

Management Accounting

Measurement of Profitability by Class of Business

Research Group

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1.

Chairman's remarks

The outcome of the deliberations of this type of research group will depend upon the subject matter of the exercise. In some instances the topic may divide naturally into several more-or-less watertight compartments in which case the allocation of labour and responsibility between the members of the group may be fairly straightforward; and the Chairman's task is simply that of a co-ordinator and, possibly, referee.

The subject of management accounting does not readily lend itself to such an approach; for whilst it may be broken down into a number of separate headings they are by no means independent. Quite the contrary - each component is closely inter-related with the others and it is imperative to marshall them all into a coherent and consistent presentation. This task is not made any easier by the wide scope for legitimate differences of opinion and emphasis. In these circumstances the Chairman needs to exercise some 'strong' editorship.

After some preliminary discussion our approach to the project was to divide the paper into sections; these being allocated among the members of the group for preparation of draft contributions. Not unnaturally this collection of drafts exhibited some healthy diversity. Left in this form the contributions might have made fascinating reading but would have lacked cohesion.

In the event the Chairman took it upon himself to impose a fairly rigorous editing (some might say censorship!); suppressing some parts of contributions, re-arranging others, and sometimes superimposing his own views. The end result is not a complete re-write; but some of the members might have difficulty in recognising their original draft contributions!

Consequently the Chairman accepts prime responsibility for the final result; but claims no credit for many of the constructive thoughts and ideas which are embodied in it.

W.W.Truckle
Chairman

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MANAGEMENT ACCOUNTINGMEASUREMENT OF PROFITABILITY BY CLASS OF BUSINESSSECTION 1. - INTRODUCTION

- 1.1 For the purpose of this paper we regard management accounting as being concerned with revealing the 'true' financial performance of a given class of business over some chosen period of time. As the discussion develops it will become apparent that the concept of the 'true' performance is somewhat nebulous; and subject to many qualifications. However, despite the limitations, we seek through management accounting to provide some more or less accurate indication of the underlying financial performance of each class.
- 1.2 As its title suggests, management accounting is concerned with the construction of accounts for the use of management. This implies that -
- (a) The validity of past decisions and the efficiency of management will be judged by the results.
 - (b) Management will use the results as the basis for future decision-making.

Hence our emphasis in 1.1 above of the need for a presentation of results which reflects as faithfully as possible the underlying performance.

- 1.3 We draw a distinction between management accounting and financial accounting; the latter referring to the published forms of accounts prepared in well-established formats according to recognised accounting conventions usually involving an element of implied conservatism.

This distinction does not necessarily imply any criticism of the latter conventions which have been evolved to provide a public (and statutory) recital of company performance in a readily-understood manner. However such presentations are not in our view sufficient for internal management.

It is important for the credibility of both forms of accounting that the different sets of results should be reconcilable. Indeed, as will emerge in the paper, the reconciliation is of itself a valuable aid to an understanding of the dynamics of performance.

- 1.4 In preparing the paper we were obliged to consider the degree of detail to be included having regard to the likely understanding of the reader. We decided to assume that he would have a working knowledge of the customary forms of non-life accounting and be familiar with the definitions of the various components.

3.

- 1.5 For the most part we have confined our discussion to practical aspects; and the solutions which we suggest are evolutionary.

In other words we see this paper as laying down guidelines for a progressive development of the form and content of management accounts.

Our approach to the subject has been to take the 'conventional' revenue account as the accepted tool for measuring profitability of class of business. A discussion of its components reveals weaknesses for which we suggest possible solutions; some concerned with improvements within the existing format, others being of a more radical nature.

- 1.6 It was apparent at a very early stage in the discussions of the research group that the subject-matter offered almost limitless scope for new ideas and concepts. The time-scale for the preparation of the paper imposed a necessary constraint on the pursuit of many tempting lines of discussion. Nevertheless, in section 14 we have indulged in some more radical questions which in our view touch upon fundamental aspects of the purpose and meaning of management accounting; and which provide a link with the conceptual approach adopted by S. Benjamin in his paper "Profit and Other Financial Concepts in Insurance".

- 1.7 Thus we see the paper as providing an amalgam of -

- (a) Ideas which are capable of implementation within the existing practical framework.
- (b) Concepts of a more speculative nature which might be material for further investigation.

- 1.8 The scope of the paper is intended to extend to all classes of non-life insurance with the exception of Marine and Aviation business.

SECTION 2 - PROFITABILITY

- 2.1 Before entering into a detailed discussion of the measurement of profit and its components we consider some fundamental questions on the nature of profit in an insurance context.
- 2.2 The probabilistic nature of the insurance process leads to random fluctuations in the claims experience between one period and another. If this experience is allowed to emerge into revenue without adjustment there will be corresponding random fluctuations in the resulting 'profit'.

What relevance has this simplistic concept of insurance profit to the measurement of 'profitability'?

Management accountability for profitability requires that profit should be assessed in such a way that -

- (a) It provides a fair and acceptable basis for judging the effectiveness of management's past decisions.
- (b) It provides a sound measure on which to base future decisions.

It is apparent that the crude measurement of profit as it emerges fortuitously for a given accounting period (i.e. without regard to the inherent randomness) may, at least for certain classes of business, be of only limited value.

- 2.3 An instinctive actuarial approach to this problem might be to think in terms of a contingency or claims-fluctuation reserve. Theoretically this seems an attractive concept; but in practice we find it difficult, at least in the present state of knowledge, to formulate a feasible set of rules by which transfers might be made to and fro between the revenue account and the reserve. Furthermore even if a set of rules were developed the nature of the problem would preclude any objective means of testing their validity and that of the adjusted profit. We do not therefore consider this approach to be immediately of practical value; but usefully forms a subject for further research (see 2.9 below).
- 2.4 Insurance managements have generally recognised the desirability that part of the profit of the 'good' year (the so-called "unused cover") needs to be set aside implicitly as a hedge against the inevitable 'bad' year. This intuitive approach may lack precision and may offend against our actuarial inclinations for a more rational method; but as indicated in 2.3 above we are at a loss to specify such a method in the absence of data.

