Direct Your Learning

15

Loss Reserving Methods

Educational Objectives

After learning the content of this assignment, you should be able to:

- Describe the role of loss reserves, including the relationship over time between incurred losses, paid losses, reserves, and policyholders' surplus.
- Explain why a reinsurer has a direct interest in the adequacy of its primary insurer's loss reserves.
- Explain how case reserves are established for the following categories of loss reserves:
  - Reported losses–payment certain
  - Reported losses–payment uncertain
  - Allocated loss adjustment expenses (ALAEs)
- Explain how bulk reserves are established for the following categories of loss reserves:
  - Reported losses–payment uncertain
  - IBNR reserves
  - Loss adjustment expenses, both allocated and unallocated
- Describe the following combined methods that can be used to estimate loss reserves:
  - Two-part combination method
  - Bornhuetter-Ferguson method
  - Three-part combination method
- Describe salvage and subrogation and their effect on loss reserves.
- Explain why excess of loss reinsurers encounter difficulties when estimating loss reserves or applying reserving techniques.

Outline

Loss Reserving Methods

15

LOSS RESERVES

Loss reserves are an important factor in determining the financial condition of insurers. Accurate reserving practices are critical to the stability and solvency of insurers.

Because insurers rely on estimates called **loss reserves**, they have difficulty establishing amounts that accurately reflect future loss and expense payments. However, because losses are a large portion of the liabilities recorded on an insurer's balance sheet, reserve amounts directly affect policyholders' surplus and insurer profitability.

Loss reserve

An estimate of the amount of money the insurer expects to pay in the future for losses that have already occurred and been reported, but are not yet settled.

Loss and Loss Adjustment Expense Reserves

Reserves consist of loss reserves and loss adjustment expense reserves. For a primary insurer, losses are the amounts that it is obligated to pay to claimants under primary insurance policies. For a reinsurer, losses are the amounts that it is obligated to pay to primary insurers under reinsurance agreements. Losses can be separated into paid losses and loss reserves.

Insurers must establish loss reserves to cover the delay between the time a loss occurs and the time the loss is settled and the claim is paid. Once a claim has been reported to the insurer, time is required to investigate the loss to determine whether the incident is covered under the policy and then to negotiate an appropriate settlement. This delay is shorter for most property claims and is usually longer for third-party liability claims, which often involve litigation. For example, a products liability or medical malpractice claim may take several years to settle and close, while a kitchen fire under a homeowners policy is usually closed within a few months.

Loss reserves also include loss adjustment expense (LAE) amounts, related either to individual claim files or to the overall claim operation, that cannot be allocated to a specific claim file. The National Association of Insurance Commissioners (NAIC) categorizes these expenses as either Defense and Cost Containment (DCC) or Adjusting and Other (AO).[1] DCC includes expenses related to the defense and litigation of claims. AO includes all other expenses, such as adjusters' salaries and other fees and expenses. Previously, the terms **allocated loss adjustment expense (ALAE)** and **unallocated loss adjustment expense (ULAE)** had been used to categorize loss expenses.

Allocated loss adjustment expense (ALAE)

The expense an insurer incurs to investigate, defend, and settle claims that are associated with a specific claim.

Unallocated loss adjustment expense (ULAE)

Loss adjustment expense that cannot be readily associated with a specific claim.

Despite the change in terminology, many insurance professionals continue to use the former terms. DCC expenses are often related to ALAE, and AO expenses are related to ULAE. Because actuarial techniques used to estimate unpaid LAE consider whether an expense can be directly associated with a particular claim, most actuarial literature continues to categorize loss adjustment expenses as either ALAE or ULAE. **Loss adjustment expense reserves** are related to loss reserves and represent estimates of future expenses for settling outstanding claims.

Loss adjustment expense reserves
Estimates of the future expense that an insurer expects to incur to investigate, defend, and settle claims for losses that have already occurred.

Loss reserve amounts are only one component of an insurer's total loss amount. Loss and LAE reserves are combined with **paid losses** to arrive at an **incurred losses** amount.

Paid losses
Losses that have been paid to, or on behalf of, insureds during a given period.

Incurred losses
The losses that have occurred during a specific period, no matter when claims resulting from the losses are paid.

Incurred losses = Paid losses + Loss reserves + Loss adjustment expense reserves

Insurers also establish bulk (or aggregate) reserves to estimate (1) the growth in reported case reserves or an amount for reported losses for which case reserves are inadequate, (2) losses that are assumed to have happened but have not yet been reported, and (3) additional costs of claims that have been reopened after previously being settled and closed. These bulk reserve components are collectively known as incurred but not reported (IBNR) reserves.

Establishing reserves for losses that have not yet been reported is more difficult than establishing reserves for known cases. IBNR reserves are generally estimated based on past experience and then modified for current conditions, such as increased claims costs and the current frequency and severity of reported claims.

Life Cycle of Incurred Losses

Loss reserves amounts must be reviewed and updated to reflect changes in paid losses and loss expense amounts over time. Insurers periodically update their estimates of incurred losses for past years using different methods. One approach is to update losses using an **accident-year method**, which aggregates incurred losses for a given period (such as twelve months) using all incurred losses for insured events that occurred during that period. Any losses that occurred in previous periods are not included.

Accident-year method
A method of organizing ratemaking statistics that uses incurred losses for an accident year, which consist of all losses related to claims arising from accidents that occur during the year, and that estimates earned premiums by formulas from accounting records.

For example, accident-year data for the calendar year 20X6 would include all events that occurred in that year. Loss amounts for events that occur in subsequent years would not be included in this amount. As loss payments are made during the accident year, paid losses increase and reserves decrease by an equal amount. Therefore, incurred losses are unchanged. However, incurred losses do change when a reserve is increased or decreased because of new information on a claim or because a new claim is reported. An accident year's accounts can be kept open for many years until all losses that occurred in that year are fully paid.

Insurers attempt to estimate accurate loss reserves as soon as possible after the end of an accident year. If loss reserves have been accurately estimated, then

incurred losses should equal ultimate losses at that point in time. In practice, an accident year's incurred losses are often less than **ultimate loss** amounts for some time after the end of the accident year. Information received after the end of an accident year usually causes loss reserves to increase, also causing incurred losses to increase for the accident year. This situation might occur when an insurer has to make a large payment as a result of a court judgment many years after the date of loss. This payment may not have been anticipated when reserves were originally established, and this causes incurred losses to increase for the accident year. The increase or decrease of incurred losses over time is called **loss development**.

Ultimate loss
The final paid amount for all losses in an accident year.

Loss development
The increase or decrease of incurred losses over time.

