

PHI RESERVING

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1. INTRODUCTION

PAPERS devoted to the subject of reserving for Permanent Health Insurance (PHI) are not exactly numerous. The author could not find one published in the U.K., although there were papers in the U.S.A., Australia and South Africa.

Most U.K. PHI papers have sought to cover the topic in its entirety and therefore do give views on reserving issues. Ironically, this paper in seeking to focus on reserving did, incidentally, find itself wandering over a large part of the PHI actuarial countryside. Perhaps this is unavoidable.

PHI reserving is not just a question of ensuring adequate solvency. The reserving basis we choose can aid or hinder our understanding of the business. After all, the recognition of profits is defined by the reserving basis. If management is going to track profits in order to assist decisions on marketing position, financial strength of the office, etc. then it needs to be concerned that the reserving basis is not distorting the emerging results. An equivalent argument can be put forward in respect of the capital requirements of the business.

The author presumes the reader will have knowledge of PHI, its peculiarities and terminology, and the reference section provides a list of recent papers which provide essential background information.

The paper is organized in three parts:

Group PHI—Sections 2 to 6,

Individual PHI—Sections 7 to 10,

General Issues—Sections 11 and 12.

In order to avoid too much repetition the individual PHI part does on occasion refer back to arguments in the group PHI part.

2. BACKGROUND

2.1 *State of the Market*

An outsider looking at prospects for the group PHI market might well conclude that this business is due for a period of substantial and sustained growth. The market is clearly underpenetrated and, in addition, recent personal pensions legislation may ultimately lead to an expanded market as more employers choose to provide disability cover outside of the pension fund.

Why then are insurance companies not pressing to increase their share of this market?

This question put to a number of people in the industry resulted in a wide variety of answers but there was one common underlying theme; group PHI is generally underpriced and therefore unprofitable. This impression has been confirmed by the sight of leading writers of group PHI withdrawing from the market and others disclosing substantial losses.

What part do reserves play in the rather negative perceptions the industry has of group PHI?

Perceptions of profit are determined by the reserving basis selected. The losses disclosed by some companies in the industry need closer examination. The most notable losses are generally due to significant changes in reserve basis, recognizing inadequacies in the past. In more general terms, any arbitrariness in the reserving basis may result in a distorted pattern of profit emergence. Such arbitrariness can potentially make loss making rates appear profitable and even profitable rates appear loss making, depending on the maturity of the business.

Reserving bases and pricing bases have often been closely linked. This is certainly true of unexpired premium reserves and incurred but not reported (IBNR) reserves and also, to a lesser extent, of claims reserves. Under-pricing has sometimes been linked to under-reserving. It is perhaps a little trite to say it, but it is hard to imagine that under-pricing could persist in circumstances where the reserves were more than adequate. More than adequate reserves imply conservatism and a conservative reserving basis should theoretically feed back into the pricing process.

2.2 Current Market Practice

The DTI does not issue any guidelines on how group PHI reserves should be set. In consequence, there is considerable variation in approaches to reserving. However, in broad terms, current practice consists of holding reserves for:

- unexpired premium reserve (UPR),
- incurred but not reported claims reserve (IBNR) (including an element in respect of the deferred period),
- reserves for claims in payment,
- deficiency reserves (if required).

In addition, some companies hold specific reserves for options, outstanding profit sharing liabilities and contingencies. When setting reserves for publication in DTI returns, companies will often sweep into a single reserve the UPR, IBNR, deficiency reserve (if any) as well as any reserves for options and contingencies and express it as a percentage of premium. This does not mean that they have not gone through the exercise of considering what the component parts should be.

For UPR, and the element of IBNR reserves related to deferred period, many companies rely on the assumption that their pricing basis was correct. Deficiency

reserves are usually only held where premium rates have recently been increased and it does not appear to be common practice to hold such reserves for particular problem schemes.

3. RESERVES FOR CLAIMS IN PAYMENT

3.1 *Methods*

Reserves for claims in payment are sometimes based simply on a fixed multiple of benefit per annum, although in some cases companies calculate these reserves using some form of continuance table. Such a continuance table may allow for deaths and recoveries or, in the extreme, for deaths only.

A few companies give individual consideration to each claim, forming a view of the likely duration of payment given the particular disability. This approach is not discussed in this paper.

Companies would normally make some provision for the expense of payment of claim but, for simplicity, this aspect is ignored in this chapter.

3.2 *Fixed Multiple of Claims in Payment*

Common sense would seem to indicate that disability annuity values will be lower at early durations of claim than later, since the expected number of recoveries is so much higher at early durations than at later durations—a point which overrides any consideration of mortality. It is only at older ages where the outstanding duration becomes shorter that this effect is overridden. The latest U.S.A. continuance table, which was prepared for use in valuing group PHI claims (87 CGDT) supports this view. Table 1 gives annuity values calculated using the experience basis of the U.S.A. table at a 10% interest rate.

Selecting a fixed annuity value which will reflect such a pattern of annuity values varying by age and, more importantly, by duration, is not an easy matter.

Particular problems of the fixed annuity approach are:

A maturing portfolio will contain an ever increasing proportion of claims of long duration. Thus, the disability annuity factor will have to be reviewed upwards on a regular basis. If this is not done, the portfolio could begin to exhibit persistent losses (depending on the multiple chosen), despite the fact that the underlying rating basis may be sound. Failure to analyse this effect could result in companies forming an overly pessimistic view of the market. The converse of this previous point is that the reserve may be set too high for an immature portfolio which may cause needless additional strain on writing new schemes. As a portfolio stabilizes, but is not yet mature, it may pass through a period of apparent profitability due to releases from these reserves and this in turn may lead to ill advised rate cutting.

If the lapse rates on existing schemes are sufficiently low, then the average disability annuity factor may remain fairly stable and internal investigations of

Table 1. *Disability Annuity Values for a Payment of £1 per annum—Male to age 65, Deferred 6 months*

<i>Duration of Disability</i>	<i>Age at Commencement of Disability</i>		
	32	42	52
6 months	3.97	4.63	4.52
12 months	4.89	5.42	5.07
18 months	5.51	5.87	5.27
24 months	5.91	6.19	5.36
3 years	6.61	6.62	5.35
5 years	7.23	6.73	4.86
10 years	7.47	6.21	2.46

the office may lead them to be satisfied with an arbitrary basis. However, the reserving basis will remain vulnerable to any future mass lapse of schemes.

These various effects are illustrated by output from a model office on assumptions described in Appendix A. Initially the model examines the projected revenue accounts generated by one year's risk of one member. Figure 1 shows the surpluses which are before tax and ignore the initial expenses of setting up a scheme. The fixed multiple approach shows reduced initial surplus followed by a peak and, finally, back-end losses.

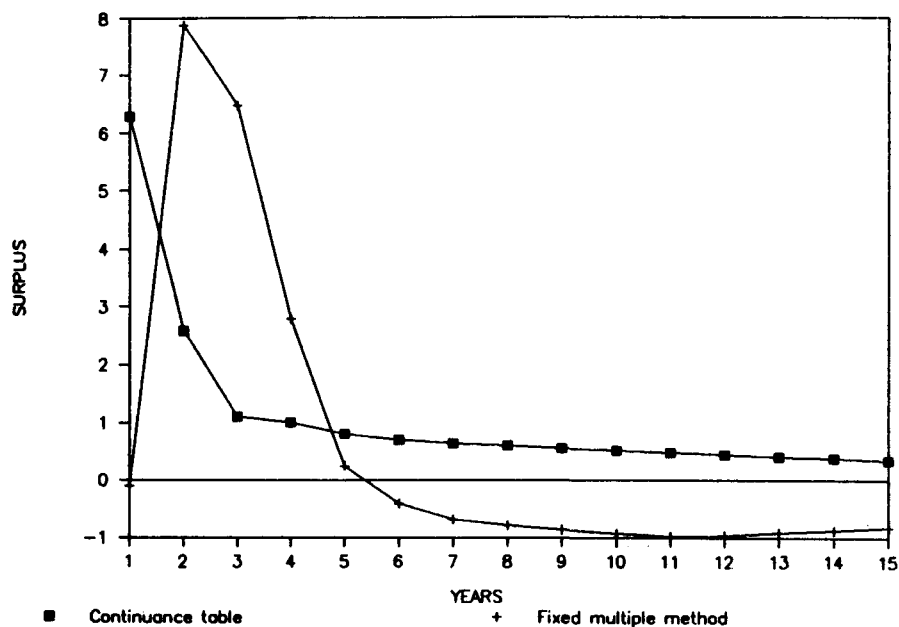


Figure 1. *Surplus generated by one year's risk for one member.*

When the model is developed to a scheme level with an assumption of 7% growth in premiums offset by 10% lapses, the above effect is obscured. Figure 2 shows surplus before tax, but at this stage initial scheme expenses are included. However, if it is assumed that there are mass lapses every third anniversary at 30% pa in each case, the back-end losses begin to re-emerge as is shown in Figure 3.

