                 | 1.000 | 1.000  |

- Thus, the ultimate paid amount for 2010 is 11,980 x 1.091 = 13,273.42.

#### → Step 3: Estimate the unpaid S&S for Ay 2010

- To estimate unpaid S&S, multiply the ultimate paid amount by the ultimate S&S ratio + subtract the cumulative received S&S.

$$(13,273.42 / 0.7715) - 2,858 = 10,415 = 13,273.42$$

#### → Summary

- The ratios method offers two distinct advantages over the development technique:

- less leverage on development factors. The ratio approach offers the advantage of generating development factors that are less heavily influenced by received S&S dollars.

- recall "highly-leveraged" means lots of variation. So if a development factor is "highly-leveraged", that just means very large development factor causes lots of variation in the amount of claims (or a lot of S&S in this case) that are expected to paid/received between periods.

- Refined selection of S&S ratios. Another advantage is linked to the process of selecting ultimate S&S ratios for recent years. By considering the average of ultimate S&S ratios from previous years, excluding the current year, a more representative & reliable ultimate S&S ratio can be chosen, leading to improved accuracy in estimating future claims.
- In other words, we can use our natural judgement to select a reasonable S&S ratio. For example, if the projected ultimate S&S ratio for the most recent Ay is much smaller than the ratios for the previous years, we may assume something is disturbing the S&S ratio for the most recent year (such as unusually large claim, change in claims handling procedures for S&S, etc.) & select a larger ratio.

- An disadvantage of the ratio method is that an error in selecting ultimate ratios will likely lead to an error in the S&S estimator as well.

#### → Assignment

- Q1 Given the following data as of December 31, 2011:

| Accident Year | Cumulative Paid Claims Gross of Salvage and Subrogation (\$000s) |           |           |
|---------------|------------------------------------------------------------------|-----------|-----------|
|               | 12 months                                                        | 24 months | 36 months |
| 2009          | \$15,117                                                         | \$16,953  | \$16,953  |
| 2010          | \$15,092                                                         | \$16,862  |           |
| 2011          | \$14,727                                                         |           |           |