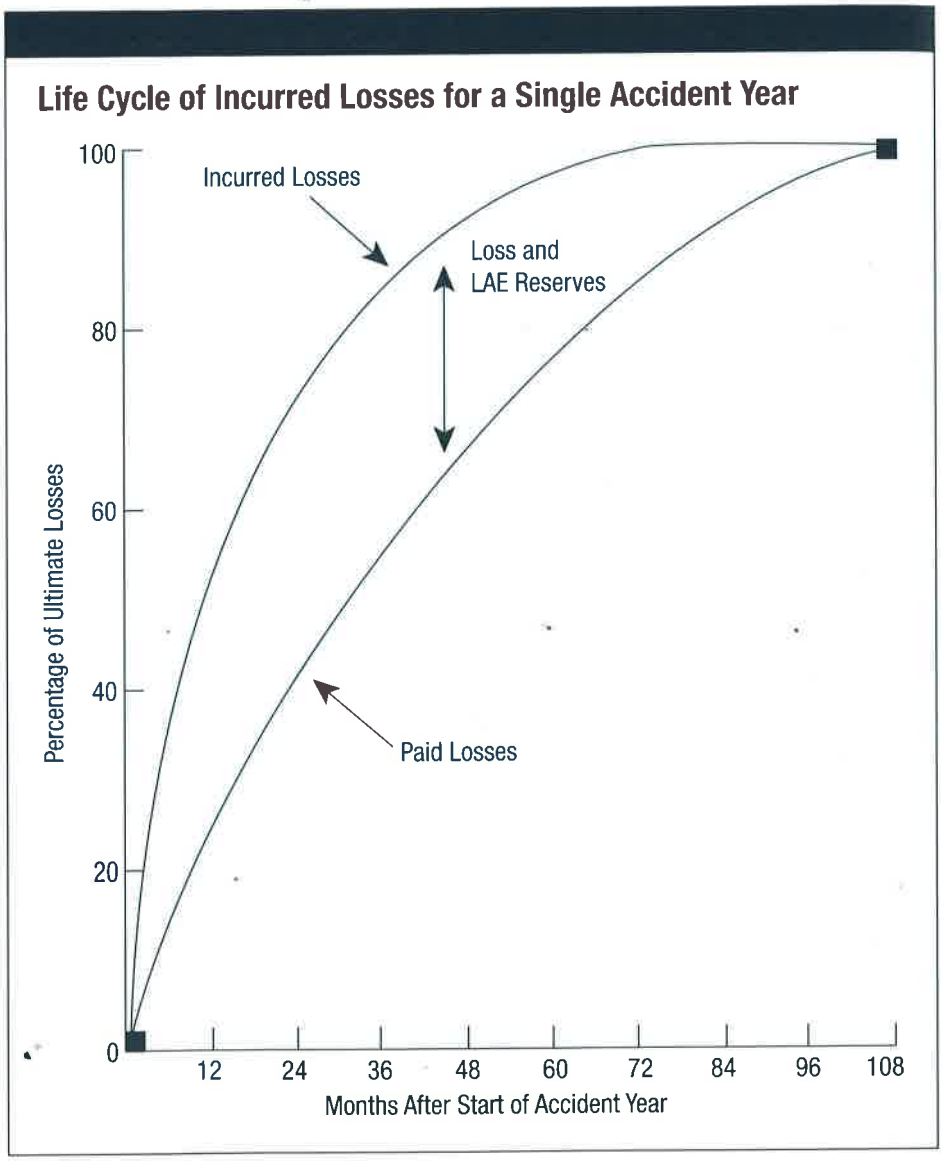
For example, actuaries can review the life cycle of incurred losses related to a single accident year. Based on this review, it is determined that incurred losses increased from zero months to seventy-two months after the start of the accident year, at which point incurred losses equaled the ultimate loss amount. The review also indicates that losses for the accident year were not fully paid until 108 months after the start of the accident year. See the exhibit "Life Cycle of Incurred Losses for a Single Accident Year."

Implications of Inadequate Loss Reserves

Loss amounts are a key element on insurers' financial statements, and accurate claim reserving is critical to maintaining the insurer's financial strength. Underestimating or overestimating the final cost of claims can distort an insurer's financial condition. Continued underreserving of claims over several years can lead to insolvency or bankruptcy for an insurer. Establishing and maintaining adequate loss reserves is important for the insurer's financial health because reserves directly affect the insurer's ability to maintain existing business and to grow in the future.

In their review of insurer financial statements, state regulators focus on the continued solvency of the insurer and its ability to pay claims in the future. Regulators are, therefore, also concerned about the adequacy of loss reserves and about insurers with a history of understating loss reserves. Insurers that consistently overstate loss reserves may also be of concern to regulators because doing so may lead to unwarranted rate increases over time and to overpriced insurance products. Continued overstating of loss reserves could result in tax penalties relating to the taxes that would otherwise apply to the resulting deferred income.

Past claims payments are also the basis of future rates. As part of ratemaking, actuaries base future rates not only on the amount paid on both open and closed claims, but on the amount reserved for open claims and IBNR claims. Consistent and accurate loss reserving translates into insurance rates that accurately reflect future loss potential.



[DA06229]

Challenges to Establishing Adequate Loss Reserves

One internal cause of inadequate loss reserves is errors on the part of claims personnel. These errors can occur in several ways, such as when initial reserves are determined based on incomplete or inaccurate information. Reserve inaccuracy can also be the result of a lack of expertise on the claim representative's part or an unwillingness to reevaluate the claim and adjust the loss reserve amount where appropriate. Lack of training for claim representatives or frequent turnover in the claim department can result in underreserving or overreserving of losses as well.Furthermore, management changes, changes in reserving guidelines, or restructuring of reinsurance programs can affect the adequacy of loss reserves.

Because reserves should reflect the ultimate cost of a claim and not the claim's present value, they should account for the claim's future settlement value. For example, a medical malpractice claim could take many years to settle and close. During that time, external factors such as inflation may increase medical costs, or new and expensive medical technology may be developed. Whenever possible, the reserves for such claims should anticipate those increased costs.

Other external causes of inadequate loss reserves include changes in legislation or regulation, which could, for example, increase workers compensation benefits. Judgments in court cases can lead to new case law and open emerging areas of coverage, such as environmental or construction defects claims. Because related claims would not previously have been contemplated under existing coverage forms, claims personnel would need to review claim files to determine whether to establish reserves.

Relationship Between Loss Reserves and Surplus

The difference between any organization's assets and its liabilities indicates its net worth. For insurers, this net worth is designated as policyholders' surplus. This means that all of an insurer's net worth is available to satisfy claims before any owner is entitled to funds. Loss reserves are one of the largest liabilities on an insurer's balance sheet and are shown under the "Losses" element. Loss adjustment expense reserves are included within the "Loss Adjustment Expenses" element of the balance sheet.

If reserves are too low, the difference between assets and liabilities will result in an overstated policyholders' surplus amount. Underreserving will also result in an overstated underwriting profit for that year. As claims are settled in the future and reserves are adjusted, future underwriting profits may decrease. Once inadequate reserves are properly recognized and the liabilities amount is corrected on the balance sheet, policyholders' surplus will be reduced. When reserve amounts are set too high, policyholders' surplus will be understated and will need to be increased once the reserves are properly recognized. This is a critical issue for insurers because policyholders' surplus is vital to insurer financial strength. See the exhibit "Principal Elements of an Insurer Balance Sheet."

For example, an insurer with $10 million in reserves and policyholders' surplus of $5 million has a ratio of reserves to policyholders' surplus of 2 to 1. An error of 10 percent in estimating reserves would cause an error of 20 percent in the stated policyholders' surplus. If reserves were initially established at $10 million and later adjusted to $11 million, the effect on policyholders' surplus would be a 20 percent decrease, from $5 million to $4 million. See the exhibit "Effect of Understated Reserves on Policyholders' Surplus."