If we keep the mass lapse assumption and then raise the model to a portfolio level with a steady flow of new business (10 new schemes a year), this further obscures the effect of the reserve basis, but if it is assumed new business ceases after 3 years the back-end loss problem surfaces, as is shown in Figure 4.

3.3 Continuance Tables

At present there is no published U.K. continuance table taking account of deaths and recoveries which can be used for valuing group PHI claims in course of payment. The U.S.A. continuance table mentioned above is the only comprehensive published table relating to a product similar to the U.K. group PHI contract. How relevant is this table to U.K. experience?

In general terms there are a number of factors to consider:

The basic products offered are not dissimilar to the U.K., since they provide an

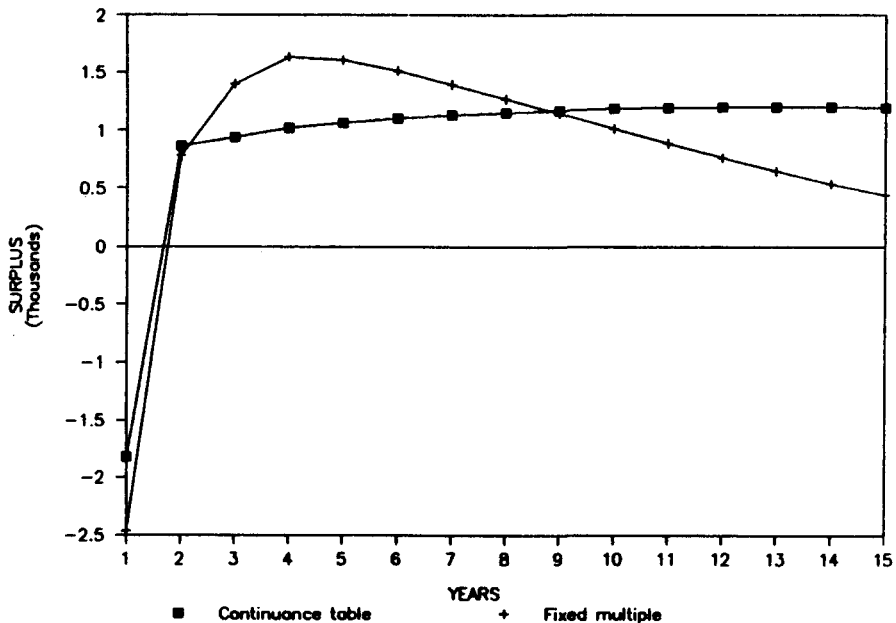


Figure 2. Surpluses generated in a scheme with 7% p.a. premium growth and a 10% p.a. lapse rate.

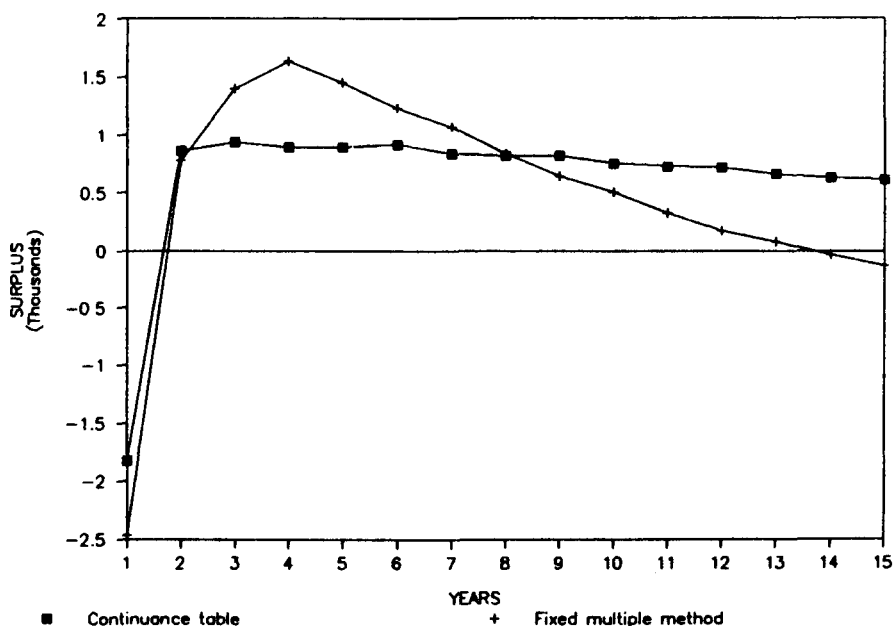


Figure 3. Surpluses generated in a scheme with mass lapses.

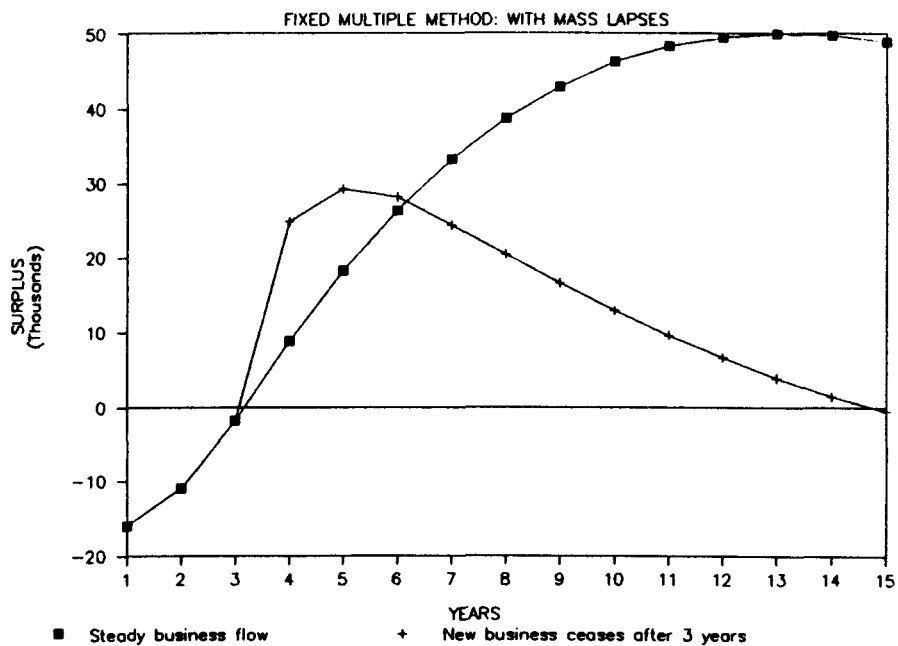


Figure 4. Surpluses generated by a portfolio of schemes.

annual income from the end of a deferred period (the table gives 3 months, 6 months and 12 months) until an expiry age. U.S.A. disability definitions are weaker than existing ones in the U.K. requiring an inability to carry out the claimant's own occupation, without any requirement not to be carrying out any other occupation. Ultimately, some U.S.A. policies impose an 'own or similar' type definition after, say, two years. The U.S.A. does not normally have a 'benefit limitation' clause in the policy (which is usual in the U.K.) which would limit the benefit from all sources to a fixed percentage of pre-disability income.

Approaches to occupational underwriting differ, with the U.S.A. applying far higher loadings for poor risk occupations. There has been a view prevalent in the U.S.A. that differences in occupation can be accounted for within the incidence of disability rates and that a continuance table common to all occupational groups is appropriate after 3 months of disability. This is a somewhat uncomfortable assumption at short durations of disability, but may be more well-founded for long-term claims. The latest Group table does suggest varying termination rates for the first 5 years of disability.

A host of social and cultural factors can be expected to be different in the U.S.A. and the U.K.—for example, work ethic/propensity to claim, medical care, ethnic mix and market penetration.

Morbidity differences between countries can be very large indeed but, even though we cannot expect the U.K. experience to mirror that of the U.S.A., the U.S.A. table does provide a useful standard for comparison with a U.K. company's experience. It provides structure and shape giving termination rates by age, sex, duration of disability and deferred periods. It is possible to adopt broad adjustments to the U.S.A. table based on a limited volume of claims experience in a company's portfolio.

It should be stressed that an individual company's experience will vary significantly according to its products, distribution systems, its market and, most importantly, its attitude towards claims control. U.S.A. reserving techniques recognize these variations and suggest that individual companies should analyse their own experience in comparison with the standard table. Similar advice would seem appropriate for the U.K.

Experience of assessing various companies' experience against the U.S.A. table indicates that a particularly useful analysis concentrates on termination rates by duration of claim. Actual terminations could be compared against expected terminations in broad durational bands, for example:

Duration of Disability
 0-6 months
 6-12 months
 12-18 months
 18-24 months
 2 years +.

If sufficient data is available it may be worth looking at very broad age bands,

even splitting the data into, say, above and below age 50 at inception of claim may show up an interesting difference in experience.