- 2.5 Accepting that the unadjusted profit of a single accounting period may be misleading as a measure of profitability a reasonable commonsense solution is to examine the emerging profits over a sequence of periods; and hence to accept that for certain classes of business the profitability can only be assessed on a long-run basis. We are conscious of the limitations of this approach; over a long period the profit may reflect a variety of management decisions made under widely differing circumstances; 'profitability' then becomes a somewhat imprecise concept. Despite these limitations the 'long-run' approach seems to be the most realistic way of judging these classes of business which are recognised as being vulnerable to random fluctuations in experience; and it is likely to evoke a sympathetic understanding among accountants and underwriters.
- 2.6 The question of whether management accounts should be drawn up gross or net of reinsurance hinges upon the internal division of management responsibility.

If the structure makes a manager responsible for both gross underwriting and reinsurance arrangements he will usually be judged on net results; in which case the management accounts could be constructed on a net basis. However, it is reasonable to suppose that those responsible will prefer to be provided with separate gross and reinsurance accounts in order to distinguish the performance of two essentially different activities. Where the management structure divides responsibility for gross underwriting and reinsurance respectively it seems essential to provide separate gross and reinsurance management accounts.

- 2.7 What constitutes a class of business?

To a large degree this should depend upon the internal management structure and division of responsibilities. Traditionally the main division has been into Fire, Accident, Motor (with sometimes an amalgamation of the latter two). Recent developments have included a division along the lines of Personal/Commercial/Industrial business; although we do not know of any company which analyses its results on this basis. Whatever basic division of responsibilities is adopted by the company will determine correspondingly the main division of the management accounts.

The question then arises as to the extent to which the main classes should be broken down into individual lines of business. Ideally each class for which there is a distinct premium rating structure should be separately identified; only thus will it be possible to monitor the profitability of past underwriting and rating levels and to decide upon future levels. Whether this ideal degree of breakdown is feasible will depend upon the size of each line of business; bearing in mind the problem of fluctuations discussed in 2.2 etc. above. Management accountability and responsibility may also influence the extent and manner of any subdivisions.

- 2.8 We have suggested that the purpose of management accounting is to monitor and judge past performance; and to form the basis of future decisions; the profitability of a particular class of business is in the first instance a measure of the adequacy of past underwriting standards and premium levels and a guide to future adjustments to those levels.

In a broader sense the distribution of relative profitabilities of the various classes of business provides a commentary on the mix of business which is being transacted. It should provoke consideration of whether the company's resources are being directed towards securing the optimal mix of business. We acknowledge that many composite insurers operate in a market where other considerations may limit their freedom to change the mix. For example, the retention or loss of the entire insurance account of a large client may require the profitabilities of individual classes in the account to be subordinate to the overall profitability, (incidentally this may pose interesting problems of internal accountability).

Nevertheless it should not be overlooked that in the final analysis it is essential to make the most efficient use of the company's capital by developing an optimal mix of business. This implies the posing of questions such as "Would a marginal increase in the volume of a certain class have produced a better or worse overall result?" This provides a broad justification for the construction of management accounts by class of business.

- 2.9 For the purpose of this paper we draw a distinction between -

- (a) Management accounts
- (b) Management information.

To monitor comprehensively the performance of a particular class of business it is necessary to look below the surface of the accounting results. This requires an analysis of the underlying dynamics as represented by such features as numbers of exposures, numbers of claims, claims frequencies, average claim costs, etc. This latter type of result we denote as 'management information'.

In order to limit the contents of the paper to manageable proportions we concentrate mainly upon the basic money-amount items which customarily enter into the accounts as the main components of the financial outcome. The link between these items (management accounts) and the underlying features (management information) is so close that there is much to be said for combining them in any statement which purports to present a complete appraisal of a class of business.

Our decision to separate the two aspects and concentrate on management accounts was therefore taken with some reservations.

7.

As we see it, the efficient planning and operation of each class of business requires the management accounts to be augmented by statements dealing inter alia with the following aspects:-

- Numbers of policies/exposures at risk
- Average premium per policy/exposure
- Numbers of claims reported
- Claims frequency
- Mean claims-cost per policy/exposure
- Average incurred cost per reported claim
- Policy movements (new business, renewals, cancellations)
- Claims movements (reported, settled, outstanding)

The object of this type of information is to provide clues as to why certain outcomes are emerging from the management accounts; and to project future outcomes from a study of the trends in the underlying components having regard to such problems as claims fluctuations (see 2.3 above). These aspects are fundamental to the rational formulation of future planning and seem logically a subject on which a further research group might concentrate.

SECTION 3 - REVENUE ACCOUNT

- 3.1 It is apparent from our enquiries into current company practice (summarised in Appendix A) that the conventional form of revenue account remains established as the basic form of presentation of the underwriting results for each class of business.
- 3.2 The revenue account customarily shows a balance which is transferred to (or from) the Profit and Loss Account and which purports to be the 'profit' (or 'loss') for the year.

In this section we discuss briefly the composition of the 'profit' figure and consider what it really represents; and what relevance it has to the decisions and operations which took place during the year of account. These considerations expose certain deficiencies and shortcomings which are examined in greater detail in the Sections which follows.

- 3.3 In its simplest form the revenue account may be represented as follows:-

<u>INCOME</u>	<u>OUTGO</u>
Earned Premiums	Incurred Claims
	Operating Expenses
	Profit

- 3.4 In order to gain further insight into the mechanics of the account the above items may be decomposed into the following format:-

<u>INCOME</u>	<u>OUTGO</u>
Written Premiums	Increase in Unearned Premiums
	Paid Claims
	Increase in Outstanding Claims
	Commission
	Management Expenses
	Profit

- 3.5 For reasons which will become apparent we prefer to make use of the following mode of presenting the format:-

<u>INCOME</u>	<u>OUTGO</u>
Unearned Premiums b/f	* Paid Claims
Outstanding Claims b/f	* Commission
Pipeline Premiums c/f	Management Expenses
*Premiums Debited	Unearned Premiums c/f
	Outstanding Claims c/f
	Pipeline Premiums b/f
	Profit

- 3.6 Consideration of the format of 3.5 immediately reveals two significant features:-

- Out of the 10 items which go to make up the profit balance only those marked * are factual; i.e. these three items alone represent firm accounting items capable of unambiguous and unqualified audit. The remaining seven items are based upon estimate, opinion or conjecture.
- The profit figure is the residue of the addition and subtraction of items which in the normal course of events are large multiples of the balance. Thus a relatively small error in any of the component items may produce a quite disproportionate error in the profit balance.

