
**Technical Paper: Incurred But Not Reported (IBNR) Claim Reserves for Life Insurance
Business
October 2026**

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1. Introduction

1.1. Status of Technical Paper

This Technical Paper (TP) was prepared by the Life Insurance Practice Committee (LIPC) of the Actuaries Institute. It does not represent a Professional Standard or Practice Guideline of the Actuaries Institute.

Incurred but not reported claim reserves (IBNR reserves) are referred to in APRA's Prudential Standard LPS 115 (Capital Adequacy: Insurance Risk Charge) and Prudential Standard LPS 360 (Termination Values, Minimum Surrender Values and Paid-up Values) and IBNR reserves are reported to APRA in accordance with APRA's Reporting Standard LRS 200.0 (Capital Adequacy Supplementary Information). LPS 360 paragraph 10(b) states that termination values must include "the discounted present value of claims incurred prior to the termination date (whether reported or not and taking appropriate account of claims settlement costs)". This TP relates to the estimate of claim payments and excludes consideration of expenses incurred to pay claims, which may also be required depending on the purpose for which the IBNR reserve is being calculated.

This TP does not constitute legal advice. Any interpretation or commentary within this TP regarding specific legislative or regulatory requirements reflects the expectations of the Institute but does not guarantee compliance under applicable legislation or regulations. Accordingly, Members should seek clarification from the relevant regulator and/or seek legal advice in the event they are unsure or require specific guidance regarding their legal or regulatory obligations.

This TP supersedes the Information Note: IBNR published in December 2014 by the Life Insurance and Wealth Management Practice Committee (LIWMPC). This is the second version of this document.

This TP forms part of a suite of Technical Papers considering the analysis of experience and setting of assumptions. The other Technical Papers are:

- Framework for Setting Life Insurance Best Estimate Assumptions (October 2026)
- Analysing Disability Income Experience and Setting Best Estimate Assumptions (October 2026)
- Analysing Lump Sum Experience and Setting Best Estimate Assumptions (October 2026)

1.2. Background

IBNR reserves are policy liabilities held for the future payment of claims that have been incurred but have not yet been reported to the insurer. For group and, to a lesser extent, individual products, the IBNR reserves are often a large component of the policy liabilities or past claim costs and are therefore material to both valuation and pricing.

1.3. Objective

The objective of this TP is to provide life insurance practitioners with information on some of the available IBNR methodologies, associated advantages and disadvantages, applications and examples. It also provides references to other available material.

1.4. Scope

This TP applies to all life insurance benefits where there can be a delay between the date the claim is incurred and when it is reported. This includes individual and group death, total and permanent disability (TPD), disability income and trauma benefits.

This TP does not discuss or assess, and is not intended (nor is it to be taken as intended) to have any application to any of the following:

- general insurance policies;
- health insurance policies;
- tax or accounting considerations; or
- liabilities or reserves other than IBNR reserves.

The main focus of this TP is the determination of the best estimate of the IBNR reserves, although there is reference to stochastic methods and some of the references address the measurement of the variance of estimates.

1.5. Reasonable judgement

Whilst this TP suggests matters for consideration when determining IBNR reserves for different purposes and in different contexts, the need to employ reasonable actuarial judgment and consider materiality would apply in all situations.

2. Data set and worked examples

A [spreadsheet](#) has been developed to accompany this TP with worked examples of the following methods:

- Basic Chain Ladder Method;
- Bornhuetter-Ferguson (BF) Method; and
- Additive Method.

The [spreadsheet](#) is provided by way of a link in this TP. The dataset is fictitious and has been applied in all examples to allow for direct comparison and for ease of understanding. The examples are provided as an aid for users to gain a better understanding of the workings of each method only. It is important to take care when using these examples to compare the various methods.

3. Methodologies

3.1. Overview

In determining IBNR reserves, there are many different methods to choose from, each having its own underlying assumptions and parameters. This TP covers methods which may have been used to determine IBNR reserves for life insurance in Australia.

The methods that are discussed in this TP are:

- Average Delay Method;
- Ultimate Loss Ratio Method;
- Chain Ladder Method;
- BF Method;
- Additive Method;
- Stochastic Methods; and
- Generalised Linear Modelling (GLM) and other statistical techniques.

The methods are listed in an approximate order of increasing sophistication. With increased sophistication, a corresponding increase in the amount of claims experience data is required for the method to provide reliable results.

The references included in Appendix 1 (Further Reading) cover a number of these methods.

Variations available on the listed methods are outside the scope of this TP.

3.2. Average Delay Method

3.2.1. Description of Method

In the Average Delay Method, the IBNR reserve is calculated by multiplying the estimated average claim delay (in fractional years) by the expected ultimate loss ratio by the annual premiums.

$$\text{IBNR Reserve} = \text{Annual Premiums} \times \text{Ultimate Loss Ratio} \times \text{Estimated Average Delay}$$

Whilst there are variations to this method, the fundamental principle is that the IBNR is estimated as the claims expected to be incurred over a period equal to the average reporting delay.

This method, at least in its simplest form, assumes that:

- past premiums are equal to the current period premium;
- past loss ratios are equal to the current period loss ratio;
- claim development patterns have not changed; and
- the portfolio has been in force for as long as it takes claims to develop.

3.2.2. When the Average Delay Method may be useful

This method is a relatively simple method and is usually only appropriate to use where the IBNR is not material or data is limited. A common application of the Average Delay Method may be in estimating IBNR when pricing smaller corporate group insurance schemes or where claims are fully developed after only a few months.

3.2.3. Average Delay Method – limitations and other considerations

If the Average Delay Method is used in situations where data is not sufficiently developed, it may not be appropriate to use the observed average delay from the data alone, since claims with long delays will not yet be appropriately represented in the overall average. Rather, it may be more appropriate in these circumstances to set the average delay by observation from a larger block of business that is more established. It may also not be appropriate to use the observed average delay where loss ratios, exposure and/or claim delays are changing materially over time.

In summary, the method assumes that the portfolio is mature and stable. Consideration may be given to potential under or overstating of reserves when applying this method to growing or shrinking portfolios, portfolios with deteriorating experience, portfolios which have been repriced, or portfolios where reporting delays are increasing.

The average delay implicit in more sophisticated methods may be used to monitor changes in results over time from those methods and/or as a broad reasonableness check.

3.3. Ultimate Loss Ratio Method

3.3.1. Description of Method

The Ultimate Loss Ratio Method is sometimes referred to as the Budgeted Loss Ratio Method. Belonging to a family of methods referred to as loss ratio methods, this is another of the simpler methods for determining the IBNR reserve. The expected ultimate claims for each period are calculated as the earned premiums for that period times an expected ultimate loss ratio. The IBNR reserve is then calculated as follows:

$$\text{IBNR Reserve} = \text{Expected Ultimate Claims} - \text{Reported Incurred Claims}$$

The estimated loss ratio will generally be developed based upon one or a combination of the following:

- experience from more developed periods;
- the company's experience for similar lines of business;
- assumptions used in pricing the business in question;
- the experience of other companies with similar lines of business; and
- expected underlying risk rates.