The U.S.A. tables could form the basis (suitably adjusted) for an appropriate valuation basis for use in the U.K. It would prove to be of tremendous assistance to any companies without sufficient data on their own claims portfolio if the Continuous Mortality Investigation Bureau (CMI) were to start publishing industry wide comparisons against 87 CGDT.

Valuing claims simply as life annuities, with no allowance for recovery, should clearly result in sufficient claims reserves being set up. There are two problems with this approach. Firstly, it leads to additional strains setting up the reserve for short duration claims and, secondly, it makes profitability figures hard to interpret.

3.4 *Practicalities*

For companies with few group PHI claims the rewards for setting up complex systems for valuing claims do not justify the effort. Rather than just use a fixed multiple of benefit, some companies have adopted 'half-way house' approaches which take some account of the duration of claims.

Some just vary their 'fixed' multiple approach for short term claims, e.g. one multiple to apply up to 2 years duration, another thereafter. Others use life annuities for long term claims but apply a factor to reduce the result at short durations. One, at least, covers short term claims by maintaining premium reserves for longer than would be usual and then deals with long term claims as life annuities.

All of these approaches have their merits in ease of calculation, without necessarily producing undue inaccuracies. However, they do cloud attempts to estimate profitability. It would seem advisable to review such methods on a regular basis against a more complex approach.

The effort involved in calculating claims reserves using variations on U.S.A. continuance tables is not actually that great. If claims data is held on a computer, as is more than likely to be the case for the purposes of administration, then it is not too difficult to develop a claims valuation system on the back of this. It is a small, and worthwhile, step to analyse this data to determine claims termination rates as a percentage of a U.S.A. table.

4. DEFICIENCY RESERVES

4.1 *Description*

Both the unexpired premium reserves and the deferred period related part of IBNR reserves are based upon the underlying pricing basis of the business. If there is any reason to believe that this basis was inadequate then it is necessary to set up deficiency reserves.

Deficiency reserves can be quite substantial since they should relate to any future period covered by a premium rate guarantee.

It is not unknown for the valuation actuary to lead the pricing actuary, since it may be his analysis of experience, and the consequent need for deficiency reserves, which will prompt the pricing actuary to increase rates. Perhaps it is more common for a change in pricing structure to precede the setting up of deficiency reserves, although the valuation actuary has a duty to act to reserve for deficiencies in the pricing basis, whatever is decided about pricing.

Global premium rate changes of this nature often concern the rating structure rather than the overall level of rates. In recent times we have seen increases for poorer occupational groups and at older ages.

4.2 For Particular Schemes

Although it is rare in practice, deficiency reserves could be set up for particular schemes (rather than on a global basis) either because it is considered that the risk category was incorrectly classified when the price was set or because a bad experience can be regarded as significant and a permanent feature. If it is considered that a particular scheme meets one of these criteria then it is not sufficient to offset expected losses against expected profits from other schemes. To do so would be to run counter to the principle that policies or contracts should not be treated as assets.

Assessing particular scheme profitability is not too difficult, providing claims reserves are held on a 'realistic' basis. Most companies prepare such profitability analyses, which basically give a revenue account for each scheme including reserves brought forward and carried forward. Interest and expenses should be included on a basis which reflects that used in the original premium basis. However, it is quite another matter to decide whether losses shown are a permanent feature, or whether they relate to random fluctuations in the claims experience. Key items of information required to assess this are:

- number of lives
- number of claims
- 'large' claims.

It is possible to develop a statistical test based on, say, an approximation to claims incidence rates, but it is not known if any company had adopted this approach.

4.3 Global

In practice most companies do not bother setting up deficiency reserves for particular schemes, but only respond to broad changes in rating bases.

Assessing the need for an overall rate increase, or a change in the rating structure, can be even more problematical. Scheme by scheme analysis as

described above can help highlight problem areas in the rating structure—for example, inadequate occupational loadings. However, at some point it is necessary to determine whether the basic level of rates is adequate and there is usually insufficient data to carry out a thorough analysis of a company's experience because:

the bulk of the business will be on unit rates and it is unlikely that individual membership details will be stored on any global computerized system; even when individual member details are available, it would be common for these to omit essential details such as occupation classification or even deferred period!

Anderson's method provides one possible way out of the former dilemma. This method was fully described in Sanders and Silby⁽²⁾ and so only a brief description will be given here. Given a standard table, in this case we are interested in incidence of claim rates, and full details of actual claim inceptions, it is possible to calculate an 'expected' in-force. This can then be compared with the actual in-force. In-force figures would be in terms of benefit per annum and would be totals for all ages, since there is no information by age on the in-force.

Views on the rating system will always be influenced by new published information in the U.K. and from overseas.

Companies do not set their rates in isolation, but operate in a competitive environment. Changes in rating structure introduced by competitors may result in an alteration of the company's mix of business and hence alter their experience, probably for the worse. This factor may reduce the relevance of the company's own past morbidity experience.

Two recent changes in the market, which may well lead to improved experience, also reduce the value of past morbidity analyses. These are:

the introduction of level commissions. Hopefully there will be a reduction in the number of switched schemes and consequently reduced anti-selection.

A move towards 'net pay' schemes. Reduced replacement ratios should cut claims rates.

Finally, it is clearly essential that the actuary responsible for reserving should be kept informed of any proposed changes in the pricing basis and any experience investigations which may have prompted them. Although this may appear obvious, it does not always happen in practice.

5. CONSERVATISM

5.1 *How Conservative?*

Many companies introduce elements of conservatism in their reserving basis for group PHI. It would seem that the stricture placed upon the appointed actuary to be 'prudent' in his reserving basis requires some conservatism, but the

degree of conservatism, and how this should be introduced, have not as yet been well defined by the profession. Perhaps it will not prove possible to do this.

The degree of conservatism required for other lines of business varies considerably and the method of its introduction makes comparison difficult.

For group PHI conservatism is required for a number of reasons:

To cater for random fluctuations in claims experience.

To allow for adverse trends in morbidity. At first glance this might not appear to be a problem for group business with a short rate guarantee. However, any morbidity experience that is available is likely to be out of date and experience can change significantly in a short period of time. In addition, new claims could potentially go on for many years and a view is required on future termination of claim rates.

To cover catastrophes. Group business usually implies some aggregation of risk.

To cover adverse variation of risk characteristics of schemes costed on unit rates.

To allow for adverse investment experience.

To allow for adverse expense experience (in particular for claims in payment).

In order to simplify consideration of how to allow for these features, reserves for claims are considered separately from UPR and IBNR reserves in the sections below.

It should not be forgotten that the cost of conservatism will ultimately be passed on to the consumer. The aim of conservatism is to protect the financial position of the company and it is required by the DTI in order to protect the consumer. Too strict an approach may result in the cost 'down side' outweighing the protection 'up side'.

5.2 *Claims Reserves*

Presuming that a continuance table has been selected which represents the expected experience, one way of introducing conservatism is to reduce the rate of termination of claim by a factor, say 90 or 95%. This approach has the advantage of recognizing profits in relation to the degree of release of risk. Termination rates are highest and most unpredictable at short durations of claim and there is a case for taking a greater margin for these durations. However, using a flat percentage of termination rates already produces a higher margin at short durations.

Statutory requirements necessitate taking a margin in the interest assumption. Presuming a block of fixed interest assets can be assigned to the liabilities, 92.5% of the gross redemption yield on that block can be used in the valuation. (It is possible to arrange to match assets and liabilities, but if this is not done then mismatch reserves are required.)

Table 2 uses the U.S.A. group continuance table, 87 CGDT, to illustrate the

**Table 2. *Disability Annuity Values for a Payment of £1 per annum—
Male aged 42 at Disability to age 65, Deferred 6 months***

<i>Duration of Disability</i>	<i>Unadjusted Morbidity at 10%</i>	<i>90% of Termination Rates at 10%</i>	<i>Unadjusted Morbidity at 9.25%</i>	<i>90% of Termination Rates at 9.25%</i>
6 months	4.63	4.95	4.82	5.16
12 months	5.42	5.70	5.65	5.95
18 months	5.87	6.13	6.12	6.39
24 months	6.19	6.42	6.45	6.70
3 years	6.62	6.82	6.90	7.11
5 years	6.73	6.89	7.00	7.17
10 years	6.21	6.32	6.41	6.53

effect of introducing margins in morbidity and interest rates. As might be expected, the morbidity adjustment produces heavier percentage loadings at short durations than at long durations, while the interest margin produces a more level percentage loading.

Even if a simplified method of calculating claims in payment reserves is used, calculations of the above type can be used to introduce the desired degree of conservatism.

5.3 UPR and IBNR Reserves

Random Fluctuations in Claim Rate

At first sight it might seem useful to apply some form of statistical test to the number of lives in order to determine the loading required. For example:

Expected inception rate	2 per mille
Lives covered	10,000
Normal distribution assumed	

Then if we wish to hold sufficient to cover the cost of claim inceptions in 95% of years then we should load the UPR and IBNR reserves by 37%.

