

A survey into the estimation of provisions for
outstanding claims by actuarial/statistical methods

1. Purpose

The purpose of the survey was to assess the extent to which actuarial/statistical methods are used in estimating the provisions for outstanding claims in some of the major non-life insurers. It was also intended to discover the methods employed in practice and the manner in which their results are translated into the provisions.

2. Contributors

During 1983 and 1984 replies were received from 6 leading general insurers; in addition information was received from 1 reinsurer and 2 firms of consulting actuaries. To some extent the latter are dealing with special situations and this report is therefore confined to a discussion of the position in the 6 companies, where actuarial/statistical methods are used routinely in the estimation of outstanding claims provisions.

3. For each company a resume statement has been prepared and appended to this report. They are all major insurers and as some requested anonymity they have been labelled as A, B, C, D, E, F, to mask their identities.
4. Most of the methods employed would have warranted lengthy descriptions in order to do them full justice. But as the object of this report is not to provoke a detailed technical discussion but to indicate in general terms the sorts of methods being used the descriptions are confined to outlines only. In each case the essential rationale is apparent.
5. It is apparent that in each of the companies concerned the actuarial/statistical methods are used directly in the establishment of a significant part of the company's provisions. This encouraging state of affairs may be tempered by the possibility that the companies in question may be a self-selected group who responded to the survey because they had something positive to impart.
6. The methods employed may prompt discussion on the following aspects.
 - (a) With one notable exception the methods do not involve any genuine statistical analysis. They might be aptly described as little more than computational procedures. Can they be properly called 'actuarial' methods?
 - (b) It may be remarked that much use is made of 'average claim amount' methods. The number of variants is a monument to actuarial ingenuity in devising different ways of taking averages. This pre-occupation with averages no doubt reflects the fact that the so-called actuarial methods seem to be used only when portfolios are large enough to form, hopefully, stable averages. There seems to be some reluctance to explore the statistical variation about the averages.

- (c) In some cases the statistical variability is avoided or dampened down, by excluding 'large' claims from the actuarial methods. Are we saying that such methods cannot cope with large claims?
- (d) There are several references to the exercise of 'judgement', either in making adjustments to the calculated figures to take account of extraneous factors, or in choosing the best of several different answers from a battery of methods. No doubt such judgement is often soundly-based upon a genuine understanding of the differences in answers. But perhaps there is also an element of picking the answer which appears right or convenient in the given circumstances?

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A

1. Scope

Territory: U.K. only
Classes of Business: Motor

2. Reporting and Use of Results

- (a) The actuary reports the results to general management.
- (b) The results are used directly to establish the Company's provisions for outstanding claims.
- (c) The objectives are to set up provisions on a reasonably prudent basis and to maintain consistency from year to year.

3. Methods

Reported claims and IBNR are assessed separately.

3.1. Reported Claims

Two statistical methods are used.

- (a) For each year of notification (N) a series of ratios is developed at quarterly intervals relating the run-off results to those at corresponding stages in the immediately preceding year (N-1). One series is based on total accumulated payments, another is based on payments on settled claims only.

By examining the trends in each series of ratios an estimate is made of the ultimate value of the ratio for each year of notification. The liability for each year is then estimated by successive application of the ultimate ratios.

In practice a considerable amount of experience and judgement is required to interpret the trends in the ratios and to estimate their ultimate values.

- (b) For each year of notification the average 'claims payments per notified claim' is calculated for each development year. The triangle of average amounts is then adjusted to constant money values, the results being used to devise a standard table based on the mean values of the entries.

The standard table is applied to each year of notification to arrive at the estimated outstanding liability after adjustment for past and future inflation. Some judgement is required in deciding upon the values in the standard table.

Neither of the above methods by itself can be relied upon to produce consistent provisions from year to year. Both approaches are examined and values are taken which take account of each method, allowing scope for adjustment in the light of circumstances.

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- (c) Case-by-case estimating is not used as the primary method of reserving but is carried out on a sampling basis in order to provide an insight into possible changes in claims-amounts distributions and other underlying characteristics. This knowledge would be used as an aid to judgement in the statistical methods; and the case-by-case results may impose constraints on the values adopted under the statistical methods.

3.2. IBNR Claims

An estimate is made of the expected ultimate number of late-reported claims for the current year by reference to the actual ultimate number for the previous year. The latter is adjusted either (i) in the ratio of the numbers of late-reported claims to corresponding dates in the two years or (ii) by the difference between the numbers (after allowing for changes in the size and mix of the portfolio). It is assumed that the number of IBNR claims lies mid-way between (i) and (ii).

The IBNR provision is obtained by multiplying the assumed number of IBNR claims by the average expected cost of claims reported in the current year.

B

1. Scope

Territory: U.K. Republic of Ireland, Australia
Class of Business: Motor, Employers Liability,
Public Liability, Workmens' Compensation

2. Use of Results

The results are used to create the provisions for outstanding claims for the Company Accounts and DoT Returns in the U.K. Elsewhere the results are used to monitor the provisions set up by other methods.

3. Methods

The method used is based upon that described in JIA 105 page 211 - 'Claim Reserves in General Insurance' by D.H. Reid. That method has been simplified by replacing the mathematical modelling of a claims development surface by amount and time by an actual surface coupled with the use of an appropriate interpolation formula. Apart from this change, the general principles of the original method are unaltered.

Care is taken to monitor the assumptions of the model by testing its goodness-of-fit. In this way changing patterns of development can be detected which can be subject to investigation.