Principal Elements of an Insurer Balance Sheet

Assets	**Liabilities**
Bonds	Losses
Stocks	Loss Adjustment Expenses
Cash	Unearned Premiums
Premium Balances	**Surplus and Other Funds**
Reinsurance Recoverables	Surplus as Regards Policyholders

[DA06230]

Effect of Understated Reserves on Policyholders' Surplus

Table 1—Primary Insurer Balance Sheet

Assets		Liabilities	
Cash	$25,000,000	Unearned Premiums	$10,000,000
		Reserves	10,000,000
		Policyholders' Surplus	5,000,000
Total Assets	$25,000,000	Total Liabilities and Surplus	$25,000,000

Table 2—Primary Insurer Balance Sheet With 10 Percent Adjustment to Reserves

Assets		Liabilities	
Cash	$25,000,000	Unearned Premiums	$10,000,000
		Reserves	11,000,000
		Policyholders' Surplus	4,000,000
Total Assets	$25,000,000	Total Liabilities and Surplus	$25,000,000

[DA06231]

SIGNIFICANCE OF PRIMARY INSURER RESERVES FOR THE REINSURER

Primary insurers and reinsurers must establish reserves. Established for losses and loss adjustment expenses (LAE), reserves affect both primary insurers' and reinsurers' financial reports, including their National Association of Insurance Commissioners (NAIC) annual statements.

Loss reserves present the largest uncertainty on a primary insurer's and reinsurer's balance sheet. Reinsurers establish their loss reserves on reserve data recorded by the primary insurer. Therefore, reinsurers have a direct interest in the reserve adequacy of the primary insurers they reinsure.

Reinsurers providing pro rata reinsurance are responsible for a proportional share of the loss reserves established by the primary insurer. Because the liability of pro rata reinsurance exists from the first dollar of loss, a pro rata reinsurer usually follows the reserving practices of its primary insurers. Consequently, if a primary insurer understates reserves, the resulting understatement will affect both the primary insurer and its pro rata reinsurer to the same degree.

Reinsurers providing excess of loss reinsurance are responsible only for those losses that exceed the attachment point. Because the liability for excess of loss reinsurers does not exist until the attachment point is exceeded, the reinsurer may be unaware of substantial losses until these losses directly affect them. Consequently, if a primary insurer understates reserves, the resulting understatement may have a significant effect on its excess of loss reinsurer's reserves.

Both pro rata and excess of loss reinsurers are exposed to the inherent time lag in loss reporting from primary insurers. Even primary insurers experience a time lag between the occurrence of a loss and the creation of a claim file in the primary insurer's information system.

Property insurance losses are usually reported and reserved sooner than casualty insurance losses. In general, property insurance losses are readily discovered and reported. However, casualty insurance losses often involve delays in discovery that result in delays in claim reporting. Mass tort claims, such as those for asbestosis-related injuries, usually involve extreme delays in reporting. For example, mesothelioma, the cancer typically associated with exposure to asbestos, may not manifest until decades following the claimant's initial exposure.

Although long loss reporting delays significantly affect the adequacy of primary insurer reserves, the financial consequences of these delays also have a substantial effect on the excess of loss reinsurer. Reinsurance premiums are based partly on a primary insurer's reserves. If these reserves are understated, the reinsurance premiums charged to primary insurers may be inadequate for the loss exposures that are reinsured.

Reinsurers are interested in the long-term survival prospects of primary insurers. If a primary insurer has inadequate reserves, it may indicate that the primary insurer is in financial difficulty, possibly facing insolvency. A reinsurer that deals with an insolvent primary insurer could experience problems, including lengthy and expensive litigation regarding the disposition of outstanding claims.

METHODS FOR ESTABLISHING CASE RESERVES

To accurately report their financial position, insurers must estimate reserves as precisely as possible. However, estimating reserves is difficult because, in most cases, the amount that the insurer will eventually pay for a claim is uncertain. For example, the insurer may not know all the facts about the underlying claim when estimating its reserves.

Case reserve

A loss reserve assigned to an individual claim.

Bulk reserves

Reserves established for the settlement of an entire group of claims.

There are two general methods for establishing reserves for losses and loss adjustment expenses—**case reserves** and **bulk reserves**. For some categories of claims, reserves can be set using either the case or bulk reserve method. For example, in instances in which the amount of payment is uncertain for reported losses, loss reserves could be set for each individual loss (case) or for the whole group of losses (bulk).

With case reserves specifically, the primary insurer's claim department usually sets reserves. A claim file is established for each reported loss and includes an estimate of the ultimate loss that will be paid to the claimant. The claim representative's estimate of the ultimate loss, less any payments already made, makes up the case loss reserve for the file. Allocated loss adjustment expense reserves can also be established for each individual claim.

Case reserves can be established for these categories of loss reserves:

- Reported losses–payment certain
- Reported losses–payment uncertain
- Allocated loss adjustment expenses (ALAEs)

Reported Losses—Payment Certain

The reserve for reported losses for which the amount of payment is certain is the easiest of the loss reserves to calculate. Because the claimant and the insurer have already agreed on the amount of the payment, calculating this type of reserve is simply a matter of adding the agreed settlement amounts for all claims. Calculating reserves in the other categories is more complex.

Reported Losses—Payment Uncertain

More expertise is necessary to determine the amount to reserve for reported losses for which the amount of payment is uncertain. The insurer must estimate the ultimate loss using known information about the claim, historical loss data for similar claims, and the judgment of the individual making the estimate. If the claimant later reports additional facts that will affect the value of the claim, the insurer must adjust the reserve accordingly.

Three methods are commonly used to determine the case loss reserves for reported losses when the amount of payment is uncertain:

- Judgment method
- Average method
- Tabular method

Judgment Method

The first method of determining case loss reserves is the judgment method. With the **judgment method**, a claim representative estimates the value of each claim based mostly on professional experience. This method does not involve any statistical analysis.

Judgment method

A method to establish a case loss reserve based largely on experience with similar claims.

One weakness of the judgment method is that the accuracy of its results depends on the quality and extent of the claim representative's experience. Two people may estimate vastly different figures for the same loss. Even reserves established by the same person for similar losses could vary from time to time.

Average Method

The second method for determining case loss reserves is based on statistical data and is generally called the **average method** or the factor method. Through this method, the case reserve for specific categories of claims is set at an average amount that is based on an analysis of past claims and is trended for inflationary changes, changes in amounts insured, and other factors that may cause future payments to differ from past payments.

Average method

A method to establish a case reserve by using an average amount for specific categories of claims.

The average method is most suitable for types of insurance in which claims are relatively frequent, reported and paid promptly, and not subject to extreme variations. Automobile physical damage is an example of a type of insurance with these characteristics. For example, every auto collision claim may be reserved at a value of $1,500, and that value is not changed until the claim is paid. The insurer may feel that setting more accurate reserves on this type of claim is not worth the expense associated with the extra effort.