Is this a reasonable approach? It is certainly not consistent with reserving bases adopted for other lines of business.

Where this approach fails is that it only looks at one line of business. It is not reasonable to look at group PHI in isolation any more than it would be reasonable to look at one policy in isolation. Furthermore, it only looks at one aspect of risk and other risk factors may operate independently from morbidity inception rates, hence they may act to reduce the overall variance of risk. Reserves of this nature should theoretically be set after looking at the overall financial position of the company. Current practice appears to be to use a 'belt and braces' approach. Smaller margins are included in all elements of the basis and then the excess of free assets over solvency requirements is examined for adequacy in the light of the overall risks borne by the company. There does not

appear to be any industry practice as to how this second step should be carried out.

Adverse Morbidity Trends

It would appear sensible to allow a margin in the inception rates to take account of any adverse morbidity changes which may have occurred since data underlying the rates was collected.

The CMI have published reports on group PHI experience in their reports Numbers 5 and 8. Unfortunately, the inception rate analysis included in No 5 was not easily comparable with that of No 8. Manchester Unity comparisons can be very misleading as they take limited account of the maturity of the business (this is discussed further in § 8). Furthermore, only a limited proportion of the overall group PHI business was included in the analysis. Table 3 shows the short duration claims experience which gives an indication of how sickness rates can change.

In both reports the committee warned about the limited amount of data backing up these results and the importance of one or two large schemes, whose particular experience could distort the whole result.

In addition, the above actual/expected numbers are affected by random fluctuations—note the 13 week and 26 week experience move in different ways.

However, it would be easy to justify holding a considerable margin, say, 20% of the morbidity element of UPR and IBNR reserves to allow for such adverse trends.

Catastrophes and Unit Rate Schemes

The loadings required for catastrophes and for adverse variations in the risk characteristics of unit linked schemes should already be included in the chosen pricing basis. If the valuation actuary is satisfied that this is the case then the normal UPR and IBNR reserve calculations will cater for this risk.

6. OTHER RESERVE ISSUES

This section contains a pot-pourri of points on reserve calculations. Many points are obvious but are included for completeness.

Table 3. *Males, all Ages, U.K. and Republic of Ireland—
Actual/Expected Weeks of Sickness %*

	<i>CMI5 1973–76</i>	<i>CMI8 1975–78</i>
Deferred 13 weeks sickness period 13/13	30.9	26.7
Deferred 26 weeks sickness period 26/26	24.8	29.8

6.1 Zillmer Adjustments

A proportion of the office premium relates to the original setting up cost. In the pricing basis this may be recouped over a number of years. A Zillmer adjustment to the reserve could be calculated to take account of these initial expenses. Any such adjustment would require an order under Section 68 of the Insurance Company Act.

Under the old regime of high initial commission a Zillmer would have been a far more attractive proposition. Nowadays, with level commissions, there is less reason to adjust reserves in this way.

By way of an example:

Initial expenses to be deferred: 25% annual premium
 Basis of deferral: 3 year annuity allowing for 15% pa attrition
 Loading for initial expenses = 9.5% (assumed spread over three years)
 Annual premium: £98 (paid annually).

<i>With Zillmer</i>				
<i>End year</i>	<i>UPR</i>	<i>Zillmer</i>	<i>Adjusted UPR</i>	<i>Without Zillmer UPR</i>
1	49.00	16.23	32.77	44.35
2	49.00	8.68	40.32	44.35
3	49.00	0	49.00	44.35

The concept of using Zillmer on group risk business with its potential for high lapse, indeed mass lapse, is debatable. With the departure of high initial commissions the attraction should diminish and perhaps the debate will fade away.

6.2 Unearned Premium Reserves

A few points of detail:

Only the proportion of the premium relating to unexpired risk need be kept, i.e. morbidity charges, maintenance and claim expenses. Some netting down of the premium is possible for initial expense loadings including commissions. An analysis of the distribution of policy anniversaries over the valuation year can be used to adjust the UPR for annually paid schemes, either on a 'broad brush' basis or more accurately.

Annual premiums at the beginning of the year are based on salaries at that time, while actual benefits may be based on the salary at time of disability. It is common practice to collect an adjustment premium at the end of the scheme year which takes account of the change in benefits covered over the year. If it is considered acceptable to take account of this future adjusted premium then a UPR of half the begin year premium is conservative. However, it is debatable whether the actuary should take account of the adjustment premium which can only be collected after the period of risk.

6.3 *IBNR Reserves*

The IBNR reserve can be considered in two parts:

- An element related to disabilities currently within the deferred period.
- An additional element related to 'true' IBNR.

Some companies actually hold specific claims reserves for potential claims which have been notified to them, but are within the deferred period. There is clearly a risk of double counting if these reserves are held in addition to an IBNR reserve related to the deferred period.

Policy conditions usually require claims to be notified during the deferred period and the latter element of the IBNR reserve should therefore be small, perhaps one or two months' in-force premium would be sufficient. An investigation can be carried out into the past experience for 'true' IBNR and the result expressed as a percentage of premium, new claims or some other measure.

6.4 *Rate Guarantees*

The premium rating process should include some loading for any rate guarantees offered, this loading may be explicit or implicit. Provided deficiency reserves (where required) have been set up, any loadings for rate guarantees earned in the past can be released. However, rate guarantee loadings included in UPR and IBNR reserves still need to be held.

6.5 *Profit Sharing*

Where companies offer profit sharing on group PHI it is necessary to hold reserves in two parts:

- A reserve for past profit sharing liabilities.
- A reserve for future profit sharing liabilities.

For past profit sharing liabilities two approaches are possible:

The loading included in the rates for profit sharing can be rolled forward, with or without interest, and released at the end of the profit sharing period. Specific reserves can be held in respect of any known profit sharing liabilities accrued to date over the profit sharing period.

In the current climate of increasing premiums and deficiency reserves, the former method may produce a larger reserve. There are problems in applying the latter method, since the deferred period causes delays in information on the actual experience of schemes. However, it is difficult to ignore hard information on known liabilities of this nature.

For future profit sharing liabilities any unearned profit sharing loading including an element relating to IBNR should be held. This reserve can be

incorporated into the calculation of the unearned premium reserve and IBNR reserve.

Where deficiency reserves are held there is a case for saying that the unearned portion of the profit sharing loading can be offset against these reserves. This does not seem to be an unreasonable approach.

Loadings for profit sharing have often been calculated on a fairly arbitrary basis. The valuation actuary should be satisfied that the loadings are reasonable. Statistical approaches to loading for profit sharing indicate that the arbitrary loadings in use are generally too low. Intuition seems to be a poor guide to pricing profit sharing loadings.

6.6 AIDS

AIDS reserves for group PHI could be considered as a form of deficiency reserve. A fuller discussion as to how AIDS impacts on PHI is included in the individual PHI part of this paper in § 10.6. For group PHI, the problems are far less since the rate guarantee periods are much shorter. It seems likely that the market will move to an AIDS exclusion in the near future, although some companies do not have the right to alter policy conditions (to include an exclusion) when the rate guarantee period ends. These companies have to rely on rate increases to force employers into accepting an exclusion. No doubt there will be anti-selection by those employers who chose to maintain full cover.

6.7 Minimum Solvency Requirements

The E.C. solvency requirements are that 4% of reserves (or less in some circumstances) are held without any requirement related to the amount of benefit at risk. Sanders and Silby⁽²⁾ pointed out that this is inconsistent with the solvency requirement for life risk business which includes a substantial requirement related to sum assured.

7. BACKGROUND TO INDIVIDUAL PHI

7.1 State of the Market

In contrast to the group PHI market the individual PHI market seems to be healthy and growing. A number of new individual PHI products have been launched in the last two years and many more are on the drawing board, or at least have acquired a place on the list of priorities. New providers, marketing the product via direct salesforces, have rapidly taken a significant share of the market and have helped produce a substantial growth in the overall volume of business written.

A number of factors have led life offices to look at the individual PHI market:

FSA and Polarization

Direct salesforce companies wishing to complete their product range. Enhanced commissions under LAUTRO.

Personal Pensions

Employees coming out of group pension schemes and taking a personal pension may lose disability protection and hence require PHI.

Shift to Risk Business

Protection is presently the insurance industry's 'home turf'. Writing risk business avoids competition with other financial sectors.

Removal of Guarantees

None of the latest products offer fully guaranteed rates. This implies less risk for the life office and less valuation strain.

While the first three factors have pushed the life industry towards individual PHI, it is the last which has opened the door for the more reluctant. With reduced guarantees on premiums—morbidity, investment returns and expenses—profitability is, in theory, more controllable and, most relevant to this paper, reserves are reduced. Lower valuation strains mean more competitive rates.