3.3.2. When the Ultimate Loss Ratio Method may be useful

This method is more likely to be used in financial reporting (that is, valuation) rather than pricing. When used for financial reporting, this method may be more appropriate for a new block of business, or smaller blocks with an insufficient number of claims to determine a credible development pattern.

3.3.3. Ultimate Loss Ratio Method – limitations and other considerations

A shortcoming of this method is that it ignores the claims development to date when estimating ultimate losses. For this reason, this method may be less likely to be used for pricing.

Since the IBNR reserve is the difference between ultimate claims and reported claims, volatility in reported claims – for example, during earlier development periods – results in volatility of the IBNR reserve.

A further shortcoming is that, since the ultimate loss ratio is set and does not depend on the IBNR reserve, this method can mask changes in the underlying experience, resulting eventually in a step change when the ultimate loss ratio is re-estimated.

It is relevant to consider as to when the claims are fully developed and the IBNR reserve can be written off, as this method will continue to hold an IBNR reserve indefinitely where reported incurred claims are less than the ultimate expected claims. Conversely, adjustments may be required, or another method may need to be used, if ultimate incurred claims are expected to exceed those implied by the expected ultimate loss ratio and thus the IBNR is too low – at the extreme, due to incurred claims reported to date exceeding those expected.

When using this method, it is also common practice to consider the impact of changes to premiums and/or benefits over time. If expected loss ratios are applied without recognising material changes, then misstatement of reserves can occur.

3.4. Chain Ladder Method

3.4.1. Description of Method

The term 'chain ladder' is used to describe the methodology or technique by which claim development or link factors are derived for a set of claims experience.

The key assumption underlying the Chain Ladder Method is that there is a consistent delay pattern in the reporting of claims. The Chain Ladder Method uses historical claims data and reporting patterns to estimate the claims that have not yet been reported.

The starting point for the Chain Ladder Method is the development or run-off triangle. In life insurance, the development triangle usually organises claims data according to the period that the claim was incurred (Incurred Period) and the delay from the period the claim was incurred to the period the claim was reported (Development Period). Triangles can either be on a cumulative or an incremental basis.

The length of the incurred and development periods to use (for example, quarterly, half yearly, or yearly) is also a key assumption, noting that different periods can produce very different results. Using shorter periods can produce a smoother runoff pattern and may provide more insight into notification patterns over time, but periods need to be long enough so that sufficient data points are available in each period.

A simplified example of a claim development triangle is shown below.

Table 1: Incremental – Number of Claims

		Development Quarter								
		0	1	2	3	...	32	33	34	35
Incurred Quarter	2016Q1	0.0	1.0	2.0	5.0	...	1.0	0.0	0.0	0.0
	2016Q2	0.0	0.0	1.0	0.0	...	0.0	0.0	1.6	
	2016Q3	0.0	4.0	1.0	8.0	...	1.0	0.0		
	2016Q4	0.0	4.0	1.0	5.0	...	0.8			
	...	...	...	...	...	...				
	2024Q1	0.0	1.0	8.0	17.8					
	2024Q2	0.0	1.0	8.4						
	2024Q3	0.8	3.6							
	2024Q4	0.8								

In the above example:

- each row includes all claims incurred in a particular exposure period;

- each column heading represents the number of development periods between when a claim is incurred and when it is reported. For example, the entry for 2024Q1 in development quarter 1 indicates that 2 claims were incurred in Q1 of 2024 with a reported date in Q2 of 2024;
- a partial number of claims is caused by applying an acceptance rate factor to any claims that are still pending determination; and
- each diagonal represents the specific period when a claim was reported with the last diagonal representing claims reported in the most recent period (in the above example, all claims reported in Q4 of 2024).

The development triangle can also show cumulative claims rather than incremental claims as follows:

Table 2: Cumulative – Number of Claims

		Development Quarter								
		0	1	2	3	...	32	33	34	35
Incurred Quarter	2016Q1	0.0	1.0	3.0	8.0	...	52.0	52.0	52.0	52.0
	2016Q2	0.0	0.0	1.0	1.0	...	36.0	36.0	37.6	
	2016Q3	0.0	4.0	5.0	13.0	...	60.0	60.0		
	2016Q4	0.0	4.0	5.0	10.0	...	51.8			
	...	...	...	...	...	...				
	2024Q1	0.0	1.0	9.0	26.8					
	2024Q2	0.0	1.0	9.4						
	2024Q3	0.8	4.4							
	2024Q4	0.8								

Based upon the development triangle, the claim development can be represented through a series of factors often referred to as development factors.

Table 3. Development factors

	0:1	1:2	2:3	3:4	...	31:32	32:33	33:34	34:35
Development Factors	4.409	2.638	2.039	1.372	...	1.014	1.000	1.018	1.000
Product	122.275	27.731	10.513	5.157	...	1.033	1.018	1.018	1.000
Outstanding Proportion	99.2%	96.4%	90.5%	80.6%	...	3.2%	1.8%	1.8%	0.0%

Development factors are calculated as the sum of cumulative claims reported in one period divided by the sum of cumulative claims reported in the prior period. For example, the development factor in 0:1 is equal to the sum of development quarter 1 divided by the sum of development quarter 0, but omitting the final value of 0.8 (from development quarter 0 of 2024Q4, as there is no corresponding value for development quarter 1).

The development factors can also be expressed as the proportion of claims already reported by taking the inverse of the product of the development factors, and this can then be converted to the outstanding proportion of incurred claims yet to be reported by subtracting from 100%.

The outstanding proportion can then be used to calculate the incurred but not reported claims. For example, for the 2024Q1 incurred quarter, there are 26.8 claims reported to date and 80.6% of ultimate claims are expected to remain outstanding. There are hence $26.8 / (1 - 80.6\%) = 138.2$ IBNR claims.

In practice, it is common to use weighted average development factors (with the number of claims being the weight), either over all available incurred periods, or over a smaller, more recent subset of periods, for example, the average over the last sixteen notification quarters. Selecting a shorter period gives more weight to recent experience and reflects more contemporary notification behaviour; conversely, a longer period will incorporate more notification data and may hence produce a smoother, more credible runoff. Selecting a shorter period may only be appropriate where there is a view that run-off patterns may be changing and there is a desire to test how much the result changes if a shorter period is used.

Further discussion of this aspect is included in Section 4.1 below.

Using these development triangles, ratios can then be selected to complete the missing triangle. A fully worked example is included in the accompanying [spreadsheet](#).

3.4.2. When the Chain Ladder Method may be useful

Where there is sufficient claims experience, the Chain Ladder Method (or variants thereof) is a commonly used method for determining the IBNR reserve within life insurance in Australia.

3.4.3. Chain Ladder Method – limitations and other considerations

Often the available claim data will not be fully developed (that is, not all claims for the earliest incurred period have been reported) or the quantity of data is not sufficient to provide a reliable view of the development for longer delays. In this situation, the ratios for later development periods (the IBNR “tail”) cannot be reliably estimated. Several methods can be considered to determine the tail factors, for example, industry benchmarks or curve fitting. See section 4.3 for further detail.