Under the average method, reserves for some individual claims are inadequate, and reserves for other claims are excessive. However, if the average is accurate, the aggregate loss reserve accurately reflects the ultimate loss amounts for all outstanding claims.

If used alone, the average method may produce inadequate reserves for those types of liability insurance that have a wide variation in claim amounts and long delays in settlements (such as medical malpractice insurance and product liability insurance). In these cases, the average method and the judgment method are sometimes used together. Using this combined reserving approach, an average value is assigned to each claim as soon as it is reported. For example, every auto bodily injury claim may initially be reserved for an

average value of $10,000. In sixty days, or as soon as additional information becomes available on the claim, the reserve is adjusted, based on judgment.

Tabular Method

Tabular method

A case reserving method that establishes an average amount for all claims that have similar characteristics in terms of the claimant's age, health, and marital status.

The third method of determining case loss reserves is the **tabular method**. This method is useful for calculating case loss reserves for lost income benefits under workers compensation insurance or for calculating structured settlement amounts under liability insurance.

The tabular method uses rates and factors from one or more actuarial tables to calculate the present value of future loss payments. This present value amount becomes the case loss reserve for those payments. These tables are examples of those that can be used:

- Morbidity tables, showing the likelihood of sickness or injury
- Mortality tables, showing the likelihood of death
- Annuity tables, showing the likelihood of survival
- Remarriage tables, showing the likelihood of remarriage by a widow or widower[2]

Each case loss reserve calculated by the tabular method can be considered an average reserve for all claims with the same characteristics (for example, claimants with the same age, health, and marital status). Consequently, the tabular method is likely to yield an appropriate total reserve for a large number of individual claims—even though the case reserve for any given claim can vary substantially from the amount ultimately paid for that claim. The primary weakness of the tabular method is that its applicability is limited to situations in which a fixed amount of benefits is paid over a period of time, such as a person's life; however, in these types of situations, it is the preferred method. See the exhibit "Calculating Case Reserves by Using the Tabular Method: An Example."

Calculating Case Reserves by Using the Tabular Method: An Example

Suppose a lost income benefit of $300 per week for life is payable to a fifty-year-old permanently disabled male worker. A case loss reserve for this benefit can be calculated by using mortality tables and present value factors. Mortality tables can be used to derive one-year probabilities of survival at each age. Because this person is disabled, the factors in the mortality table may need to be adjusted to reflect the mortality rates for disabled persons. Special mortality tables for this purpose have been developed. Using present value factors and the results of the mortality table values, actuaries can calculate the present value factor for an annual annuity of $1 payable to this person for life. Assume this present value factor is 16.412. The case reserve is calculated by multiplying the present value factor by the annual benefit amount. In this example, the case reserve would be $256,027 ($300 per week × 52 weeks × 16.412).

[DA09061]

Allocated Loss Adjustment Expenses (ALAEs)

Case reserves for ALAE can be established by using the judgment method or by adding a fixed percentage to each case loss reserve. The judgment method of establishing case reserves for ALAE suffers from the same weaknesses as the judgment method of establishing case loss reserves. For some types of insurance, simply adding a percentage to each loss reserve can produce accurate aggregate reserves for ALAE.

Correcting Case Reserves

At any point in time, the total case reserves for reported losses are likely to be inadequate because they tend to develop, or increase, over time.

One method for correcting inadequate total case reserves is to increase the case reserve for each claim. The simplest way to do this is to add the same percentage to each. These increases are often called "additional case reserves."

A more time-consuming method of correcting understated case reserves is to review each open claim file, increasing only those reserves that are inadequate. This approach assumes that either the reviewers can more accurately determine loss reserve amounts than those who established the original claim reserve or more information has become available on the claim.

For their own financial reporting purposes, reinsurers may supplement the primary insurer's case reserves. A reinsurer's claims personnel may review the primary insurer's claim files and add amounts that they feel are necessary to account for loss development. The reinsurer's total case reserves would then consist of the primary insurer's case reserves and the reinsurer's additional case reserves.

METHODS FOR ESTABLISHING BULK RESERVES

An insurer usually cannot identify specific claims with inadequate or excessive case reserves or predict which claims will reopen. Therefore, insurers make a general provision for additional reserves, called bulk reserves. For some types of insurance, the bulk reserves can be a substantial part of an insurer's total liabilities.

Typically determined by an actuary, bulk reserves can be established for these categories of loss reserves:

- Reported losses–payment uncertain
- Incurred but not reported (IBNR) reserves
- Loss adjustment expenses, both allocated and unallocated

Reported Losses–Payment Uncertain

Reserves for reported losses when the amount of payment is uncertain can be calculated on a bulk basis by subtracting the amount already paid for losses from a certain percentage of total earned premium. For example, an actuary may estimate general liability losses at 70 percent of an earned premium of $13 million, or $9.1 million. However, if $3 million has already been paid on these losses, then this amount is subtracted from the reserve, reducing the reserve from $9.1 million to $6.1 million.

IBNR Reserves

Incurred but not reported (IBNR) losses are losses that have occurred but have not yet been reported to the insurer. Because these losses have occurred, IBNR reserves are established and reflect estimates of unknown future loss payments. The IBNR loss category also includes a reserve for reported losses that are expected to develop; that is, the final payment for these losses is expected to exceed the amount for which they are currently reserved. (This component of IBNR is sometimes called IBNER: incurred but not enough reserved.)

For liability insurance, IBNR reserves are difficult to estimate because tremendous uncertainty exists regarding the number and size of losses yet to be reported and the development of reported losses.

A primary insurer usually has a liability for IBNR losses. Because estimating the number and average size of individual claims that may be reported late is difficult, IBNR reserves are, by their nature, a bulk reserve. IBNR reserves are residual reserves because, at any point in time, they equal the difference between incurred losses and ultimate losses. This formula shows the relationship:

IBNR reserves = Ultimate losses – Reported incurred losses

Three basic methods of estimating IBNR reserves exist, along with many acceptable alternative approaches:

- Loss ratio method
- Percentage method
- Loss triangle method

Loss Ratio Method

The first method of estimating IBNR reserves is the loss ratio method. This method assumes that the ultimate loss ratio will equal the loss ratio that was considered when calculating premium rates. Therefore, if the premium rates assumed a loss ratio of 80 percent, the ultimate losses are assumed to equal 80 percent of earned premiums. Deducting paid and reserved amounts for reported losses from the ultimate loss amounts yields the IBNR reserve.

The loss ratio method may be useful in the early stages of developing IBNR reserves for long-tail liability insurance. However, the loss ratio method should be used only for the first year or two after losses are incurred. More sophisticated and responsive methods should be used as soon as the actual reported losses provide an adequate basis for projecting IBNR reserves.

One weakness of the loss ratio method is that the actual loss ratio seldom equals the anticipated loss ratio. In fact, the difference between them can be substantial. If the actual loss ratio is less than the anticipated loss ratio, the loss ratio method results in redundant reserves. If the actual loss ratio is greater than the anticipated loss ratio, the method results in inadequate reserves. Furthermore, if the premium rates charged were inadequate (as evidenced by an underwriting loss), the reinsurer needs to recognize the inadequate subject premium rates used by the primary insurer when calculating the anticipated loss ratio.