Perhaps the ultimate in 'risk averse' contracts is unit linked PHI. Unit linking allows the investment risk to be passed directly to the policyholder. Morbidity charges are reviewable and it is even possible to design a contract which passes the risk on claims in payment back to the policyholders.

7.2 Current Practice

In general the longer established offices use a Manchester Unity (MU) approach to reserving. Newer entrants to the market have adopted an American style inception/annuity approach. This method is almost essential for unit linked contracts.

As with group PHI the DTI provides no guidelines as to what constitutes an acceptable basis. There are no statutory rules on morbidity or Zillmers. However, the actuary is required to reserve on a prudent basis and the interest rate controls on long term business apply to PHI.

8. METHODOLOGIES

8.1 Options Available

Methods of reserving for individual PHI which have been adopted or suggested fall into three main categories; the MU approach, the inception/annuity approach and multiple state models.

Adjusted MU tables are used by the majority of U.K. companies. In recent times there has been a definite movement towards inception/annuity methods, in particular these are almost essential for unit linked PHI products.

Inception/annuity approaches are the norm in the U.S.A., Canada, Australia and South Africa, whereas in Europe all three approaches can be found.

8.2 *The Manchester Unity Approach*

MU type tables provide, for each age, the proportion disabled split by duration. Unfortunately, durations are not split up in any great detail, in particular all durations of more than 2 years are lumped together. In view of this lack of distinction on durations, for reserving purposes all durations of disability are usually amalgamated together. Given that z_x is the proportion disabled at age x , the reserve at time t is then:

$$\text{Reserve}_t = VB_t - NP_x * \ddot{a}_{x+t:m-t}$$

$$VB_t = \sum_{n=t}^{m-1} (NP_x + B_n) * z_{x+n+\frac{1}{2}}^{d/all} * \frac{lx + n + \frac{1}{2}}{lx + t} * v^{n-t+\frac{1}{2}}$$

$$NP_x = \sum_{n=0}^{m-1} (NP_x + B_n) * z_{x+n+\frac{1}{2}}^{d/all} * \frac{lx + n + \frac{1}{2}}{lx} * v^{n+\frac{1}{2}}$$

$$\ddot{a}_{x:m}$$

where x is age at entry, B_n is benefit in year n , m is term of policy, d is deferred period.

serving approach theoretically requires no additional reserves for claims in course of payment.

For some time now the actuarial profession has been aware of the inadequacies of the MU approach. Sanders and Silby⁽²⁾ provided a clear statement of the main drawbacks of MU tables.

The major problem is that MU tables combine all durations of sickness greater than 2 years. When these tables were compiled the rates for 2 plus years reflected the maturity profile of the underlying data. In practice, the business was immature and therefore long durations are proportionately under-represented and the 2 years plus rates are understated. In this paper this is referred to as the 'durational effect'.

On the other hand if a policy has only been in force for, say, 3 years then there can be no claims of duration 4 plus years. A rate taken from a MU table would include allowance for some 4 plus year's sickness and would therefore be overstated. This produces an effect which looks a little like 'selection', and it is referred to as such in this paper.

From the reserving point of view the main technical problems of the Manchester Unity approach are:

Using experience adjusted MU tables will result in understated morbidity at the back-end of a policy due to the 'durational effect'. Reserves are therefore understated at all earlier durations.

Reserves will be overstated in the early years of a policy since the 'selection' effect is ignored. However, the 'durational effect' normally overrides 'selection'.

Claims reserves are implicit in the MU approach and no account is taken of actual claims in payment. This could result in either under-statement or over-statement of reserves depending on the experience.

There is no satisfactory way of handling products which allow benefits to escalate during claim.

In summary, a MU approach is likely to cause:

an insufficient rate of build up of reserves at earlier durations and, in consequence,
a period of profitability in the early years of the contract,
back-ended losses as inadequate reserves become apparent in the last years of the contract.

These effects are illustrated in an example in §8.5 below.

8.3 Inception/Annuity Approach

In the U.S.A., reserve calculations are based upon Commissioners' Disability Tables (CDT). For many years the 1964 CDT has been used and the 1985 CDT has just been published. These tables give central rates of inception of claim by age and deferred period, i_x and rates of termination of claim due to death and recovery. The latter can be used to calculate the present value of the annuity of future claim payments a_x^i , which takes account of the deferred period. Typical reserve formula would be:

$$\text{Reserve}_t = VB_t - NP_x * \ddot{a}_{x+t:m-t}$$

$$VB_t = \sum_{n=t}^{m-1} B_n * i_{x+n+\frac{1}{2}} * a_{x+n+\frac{1}{2}}^i * \frac{lx+n+\frac{1}{2}}{lx+t} * v^{n-t+\frac{1}{2}}$$

$$NP_x = \sum_{n=0}^{m-1} B_n * i_{x+n+\frac{1}{2}} * a_{x+n+\frac{1}{2}}^i * \frac{lx+n+\frac{1}{2}}{lx} * v^{n+\frac{1}{2}}$$

$$\ddot{a}_{x:m}$$

where x is age at entry, B_n is benefit in year n , m is term of policy.

Under this method explicit reserves are required for claims in course of payment.

The four major problems associated with MU reserving are removed since full account is taken of the expected duration of claim and information on known claims in course of payment is directly taken into account.

The MU approach is incorrect but has good experience data, while the inception/annuity approach is more correct but lacks good data. It is the author's opinion that it is better to get the underlying method correct and then worry about how to deal with lack of data, rather than use an incorrect methodology. After all, would you sooner value on adjusted 1980 CSO (an American table) or on an up to date U.K. crude mortality rate, without age distinctions, which was based on good relevant data?

To quote CMIR7:

"The Sub-Committee suggests that the problems caused by paucity of data relating to claims of long duration are at least recognized under the disability annuity form of analysis, and may therefore be handled better. Those same problems exist in the Manchester Unity approach, but are buried and often overlooked, thus creating real dangers of misinterpretation."

Figure 5 contrasts the different shape of the reserves produced by the two approaches.

The inception/annuity curve remains above the Manchester Unity curve despite similar net premiums. This is because the risk in any year is fully released

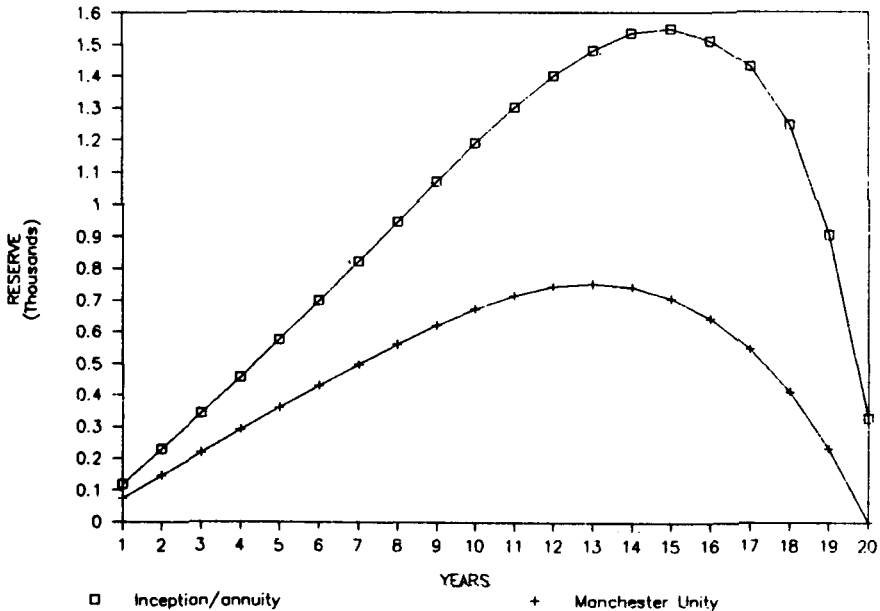


Figure 5. Reserves on Manchester Unity and Inception/Annuity bases.

under Manchester Unity, while outstanding claims annuities remain under the inception/annuity approach.

The inception/annuity approach contains a basic simplification. It assumes that the only decrement operating on lives at risk is death, i.e. in year t the number falling sick is

$$\frac{l_{x+t+\frac{1}{2}}}{l_n} * i_{x+t+\frac{1}{2}}$$

In practice those who have fallen sick in previous years and are still claiming should not be included in the exposed to risk. However, some allowance is necessary for the possibility that claimants will recover in the future and re-enter the exposed population.

Established practice avoids this problem by:

holding active life reserves for all policyholders including claimants,
not loading the benefit to take account of waiver of premium.

The two effects are considered to cancel one another out. Westwood⁽⁶⁾ says: "The two overstatements are roughly compensatory and any error is small and can be ignored." He refers to further comment on this approximation in Hunter and Phillips.⁽⁷⁾

There is a presumption underlying this approximation that the inception of claim rates i_x apply to the active lives and not the disabled lives. The CMI inception of claim rates apply to both active and disabled lives and so should be adjusted before this approximation is adopted.