C

1. Scope

Territory: U.K. and Overseas
Classes of Business: All

2. Reporting and Use of Results

- (a) Reserving policy is developed by a committee which reports to the Group financial director. The actuary who serves on the committee undertakes an internal audit of the claim reserving proposals, and produces reports for the financial director indicating whether or not the proposals are acceptable and in line with Group policy.
- (b) The audit extends over the proposals of the various subsidiaries (U.K. and overseas) each of which may use different methods for establishing reserves. The methods described below are those used by the main U.K. direct writing subsidiary, for which the claim reserving proposals are formulated by another actuary.

3. Methods

Each class of business is considered separately. The starting-point is the total case estimates (which may be either individual estimates or standard average amounts) held on a computer system. The actuary's responsibility is to propose an additional reserve to cover -

- (a) Potential insufficiencies in the case estimates, referred to as SAUCE (statistical adjustments for under-provisions in case estimates), plus
 - (b) IBNR
- (a) The assessment of SAUCE (which may be negative for a class with a history of over-estimating) is based upon consideration of a cohort analysis using years of notification. The emerging run-offs provide a test of the adequacy of the case estimates.
 - (b) For IBNR triangular tabulations are maintained for the developed amounts (payments and outstandings) by year of origin and year of notification, and standard methods used to estimate IBNR provisions. An alternative view of IBNR is obtained by looking at IBNR number triangles, projecting IBNR numbers and average amounts.

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The total additional reserve, (a) + (b), is considered and 'steered' subjectively in the light of -

- (i) the additional reserves as a percentage of premiums and case estimates,
- (ii) surplus or deficiencies arising from prior year reserves,
- (iii) the results of a battery of tests using chain-ladder methods.

For each class the investigation is extended to considering the effect of individual large claims, weather patterns, systems changes, exposure changes etc., and known exceptional features.

The reserving policy recognises the standard of reserving of the U.K. market as shown by the DoT Returns of the top 12 U.K. general insurers.

1. Scope

Territory: U.K. and Republic of Ireland
Classes of Business: Fire, Accident, Motor

2. Use of Results

The results are used directly to establish the Company's provisions for outstanding claims.

3. Methods

A. Known Outstanding Claims

- (i) For certain minor classes of business, where the numbers of claims are too small to form stable averages, the claims are looked at case-by-case and individually estimated. Case-by-case estimating is also used for all 'large' claims (defined as £5,000 or over) in all other classes of business.
- (ii) All other claims are estimated by an average factor method. For this purpose the claims in each relevant class of business are divided into a maximum of 6 groups defining different types of loss the intention being to make each group as homogeneous as possible.

The average factors are arrived at from a study of the historic run-off of successive annual cohorts of reported claims; alternatively by examining the levels of settled claims costs arising during successive 12-months periods. The estimates obtained by the different methods are adjusted for inflation to current price levels. The values of the factors are revised quarterly. Judgement is exercised in using the results to determine the appropriate average cost factors; and before a decision is taken discussions are held with underwriters and claims personnel.

B. IBNR Claims

The provision for each class of business is obtained by projecting separately the numbers of claims and the average cost per claim. The numbers are estimated from the past patterns of reporting delay distributions. The estimation of average costs is done by reference to the average cost of IBNR claims over the most recent 3 years. The effect of large claims is removed from these historic costs and a separate provision is made for large claims by reference to the actual costs over the most recent 7 years.

E

1. Scope

Territory: U.K.

Classes of Business: Motor, Domestic

2. Use of Results

The results are used directly to establish the Company's provisions for outstanding claims.

3. Methods

Statistical estimates are applied to all motor and domestic claims until the end of the calendar year following occurrence. Thereafter they are estimated individually case-by-case.

A. Known Outstanding Claims

The rationale of the method is to split up the outstanding claims according to the time elapsed (in months) since month of notification. The average cost of each such division is estimated by constructing a projected settlement delay distribution in which the probability of a claim being settled at each future duration is multiplied by the amount of claim then expected.

The components of the distribution are determined from an analysis of current settled claims according to duration since notification, the results being adjusted appropriately for inflation.

Large claims (the defined level being adjusted each year to allow for inflation) are omitted from the analysis of settled claims, the results from the remaining data being scaled up to allow for the smoothed contribution of large claims derived from past experience.

B. IBNR

The reserve is normally calculated as a percentage of premiums, allowing for the effects of rate increases, claim inflation and claim frequency. The IBNR reserve set at each year-end will take account of the run-off profit from previous reserves.

F

1. Scope

Territory: U.K. and Republic of Ireland
Classes of Business: All excluding MAT.

2. Use of Results

The results are used to establish the Company's provisions for outstanding claims.

3. Methods

Known Outstanding Claims

The gross future payments for each year of origin (within territory and class) are forecast by assuming that historical patterns of underlying numbers and average amounts will hold in future. The total payments in each future period of account are forecast separately for each year of origin and separately for claims closed and open at the end of the period of account. The total payments are calculated by taking the number of claims closed (or open), as forecast for each future period of account, multiplying by an appropriate average payment brought to current prices and inflating to prices as at the middle of each future period of account.

The number of claims closed 1, 2, 3,.... years after the year of origin is forecast by multiplying the number of claims reported in the year of origin by the proportion of claims expected to be settled 1,2,3,.... years after the year of origin. The number of claims open is deduced from the number notified and the forecast number closed.

The average payments expected to be made 1,2,3,.... years after the year of origin are calculated by inflating historical total payments to current prices, dividing by the appropriate number of claims, and projecting the resultant pattern in order to obtain future average payments.

IBNR

The provision is calculated separately for each quarter of origin by projecting the payments expected in each future quarter of account. The numbers of claims and the corresponding average cost are projected separately.