Despite these weaknesses, the loss ratio method is often used in the early stages of development for long-tail liability insurance because, during this time, the loss triangle method is not completely reliable. After twenty-four months, the loss triangle method is likely to be more reliable than the loss ratio method.

Percentage Method

The second method of estimating IBNR reserves is the percentage method. This method uses historical relationships between IBNR reserves and reported losses to develop percentages that are used in IBNR forecasts. For example, if the IBNR losses were 30 percent of total incurred losses over a period of years, IBNR losses for a particular year may be estimated at 30 percent of incurred losses for that year. In its application, the percentage method develops a separate percentage for each accident year. If the trend (upward or downward) in the percentage of IBNR losses is measurable, the percentage used for projecting IBNR losses should reflect that trend.

The number of months necessary for losses to develop to their ultimate level varies depending on the type of insurance. The percentage method is acceptable for estimating property loss reserves because they can be estimated with reasonable accuracy soon after they are reported. It is likely to be less accurate for liability loss reserves, which typically take longer to develop.

The exhibit shows an IBNR calculation using the percentage method. In this example, IBNR losses are assumed to equal 20 percent of reported losses for the most recent accident year—twelve months of development (twelve months after the start of the policy year), 10 percent for the prior accident year—twenty-four months of development, and 5 percent for the next prior accident year—thirty-six months of development. Losses are assumed to be fully developed at forty-eight months after the start of the accident year. The IBNR reserve for each accident year is calculated by multiplying the reported losses for that accident year by the IBNR factor. The total IBNR reserve for

the four accident years is $1,723,258. See the exhibit "Calculation of IBNR Reserve for X4 From Hypothetical Data Using the Percentage Method."

Calculation of IBNR Reserve for X4 From Hypothetical Data Using the Percentage Method

Historical Accident Year	Reported Losses ($)	Evaluation Point (Months of Development)	IBNR Factor	IBNR Reserve ($)
X1	4,725,679	48	0.00	0
X2	4,887,963	36	0.05	244,398
X3	4,878,845	24	0.10	487,885
X4	4,954,876	12	0.20	990,975
Total	$19,447,363			$1,723,258

[DA09067]

Loss Triangle Method

The third method for estimating IBNR reserves is the loss triangle method, which is also known as the loss development method, the chain link method, the chain ladder method, and the link ratio method. The loss triangle method uses historical loss data to calculate loss development factors with which to estimate IBNR reserves. This method is commonly used to determine IBNR reserves for liability insurance, particularly liability insurance that requires many years to fully develop. The loss triangle method is subject to wide variability in the first year or two of loss development and is more complex than the other reserving methods already presented. As with all loss reserving methods, this method will not produce reliable results unless the historical data and the actuarial assumptions are accurate.

A loss triangle is a display of historical loss data in the shape of a triangle. The data usually consist of the total reported losses for each historical year, although other data can be used, such as losses paid, number of claims paid, or average claim size.The nature of the estimates derived from a loss triangle depends on the data used in the triangle. The data in a reported losses triangle are used to project the development of total loss amounts for each historical year. IBNR loss reserves can then be derived based on this projected loss development. Because loss triangles analyze historical loss development patterns to forecast future loss development, a major assumption of the loss triangle method is that the historical pattern of development will continue.

The loss data used in a loss triangle may or may not include allocated loss adjustment expense (ALAE) information. If the loss data include ALAE, then the forecasted loss amounts will also include it. (In some cases, separate loss triangles are used to estimate ALAE.)

These are the four major steps for calculating IBNR reserves from a loss triangle:

1. Organize historical data in a loss triangle format
2. Calculate twelve-month loss development factors from the loss triangle
3. Calculate ultimate loss development factors from the twelve-month development factors
4. Use ultimate loss development factors to calculate the IBNR reserve

The first step in the loss triangle method is to organize historical data in a loss triangle format. A simplified loss triangle using the severity of reported losses is shown in the exhibit. This loss triangle is based on incurred losses not including ALAE, and it assumes that ultimate losses can be accurately estimated at seventy-two months after the start of an accident year. See the exhibit "Loss Triangle Based on Incurred Losses ($000)."

Loss Triangle Based on Incurred Losses ($000)

Accident Year	Months of Development (after beginning of accident year)					
	12	24	36	48	60	72 Ultimate
X1	10,000	10,200	10,300	10,350	10,375	10,375
X2	12,000	12,300	12,500	12,600	12,650	12,650
X3	14,000	14,500	14,750	14,850	14,900	
X4	16,000	16,600	16,900	17,050		
X5	18,000	18,800	19,200			
X6	20,000	21,000				
X7	22,000					

[DA09068]

Each row of data in the "Loss Triangle Based on Incurred Losses ($000)" exhibit shows historical estimates of the incurred loss amounts for the accident year shown at the left end of the row. For example, the first row shows data for accident year X1. On December 31, X1 (twelve months after the start of the X1 accident year), the primary insurer estimated its incurred losses for accident year X1 to be $10,000,000. On December 31, X2 (twenty-four months after the start of the X1 accident year), the estimate for X1 accident-year losses had increased to $10,200,000. By December 31, X6 (seventy-two months after the start of the X1 accident year), the estimate for X1 losses had reached $10,375,000. At that point, the primary insurer assumed that the incurred losses reserves for accident year X1 had reached their ultimate value.

The lowest diagonal of the table, running from $22,000,000 on the left to $12,650,000 on the right, shows the estimate for each year's losses as of December 31, X7, the latest year for which data are available. On December 31, X8, another diagonal of severity data should be added below the figures in the table.

The second step in the loss triangle method is to calculate twelve-month loss development factors from the loss triangle. The exhibit uses data in the "Loss Triangle Based on Incurred Losses ($000)" exhibit to calculate loss development factors based on changes in incurred losses over successive twelve-month periods. These factors are called twelve-month loss development factors (also known as age-to-age loss development factors and link ratios). For example, the first factor for X1 (1.020) shows the change in the company's estimates of X1 accident-year losses from December 31, X1, to December 31, X2. It was calculated by dividing the twenty-four month figure for X1 by the twelve-month figure for X1 ($10,200,000 ÷ $10,000,000 = 1.020). Each of the other figures in this exhibit's triangle was calculated in the same manner. The X7 year has no twelve-month loss development factor because two successive estimates are required to calculate a loss development factor, and only one estimate is available. See the exhibit "Calculating Twelve-Month Loss Development Factors."

Calculating Twelve-Month Loss Development Factors

	Twelve-Month Loss Development Factors				
Accident Year	12 to 24	24 to 36	36 to 48	48 to 60	60 to Ultimate
X1	1.020	1.010	1.005	1.002	1.000
X2	1.025	1.016	1.008	1.004	1.000
X3	1.036	1.017	1.007	1.003	
X4	1.038	1.018	1.009		
X5	1.044	1.021			
X6	1.050				
Average	1.036	1.016	1.007	1.003	1.000
5-Year Average	1.039	1.016	1.007	1.003	1.000
3-Year Average	1.044	1.019	1.008	1.003	1.000
Selected	1.044	1.019	1.008	1.003	1.000

[DA09069]

The lower section of the "Calculating Twelve-Month Loss Development Factors" exhibit shows the derivation of twelve-month loss development factors that are used to estimate ultimate loss amounts for each historical accident year. The row labeled "Average" shows the average of all of the twelve-month loss development factors above it. The next row shows the average of the twelve-month factors for the five most recent years above it.[3] The third row shows the average of the twelve-month loss development factors for the three most recent years.