These two features in combination suggest that the emerging 'profit' may be subject to wide margins of error.

- 3.7 A numerical illustration of the conclusion of paragraph 3.6 is provided by the following hypothetical example; the order of magnitude of the various components is fairly typical of certain classes of business.

INCOME			OUTGO		
	(a)	(b)		(a)	(b)
UPR b/f	40.0	39.6	Paid Claims	65.0	65.0
O/S Claims b/f	150.0	148.5	Commission	10.0	10.0
Pipeline Premiums c/f	10.0	9.9	Management Expenses	20.0	20.2
Premiums Debited	100.0	100.0	UPR c/f	40.0	40.4
			O/S Claims c/f	150.0	151.5
			Pipeline Premiums b/f	10.0	10.1
			Profit	5.0	0.8
	300.0	298.0		300.0	298.0

The two sets of figures (a) and (b) differ by only 1 per cent in their 'estimated' components; and yet this produces a radical change in the apparent profit.

- 3.8 The detailed discussion of the various revenue account items in the following Sections will suggest that the 'variability' of the estimates often far exceeds the 1 per cent assumed in the above example. In such circumstances the figure which emerges as the so-called 'profit' may give a quite deceptive picture of the true experience of the period of account.

- 3.9 Leaving aside the question of accuracy what is the interpretation to be put upon the 'profit' of an accounting period?

Almost every item appearing in the form of revenue account in 3.5 relates to some period prior to the year of account. Such items are generated either by events which occurred or by decisions which became effective in previous years.

Thus for example, unearned premiums brought forward are the result of written levels determined by decisions made in earlier years. Paid claims will include payments made under claims which arose in some cases many years previously.

This shows the revenue account as being a mixture of contributions made by a number of different years of origin. The proportions in which such contributions are mixed will be variable since they will depend inter alia upon past growth rates. The resulting revenue profit will be a hybrid of the performances of a number of years of origin.

This view of the revenue profit suggests that its use as a criterion of management performance and as a basis for future decision-making is subject to serious limitations. In subsequent Sections we discuss ways of presenting results which seek to mitigate these difficulties. One suggestion is to attach only limited credence to the 'profit' of a single year and to focus attention on the sequence of revenue profits over a period of years; i.e. that the appraisal of non-life insurance for management purposes can be carried out only on a long-run basis. A more radical approach is to decompose the revenue results into the component years of origin and to study the true profit of each such origin year.

- 3.10 An obvious corollary of the aspects discussed in 3.8 and 3.9 is the observation that the profit (whether of an 'origin' year or a 'revenue' year) cannot be ascertained until some time after the close of the year in question. For the most part profit is a function of the estimated values of the unresolved parts of the experience.
- 3.11 The form of revenue account adopted in 3.5 implies the carry-forward of a 'fund' from one year to another. The numerical illustration of 3.7 provides an idea of an order of size which is not untypical.

11.

Because of claims-settlement delays the rolling fund may therefore amount to as much as twice the premium income; perhaps even more in the case of certain 'long-tail' classes of business.

It is apparent therefore that the income generated by the investment of the fund is a significant contribution to the profitability of each class of business. And our view, developed in a following Section, is to treat investment income as part of the total insurance profit. Such an approach, regarded as heretical a few years ago, is now finding increasing acceptance in internal management accounting. (See Appendix A).

- 3.12 The items included in the form of revenue account in 3.5 above are orientated towards U.K. operations. Other items, such as premium taxes, may enter into consideration in the measurement of profit in other territories. These matters are not discussed in detail in this paper.

Section 4 - Premiums

- 4.1 The discussion of premium reserves in Section 5 involves consideration of the incidence of premium income; and the error implicit in the assumption of a uniform flow of income over the year. This assumption is obviously invalidated in conditions of growth of premium income. Other resources of distortion arise from the following causes.
- 4.2 Not all premium amounts relate to a year's insurance. Some business runs for less than a year and some for more; and even in a portfolio of annual policies endorsements occur mid-term and the corresponding premium adjustment relates to a period of less than a year.
- 4.3 Premiums are not reported to the accounting system until sometime after the risk commences, changes or ceases. Thus the premiums reported in any month do not in general relate to risks commencing in that month. It would, of course, be possible to record the effective dates of all premiums, but there would still be the problem that at the end of the accounting period the premiums effective in the most recent months would not be completely known. In practice many companies simply use the reporting date or date of debit for the purpose of calculating the 1/24ths rule (or indeed the 40% rule) U.P.R. The effect of delays in reporting premiums can cause quite serious distortions in the published earned premiums, and this source of error should as far as possible be removed from management accounts. For this reason it is desirable that earned premiums and UPR should be calculated using the actual inception and expiry dates.

We refer to premiums which have been incepted but not debited or reported to the accounting system as 'pipeline' premiums. They represent a situation where the company is technically 'on risk' but where such knowledge is not yet recorded in the accounting system. In this respect there is an analogy to IBNR claims.

- 4.4 It is by no means obvious that the premiums should be spread pro-rata to time-on-risk. There is clear evidence of seasonality in many categories, and in some categories such as building society indemnity business the risk is of indeterminate duration and clearly not constant at all times.
- 4.5 One aspect of unevenness in the incidence of risk which we have not yet mentioned is caused by inflation. Perhaps we should recognise the increasing cost of the risk and reserve more in conditions of high inflation than we would if inflation were moderate. However it is difficult to talk about inflation without also talking about investment income.