The multiplicative Chain Ladder Method can be oversensitive to variations in emerging experience. For example, it can inappropriately multiply up or down variations in reporting to date that are to be expected in scanty data. In this context, such scanty data may be due either to a small portfolio/low claim numbers or to low early reporting for business with long reporting delays (for example, industry fund TPD business).

The multiplicative effect can similarly apply to changes to the run-off pattern over time, where development factors from an early incurred period with a faster / slower run-off pattern are joined with development factors in a later period where the run-off pattern may have changed. As a result, the tail and recent exposure periods are particularly sensitive where there is an acceleration / deceleration in reporting delays from step changes in experience.

An alternative approach to allocating claims to reporting delays may be adopted whereby claims are allocated within the claim development triangle based on the length of time between the date the claim is incurred and the date it is notified. For example, the entry for 2024Q1 in development quarter 1 contains claims incurred in Q1 of 2024 with a reported date between 1 and 2 quarters later. However, this alternative approach results in the final diagonal of the claim development triangle being incomplete as claims incurred in the final quarter would only have had on average half a period to develop. The two approaches are both reasonable and produce a broadly similar reserve provided that the final diagonal of the claim development triangle is fully developed (which requires an additional period of data after the valuation date to be adopted under the alternative approach).

In life insurance, the Chain Ladder Method will often be applied to claim numbers rather than claim amounts, with the estimate of unreported claims multiplied by the average sum insured (or average expected claims cost for disability income claims) to arrive at the IBNR reserve. When considering the average sum insured/claims cost to use for this purpose, potential and/or actual variations by incurred period or, particularly in the case of industry funds or disability income, variation by reporting delay, may need to be taken into account. This is discussed further in section 6.3.

In practice, the Chain Ladder Method is typically implemented at a more granular level, using cohorts of claims that exhibit similar reporting patterns. For example, default members and voluntary members often display significant differences in reporting speed. Establishing separate Chain Ladder models for each group allows for a more accurate reflection of these differences, particularly when the underlying membership exposure of each cohort evolves at varying rates. However, it is important to carefully evaluate the appropriateness of claims grouping, as overly granular segmentation may compromise the overall credibility of the model due to insufficient data volume within each cohort.

3.5. Bornhuetter-Ferguson Method

3.5.1. Description of Method

The Bornhuetter-Ferguson (BF) Method, also referred to as the Budgeted IBNR method or the “Expected Loss” method, estimates ultimate claims by taking the development to date as given and calculates the IBNR for each exposure period as:

$$\text{IBNR Reserve} = \text{Earned Premium} \times \text{Expected Ultimate Loss Ratio (for that exposure period)} \times \text{Estimated \% of claims not yet reported}$$

The key inputs to the BF Method for each exposure period are:

- an expected loss ratio; and

- an array of “yet to be paid/reported” proportions by development period.

The expected loss ratio can be established from older experience for the business in question or from other sources such as the pricing expected loss ratio. The expected loss ratio may vary by exposure period and may be refined over time as further experience or other sources of information become available.

The array of “yet to be paid/reported” proportions by development period can be developed from past experience for the business in question using a variety of methods (including the Chain Ladder Method) or can be taken from other sources (for example, in the case of a new line of business, from experience for business that is expected to display a similar reporting/payment pattern).

The estimate of ultimate claims from the BF Method for a particular exposure period can be expressed as, or derived as, the credibility weighted average of:

- (a) the estimate of ultimate claims from the Chain Ladder Method, and
- (b) the estimate of ultimate claims from the Ultimate Loss Ratio Method.

For this purpose, the credibility factor applied to the chain ladder result is the assumed proportion of ultimate claims developed for the exposure period. Further, for this equivalence to hold, the parameters used for the BF result need to be consistent with the respective parameters of the Chain Ladder Method and the Ultimate Loss Ratio Method. Hence, when expressed or derived in this way, the BF Method can be said to use all of the data that goes into the previous two methods.

The BF Method may also be based on in-force premium or written premium rather than earned premium, or may be based on other measures of exposure (with suitable modification of the “loss ratio” term).

Bornhuetter and Ferguson originally proposed the BF Method in their 1972 paper (see Bornhuetter-Ferguson (1972) in Appendix 1).

A variation of the BF Method is the Benktander/Hovinen (BH) method, which tries to make a credibility compromise in the determination of the IBNR reserve between the Chain Ladder Method and the BF Method by weighting them together based on the assumed proportion of known and unknown claims for each exposure period.

The BH method is named after Gunnar Benktander (Benktander 1976) and Esa Hovinen (Hovinen 1981), who independently invented it. The BH method is also referred to as the “Iterated Bornhuetter Ferguson” method or “Blended IBNR” method, although the latter label is also applied to other methods.

3.5.2. When the BF Method may be useful

This method is most commonly used for the most recent incurred year or two where experience has not been adequately developed. It is more stable than the Chain Ladder Method and provides a smooth estimate whilst incorporating information as it becomes available, placing more weight on credible information.

3.5.3. BF Method – limitations and other considerations

Given the need for an expected loss ratio as an input, the BF Method may have less applicability for pricing than for valuation. Effectively, the method is circular for a pricing exercise, as the expected loss ratio (an input for the BF Method) is the output from a pricing exercise.

Variations in actual reporting to date translate directly into the estimate of ultimate claims under the BF Method, but such variations do not result in a compounded impact on the IBNR estimate, in contrast with the loss ratio methods and the Chain Ladder Method. The Chain Ladder Method relies solely on past experience, while the BF Method relies partly on expected losses given the exposure, especially for early notifications.

3.6. Additive Method

3.6.1. Description of Method

As for the Chain Ladder Method, the Additive Method seeks to complete the missing triangle (that is, estimated future claims reporting) based on the development or run-off triangle. In contrast to the Chain Ladder Method which can be said to use a multiplicative approach, the Additive Method is based on the increments or additions to cumulative reporting to date for each development period.

The Additive Method is also known as the “incremental loss ratio” or “loss ratio development” method. The Additive Method is based on the hypothesis that claims paid/reported in a particular development period (when expressed relative to an exposure measure) are the same for all exposure periods. By contrast, the Chain Ladder Method predicts losses for a particular development period for a particular exposure period as a multiple of cumulative losses for that exposure period up to the previous development period.

Under the Additive Method, the IBNR reserve for each exposure period is calculated as the sum, for all outstanding development periods, of:

IBNR Reserve = Additive assumptions for development period x exposure measure for the exposure period

Where premium is used as the exposure measure, the resulting additive assumptions are expressed in loss ratio points of development for each development period. In this case, the additive assumption for a particular development period (d) would usually be determined as:

Additive assumption (development period (d)) = The average amount of claims paid (or expecting to be paid in the case of pending claims) across all (or a selected number of) exposure periods, for that development period

When there has been historical repricing, it is necessary to strip out repricing effects in the premium by the application of a scaling index. A similar approach, involving construction of a scaling index, may be used where the method is applied to numbers of claims rather than the amount of claims. Where the method is applied to numbers of claims, the resulting estimated future claim numbers would then be applied to an average claim amount to determine the IBNR reserve.