The last row in the "Calculating Twelve-Month Loss Development Factors" exhibit, labeled "Selected," shows the twelve-month factors that an analyst may choose. Selecting twelve-month factors is a matter of judgment. In the exhibit, the averages show an increasing trend. That is, the three-year average is greater than the five-year average, and, in the first column, the five-year average is greater than the overall average. Therefore, an analyst would probably select the largest of the three averages, without modification. See the exhibit "Selecting Twelve-Month Loss Development Factors."

Selecting Twelve-Month Loss Development Factors

The selection process involves comparing the average factors for various periods, such as those used in the "Calculating Twelve-Month Loss Development Factors" exhibit. The time periods used reflect the types of claims being estimated. The following approach may be helpful in selecting a factor:

- If the three averages show an increasing trend, select the largest factor.
- If the three averages show a decreasing trend, select the smallest factor.
- If the three averages do not show a trend, select the factor intermediate in value.

A selected factor can be adjusted if, in the actuary's opinion, it is inconsistent with the loss data or other adjacent factors. For example, most actuaries would expect each twelve-month loss development factor to be smaller than the factor immediately preceding it because as losses age, loss development tends to slow down. For example, for X1, the twenty-four-to-thirty-six-month factor (1.010) is lower than the twelve-to-twenty-four-month factor (1.020).

[DA09070]

The third step in the loss triangle development method is to calculate **ultimate loss development factors** from the twelve-month loss development factors. The exhibit shows the calculation of ultimate loss development factors. Each selected factor from the "Calculating Twelve-Month Loss Development Factors" exhibit is multiplied by the other selected factors to its right to calculate an ultimate loss development factor. See the exhibit "Calculating Ultimate Loss Development Factors."

Ultimate loss development factor

A factor that is applied to the most recent estimate of incurred losses for a specific accident year to estimate the ultimate incurred loss for that year.

Calculating Ultimate Loss Development Factors

Time Period	Ultimate Loss Development Factor
60 Months to Ultimate	1.000 = 1.000
48 Months to Ultimate	1.003 × 1.000 = 1.003
36 Months to Ultimate	1.008 × 1.003 × 1.000 = 1.011
24 Months to Ultimate	1.019 × 1.008 × 1.003 × 1.000 = 1.030
12 Months to Ultimate	1.044 × 1.019 × 1.008 × 1.003 × 1.000 = 1.076

[DA09071]

The fourth step in the loss triangle method is to use ultimate loss development factors to calculate the IBNR reserve. Multiplying the ultimate loss development factor from the "Calculating Ultimate Loss Development Factors" exhibit by the latest evaluation of losses for each year ("Loss Triangle Based on Incurred Losses ($000)" exhibit) gives an estimate of ultimate losses for each accident year, as shown in column 5 of the exhibit. The IBNR reserve (column 6) is calculated by subtracting incurred and reported losses (column 2) from estimated ultimate losses (column 5). See the exhibit "Calculating IBNR Reserves Using Loss Development Factors."

Calculating IBNR Reserves Using Loss Development Factors

(1) Historical Accident Year	(2) Incurred and Reported Losses ($000)	(3) Months of Development	(4) Ultimate Loss Development Factor	(5) Estimated Ultimate Losses ($000)	(6) IBNR Reserve ($000)
X1	10,375	72	1.000	10,375	0
X2	12,650	72	1.000	12,650	0
X3	14,900	60	1.000	14,900	0
X4	17,050	48	1.003	17,101	51
X5	19,200	36	1.011	19,411	211
X6	21,000	24	1.030	21,630	630
X7	22,000	12	1.076	23,672	1,672
Total	$117,175			$119,739	$2,564

[DA09072]

The data in the "Loss Triangle Based on Incurred Losses ($000)" exhibit are consistent, making it easy for the analyst to arrive at reasonable loss development factors. Most loss triangles are less consistent and include anomalous data items.

Such anomalies may result from chance variations in loss frequency or severity, from changes in rules of law, or from delays in adjusting claims. They may also result from conscious decisions made by claim personnel to increase or decrease the level of case reserves, as well as from changes to the level of case reserves resulting from shifting responsibilities in the claims handling process.

Systematic increases in loss reserves over time indicate a consistent practice of carrying inadequate case reserves. These systematic increases create larger than normal loss development factors.

After a period of systematic increases in loss reserves, knowing whether the reserves are still inadequate, or whether they are now correct, is difficult. However, the typical assumption is that the reserves are still inadequate. The loss triangle itself does not indicate the adequacy of loss reserves. That determination requires a careful analysis of individual claim files or, in many cases, additional data on individual claims.

Loss Adjustment Expenses

Bulk reserves can be used for both ALAE and unallocated loss adjustment expense (ULAE).

Allocated Loss Adjustment Expense

Bulk reserves for ALAE can be estimated by applying a percentage factor to either earned premiums or incurred losses. The percentage factor is determined by analyzing the insurer's experience. For example, if experience shows that ALAE averages 25 percent of incurred losses, then 25 percent is applied to current incurred losses to estimate the reserve for ALAE.

One disadvantage of this method of estimating ALAE is that the calculation assumes no changes have occurred that affect the factor. If changes have occurred, the factor must be adjusted. Another disadvantage results from the manner in which losses are usually settled. Small losses, especially those settled without payment, are usually settled more quickly than large losses. Consequently, total loss reserves at any given time are likely to include a disproportionate number of large losses. Because large losses usually involve proportionately more ALAE than small losses, the percentage method may underestimate the ALAE reserve. Calculating ALAE using the loss triangle method may overcome this problem.

Unallocated Loss Adjustment Expense

By definition, ULAE cannot be attributed to specific claims. Consequently, the reserve for such expenses must be estimated on a bulk basis. The reserve for ULAE is usually estimated as a percentage of the sum of incurred losses and ALAE. The insurer determines the percentage based on experience.

Because ULAE consists of budgeted items, the total amount to be paid in a given year is easy to estimate at the beginning of the year. However, some of the ULAE paid in a given year is related to losses incurred in earlier years, particularly for long-tail liability insurance. Allocating current expenses to prior accident years is common, but such allocations may distort current accident year expense.

COMBINED METHODS OF LOSS RESERVING

No single reserving method can produce the best loss reserve estimates in all situations. Every reserving method is based on certain underlying assumptions, which may or may not be satisfied in a given situation. Thus, several methods should be considered, when possible; in many cases, the various methods of loss reserving are combined to leverage their strengths and improve the accuracy of loss reserve estimates.