- 4.6 The revenue account, even when adjusted for the various distortions identified above, will reflect the results of underwriting decisions over at least a 2-year period. The office may have been making a loss on its insurance operations as a result of inadequate premiums charged in earlier years and in the early part of the latest year. Nevertheless it may already have reacted by increasing its premium rates, so that business being accepted on current premiums may be yielding an adequate profit. Essentially the revenue account will report the average profitability of the business in force, and hence will not directly indicate whether the current premiums are adequate. This suggests that the measurement of profitability ought to be related to the outcome of business written in a particular period. We develop this concept of the 'Series Account' in Section 13.

Section 5 - Unearned Premium Reserve (and Earned Premium)

- 5.1 For many years the '60:40' method was used almost exclusively in annual accounts. On the assumptions that 20 per cent of the premium is absorbed in initial expenses and that policy renewal dates are evenly spread over the year of account then if the policy is annual and the risk is also evenly spread then the Unearned Premium Reserve is 40 per cent of written premium (and the 'Earned Premium' will be 60 per cent).
- 5.2 It will also be clear that there are the following further assumptions; firstly that expenses (other than initial expenses) accrue evenly over the risk period and also that the reserving basis is a function of the premium bases on which business has been accepted during the year.
- 5.3 The 1/24ths method now generally employed following the introduction of the latest D.O.T Regulations is a refinement of the '60:40' method under which the assumption that business is written evenly over the year is replaced by the assumption that business is written evenly over each month. Thus it makes a correction for seasonal changes in the volume of business. The assumption that the risk is spread evenly over the period of the policy remains, as it would with refinements of the method down to 1/365ths; nor does it deal as usually applied with the problem set out in paragraph 2. However, with the 1/24ths method it is possible to include correctly policies written for varying periods.
- 5.4 The refinements discussed in paragraph 5.3 may be employed with or without an allowance for 'front-end' expenses. For management accounting it seems desirable to allow for the front-end expenses; i.e. to assume that some appropriate proportion of the premium is 'earned' immediately on inception, and to spread the balance using the selected method.

The appropriate front-end proportion should be based on the relevant rate of commission plus some element of management expenses assumed to be incurred at inception of the risk, (but see Section 7 - Commission for an alternative approach involving the concept of 'earned' commission).

- 5.5 It is unlikely that the assumption of even spread of risk will be realised in practice. Even apart from inflation on the amount of claims costs, the majority of risks will be affected by seasonal influences on frequency of claims occurrence and some risks may be affected by linear time trends (e.g. motor risks through increasing traffic density). Hence strictly, if the 1/24ths rule is employed different weights, empirically determined, should be assigned to each renewal month. Further the effect of inflation is ceteris paribus to increase the risk continuously over the policy duration. These refinements present computational complications which in many cases may not be justified by the effects on the end-results; in practice it may be sufficiently accurate to allow for them empirically by some adjustment to the front-end loading factor.

- 5.6 As mentioned in 5.2 the fundamental implication of the Unearned Premium Reserve is that it is a function of the premium bases; i.e. any inadequacy in the premiums is reflected in a corresponding inadequacy in the Reserve.

This leads to the concept of a reserve which is based upon a level of premiums which differs from that of the written premiums (for example, that resulting from a rating increase during the year). A further stage of this line of development is the concept of the Unexpired Risk Reserve being an explicit expression (independent of the premiums) of the estimated cost of expected claims occurrences arising from current business.

Section 6 - Incurred Claims

- 6.1 In a conventional revenue account the incurred claims cost is taken to be the total claims payments in the year plus the increase in the claims reserves, including the I.B.N.R. reserve. Clearly the reported claims cost may be seriously affected if there are significant changes in the relative strength of the claims reserves at the beginning and end of the year. In long-tail business the claims reserves may amount to several years payments, and a relatively small error in the reserves can cause substantial distortion of the incurred cost. The problem is to devise methods of assessing reserves for outstanding and IBNR claims which help to bring these distortions under some control.
- 6.2 It is impossible to estimate claims reserves with complete accuracy; indeed it is likely that for many classes of business a large standard deviation will persist no matter what methods may be used. We therefore have to live with this uncertainty and to devise methods which will concentrate primarily on exposing the errors in the estimating process.

Hopefully this may lead to a greater appreciation of the limitations of the incurred claims amounts which emerge into the accounts.

- 6.3 In practical terms the most feasible approach is to keep prior years' accounts open and to re-appraise the incurred claims retrospectively in the light of the most recent information about claims costs.

Long-tail business will need to be kept open and re-stated in this way for many years; and this may be criticised on the grounds that the experience of years long past is no longer relevant. On the other hand the experience of recent years is not yet accurately known, so we are faced with the uncomfortable choice between accurate figures which are not relevant and relevant figures which are not accurate. However this is but one facet of the obvious fact that long tail business needs to be observed over a long period to obtain a reasonably accurate idea of the underlying level of claims costs. If external conditions do not remain fairly stable over a long enough period the consequence is increased uncertainty about the underlying cost of claims. It is one of the many problems of high rates of inflation that it renders past experience obsolete, thereby increasing the degree of uncertainty.

- 6.4 A significant contribution to distortion of incurred claims may arise from the uncertain incidence of large claims. The problem of large claims is simply a part of the wider problem of the extent to which one year's claims costs are typical of the long run level of claims costs. Whatever else is done, it is suggested that at some stage the actual cost of claims should be reported. This means the cost of those claims that have occurred, and specifically excludes adjustments to catastrophe reserves or claims equalisation reserves, which are concerned with the cost of claims that have not occurred.

If it is thought that the cost of claims actually recorded in any year is not typical of the long run level of claims costs, an adjustment should be made at a later stage in the set of management accounting statements, so that management can see by how much the year's result has differed from what might reasonably have been expected. This adjusted cost would then be used for the other management accounting statements, namely the revenue account projections, the rating series projections, the assessment of the adequacy of current premiums, and the suggested timing and extent of future changes in overall rating levels.

6.5 The conventional definition of incurred claims is -

Total claims payments during year of account plus Increase in reserve for outstandings (including IBNR).

For management accounting our aim is to arrive eventually at a figure which is defined as -

Total developed claims payments paid in respect of claims occurring in the year of account.