As for the Chain Ladder Method, additive assumptions for the Additive Method may be determined either over all available incurred periods, or over a smaller, more recent subset of periods.

3.6.2. When the Additive Method may be useful

The Additive Method is less sensitive to variations in emerging experience than some other methods (for example, the Chain Ladder Method) since the IBNR reserve under this method for a particular exposure period is not directly affected by claims that have been reported to date for that exposure period. On the other hand, where the additive assumptions are based on experience up to a recent date, it is more sensitive to emerging experience than the BF Method, which is likely to be based on an ultimate loss ratio determined longer ago (for example, at time of pricing).

The Additive Method can be modified to incorporate trends or apparent step changes in claim incidence. Trends can be allowed for by deriving the additive assumption by a linear regression rather than by an average. A higher order polynomial could also be used, but a minimum amount of data would be required for a credible outcome. Step changes can be allowed for by deriving one additive assumption for exposure periods before the step change and another for exposure periods after the step change.

3.6.3. Additive Method – limitations and other considerations

There is a risk of underestimating the IBNR where underlying trends are not captured, for example, the underlying claims incidence is increasing (i.e., the ultimate level of claims is increasing rather than an acceleration in claims reporting).

A useful sense check for the Additive Method is to:

- Adjust the historical data for incidence trends;
- Calculate additive claim factors;
- Project IBNR reserves on the adjusted data; and
- Calculate ultimate claim counts using observed claims and IBNR estimates.

If incidence trends have been appropriately allowed for and there aren't other issues with historical run-off patterns changing, then this is expected to result in an ultimate claim count unaffected by trends.

3.7. Stochastic Methods

3.7.1. Description of Method

Stochastic methods are more likely to be used for capital modelling than for reserving purposes. With stochastic claims reserving, the output is a probability distribution of ultimate claims, as opposed to the single reserve estimate in deterministic models. Additionally, while the stochastic models calculate the ultimate claims, the deterministic models estimate the expected value of claims that have already been incurred in a prior period. There are different types of stochastic methods such as the Bootstrap method (see England and Verrall (2002)), the Mack method (see Mack (1993)) and the Parodi method (see Parodi (2012) as set out in Appendix 1).

The Bootstrap method uses existing claim development factors and separates them into an underlying pattern and random noise. The distribution of the random noise is assumed to be consistent at all points in the development factor triangle and is shuffled around randomly to produce the results. The underlying distribution of ultimate claims can then be determined. A range of possible results can then be associated with a specific probability.

The Mack method fits the normal and lognormal distributions to the mean and standard error of reserve estimates. The method is applied to each exposure year and a full distribution of ultimate claims is derived.

The Parodi method adopts an approach which uses individual claims information to determine a separate model for the frequency and severity components of IBNR claims. A Monte Carlo simulation is then used to combine the components to determine the aggregate loss distribution.

3.7.2. When Stochastic Methods may be useful

Stochastic methods may be useful in testing the sensitivity of results to changes in assumptions and the reasonableness of results derived from other methods. Sensitivity testing can play an important role in pricing, reserving and developing stress margin assumptions for capital calculations where, for example, there is limited data upon which to develop assumptions, and a range of results may be produced depending on the assumption set and/or method chosen.

3.7.3. Stochastic Methods – limitations and other considerations

Some of the challenges presented by stochastic models include:

- perception of being a ‘black box’ producing results which are difficult to explain and/or interpret;
- sensitivity to the data inputs;
- complexity; and/or
- difficulty in applying judgment to test, explain, interpret and communicate results to key stakeholders.

3.8. Generalised Linear Modelling and other statistical techniques

3.8.1. Description of Method

Generalised Linear Modelling (GLM) is a flexible application of linear regression techniques which uses a set of observed data to predict the values of unknown variables. There are a number of programming platforms available to facilitate the building and application of GLM models, for example R and Python, and related techniques to enable fitting parameters to a GLM model from the observed data, for example, Maximum Likelihood Estimation (MLE).

Consideration may be given as to whether the model fitted is prone to overfitting the underlying data. Approaches such as cross-validation and regularisation can help minimise overfitting.

Programming platforms such as R and Python can also be used to explore the application of other statistical techniques in modelling IBNR.

General insurance practice provides examples of GLM and other related modelling approaches being used for IBNR, acknowledging that their usefulness may be limited due to the significantly longer run-off of life insurance claims.

3.8.2. When GLMs and other statistical techniques may be useful

GLMs and other statistical techniques can enable identification of features of a claim which materially impact claim notification delay. These techniques can be used in conjunction with more traditional IBNR methods to identify key drivers of claim notification delays, and a traditional technique used to quantify the IBNR.

These techniques can be useful in conducting sensitivity testing and/or reasonableness checking of other methods.

3.8.3. GLMs and other statistical techniques – limitations and other considerations

When fitting a GLM, decisions will need to be made about how to parameterise the run-off shape. Ideally, the model would have factors by incurred and development period that capture the key features of the run-off shape and how it changes over time. In practice, this may be difficult to achieve – as data may not be credible enough to model certain factors in the experience, and features like initial delays or acceleration in notifications over time due to behavioural or operational changes can increase the number of factors needed to accurately model future experience.

GLM tools may need to be adapted to manage the truncation (incomplete development years) that is a feature of IBNR data sets, otherwise results may be skewed or otherwise inaccurate.

GLMs (similar to most IBNR methods) may not effectively capture and allow for changes in the IBNR run-off pattern over time.

Large observed data sets may be required to achieve a meaningful application of these modelling techniques depending upon how many variables are being analysed.

3.9. Strengths and weaknesses of each Method

The following discussion of the strengths and weaknesses of various methods is based on an unadjusted application of each of the methods. In practice, the application of a particular method may be modified or adjusted to address the weaknesses of the method in particular circumstances.

When comparing methods, practitioners could consider the pros and cons associated with each method and the circumstances where different methods are more or less suitable. Some aspects to consider are:

- complexity vs simplicity;
- small growing portfolio / stable portfolio / declining portfolio;
- variability in claim size;
- long vs short reporting delay;
- sensitivity to recently reported claims;
- sensitivity to outliers or changes in benefits or changes in premium rates; and
- dependence upon input parameters.