8.4 Multiple State Models

It is possible to devise a model which will take account of the actual mechanics of PHI in a more theoretically correct manner. It would allow for claimants to be excluded and the possibility of them recovering and re-entering the exposure. Such a model is described as a multiple state model (MSM) since the expected numbers of lives in various states—active lives, claimants, deaths—are established. Rates of movement between the various states are required. These may be two way; for example, active lives falling sick and sick lives recovering.

As far as the author is aware, MSMs are not used by companies in the U.K., U.S.A., Australia or South Africa, although it is believed they are used in Scandinavia.

It is understood that the CMI are currently working on a MSM to characterize U.K. individual PHI Morbidity experience. Hopefully details will be published next year.

The production of an MSM on U.K. experience could prove a major step forward for the understanding of PHI, not only in the U.K., but in the rest of the world too.

In particular, it should be possible to re-test the extent of the approximation

involved in the inception/annuity approach. It would be helpful if sufficient information should be available to allow the more simple inception/annuity method to be used if desired.

One final word of caution—the U.K. actuarial profession have been aware of the weaknesses of the MU approach for a great many years. The inception/annuity approach has been known about but shunned. Even now, most companies have MU bases for both pricing and reserving. One reason put forward for this lack of enthusiasm has been that there is no appropriate table or data available for the U.K. although in recent years much effort has been made to correct this deficiency. Perhaps a more fundamental reason is that the inception/annuity method has just seemed too complicated to handle for many companies. After all, this is often a minor line of business. Will we face even more reluctance to use an MSM basis? It would be a pity if the full benefit of this development were lost through fear of complexity by the industry and profession. There is a case for saying that in going directly from MU to MSM without passing through the inception/annuity approach, we may be running before we can walk.

8.5 Profit Emergence

The effect of reserving on MU while the underlying experience mirrors an inception/annuity approach can be considered by looking at an example. More information on the assumptions behind this example are set out in Appendix B.

Figure 6 shows the emergence of surplus on a single policy sold to a life aged 40. The back-end losses under MU are clearly shown up.

Figure 7 shows the surplus arising from a steady flow of business over the 30 year period. The losses are masked since the average duration is shorter. It is not a happy situation where future profitability depends on maintaining new business volumes and the value of the business on the books can potentially become negative.

As was said before, using the wrong build-up of reserves may result in profits being recognized too early and lead to subsequent losses. A secondary, but irritating, consideration is that tax may be paid on contracts which are ultimately loss-making.

8.6 Adjustments and Hybrid Methods

Some attempts have been made to remove the durational and selection effects included in Manchester Unity. Sansom⁽³⁾ indicates how it is possible to derive a split of MU experience according to duration of sickness for durations over 2 years. This shows how it is possible to bridge the gap between MU and inception/annuity methods. An analysis of this kind could lead to adjustment factors to be applied to MU tables according to the number of years since the inception of the policy. The author is not aware of such adjustments being used for reserving purposes although they have been used in the pricing process.

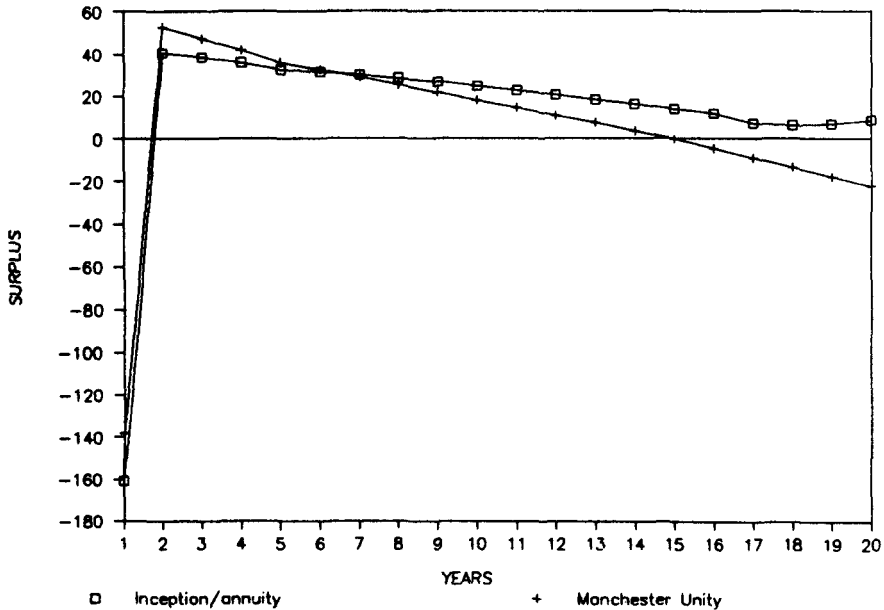


Figure 6. Profit Signature for a single policy issued at age 40.

Some companies hold active life reserves calculated using a MU basis and, in addition, reserves in respect of claims in payment. Since MU reserves include an implicit element catering for claims in course of payment this implies some double counting. The resulting reserves would almost certainly be conservative and would safeguard solvency. However, the basis does not give a clear guide to the actual profitability of the business.

A suggestion made by one actuary during research for this paper does have some appeal. He pointed out that MU experience is quite appropriate for short term claims but only fails at longer durations. Hence it may be possible to reserve for short term claims using MU, while adding a second element of reserve on an inception/annuity approach for longer term claims.

For the MU portion of the reserve, useful data is available from the CMI reports. For the inception/annuity element the annuity decrements would be biased towards mortality rather than recovery thereby ensuring prudence. There may be some difficulty in selecting 'inception' of claim rates for the long term claims.

Specific claims reserves would only be required for long term claims, considerably cutting down on the number of claims requiring such reserves. The consequent administrative cost saving could be attractive especially for business with short deferred periods.

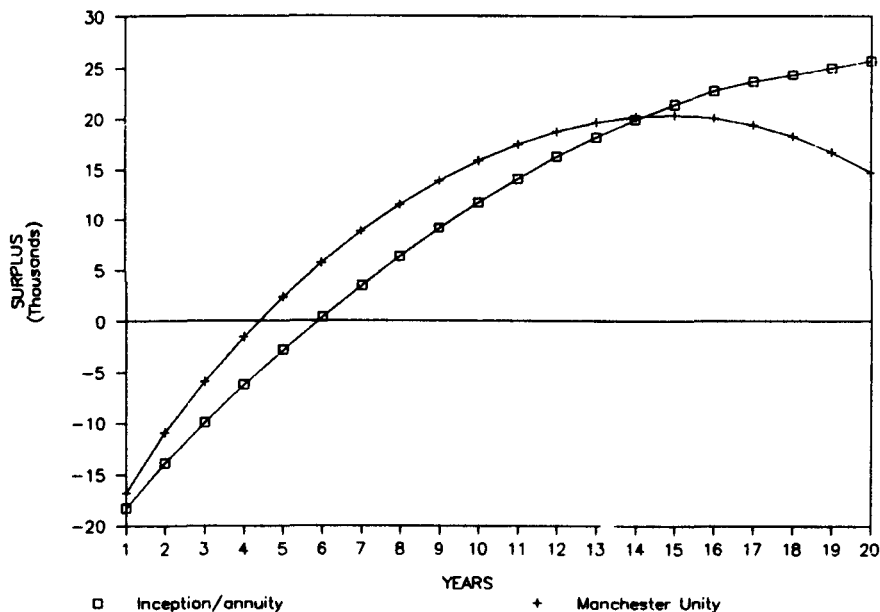


Figure 7. *Surplus Emergence for a Model Portfolio.*

9. CHOICE OF MORBIDITY TABLE

This is a subject worthy of a paper in itself. Within the confines of a paper on reserving it is only appropriate to indicate approaches to selecting a basis rather than attempt to spell out the precise basis to be used. Hopefully the choice will become far easier following the publication of the next CMI report.

9.1 Theory

In an ideal world morbidity experience would be available and analysed for a wide variety of factors. Not only that, there would also be a sufficient volume of data to be significant in all the cells analysed.

Some key factors to analyse would be:

Age

Sex

Duration of claim

Duration to retirement

Occupational category

Smokers/non smokers

Replacement ratios
 Deferred periods
 Policy variations (e.g. disability definitions)
 Geographical location.

On top of these it would be nice to be able to categorize woolier factors such as :

Strength of underwriting
 Strength of claims handling.

It is possible to think of a dozen other factors which might have an impact on experience.

Given an analysis of this kind for the industry, it would be possible to start considering how it would need to be adapted for a particular company. In practice, most companies would combine various risk categories and wherever this occurred it would be necessary to determine (or assume) the mix of business applying.