These combined methods, among others, can be used to estimate loss reserves:

- Two-part combination method
- Bornhuetter-Ferguson method
- Three-part combination method

Two-Part Combination Method

To realize the advantages of both the loss ratio method and the loss triangle method, some actuaries have suggested that a weighted average of the two methods be used with weights varying by the number of months after the start of the policy year. The exhibit shows a set of weights that may be used for estimating liability loss reserves. See the exhibit "Weights for Combining the Loss Ratio Method and the Loss Triangle Method."

At the end of the accident year (twelve months of development), the reserve would be based entirely on the loss ratio method because the reported loss data are not mature enough to estimate ultimate losses using the loss triangle method. Starting at twenty-four months of development, the loss reserve can be partially based on the loss triangle method. At sixty months of development and thereafter, the reserve is based solely on the loss triangle method.

The weights shown in the "Weights for Combining the Loss Ratio Method and the Loss Triangle Method" exhibit are based on judgment. Different weights could be selected for different types of insurance.

Weights for Combining the Loss Ratio Method and the Loss Triangle Method

Months of Development (after start of accident year)	Weights	
	Loss Ratio Method	Loss Triangle Method
12	100%	0%
24	50%	50%
36	25%	75%
48	10%	90%
60 or more	0%	100%

[DA09062]

Bornhuetter-Ferguson Method

A variation of the two-part combination method that does not rely on judgmental weights is called the Bornhuetter-Ferguson method. The Bornhuetter-Ferguson method estimates the incurred but not reported (IBNR) reserve using expected losses and an IBNR factor. It is frequently used when the losses reported to the insurer are not sufficiently mature to use the loss triangle method. Immature loss data occurs because of the delay between the time a loss occurs and when it is reported to the insurer. This delay is more pronounced for liability insurance than for property insurance.

Likewise, reinsurers experience an even longer delay in loss reporting because they establish reserves only after the primary insurer does. Losses arising out of casualty excess of loss treaties generally suffer the most delay. The reinsurer's reported losses can be zero for the first two or three years before retentions are exceeded and primary insurers report known claims to their reinsurers.

One weakness of the Bornhuetter-Ferguson method is the level of inherent subjectivity that is involved in selecting IBNR factors, which can be estimated using a variety of techniques applied to industry data or historical insurer data. Even small changes in assumptions can cause wide variations in IBNR reserves and thereby net income, sometimes changing a profit to a loss, or vice versa.

The exhibit illustrates how the Bornhuetter-Ferguson method is used to calculate IBNR loss reserves for a casualty excess of loss treaty. The ultimate earned premiums (column 2) are multiplied by an initial expected loss ratio (column 3) to yield initial expected losses (column 4). Then an expected percentage of unreported losses (column 5)—an estimate of losses that have occurred but have not yet been reported to the reinsurer—derived from loss development factors is multiplied by the initial expected losses (column 4) to yield expected IBNR reserves (column 6). See the exhibit "Bornhuetter-Ferguson Method—Casualty Excess of Loss Treaty."

Bornhuetter-Ferguson Method—Casualty Excess of Loss Treaty

(1) Accident Year	(2) Ultimate Earned Premiums ($000)	(3) Initial Expected Loss Ratio	(4) Initial Expected Losses ($000)	(5) Expected Percentage of Unreported Losses (%)	(6) IBNR Reserves ($000)
X0	13,940	0.70	9,758	14.5	1,415
X1	13,940	0.75	10,455	17.8	1,861
X2	13,940	0.85	11,849	22.5	2,666
X3	19,110	0.95	18,155	30.8	5,592
X4	15,870	1.10	17,457	42.3	7,384
X5	15,870	1.15	18,251	56.3	10,275
X6	19,110	0.85	16,244	72.7	11,809
X7	31,310	0.80	25,048	82.5	20,665
Total	$143,090		$127,217		$61,667

Column 2 is obtained by applying the loss triangle method to earned premiums.

The expected loss ratios in column 3 are adjusted for the premium adequacy level for each year relative to the current year.

Column 5 is derived from loss development factors.

Data provided by Jerome E. Tuttle, FCAS, FCIA, CPCU, ARM, ARe, AIM, Senior Vice President & Senior Pricing Actuary, Platinum Underwriters Reinsurance, Inc. [DA09063]

For example, in the "Bornhuetter-Ferguson Method—Casualty Excess of Loss Treaty" exhibit, in the year X5, the ultimate earned premium is estimated to be $15,870,000. Because of inadequate pricing in X5, the initial expected loss ratio (column 3) is 1.15. Multiplying the two figures yields initial expected losses (column 4) of $18,250,500. The $18,250,500 is multiplied by 56.3 percent (column 5), which is the projected percentage of losses that have been incurred but not yet reported to the reinsurer under the treaty, to yield the indicated IBNR reserves for X5 under the treaty of $10,275,032 (column 6).

Three-Part Combination Method

The three-part combination method combines the loss ratio method, the loss triangle method, and case loss reserves. This combination therefore requires three sets of weights. The weights are set so that they place most or all of the emphasis on the loss ratio method in the first year. Thereafter, the loss ratio method is phased out, and the loss triangle method is phased in. Subsequently, the loss triangle method is phased out, and more weight is placed on case loss

reserves. Finally, when all losses have been reported and only a few remain open, the reserve is based entirely on case loss reserves.

This emphasis on case loss reserves is based on the belief that in the final stages of development, case reserves are likely to be more accurate than bulk reserves. The exhibit shows a set of weights that may be used for a three-part combination. The weights are based on judgment. See the exhibit "Sample Weights for the Three-Part Combination Method."

Sample Weights for the Three-Part Combination Method

Months of Development	Loss Ratio Method (%)	Loss Triangle Method (%)	Case Reserves (%)
12	100	0	0
24	50	50	0
36	25	75	0
48	0	100	0
60	0	100	0
72	0	100	0
84	0	100	0
96	0	100	0
108	0	90	10
120	0	75	25
132	0	50	50
144	0	25	75
156 or more	0%	0%	100%

[DA09064]

EFFECT OF SALVAGE AND SUBROGATION ON LOSS RESERVES

Salvage and subrogation are additional items considered in establishing a primary insurer's or a reinsurer's loss reserves.

Insurers try to recover a portion of the losses that they pay through salvage and subrogation. Schedule P of the National Association of Insurance Commissioners (NAIC) Annual Statement combines these recoveries into one category because both salvage and subrogation serve to reduce paid and reserved losses. Primary insurers commonly share subrogation and salvage recoveries with reinsurers if those reinsurers contributed to the loss payment.

Salvage

Salvage refers to property that is transferred to an insurer and then sold to partially offset the insurer's loss payment. For example, if a primary insurer pays an insured for a stolen car's value, and the car is later recovered, the primary insurer can take possession of the car and sell it to offset the loss.

The amount of paid losses is reduced by the amount of salvage in the year in which salvage is received, even though the salvage might have resulted from a loss incurred in a previous year. Anticipated salvage is a reduction to loss reserves, so it reduces the liability that the insurer reports on its balance sheet.

Subrogation

Subrogation refers to the insurer's right to recover the amount of its loss payment from the third party who is legally responsible for the loss. Subrogation often applies to claims involving auto accidents. For example, once the insurer pays the insured for the repair or replacement of a damaged auto, the insurance policy provides that any rights to collect from the third party responsible for the damage to the auto belong to the insurer (up to the amount the insurer paid the insured for the claim).