Method	Strengths	Weaknesses
Average Delay	<ul style="list-style-type: none"> • Simple, easy to understand 	<ul style="list-style-type: none"> • Does not provide insights into the experience • May need adjustments especially for growing / shrinking portfolios, changing claim rates or changing delays
Ultimate Loss Ratio	<ul style="list-style-type: none"> • Simple, easy to understand • May be used in situations where there is a reliable estimate of the ultimate loss ratio, but not the average delay 	<ul style="list-style-type: none"> • May not reflect recent experience

Method	Strengths	Weaknesses
Chain Ladder	<ul style="list-style-type: none"> • Uses updated claim delay data to inform the reserve • Provides more insight into the experience than the Average Delay and Ultimate Loss Ratio Methods 	<ul style="list-style-type: none"> • May be oversensitive to the latest development diagonal • Is volatile in the recent exposure periods where IBNR reserves are the biggest • Makes no estimate of ultimate claim rates
Bornhuetter-Ferguson (BF)	<ul style="list-style-type: none"> • More stable than the Chain Ladder Method; provides a smooth estimate whilst incorporating information as it becomes available, placing more weight on credible information 	<ul style="list-style-type: none"> • If the claim development factors are not actively updated (e.g., using the Chain Ladder or Additive Methods), then less sensitive to emerging trends than the Chain Ladder or Additive Methods. • Is reliant on a previous estimate of the experience. This may not be available or reliable.
Additive	<ul style="list-style-type: none"> • More easily understood than Chain Ladder • More stable than the Chain Ladder Method 	<ul style="list-style-type: none"> • Less sensitive to emerging trends than the Chain Ladder Method • Additional assumptions (e.g., incidence trends) required compared to Chain Ladder
Stochastic	<ul style="list-style-type: none"> • Informs users about statistical credibility and the range of reasonable estimates • Can include more information than the other methods particularly if advanced methods are used to estimate claim delay functions 	<ul style="list-style-type: none"> • Complicated, not well understood

Method	Strengths	Weaknesses
GLM	<ul style="list-style-type: none"> • Uses large amount of observed data to identify patterns which may not emerge from applying conventional techniques • Useful in conducting sensitivity testing and/or reasonableness checking of other methods • A range of statistical tools available (e.g., R, Python) to develop innovative, automated approaches to modelling IBNR 	<ul style="list-style-type: none"> • May require large amounts of data to achieve meaningful results depending on how many variables are being analysed • Requires a level of expertise to apply • May require knowledge of statistical tools to build models and automate results analysis • Additional complexity in analysis and communication of results

4. Considerations in setting Parameters

This section and the following section contain considerations which are also covered in the Technical Paper Framework for Setting Life Insurance Best Estimate Assumptions.

4.1. Selection of historical experience

Many of the methods in Section 3 require assumptions about the pattern of future claim delays. These assumptions are usually derived from the experience directly related to the business being valued or priced. The main decisions are:

- what level of granularity to group the experience data by (that is, the main product group or product classes etc);
- which period in time to take the experience from;
- were there any deviations in experience driven by a one-off event that is unlikely to recur; and
- the adequacy of segmented historical data to produce credible assumptions.

Where these assumptions are based upon past experience, it is important for the practitioner to have a good understanding of this experience to allow for changes to delays over time and produce a 'best estimate' of future claim delays. Issues that may be relevant to take into account include but are not limited to:

- past administration delays/backlogs;

- changes in claims processing, claims administration processes generally and/or claims reporting processes (such as digitalisation of claims reporting);
- changes in date definitions;
- acceleration / deceleration in reporting delays;
- changes in benefit design;
- changes in mix of business;
- changes in member communication practices;
- changes in member awareness;
- more recent emergence of late claims;
- seasonality in claims lodgement / reporting;
- changes in other environmental factors (for example, greater lawyer involvement in TPD); and
- legislative changes.

When choosing the experience upon which to base the claim delay assumption there is often a trade-off between choosing:

- (a) a shorter period with the most recent and relevant experience albeit with potentially less credibility; and
- (b) a longer period with more experience to provide a stable and credible view albeit with a reduced sensitivity to the most recent experience.

An initial study of the past experience may be carried out to detect if there are any calendar, development or event period effects or trends.

It is common practice to assess whether any historical events or changes that influenced claims reporting behaviour are likely to be one-off occurrences or recurring in future periods, and adjust the modelling accordingly. For example, claims that exhibited atypical reporting behaviours due to legislative changes or mass media campaigns may be excluded from the derivation of reporting assumptions (e.g. CDF) for outstanding claims, if it is deemed unlikely that such events will reoccur.

It is important to understand if there have been product or sum insured scale changes in the claims and exposure data. This is common in group insurance. The data may need to be “rescaled” to ensure the analysis is on a consistent basis.

“Rescaling” means adjusting historical data and may be required where:

- There is a change to cover levels (i.e. sums insured): all historical claims are restated to the current sums insured design. For example, where the sum insured design was doubled, claims prior to the design change are doubled; and
- There is a major change to product terms: the historical claims are adjusted to ensure the experience is consistent with current product terms and conditions. Common practice is to rescale the claims by increasing or decreasing claim amounts by the cost of the product change. For example, where a historical product change was expected to cost x% and a cost of x% was included in the premium rates, claims prior to the product change are increased by x%.

In general, as rescaling is commonly applied to both premiums and claims for pricing purposes, it is common practice to make adjustments to both premiums and claims on a consistent basis to minimise their impact on the loss ratio.

4.2. Pending and re-opened claims

Where the IBNR reserve is being developed based on date notified (rather than date paid), it is appropriate to include all claims that have been classified as “reported” that have not yet been declined in the claim development triangle (that is, those that are not yet admitted or still pending). An acceptance rate would be applied to the pending claims for inclusion in the development triangle. The acceptance rate is based upon the proportion of claims expected to be admitted. The acceptance rate is simply the complement of the decline rate (that is, acceptance rate plus decline rate equals 1).

In assessing the decline or acceptance rates, it is common practice to give consideration to the materiality of the assumption, the application of the assumption (that is, pricing or financial reporting) and the applicability of the past measurement of the company-specific decline rates. Acceptance rates (particularly for TPD) often differ by delay until claim notification and can also differ by delay since notification.

Where the decline rate from historical experience is material, it is common practice to give consideration to including re-opened claims in the triangle (as at the date they were first reported) and the appropriateness of applying a re-open rate to the previously declined claims. It may be prudent to capture the potential re-open claims in the claim development triangle similar to the treatment of pending claims to ensure the IBNR reserve reflects the historical decline and re-open experience of the portfolio.

4.3. Tail considerations

There are situations where the experience available is not fully developed (that is, there are still claims being reported for the oldest exposure periods in the available data). In addition, the data available for older development periods may also not be credible due to limited exposure or be considered not relevant to the more recent exposure periods. In these situations, assumptions need to be made about how the older unreported development periods will develop.

In these situations, the development for older periods will need to be derived by some other means. Ways that this may be done are:

- base the development pattern on experience that is available elsewhere;

- fit a curve to the run-off pattern around the end point where the experience is still used. A common type of curve fitted is an exponential curve. In practice, a commonly used approach is to apply a linear regression to the logarithm of development factors (e.g. $\ln(DF-1)$) from credible development periods; or
- A decay factor approach can also be explored if there is no other option available for tail fitting. This is done by applying a decay factor on the existing development factors (i.e. decay factor $\times$ (Development Factor – 1) and extend it for the entire tail until the period where experience is believed to be fully developed.

A decision may also need to be made regarding at which point to cut off the tail (i.e., assume the experience is fully developed). In practice, setting this assumption is a common challenge based on actuarial judgement and requires holistic understanding of the claims experience as well as characteristics of the underlying membership cohort and availability of credible data. An alternative is, where the reporting delays are considered outliers, to bring the claims into an earlier period so the claims experience is still captured.