In practice in the U.K. we have a MU analysis plus inception of claim rate, but as yet no termination of claim rates. For most of the other factors we have to turn to U.S.A. data and tables, or simply make educated guesses.

CMIR4 reports considerable variation in morbidity experience by company, on a MU basis the heaviest experience is about 1.8 times the lightest for both deferred periods 13 and 26 weeks. However, this is hardly surprising when one considers one possible example of the impact of heterogeneous data.

- Assume (1) 3 acceptable occupational classes
 (2) Experience

<i>Occupation Class</i>	<i>Multiple of Class 1</i>
1	1
2	1.5
3	2

- (3) Mix of Business

<i>Occupation Class</i>	<i>Split (%)</i>
1	50
2	25
3	25

Company 1 Offers ordinary rates (i.e. no loading) to classes 1, 2 and 3 with a resulting Experience = $1.38 \times \text{Standard}$.

Company 2 Offers ordinary rates to classes 1 and 2 only with a resulting Experience = $1.17 \times \text{Standard}$.

This is not an unreasonable comparison. Indeed there are companies who would rate class 2. All standard rate cases are included in CMI analyses and variation is to be expected. (Incidentally there are good reasons why the CMI have had difficulty removing inconsistencies like these.) In practice, a failure to distinguish between occupational classes is likely to shift the mix of business towards the poorer risks.

There are many other forms of heterogeneity, for example maturity of portfolio, mix of deferred periods—and in addition there will be random fluctuations. The variations between companies highlight the problems of using a simplified published table without first adjusting for the particular office being considered.

It is of great help when trying to think about morbidity bases to have a view of what the structure of rates should look like, if it took account of a wide range of factors such as those described above. Of necessity, some factors are more certain in their effect than others. Data drawn from different sources is often combined (a risky business) and some adjustments are entirely subjective. However, an underlying structure, once achieved, can be combined with the company's mix of business and its own approach to rating to produce a consistent morbidity basis.

9.2 *Practice*

Manchester Unity

Current practice would seem to be to look at CMI experience and then load or de-load for:

- random fluctuations in experience
- adverse trends
- own experiences
- own product
- own distribution
- built-in understatement of MU tables (explained in § 8).

This last point is essential. It could be done in an approximate manner by loading rates at old ages, or more directly by reserving explicitly for long term claims.

Inception/Annuity

Here we can turn to the CMI for inceptions but must look overseas and at own company experience for termination of claim rates. The inclination is to adjust for the items above and in addition load for the speculative nature of the table chosen. However, any anxiety is much reduced if the product does not have guaranteed rates as is the case with all recent products, launched by the same companies who have adopted inception/annuity approaches.

For a continuance table most companies use an adaptation of the U.S.A.

85CIDA table (previously known as DTS). How relevant is this for U.K. business?

The comments on group PHI in § 3.3 also apply to individual PHI with the following additional points:

A large part of the U.S.A. business pays benefits for only a limited period (e.g. 2 years), although some do pay to an expiry age.

Disability definitions in the U.S.A. vary with some being stronger than the U.K. and some weaker.

The process of adapting the table for use in the U.K. is similar to that described in § 3.3 for group business. Results vary by company but the degree of adjustment required would appear to be surprisingly small.

9.3 *Premium Guarantees*

A considerable loading may be required to take account of long term premium rate guarantees. It is very difficult to assess exactly what this loading should be since it is not possible to quantify and analyse possible long term future changes in certain fundamental factors which affect PHI experience. For example:

- society's attitude towards claiming PHI benefit
- the economic situation, especially unemployment
- morbidity due to epidemics from as yet unknown diseases
- social security benefits
- the tax regime
- legal attitude towards claims disputes.

For the short term guarantees, say 5 years, the actuary may be able to observe trends in experience and use these to adjust morbidity, but these trends may not prove helpful for long term guarantees.

Random fluctuations in experience may be dealt with in a statistical manner similar to that described for group business in § 5.3. However, once again, we are faced with the problem of deciding how to take account of the offsetting effect of random fluctuations in the experience of other lines of business. Furthermore, we are dealing with a portfolio of long term contracts and the consequent increase in years exposed to risk will dampen random fluctuations in experience in the long term (but not adverse trends!).

A simplistic approach is for the actuary to consider what he would regard as a worse case permanent movement in morbidity experience and then reserve on that basis.

While it seems unlikely that any very solid theory will emerge on this subject, this is obviously an area where further research is called for. In the meantime it remains an area for the actuary to demonstrate his prudence.

Perhaps a more manageable issue is "how much conservatism is required in

morbidity for a reserving basis for individual PHI with limited or no guarantees?”

If there are no guarantees whatsoever, then strictly no conservatism is required at all. However, companies may well take a margin in their costing basis in order to limit the need to review premiums too often and, if this is the case, the loading should be reflected in the reserving basis.

In practice, most companies do at least provide a guarantee on the rate of termination of claim in course of payment and an explicit margin is therefore required. The considerations in setting this margin are the same as those for group PHI claims in payment (see § 5.2).

10. OTHER RESERVE ISSUES

Once again this chapter is a mixture of points on reserve calculations, this time for individual PHI.

10.1 *Gross/Net Premium Valuation*

Either is possible and acceptable, although a gross premium valuation would be bound by the constraints of the Insurance Company Regulations 1981, which require a minimum basis calculated on a net premium approach.

Expenses for individual PHI are relatively high and tend to build up towards the end of the term of a block of contracts as the number of claims in force increases. This may cause difficulty in selecting the office premium limitations that should apply under a net premium method.

A powerful reason for using a gross premium method is that, for policies with annual inflation increases with incremental premiums based on the age at increase, gross premiums may be far more administratively convenient.

10.2 *Zillmer Adjustments*

The concept of a Zillmer is far more familiar for individual PHI than it is for group PHI. Zillmers are used and it only needs to be said that a Section 68 order is required before adopting one in the statutory valuation.

10.3 *IBNR Reserves*

IBNR reserves can, as described for group PHI in § 6.3, relate to:

‘true’ IBNR

claims within the deferred period.

The former element may be larger than the one month suggested for group PHI and is likely to depend on the particular company’s approach to marketing and its policy wording.

The latter element is already taken care of under the MU system of reserving. However, for inception/annuity reserving a specific IBNR reserve in respect of the deferred period is essential. This will usually equal:

$$\frac{(\text{Annual Office Premium less initial expenses}) \times (\text{Deferred Period in months})}{12}$$

10.4 *Unit Linked*

Unit linked PHI contracts are generally (but not always) a life fund product (usually endowment assurance) with deductions from units to pay for PHI cover.

Reserving for the underlying unit linked contract follows the usual practice for unit linked contracts. This is true whether it is life fund or PHI fund based—only the tax assumptions change.

The morbidity deductions from the unit fund(s) pay for PHI claims as they occur, i.e. they are determined on a current cost basis. Therefore it is necessary to hold UPR, IBNR and (if necessary) deficiency reserves on the deductions as well as a reserve for claims in course of payment—a situation, to all intents and purposes, identical to that for group PHI.

10.5 *Options*

Individual PHI products used to offer GIO (guaranteed increase options), regular options to increase cover every 3 or 5 years by a predetermined amount. Products have developed towards regular annual inflationary increases in cover, which are more easily lost if not taken up than GIO, but offer the potential for anti-selection on a far grander scale.

If the increase option produces a policy costed for on premium rates applicable at the time it is taken up, then why is any reserve required at all? A reserve is required since the alternative is to over-charge new entrants in the future, potentially making the product uncompetitive. Furthermore, large premium increases may cause even greater anti-selection amongst those taking up options, making the increases insufficient.

The response of actuaries has been to use approximate methods. GIO loadings are rolled up with or without interest and inflationary option anti-selection is presumed to be catered for in the loadings in morbidity deductions for unit linked PHI.

The nasty issue of AIDS is usually ducked. If worse case anti-selection is assumed, AIDS reserves for increase options are enormously high. It is a matter for debate as to how much the actuary can rely on future policyholders who take out new policies being prepared to accept increases in premium rates.

10.6 *AIDS*

AIDS Bulletin No 3 deals with PHI reserving in some detail. It offers an

enormous range of possible reserves which depend on the precise time an HIV + individual becomes a claimant. At one extreme anyone who is HIV + could be expected to claim, at the other only those diagnosed as having AIDS would be claimants. The difference in reserves is so large that the actuary is faced with a largely subjective decision as to what to hold.

One simple way of looking at the problem is to consider the expected number of years of claim before death from AIDS. If this were four years, say, then the reserve could be approximated by a term assurance AIDS reserve for a sum assured of four times the annual benefit per annum (ignoring a small interest adjustment).

In the U.S.A. some actuaries have been considering modelling disability income claims as commencing on diagnosis of ARC (an intermediate condition between infection with HIV and diagnosis of AIDS).

Although future medical advances for the treatment of AIDS are likely to reduce the risk for life business, the reverse is true for PHI. Developments of this kind are almost entirely unpredictable but this does not mean that the actuary should absolve responsibility for estimating their impact.