6.6 It is helpful to analyse the conventional concept of incurred claims as follows:-

	Prior years	Current year	Total
Reserve at beginning of year	R_0^e	-	R_0
Claims payments during year	P^e	P^c	P
Reserve at end of year	R_1^e	R_1^c	R_1
Incurred claims =	$(P^e + R_1^e - R_0^e) + (P^c + R_1^c) = P + P_1 - R_0$ $G^e + I^c = I$		

This shows the conventionally-calculated incurred claims (I) as being made up of -

Payments/outstandings on current year's claims (I^c)

Strain on prior years' estimates (G^e).

Clearly G^e may be further analysed into individual prior years; so that we may develop the following type of expression -

$$I = I^c + G^0 + G^{-1} + G^{-2} + \dots$$

where the sequence of G's represents the strains arising from individual prior years.

- 6.7 Looking at the above analysis from the point of view of an individual year's incurred claims, in the light of the management accounting definition in 6.5 above, we may develop an expression of the form -

$$I^{\circ} = (P_0^{\circ} + R_0^{\circ}) + G_1^{\circ} + G_2^{\circ} + \text{-----}$$

This shows the items in brackets as being the initial estimate of the incurred losses for year 0; and the subsequent adjustments of strains (G) on the original reserve as the experience emerges in ensuing years.

In the situation in which reserves are conservatively estimated the G's will tend to be negative, indicating releases from the original estimate.

The ultimate development of this expression naturally equates with the total accumulated payments required by the definition in 6.5 above.

- 6.8 In recent years there has been much discussion of the relative accuracy of estimation of claims reserves by (a) conventional case-by-case appraisal and (b) statistical claims models.

The vulnerability of the assessment of incurred claims to the errors in the component outstanding estimates makes this discussion a matter of some importance.

To date there are understandable reservations with regard to the role of statistical methods; and the construction of complex models is not necessarily a guarantee of precision. Indeed there has been a peculiar absence from the debate of any attempt to define the order of precision which is desirable or feasible.

It may well be that the justification for statistical methods rests not so much on the question of precision but rather upon the following merits:-

- (a) They are objective (or at least substantially so) whereas manual estimating involves a predominately subjective element.
 - (b) They involve a defined and explicit basis expressed in terms of parameters and assumptions.
 - (c) As a corollary they may preserve (in the absence of complete precision) a consistency of bias from one point of time to another.
- 6.9 Normally there are no problems of allocation with claims-handling expenses. The costs clearly arise in defined areas of the portfolio and can be analysed in as much detail as is warranted by the costing system. There are, however, some types of cost which naturally fall into the category of claims costs and yet are not associated with individual claims. The most obvious example is the cost of the M.I.B. scheme which clearly belongs to the motor account, but cannot readily be subdivided within motor business.

Section 7 - Commission

- 7.1 This is an area where there is little difficulty in analysing the figures into separate accounts for each class of business. There may be small amounts of commission in connection with combined policies or reinsurance where allocation is required, but again the basis will normally be obvious.
- 7.2 The concept of 'pipeline' premiums (see Section 4.3) has a parallel with regard to commission which has become due (because a risk has been accepted) but which has not yet become a recorded accounting item.
- 7.3 In published revenue accounts commission and initial expenses are deemed to be paid at inception, and only the balance of premium is spread for the purpose of calculating reserves and earned premium. The amount of commission entering into the revenue account is thus the amount actually due on the premiums included in the account.

Ignoring for the moment the question of initial expenses the conventional calculation of the Unearned Premium Reserve operates on the residue of the written premiums after deducting commission; i.e. the UPR is a function of $(P-C)$ and the change in UPR between the beginning and end of the year may be denoted by $\Delta F (P-C)$.

The equivalence -

$$P - C - \Delta F (P-C) = \left[P - \Delta F (P) \right] - \left[C - \Delta F (C) \right]$$

expresses the obvious condition that the conventional calculation of UPR, based upon $(P-C)$, produces exactly the same result as the separate calculation of "unearned gross premiums" and "unearned commission".

An analogous concept applies to initial expenses.

- 7.4 The above is an interesting way of presenting the result because it makes it clear that the company is setting up a reserve based on the full premium, and is treating as an asset that part of the reserve represented by commission already paid to agents and others. Clearly this would be appropriate if the company could recover its liabilities in respect of commission.

If in the event of a cancellation the company were unable to recover the commission in circumstances when it required to do so then the implied liability should be recognised in the reserves set up and in the charge to revenue under the heading of commission.

It is suggested that this treatment of commission is more in accordance with the facts, and displays more clearly the inherent assumptions. It should also be easier to adjust in the event that these assumptions are not borne out.

Section 8 - Management Expenses

8.1 Scope.

We are here concerned with all those expenses which do not fall into the categories of:

Commissions; external loss adjustment expenses and other external claim expenses; taxes; licences, and fees.

These management expenses may take approximately between 10% and 40% of premium revenue depending on different lines of business, different marketing approaches used, and other factors. Since expenses are such an important factor the success or failure of the company may well be determined by the ability to control expenses; carefully designed reports accompanied by an adequate expense accounting system form a vital ingredient in assisting in expense con

8.2 Purpose of Accounting for Expenses

Management interest in expenses is usually confined to information which will assist in operating the company, particularly in the areas of profitability analysis and expense control. From a profitability viewpoint a good reporting system will call attention to those activities which require management attention - the reports highlighting not only operations for which expense control is needed but also those areas where profitability is evident and hence where emphasis should be placed in further growth development.

8.3 Main headings of Expenses

Management expenses can be regarded as falling into two areas:

- (i) Acquisition, marketing and collection expenses: this category includes expenses connected with soliciting and securing business, developing a sales staff, writing policy contracts, receiving and paying commissions, collecting premiums either by via brokers or direct, reconciling premium records, compiling lists of premiums due and expiries. Also preparing contingent commission statements, maintaining the goodwill of brokers and policyholders, rendering services to brokers and any other producers, advertising and publicity related to group, premium quotations, policy signing and other related activities.
- (ii) General expenses: any other expenses not assignable such as costs of associations, surveys and underwriting reports and audit of records. In addition there will be an element of general overhead expenses arising from service and support departments which are strictly non-specific to individual classes of business. This element may represent a significant proportion of the total expenses.