4.4. Use of IBNR reserves

IBNR reserves are used in both pricing and valuation. There are similarities and differences between pricing and valuation. Valuation is generally about setting the IBNR reserve for all past periods, whereas pricing involves setting the IBNR reserve for past periods in order to predict experience in future periods. This results in a number of differences, including:

- pricing analysis often chooses a shorter period to analyse the experience. This may mean excluding later periods with large IBNR reserves;
- valuations are required to estimate the reserves right up to the valuation date. This could involve roll-forwards or other approximation techniques in between detailed studies; and
- valuations will also be required to estimate IBNR reserves for all periods, even when development is very early, as opposed to pricing which may just exclude this period.

Given these differences, the methods applied for valuation may focus more on estimating the IBNR reserve in periods early in the development, whereas pricing may focus on choosing a period where it is expected experience is credible and can be used to project future loss ratios or claim rates.

IBNR reserves for both valuation and capital may include a risk adjustment or risk margin. A common approach for capital is to use the same best estimate IBNR methodology as for valuation, but to apply capital risk margins to reflect the appropriate level of stress (e.g. 1-in-200 year).

4.5. Discount rates

The application of a discount rate (or rates) in the calculation of an IBNR reserve is dependent upon the purpose, nature and materiality of the IBNR reserve. When choosing whether to use a discount rate, and the specific discount assumption to apply, the following are examples of items to consider:

- whether discount rates are prescribed under any relevant accounting, actuarial or other standards;

- the purpose for which the IBNR reserve is being calculated;
- the length of the delays expected in the IBNR reserve – if there are significant delays between reporting and payment of claims then the discount assumption will be more material;
- the materiality of the impact on the final result of the IBNR reserve (for example, the IBNR reserve may be sensitive to the level of discounting, but in the context of the overall result the IBNR reserve itself may be immaterial); and
- whether a single discount rate is appropriate or a yield curve approach is required.

5. Data

5.1. Collection

As is the case for determining all reserving estimates, the quality and completeness of the underlying data is important for the overall accuracy of the IBNR reserve. In normal circumstances the policy and claims data are obtained from a number of administration or claims systems and the data is collected over a number of years. Therefore, it can be expected that there may be missing, erroneous or inconsistent data in the resulting data extracts.

It is common practice to review data for accuracy and completeness with consideration of the following aspects:

- reconciliation of claim data to the paid claims data in the general ledger and as reported in the financial statements;
- reconciliation of the claim data to the claim data used for prior period analysis; and
- reconciliation of the “incurred date” assigned to claims for reserving purposes to the contractually determined incurred date for benefit purposes.

Additionally, it is common practice to review the data for reasonableness and appropriateness, including when the data has been provided by a third party. Considerations include:

- data field definitions;
- the completeness of the necessary data elements, including the internal and external consistency of the elements;
- contract provisions, plan documents, and reinsurance treaties to establish context of data;
- any known, material limitations of the data;
- identifying and understanding questionable or inconsistent data values;

- identifying relationships of data that are materially inconsistent; and
- checks performed by the third party provider (where relevant).

5.2. Definition of “reported”

The definition of “reported” and consistency with the underlying data is key. There may be different interpretations of when a claim is reported, including:

- when a request is received by the insurer/administrator asking for a claim form to be sent;
- when the claim form is received by the administrator;
- when the claim form is received by the insurer;
- when the claim form is received by the claims department of an insurer; or
- when the eligibility of the claim has been checked.

Claims may be lodged digitally, meaning that the claim may be checked for eligibility and lodged with the administrator and insurer concurrently.

It is important that, whatever definition is used, the date reported is recorded accurately and consistently, and that there is internal consistency when determining IBNR, determining other reserves for outstanding claims (e.g., RBNA and re-opened claims) and analysing experience. For example, if the definition of “reported” is claim form received by the administrator, but the data extract is from the insurer’s system, then there will be some claims which are “reported” under the definition but have not yet been received or processed by the insurer and therefore will not appear on the data extract. It is important that:

- these claims are not missed in determining total claims incurred; and
- the calculation of development factors are consistent with the definition of “reported”

Note that there may also be differences between how a finance team, pricing team and claims team report these statistics within an insurer.

Any changes over time in the basis on which a claim is recorded as “reported” or in the overall claim reporting process need to be carefully considered. If the effect is significant, specific allowances may need to be made in the IBNR reserves determination so that the IBNR reserve is consistent with the basis on which claims are expected to be recorded as “reported” going forward. Such changes can also affect the appropriate decline rate assumption going forward.

5.3. Definition of “incurred date”

The “incurred date” is the date on which a claim is deemed to have “occurred”. This date is important for determining whether the event is covered under the policy, determining the basis of claim payment and for developing the IBNR reserve. The incurred date may have a number of definitions or interpretations, such as date of accident or death, and it is important to establish a definition consistent with the language and spirit of the policy contract. It is important to ensure that the data on the administration system is being interpreted correctly and consistently with the way in which it was input. The incurred date is especially important as the basis for using the development methods to calculate claim reserves.

The “incurred date” may be after the notification date, for example, an IP claim for a specified period of incapacity (due to a scheduled operation) may be lodged in advance of the date of the operation. This may require careful treatment to ensure it flows through the analysis correctly.

There may be restatements in the data which may require rules to be developed on how to treat these cases, for example, overriding the “reported date” to equal the “incurred date”, applying a minimum notification delay of zero or adjusting the IBNR to reflect the specified period of incapacity.

5.4. Claim numbers or amounts

Most IBNR reserving methods can be utilised using either claims numbers or claim amounts. A key advantage of using amounts is that it incorporates both the number of claims and the sum insured of claims, whereas using claim numbers requires the average claim size to be estimated as a second parameter. On the other hand, a key advantage of using claim numbers is that by having to set up separate assumptions for volume and cost of claims, it can provide the practitioner with greater insight into the claims reporting pattern and uncover the underlying drivers behind certain member behaviour.

Using claim numbers is also advised when the sum insured range is large or when the result can be volatile (that is, business with immature claims development). It is also possible to then apply different average claim sizes by notification delay. This is useful for some group schemes where the benefit scale is larger for younger members who tend to have longer claim notification delays. This is also particularly important for disability income, where the average claim size can vary significantly by notification delay (due to being past the higher termination rates expected in the earlier durations of a claim). One approach is to run the Chain Ladder Method using both claim numbers and claim amounts and then, by comparing, ensure the results yielded are consistent (one result will serve as a reasonableness check of the other).

5.5. Grouping

The grouping of the data into the main business or product classes and risk subgroups is a significant factor in the determination of reserve estimates. For each subgroup, the larger it is and the more homogeneous the risks it contains, the greater the degree of statistical stability of the estimate. If sufficient data is available, then grouping claims at a lower level will allow for specific features of the claims or underlying risks to be taken into account and could result in more accurate estimates.

There is a trade-off, however, between attaining more homogeneity of risks and maintaining the statistical credibility of the reserve estimate. A sound knowledge of the underlying business in respect of the operational characteristics (such as marketing, underwriting and claims management) is also an important input to data segmentation decisions.