As more information becomes available and modelling techniques are refined, our views of how the epidemic will progress alter quite regularly.

Introducing alternative projections into this paper would not help clarify the central problems of dealing with AIDS and PHI; the point at which AIDS commences and the likely improvements in mortality of AIDS sufferers.

For future business it is expected that AIDS exclusions will become the norm and so the reserving problem will diminish with time.

10.7 Mismatch Reserves

PHI, both group and individual, is included in the company's calculation of mismatch reserves—if the volume of business is material.

10.8 Extra Premiums

Two approaches are common in dealing with extra premiums:

Holding, say, one year's extra premium,

Increasing the reserve (calculated, ignoring the extra) in proportion to the loading.

The former approach is more common for medical extras while the latter predominates for loadings for females and, to a lesser extent, occupational loadings. The author prefers the latter approach for all loadings, but accepts that the reserve amounts may be small and therefore it may not be worthwhile to change existing procedures.

10.9 *Other Aspects of the Basis*

Mortality

Of very little significance in the calculation of individual PHI reserves. A conservative basis is a light mortality.

Interest

As prescribed by statute.

Tax

PHI is taxed on profit and therefore tax is ignored in the reserve calculation.

Expenses

See comments under § 10.1.

11. THE CASE FOR A STATUTORY MINIMUM RESERVING BASIS

The U.S.A. and South Africa have statutory minimum reserving bases for PHI. The U.K. does also, to an extent, since Sections 54 to 64 of the Insurance Company Regulations 1981 cover all long term business. However, although the net premium method and the maximum interest rate are prescribed, the morbidity basis is only referred to in broad terms—"appropriate rates of . . . disability that take into account—

- (a) relevant published tables of rates of . . . disability and
- (b) the rates of . . . disability experienced . . . by the company".

Immediately, it would almost be impossible to set a statutory minimum basis for PHI reserving since there is no acceptable published experience yet available. CMI experience is on a MU basis which contains the defects described in § 8. Further, the variability between companies is large and a basis drawn from the average is unlikely to prove sufficient for many, while proving onerous for some.

However, the CMI promise us a more useful experience in the near future. Will this, should this, lead to a statutory minimum reserving basis?

11.1 *The Case for a Minimum Basis*

It codifies the guidance provided by the profession.

The losses disclosed on PHI in recent years may imply a weakness in the current system for ensuring adequate reserves.

A harsh statutory basis ensures solvency. It should ultimately lead to profitability—provided the cost of reserving is fed through to pricing. However, the cost of excessive reserving is ultimately borne by the policyholder.

11.2 *The Case Against*

Statutory bases are derived from the profession, they add nothing but rigidity to its guidance.

The losses disclosed in recent years indicate the difficulty in assessing an adequate reserving basis.

PHI is particularly unsuited to statutory rules in that future experience is so uncertain. Rules enshrined in legislation are notoriously hard to change. (Why is the Zillmer rule based on sums assured? Because old LOA commission rules used to be sum assured based.)

11.3 *Conclusion*

Even with total information as to the current experience on PHI morbidity it would be unwise to legislate for a minimum reserving basis, since we can expect continual changes in future experience.

Institute and Faculty guidelines are an entirely different matter. The profession does lack guidance on PHI reserving. A simplistic reserving approach on a minor line of business can result in losses quite out of proportion to the apparent volume of business.

Although in the past there have been bad experiences in terms of the Institute's tentative advice being rapidly converted into a minimum requirement, this should not inhibit the future giving of advice. Perhaps the CMI should consider adding a warning to any tables they publish to the effect that the tables may not be suitable for an individual company's reserving basis.

12. CONCLUSIONS

When setting reserves to demonstrate solvency, we are also defining the pace at which profits emerge and/or losses are recognized. These are issues which seize the attention more than reserve adequacy, however fundamental the latter is to the company's operation.

Many current reserving bases contain features which obscure the actual profitability position. This is true irrespective of the adequacy of the basis. A failure to understand these effects can result in a false impression of the profitability of the market which, in turn, may potentially lead to incorrect strategic decisions.

The two main culprits in this respect are:

For group PHI, claims reserves based on a fixed multiple of benefit or a life annuity.

For individual PHI, MU reserves without any adjustment for 'durational' and 'selection' effects.

From the point of view of solvency, group claims reserves based on fixed

multiples of benefit and MU based individual reserves may both ultimately prove inadequate for a mature portfolio. Such back-ended losses may be disguised by the company writing volumes of new business, but it would be a disturbing situation if profitability depended on writing new business and the value of in force business was projected to become negative.

In order to be able to track experienced morbidity and feed this back into the pricing and reserving basis, a very complex system is needed which analyses both inception rates and claim termination rates according to a wide variety of factors. Few companies have such a system. However, some of the newer entrants into the market have developed monitoring systems to use in rate review exercises and it is interesting to speculate whether this might place them in a strong position to enter the group PHI market on a controlled and profitable basis.

This paper draws no firm conclusions on how to reserve for rate guarantees. Indeed, the author suspects there may never be a rigorous theory dealing with this subject, since so many of the factors affecting morbidity are of a 'soft' nature and not susceptible to analysis. It is, however, a highly important subject and would seem to merit further research by the profession.

We can expect to see details of the CMI's work on multiple state models sometime next year. It may be that we will find ourselves hauled out of the era of 19th century tables straight into the 21st century. The concept promises much and it is to be hoped that it will gain acceptance a little quicker than did the inception/annuity approach.

The author feels that a statutory minimum morbidity reserving basis is inappropriate for PHI business. At present it would be impossible to specify a basis since the published experience is simply not there. However, when the CMI publish next year there may be pressure to introduce statutory controls. Any move in this direction should be resisted by the profession since, for PHI in particular, it is vital to maintain the ability to respond quickly to new trends in experience. Further, morbidity experience is known to vary greatly between companies and a minimum basis may well fail to protect those companies most at risk. Statutory controls are often introduced where self regulation is seen to be inadequate, moves by the profession to adopt a more rational, coherent and more easily defensible basis for reserving would be extremely welcome.

Reserving might be regarded as a dull subject. Some readers may not yet be persuaded that inappropriate reserving bases can lead to misunderstanding, even commercial loss. For them, it is suggested that they analyse their own experience as far as is possible and then attempt to project emerging profits on their in-force block of business. The subject may suddenly come to life!

13. ACKNOWLEDGEMENTS

Writing this paper has made me appreciate far more the excellent work of PHI authors before me. All of the works listed in the reference section were of great

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APPENDIX A

GROUP PHI ASSUMPTIONS FOR MODEL PORTFOLIO

1. Policy
To age 65, deferred 6 months.
2. Average Age
New entrants, exits and ageing of the employee population maintain a constant average age at risk of 42.
3. Average Premium
£98 per annum
4. Average Cover
£7,500 per annum
5. Average Scheme Size
100 members
6. Experienced Morbidity
Inception rate 100% 87 CGDT (experience basis)
Termination rate 100% 87 CGDT (experience basis)
7. Earned Interest
10% per annum
8. Administration Expenses
Initial expenses 25% of annual premium
Renewal expenses 5% of premium
Claim expenses 2% of claim
9. Commission
12% per annum
10. Growth in Cover
7% per annum
11. Reserves
UPR = zero (assumed monthly paid)
IBNR = 80% (annual premium × deferred period in months)/12
Interest 9%
Claims
(1) Termination rates 95% 87 CGDT (experience basis)
Interest 9% per annum
(2) Multiple of $6.5 \times$ (annual benefit + annual claims expenses)
12. New Business
(1) 10 new schemes each year
(2) 10 new schemes for 3 years, then no new schemes
13. Tax
35% on profits

N.B. These assumptions are for illustration purposes only.

APPENDIX B

INDIVIDUAL PHI ASSUMPTIONS FOR MODEL PORTFOLIO

1. Policy
To age 60, deferred 3 months, level benefit, level premium
2. Average Age
New entrants: 40
3. Average Premium
£185 per annum
4. Average Cover
£10,000 per annum
5. Experienced Morbidity
Inception rate 110% CMIR 7
Termination rate 100% 85 CIDA
6. Earned Interest
10% per annum
7. Administrative Expenses
Initial £150
Renewal £20 per annum
Claim: Initial £150
Renewal £10 per month
8. Inflation
Inflation is taken as zero in order to avoid confusing the issue concerning the morbidity approach used in reserving.
9. Commission
LAUTRO indemnity
10. Reserves
Mortality 75% A67/70 Ult
Net premium/no Zillmer
Interest 7%
(1) 65% Manchester Unity
(2) Inception rates 120% CMIR7
Termination rates 90% 85 CIDA
11. New Business
100 new policies a year
12. Tax
35% on profits

N.B. These assumptions are for illustration purposes only.