8.4 Expense Allocation

Provided that the relevant costing system is maintained (usually coupled with a parallel budgetary control system) an appropriate model may be used to identify assignable costs to classes of business.

Various methods are available to allocate non-specific management expenses to different classes - such as relating things like advertising to "acquisition, field supervision and collection expenses", the basis of "overhead on salaries" for such as rent and related items; data processing costs might be allocated on the basis of numbers of policies.

In any event there can be no precise analysis of expenses and in particular no precise determination of the marginal costs of business - since in the long run all costs vary with volume of business transacted.

An alternative approach is to attribute costs to specific product lines only so far as they can be quite explicitly determined to be marginal costs. The resultant margin between office premium less commission less directly allocated expense less anticipated claims costs, can be regarded as a contribution to office overhead and profit. This clearly focuses attention on

(a) the need to transact a sufficient volume of business at the right premium level, (b) the need to keep under control that item of expense which cannot be directly attributed to specific policy lines.

It is general to allocate claims expenses and loss adjustment expenses specifically to claims costs and accordingly when viewing management accounts they should be separated from other administration expenses and regarded as supplementary to the claim amounts.

8.5 Incidence of Expenses

The analyses of expenses should extend to identifying, at least approximately, the proportion which may be regarded as being incurred at inception (the 'front-end' expenses).

We have suggested elsewhere that this percentage of expenses, plus commission, might be regarded as being 'earned' at inception; by implication the balance would be assumed to be spread evenly over the period of insurance.

Two aspects of this approach may be questioned -

- (a) The 'even-spread' assumption is unlikely to apply in conditions of high inflation. There would be computational problems in implementing an escalating incidence of expenses; and in practice this feature might be allowed for by the artifice of reducing the front-end proportion.
- (b) In the short-term the total insurance organisation (e.g. staff, equipment and premises) is relatively inelastic; i.e. the resulting expenses are almost entirely 'fixed'. And the assumption that various components may be hypothecated to specific activities (with its implication that the relevant expenses disappear immediately on cessation of the activities in question) may not be in accord with the real situation.

In the latter respect there is the suggestion of an analogy with the concept of 'earned commission' explored in Section 7.3. and 7.4. And the suggested treatment of commission could be paralleled in the presentation of expenses.

8.6 Expense Budgeting

Many companies forecast or budget future operation results sometimes labelling the final product a "plan". Generally the plan is for the immediate insuring year but may be for as many as five years ahead. An important part of this plan is projection of expense experience.

The necessary pre-requisite of an expense projection is the establishment by the management of the company of goals which can be quantified - such as desired volumes of premium, profit etc. After these goals had been laid down individual departmental managers are able to determine what their participation must be since they can now forecast requirements for staff etc.

An important concept in expense budgeting is that responsibility should follow authority - the manager should be held accountable only for those expenses within his control. In addition to directly projecting expenses we may also project expense totals by using historical expense/premium ratios. These ratios should of course be adjusted where necessary to recognising changing conditions either inflation or other. This approach may be helpful in the process of approving departmental expense budgets.

Flexible Budgeting Methods may be used in analysing performance - fixed budgets may be initially constructed on the basis of the planned level of premium volume. If actual premiums written during the period are substantially different there could be a severe distortion in expenses - particularly those that are directly related to premiums. In an analysis of performance using flexible budgeting techniques it could be necessary to modify planned expenses to recognise the actual premium volume attained - after adjustments in premiums for rate changes etc. For example if premium income is 10% higher than expected those planned expenses varying directly with premium volume should be increased by 10% to assure a valid comparison with actual expenses. Finally, fixed expenses should only be regarded as fixed with certain ranges of premium income.

8.7 Class Expense Ratios

Whatever method of allocation may be used it is to be expected that expense ratios will vary markedly between different classes of business. At one extreme 'bulk-handled' classes with large average premiums may have a single-figure percentage; at the other extreme individual small-premium policies may have marginal expense ratios in excess of 40 per cent (higher if a share of overheads is included). It may, for political or other reasons, not always be feasible, to charge a 'profitable' level of premiums for the latter classes; and much attention has been directed to reducing the operating costs of these small personal lines by 'packaging' and other devices. Failing this it may be necessary to accept a degree of 'subsidisation' of these classes; in which event it becomes even more important to measure profitability as accurately as possible in order to act as a reminder of the amount of cross-subsidy involved.

Section 9 - Investment Income

9.1 General Considerations

The essential concepts underlying the consideration of investment income is the concept of delay: delay between the receipt of a premium and the date of the claim event corresponding to the premium, delay between that claims notification and actual claim payments.

These two forms of delay may be termed risk delay and payment delay respectively.

Unless premiums are accepted for substantial periods of risk well in excess of one year - the impact of investment income due to risk delay is of significance when interest rates are at high level; when interest rates were below 5% the interest earned by the company on account of risk delay was probably insignificant. With interest rates in excess of 10% interest earned by the company under the heading risk delay is no longer trivial and will vary considerably by type of business.

Certain types of claim: long term liability claims and claims settled by annuities, give rise to a considerable amount of interest under the heading claim delay. There is of course always the risk with these long term claims that monetary amounts of payment may increase over time to offset the favourable impact on investment income - or vice versa.

9.2 Arguments for Recognising Investment Income

- (i) Premium rates may be determined assuming some interest to be earned on funds derived from pre-payment of premiums and deferral of payments of expected losses and loss expenses. Any such investment income should therefore be taken into account in determining both premium and loss reserves; correspondingly such investment income should be passed through the revenue account.
- (ii) However, more often than not, premium rates are determined by market considerations which preclude the use of a premium 'basis' in the actuarial sense; and the assumption of some rate of interest plays no explicit part in the premium calculation. We may still regard the investment income as an implicit and unstated part of the premium assessment; and such investment income should be considered as an integral part of determining the appropriate provision for long-term liability claims for example.