6. Overall Considerations

The overarching goal in selecting methodologies and assumptions is to produce IBNR estimates that are forward-looking, data-informed, and reflective of the nature of the business. It is good actuarial practice to apply the control cycle – continually reviewing and refining assumptions based on actual experience and emerging insights. An important part of this process is identifying what additional information would improve the robustness of the analysis and actively building this data over time.

Given the breadth of factors relevant to IBNR estimation, this section is divided into three subsections:

- 6.1 Methodology Considerations: factors that drive the choice of IBNR methods.
- 6.2 Portfolio-Specific Considerations: considerations that relate to specific portfolios.
- 6.3 Other Considerations: broader practical and technical considerations relevant to IBNR estimation.

6.1. Methodology considerations

It is important for the methodology used for calculating IBNR reserves to reflect the characteristics of the underlying product. For example, TPD claims tend to have longer claim reporting delays than death claims, requiring more sophisticated approaches to IBNR estimation.

6.1.1. Changing methodologies

As portfolios evolve or for any other reasons, it may be necessary to change methodologies (e.g. from simple average delay to stochastic methods).

The following outlines the considerations when changing methodologies:

- The appropriateness of alternative methods;
- The reasons for the change;
- The impact of changing the methodology at a particular point in time, including second-order impacts. It is important to understand the full implications before implementing the change; and
- Ability to demonstrate the rationale for changing the methodology to relevant stakeholders including auditors.

6.1.2. Blending methodologies

A combination of methods may be appropriate, such as using the Chain Ladder Method for older, more developed exposure periods and a methodology such as the Ultimate Loss Ratio Method or BF Method for more recent periods. Each of these methods should be well understood and documented to ensure the reasonableness of the IBNR estimation.

6.1.3. Writing off IBNR Reserves

Liability for claims is indefinite but, for practical purposes, the risk of claim may become immaterial. This may be dealt with by combining less material groups of business or, where there has been an extended period with no claims, setting the IBNR reserve to nil.

6.2. Portfolio specific considerations

IBNR reserves are highly sensitive to the characteristics of the underlying portfolio. This section outlines portfolio-specific considerations that practitioners can address to ensure that the IBNR remains robust, forward-looking, and fit for purpose.

6.2.1. Growing or diminishing portfolios

Using historical data to estimate future claims is generally most reliable when the business is in a steady 'maintenance' phase – where the size and characteristics of the portfolio remain relatively stable. However, when the portfolio is undergoing rapid growth or run-off, additional challenges arise.

In general, for new products with no credible claim history, IBNR reserves are typically based on pricing loss ratios using methods such as the Ultimate Loss Ratio Method or the BF Method. Alternatively, if there are similar products in the company's portfolio, the claims data from those products may be used to inform the level of reserves for the new product. These methods are generally adopted until the block of business reaches a size such that its own data is deemed credible.

On the other hand, when a block of business is in run-off, a different set of challenges arise, and these include declining credibility of the data. As data volumes reduce, methods like the Chain Ladder may generate volatile results and exposure methods may again have to be used. Practitioners may consider grouping data at a higher level of granularity to ensure credibility of the data.

An additional complexity in run-off portfolios is anti-selective behaviour that could result in deterioration of claims experience. The methodology including the assumptions and parameters need to be reassessed to ensure that the IBNR reserves remain reasonable.

6.2.2. Business mix changes

Different cover types exhibit distinct claims reporting patterns and therefore development factors are determined separately by cover type. For death claims, delays often occur as beneficiaries may not immediately be aware of the policy's existence. Disability income covers typically involve a waiting period before the benefit payments commence, hence some claimants may delay reporting until this period has passed. Total and Permanent Disability (TPD) generally requires both a waiting period and confirmation that the disability is permanent rather than temporary, resulting in longer reporting delays. Reporting delays are often more pronounced for group covers where members may be less aware of their insurance covers, contributing to further lags between the disabling event and the claim being reporting.

Reporting patterns also vary within cover types, for example default versus voluntary cover, older members versus younger members. Cause of claim can also impact reporting delays (for example Mental Health claims tend to have longer reporting delay).

Given these differences across and within cover types, it is common practice to regularly monitor the composition of the portfolio in order to ensure that assumptions around reporting delays remain reasonable and aligned with the characteristics and behaviours of the insured cohort.

6.3. Other considerations

This section outlines other considerations that were not addressed in the preceding subsections.

6.3.1. Considerations specific to disability income/group salary continuance business

Additional consideration when setting IBNR reserves for individual disability income and group salary continuance (GSC) business:

- Using claim amounts (based on estimated claims costs for claims reported to date) is implicitly using the average claims size of claims reported to date and is impacted by the termination basis used to determine the Open Claims Reserve (OCR) for open claims. Termination experience may vary depending on reporting delay and a different termination basis may be appropriate for calculating the average claim size for IBNR claims. Using claim numbers allows average claims size to be explicitly set as a parameter which may be varied depending on claim delays.
- Consistency of the date notified definition for the IBNR reserve calculation and the timing of establishing the OCR for a claim to avoid an overlap or a gap, i.e., there is a transition from the claim being included in the IBNR reserve to being included in the OCR.
- Separate consideration of the effect of changes in the termination basis on the IBNR.

6.3.2. Step changes in experience

Step changes in experience will impact the IBNR analysis. The Chain Ladder Method, in particular, is sensitive to significant changes in experience and it is common practice to consider if there appear to have been any step changes in development experience and how best to deal with the impact of such step changes.

The basis of the Chain Ladder Method is that the reporting delays of a book of business are stable over time or, in other words, that there is a stable development pattern that emerges over time until the ultimate number of claims is reached.

If a break in the pattern is observed, it usually means one or both of the following scenarios:

- there is an acceleration (or deceleration) of claims reporting. In this situation, the ultimate number of claims does not increase (i.e. delay effect); or
- there is a step-change in underlying claims experience. In this situation, there is a change in the ultimate claims rate and ultimate number of claims (i.e. incidence effect).

Actuarial judgement is required to consider whether the observed claims experience represents a delay effect or incidence effect or both and whether the change is persistent. If it is the former, then using the past development factors without adjustment would result in an overstatement of IBNR reserves, and some form of adjustment is considered, as follows:

- Firstly, gather and document evidence of contemporaneous events that logically support the observed experience (for example: greater member communications prompting higher awareness of cover; a change in claims lodgement – e.g. shift to digital; an administrative disruption or backlog; a change in the external environment – e.g. COVID pandemic). However, in many cases it will be difficult to prove conclusively that a direct causal relationship exists.
- Secondly, quantify, to the extent possible, the impact on the claims reporting pattern – both development factors and claims received to date – and adjust to ensure a justifiable documented and peer reviewed IBNR Reserve.

6.3.3. Reasonableness checks

Performing reasonableness checks is an important part of validating IBNR estimates.