Subrogation recoveries are also possible with other types of insurance in which the party responsible for the loss is someone other than the insured. Subrogation prevents an insured from collecting from both the insurer and the third party at fault for the same loss.

As with salvage recoveries, insurers reduce the amount of paid losses in the year the subrogated loss payment is received by the amount of the subrogation recovery. Anticipated subrogation recoveries serve to offset loss reserves.

RESERVING METHODS FOR EXCESS OF LOSS REINSURERS

Reinsurers use essentially the same reserving techniques as primary insurers, and the reserving problems of pro rata reinsurers do not differ significantly from those of primary insurers. However, with excess of loss reinsurance, the problems in estimating loss reserves are much greater for the reinsurer, and special considerations are involved.

Excess of loss reinsurers have significantly greater problems than primary insurers when estimating loss reserves because of the effects of monetary inflation and social inflation. Excess of loss reinsurers also experience much longer loss development periods than primary insurers. In addition, some of the techniques used to estimate loss reserves are more difficult for an excess of loss reinsurer to apply.

Factors That Affect Estimating Loss Reserves

Several factors disproportionately affect an excess of loss reinsurer's ability to estimate reserves. The usual loss development techniques are also more difficult for excess of loss reinsurers to apply. Excess of loss reinsurers have significantly greater problems than primary insurers when estimating reserves because of these effects:

- Monetary inflation
- Social inflation
- Long loss development periods

Monetary Inflation

An excess of loss reinsurer's losses are affected by monetary inflation to a greater extent than a primary insurer's losses. For example, inflation may increase the value of property insured from an amount that is below the primary insurer's retention to an amount in excess of the retention. This would increase the number of claims to which the excess of loss reinsurer must contribute.

These inflationary pressures are increased by long loss development periods for liability losses. If the primary insurer's retention is not increased to account for inflation, then inflation has a disproportionate effect on the excess of loss reinsurer.

Social Inflation

Certain trends in the United States legal system have resulted in higher costs for insurers. For example, judgment amounts have increased at a rate greater than inflation.

There have also been legislative changes that benefit claimants. These trends are sometimes referred to as social inflation. As with monetary inflation, social inflation increases the value of claims that exceed the attachment point as well as the number of claims to which the reinsurer must contribute.

Long Loss Development Periods

Long loss development periods in excess of loss reinsurance result from the nature of the contract. The reinsurer is not obligated to pay anything unless the amount of loss exceeds the retention of the primary insurer. Consequently, the primary insurer is required to report only those claims that it expects to exceed some agreed amount, typically ranging from 50 percent to 100 percent of its retention, depending on the terms of the contract. However, some claims that eventually exceed the agreed amount may not initially be perceived as being that large. Consequently, the primary insurer may not initially report them to the reinsurer.

Because of long loss development periods, many reinsurers do not have sufficient data on losses that have developed to their ultimate value. Therefore, actuaries must carefully consider how long it will take for losses to develop to their ultimate value and apply mathematical techniques to develop the additional loss development factors.

Bornhuetter-Ferguson method

A method of estimating the IBNR reserve using expected losses and an IBNR factor.

The **Bornhuetter-Ferguson method** is often used by excess of loss reinsurers because of its ability to estimate IBNR reserves when little mature data are available.

Difficulties When Applying Reserving Techniques

Although reinsurers use the same reserving techniques as primary insurers, some of the techniques are more difficult for an excess of loss reinsurer to apply. For example, the loss triangle method for an excess of loss reinsurer often shows a wide range of values for the loss development factors for each historical accident year, and selecting a suitable factor is difficult. In addition, reinsured losses arise from a large number of primary insurers. The losses are not homogeneous, and primary insurer reserving and claim settlement practices vary widely. Constructing loss triangles using the historical claim count and average claim amounts also creates problems for setting excess of loss reinsurance reserves.

Problems arising from the lack of homogeneity can be overcome by dividing the data into homogeneous categories and constructing a separate triangle for each category. This technique may mean that actuaries responsible for generating reserves for reinsurers must divide their data by type of insurance as well as into other categories, such as by treaty layer.

Because each excess of loss treaty is individually negotiated with the primary insurer, some treaties have special terms and conditions, such as aggregate limits—whereby the reinsurer's losses will not develop beyond the specified aggregate. Other treaties cover types of insurance with unusual loss development patterns that require special consideration by both the primary insurer and the reinsurer. Although combining the results from individual treaties may enhance the statistical credibility of the loss data, addressing the special features of an individual treaty separately from the larger portfolio of in-force policies may be more useful.

SUMMARY

Insurers establish loss reserves to reflect amounts that will be needed in the future to pay claims that have occurred but are not yet closed. Inadequate loss reserves can lead to overstating or understating an insurer's profitability.

Reserves are reported as a liability on a primary insurer's and reinsurer's balance sheet. If reserves are initially understated and later increase, policyholders' surplus will decrease when the understatement is recognized.

Therefore, the primary insurer may not have the funds necessary to pay claims. Similarly, if a reinsurer establishes its reserves on the reserve data recorded by the primary insurer, then its reserves will be understated if the primary insurer's reserves are understated. Additionally, reinsurers may be adversely affected by delays in loss reporting.

Case reserves are reserves established for the settlement of an individual claim. They can be established for three categories of loss reserves: reported losses–payment certain, reported losses–payment uncertain, and allocated loss adjustment expenses. The three general methods of establishing case loss reserves when the amount of payment is uncertain are the judgment method; the average, or factor, method; and the tabular method.

Bulk reserves are reserves established for settling an entire group of claims. They can be established for three categories of loss reserves: reported losses–payment uncertain; IBNR reserves; and loss adjustment expenses, both allocated and unallocated. The three basic methods of establishing IBNR reserves are the loss ratio method, the percentage method, and the loss triangle method.

Methods of loss reserving can be combined to leverage the strengths of two or more methods. Combination methods include the two-part combination method, the Bornhuetter-Ferguson method, and the three-part combination method.

Insurers use salvage and subrogation to recover a portion of the losses they have paid. Salvage refers to property that is transferred to an insurer and then sold to partially offset the insurer's loss payment. Subrogation refers to the insurer's right to recover the amount of its loss payment from the third party who is legally responsible for the loss.

Reinsurers use essentially the same loss reserving techniques as primary insurers and experience similar issues with reserving. However, excess of loss reinsurers experience significantly greater problems than primary insurers when reserving because of monetary inflation, social inflation, and long loss development periods. In addition, some of the loss reserving techniques used by primary insurers are more difficult for excess of loss reinsurers to apply.

ASSIGNMENT NOTES

1. National Association of Insurance Commissioners, Accounting Practices and Procedures Manual, vol. III, Statutory Issue Paper no. 55 (Washington, D.C.: National Association of Insurance Commissioners, 2009), p. IP-55-2.
2. The remarriage table is used only if the provisions of the insurance policy state that benefits are terminated by remarriage.
3. Because of the abbreviated nature of this exhibit, the average of all years and the average for five years are the same except for the first column. This would not usually be the case in practice.