9.3 Arguments Against Inclusion of Investment Income

- (i) Underwriting results and investment income are separate and distinct functions; and are usually subject to different areas of responsibility and accountability. They should therefore not be combined in determining premium rates or reserves; and hence should not be brought into the revenue account.
- (ii) Whilst there is some theoretical justification for considering investment income it is not practical to allocate it to unearned premiums and outstanding losses on any reasonable bases.
- (iii) Because of the uncertainty inherent in establishing estimates of losses which will not be paid until some undetermined future date investment income should merely be regarded as a margin for conservatism.

9.4 The Actuarial Position

The insurance process may be regarded as the acceptance of a premium at one point of time in order to pay claims at a later date. In this case investment income is an integral part of insurance operations and present value concepts should be applied to all liabilities provided that the settlement date of such liabilities can be reasonably determined. And provided that they can be estimated in terms of the (inflated) money values applicable at the time of payment.

9.5 Some Thoughts on Investment Income in Practice

It is possible to combine the viewpoints

- (a) that investment and underwriting are separate activities.
- (b) that it is necessary to give credit for interest to the underwriting account.

This can be done in practice by determining in advance a notional rate of interest to be credited on revenue account balances for each type of business - this could perhaps be the short term deposit interest rate; or a rate based upon asset-matching considerations having regard to the period of run-off of liabilities of each class of business.

It will be appropriate to credit this interest to the underwriting account and debit to an "investment account". The investment division of the company could then be run on the basis that it is borrowing money at this interest rate and, subject to certain capital value and liquidity constraints, the object of the investment division would be to maximise returns.

Section 10 - Inflation

10.1 What is inflation

Before considering the effect of inflation on Insurance Company accounts we must consider what we mean by inflation. The dictionary defines inflation "as an increase in the money available relative to its buying power".

Thus, if incomes increase relative to the goods available, which is a function of productivity, inflation is the result. The inflation may be attributed to the increased demand resulting from the money available or to the increased costs inherent in producing the goods.

For a number of years money available to purchase goods and services has grown more quickly than the actual goods and services available. In 1974/75 incomes increased at an unprecedented rate, the Government increased its own spending and printed the money to meet the bill - the result, inflation at a rate hitherto unknown in this country.

It is necessary to distinguish between inflation in the general economic sense and in its application to the costs of a particular business activity. In insurance we need to differentiate between the inflation of management expenses (heavily influenced by wage-costs) and the inflation of claims costs (which may be affected by escalating Court awards, etc.)

10.2 Inflation's effect on revenue accounts

Inflation, even at a low rate, has an effect on the revenue accounts of any Company. It distorts comparisons between one year and the next. Within a year the figures contributed by activities at the beginning of the year have a different true value from those produced by activities later in the year.

The Sandilands Committee was appointed by the Government in January 1974 to consider whether, and, if so, how, accounts should allow for changes in costs and prices having regard to standard accounting practices and other possible methods. The Committee recommended that a Current Cost Accounting method should be adopted, the main features being:

- (i) figures be expressed in monetary units,
- (ii) balance sheets should show assets at their value to the Company,
- (iii) profit for a particular period should only include operating profit; it should exclude the appreciation on stock (unrealised profits),
- (iv) historic accounting figures to be shown in notes.

The third recommendation of the Sandilands report summarised above appears to create problems for insurance companies. Although in the usual sense an insurance company does not have any stocks to appreciate it does have to increase its claims reserves due to inflation. Although these are "unrealised" adequate provision should be made in the accounts as if the appreciation were a realised loss.

Inflation distorts insurance company accounts in other ways. For example, the accounts may show an increase in premium income although in real terms it could have declined. The same applies to other items in the accounts.

10.3 Effect on profitability

Distortion of the figures shown in accounts has been referred to above; inflation does in fact distort the whole pattern of the business and has an adverse effect on profit.

In certain classes, for example private car insurance, the underwriters can take steps to anticipate inflation and as at least part of the insurance is obligatory, premium income should grow to match the inflation of the claims.

There are other classes where the growth of premium is inadequate, for example, household fire insurance. Most policyholders in this class are underinsured but they do not suffer unless there is a complete loss. In the absence of application of 'average' the insurer has to bear the cost of inflated claims out of premiums which are static or at least lagging behind inflation. Many insurers are now introducing 'index-linked' schemes in order to combat this feature.

In addition to its effect on underwriting profits, inflation affects profitability through its action on expenses. Whilst a large part of the expenses are incurred when business is placed on the books or the renewal effected, a substantial part is involved in the administration of settling claims. This part is incurred on average more than six months (often much longer) after the premium has been collected and is affected by inflation, thus prejudicing the ultimate profit of the business.

10.4 Escalation of Reserves

So far we have considered the distorting effect of inflation on revenue account items.

Inflation's effect on reserves can be more serious. Reserves can be divided into two categories -

Unearned premium
Outstanding claims

We have already demonstrated that the premiums charged at the beginning of a year may be overtaken by inflation.

Should the unearned premium reserve be based on -

- (a) the premium originally charged, using a direct time-apportionment.
- (b) the expected cost of the remaining period, allowing for the inflationary effect of weighting the risk concentration towards the second half of the risk period.
- (c) the premium which would be charged if the policy were renewed on the date the reserves are calculated

The reserves for outstanding claims present different problems. Some will be settled almost immediately, others not for some years; this applies particularly to "long tail" business. In former practice, these reserves tended to be established on a current cost basis and updated each year in the light of the expected outcome of a claim; this escalation would reflect the effect of inflation. Under the impact of high rates of inflation the recent tendency has been to anticipate future inflationary escalation in the estimated costs in order to avoid too great a transfer of the burden into subsequent year of account.

It has been suggested elsewhere that interest earnings should be taken into account. If they were, it can be argued that inflated claims reserves could be discounted to allow for interest earnings - if the rate of inflation approximated to the yield on the investments the end product would be the reserves established by current-cost principles.

The corollary is that the discounting of claims reserves is justifiable only if the cash estimates are expressed in terms of money values ruling at the time of anticipated payment; to discount current-cost estimates would lead to an understatement of reserve.