Some common high-level validation techniques include:

- Development factor benchmarking: Compare claim development factors across similar products or schemes to assess consistency in run-off patterns and explain any deviations;
- Back-testing: Evaluate the accuracy of past IBNR estimates by comparing them against actual claims that have since emerged, noting that this can be done as part of the experience investigation work;

- Ratio analysis: Calculate simple metrics such as IBNR as a proportion of premium or loss ratios to compare the metrics across the portfolio and over time;
- Sensitivities: Compare total incurred claims across different assumption sets to evaluate how sensitive the IBNR is to key inputs; and
- Analysis of movement: Analyse changes in IBNR from period to period and ensure that the key drivers of these movements – such as changes in assumptions, product change etc – are well understood and documented.

6.3.4. Different levels of granularity for various purposes

In actuarial practice, it is often necessary to break down IBNR into different levels of granularity to serve different analytical and reporting needs. For example, segmentation by incidence year may be required for experience investigations, cohort-level breakdowns for financial reporting, and product or scheme-level detail for pricing exercises. This process of segmentation aims to ensure that the resulting analysis remains robust and that the communication of findings is accurate.

6.3.5. Different discount rates for different purposes

Given the potential for long reporting delays, IBNR is typically discounted to reflect the time value of money. In choosing a discount rate it is important to consider compliance with relevant standards and consistency with industry practices. For example, whilst a risk-free rate is commonly used for discounting IBNR in both financial and capital reporting, the specific rates applied may differ according to the respective prudential standards. Therefore, reconciliations may be required to understand and explain any differences between these reporting bases.

There are implications for investment experience analysis by discounting the IBNR. Specifically, the process of unwind over time contributes to the overall investment experience. Therefore, it is important for practitioners to be aware of the discount rate applied to IBNR, as it will influence the interpretation of investment experience and related metrics, and may impact other areas such as asset-liability matching.

Furthermore, practitioners may need to consider the impact of IBNR discounting for purposes such as claims experience monitoring and business planning. For example, when analysing claims experience for any given period, it is important that the discounted IBNR included in actual claims is consistent with the IBNR included in expected claims to support meaningful analysis and communication.

It is common to consider the appropriateness of the time period applied for IBNR discounting and ensure alignment with other actuarial processes and models. For example, under a chain ladder approach, if claim amounts used in the triangle are on an undiscounted basis, additional discounting from payment date to incurred date may be required within the IBNR model.

6.3.6. Other claims-related components

In practice, it is common for claims-related components to be captured as part of the IBNR. For example, a volume-based expense component in relation to claims management may be included to capture these costs upfront. As such, it is important for practitioners to have a clear understanding of these components embedded within the IBNR to support more accurate interpretation of period-to-period movements and effective communication around the underlying drivers of change.

6.3.7. Excess or outlier claims

Excess or shock claims (particularly their timing, number and amount) can have a material impact on completion factors produced by the Chain Ladder Method and can distort the results generated under some other IBNR methods.

Examples of such claims can include those arising from a catastrophic event (which may have a different reporting pattern), large industry fund voluntary cover claims or, more generally, those outside the normal range for the business in question. Such claims can produce significantly different results from analysis on a claim numbers vs claim amounts basis and, this may be part of the process of identifying them. Care needs to be taken though to consider whether departure from a past norm is an outlier or the start of an underlying change (for example, greater prevalence of industry fund voluntary cover claims due to increases in take-up of such cover).

The assessment time and/or reporting delay for these excess claims may be longer, and hence when they are paid/reported they can lower all previous development periods' completion factors or increase the average claim size. In either case, the overall claim reserve produced will be increased. Incorporating the excess claims impact (for example, lower completion factors) is providing an ongoing reserve for a similarly expected excess claim – which may be appropriate, depending on the likelihood of recurrence and the likely recurrence period.

Alternatively, in the less usual case that the large excess claim is paid/reported faster than other claims (and a Chain Ladder Method based on claim amounts is being used), the resulting completion factors will be increased, thus lowering reserves, which may not be appropriate.

The impact of excess claims on the Chain Ladder Method's completion factors could be allowed for by including them at an average amount or by removing them completely from the completion factor calculation. If done in the latter way, the practitioner may:

- (a) keep the excess claims in the cumulative paid/reported claims to which the completion factors are applied; or
- (b) continue to keep the excess claims removed even from the cumulative paid/reported claims and adopt another method to calculate claim reserves for future potential payment/reporting of excess claims already incurred.

If (b) is chosen, a possible approach is to include claim-specific excess claim reserves set with support from the claims assessment team. Correspondingly, if the averaging approach is adopted, then there is an option of including the excess claims at their full amount or only at the average amount. In the latter case, the excess claim reserves would then be in respect of the excess over the average amount.

A key factor in the choice of whether to remove excess claims from completion factor development is the relative materiality that excess claims have on the portfolio in terms of size, completion factor impact and reserve impact, and as such it is important to run sensitivities to understand the material impact of adjustments. A further factor in a pricing context is to ensure consistency between the allowance in the IBNR reserve calculation and allowance for excess claims that may be made in another part of the pricing analysis.

6.3.8. Allowing for uncertainty

Some emerging areas of uncertainty in calculating IBNRs include:

- assessing whether higher levels of reported claims indicate that underlying incidence has increased or claims are being reported earlier (i.e., reporting delays have decreased);
- drivers of an increase in late reported claims; and
- whether a change in reporting patterns is temporary (e.g., one-off catch-up) or permanent.

Traditionally best estimate IBNRs have been set on a deterministic basis, i.e., there is a central methodology and set of assumptions, which may then be tested using sensitivity testing to alternative methodologies and/or ranges of assumptions. Using a weighted average of different outcomes is an alternative approach which is less commonly used.

It may be useful to provide sensitivity analysis or alternative approaches to the IBNR calculation to management and the board when outcomes are sensitive to judgements made.

Appendix 1 Further Reading

General references

Unless otherwise indicated, the references below are sourced from the following websites:

Society of Actuaries www.soa.org

Institute and Faculty of Actuaries www.actuaries.org.uk

Casualty Actuarial Society www.casact.org

1. Chadick, C, Campbell, W and Knox-Seith, F (2009). Comparison of Incurred But Not Reported (IBNR) Methods, Society of Actuaries Health Section

This report assesses the accuracy of many commonly used IBNR estimation methods over a wide range of scenarios.
2. Claims Reserving Manual (1997). Institute and Faculty of Actuaries

The aim of this manual is to provide a review of common methods used to set claims reserves in general insurance. It covers the basic methods and some more advanced methods including stochastic methods.
3. Friedland, J (2010). Estimating Unpaid Claims Using Basic Techniques, Casualty Actuarial Society, Fall Forum

This text provides an extensive review of methods used to determine claims reserves in general insurance and reinsurance.
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END OF TECHNICAL PAPER

DOCUMENT CONTROL

Version	Title of Document	Name of Approving Council or Committee	Date of Approval	Date of Publication
1.0	Information Note: IBNR	Life Insurance and Wealth Management Practice Committee	December 2014	December 2014
2.0	Technical Paper: IBNR (classification change only)	Professional Practice Committee	September 2022	September 2022
3.0	Technical Paper: IBNR Claim Reserves for Life Insurance Business	Professional Practice Committee	October 2026	October 2026