10.5 Inflation and solvency margins

As inflation pushes up premiums, unearned premium reserves and outstanding claims reserves, solvency margins (the excess of the total resources of a Company over its trading liabilities) come under pressure. To rectify the situation, Companies have recently had to go to the market for increased capital. One alternative is to restrict premium income but this can lead to other problems by putting pressure on expense margins. The only viable long-term action may be to finance the solvency strain out of adequate underwriting profits; this may require an increase in premium rates of an order which individual companies may find it difficult to achieve in the face of competitive pressures.

Section 11 - Solvency Margins

- 11.1 Before a company can underwrite any business it will require capital to create a solvency margin to support the business so written. This initial capital will usually come from the shareholders who are investing in the company in the expectation of getting a return on their investment. Whilst this capital is required for solvency purposes it can however be invested by the company and so some return is available to be passed back to the shareholders. As business is written, the profits from the business will be available to be added to the return paid to the shareholders or to be retained within the company to increase the solvency margins. As the volume of business grows the company will need a larger solvency reserve, which in normal circumstances would be financed out of retained profits. In other circumstances it may be necessary to obtain further capital from the existing, or new, shareholders by means of further share issues.
- 11.2 A discussion of which of these courses of action to adopt is largely outside the scope of this paper. Suffice is to say that the choice may hinge upon the question of whether the premium growth is in real terms or solely from the effects of inflation.
- 11.3 What we are here concerned with is the extent to which the solvency margin may be thought of in terms of individual classes as opposed to an overall corporate concept.

The need for a solvency margin arises from two main areas of uncertainty in insurance operations :-

- (a) Fluctuations in claims experience, usually of a catastrophic nature.
- (b) Changes in the market value of assets.

We suggest that the starting-point is to conceive the solvency margin in the first instance as an overall corporate requirement; and, having decided the extent to which any increase in the margin is to be financed out of retained profits, to consider the basis upon which individual lines of business may be expected to contribute towards the required increase.

- 11.4 The solvency margin required for a class of business is dependant inter alia on the inherent variability of the cost of claims for the class. The smaller volume of business within the class, the greater will be the variability as a proportion of the premium income or claims costs. The absolute degree of variability is considerably different for different classes of business depending upon the spread of the claim-size distribution. Thus only a small solvency margin, as a percentage of premium, will be required for a company writing large volumes of Household Insurance, whilst large margins will be needed for a small company concentrating on Liability Insurance.

- 11.5 The principles enunciated in 11.4. are in very general terms; and in our present state of knowledge cannot generally be enumerated on any firm basis. In any event we cannot overlook that the solvency margin requirement is not conditioned by claims variability alone; it is also required for asset value variations, an aspect which seems to fall outside considerations of individual classes of business.
- 11.6 Thus, the maintenance of solvency margins should be a legitimate charge against the trading profit of each class of business (justifying a non-taxable transfer to reserves?). However the exact basis of charge against each class is difficult to define; practically it may be related primarily to the amount and nature of growth within the class but any more refined method intended to reflect the principles of 11.4. may be ruled out by the absence of suitable data.

Section 12 - Improvements in the Presentation
of Profitability.

- 12.1 In the light of the foregoing discussion we put forward in this Section suggestions for remedying some of the more obvious shortcomings of the usual forms of presentation of revenue results.

These suggestions are evolutionary and do not involve any radical changes in the components of information entering into the presentation; only the mode of presentation is altered.

The summary of current practice provided in Appendix A indicates that some of the ideas mentioned in this section are already in use.

Our proposals in this section may be implemented in whole or in part; they may be introduced in a single step or in progressive stages. Thus we entertain the hope that they may receive serious consideration as a practical strategy for evolving a more effective approach to the presentation of management accounts for individual classes of business having regard to their aims and purpose.

To help focus the discussion two Exhibits are attached; these illustrate with hypothetical figures the form of presentation we have in mind; and assist us to comment on matters of detail.

Exhibit 1 is concerned with money amounts; Exhibit 11 presents a number of key ratios expressed as percentages. In practice both sets of figures might conveniently be presented in a single statement; we have merely separated them for ease of reference.

- 12.2 There are two important characteristics to be noted -

- (a) The forms present a sequence of results for successive years.
- (b) The results for each year are progressively up-dated as more information becomes available; i.e. facts gradually replace estimates.

These characteristics reflect our view that an individual year's results are rarely of use in isolation; and of course it is important to adjust results retrospectively because, as we have discussed above, the initial estimates may be in error to such an extent as seriously distort the apparent results.

We have chosen to present a sequence of five years results plus the future projection of a further year. We do not imply that this length of sequence is sacrosanct; the total periods covered (past and future) will depend upon individual company circumstances and the characteristics of the classes of business included.

- 12.3 The sequential presentation assists in the identification of trends which might be used as a basis for future projections. If therefore seems appropriate to show projections in an adjacent position on the forms.
- 12.4 For illustration we have assumed that the oldest year (1971) in Exhibit I is completely developed, i.e. the results are finally determined as the factual outcome for the year in question. Thus the incurred claims are then known to be equal to the accumulated claims payments.

For more recent years an increasing element of estimation enters into the figures; so that the results for the most recent year, 1976, are essentially provisional.

- 12.5 It may be considered that if a significant and persistent bias exists in certain of the estimating procedures the results for the most recent year may be seriously distorted by the forms of presentation adopted in Exhibit I. For example the estimation of outstanding Fire claims is almost universally conservative and may involve a margin of the order of 20 per cent or more.

In such circumstances the incurred claims would initially be significantly over-stated; and the 'equity' in the estimates would emerge only as the year in question progressed towards maturity.

This suggests a possible refinement of introducing an item "Assumed margin in outstanding claims" into the presentation as line (9A). A similar refinement could be introduced with regard to estimated pipeline premiums; but the absence of bias probably makes this unnecessary.

- 12.6 The trends in Exhibit I may be distorted by the effects of inflation on money values and it is therefore useful to attempt to immunise these effects by presenting certain key aspects in ratio form. This is the purpose of Exhibit II.
- 12.7 The real value of the form of Exhibit I is likely to be found in the comparison of the developments at various points of time; e.g. the comparison of the developed results of revenue year 1973 updated to end-1974 with the corresponding development to end-1975. The link between successive sets of results could be established by means of reconciliation statements including items such as "Gain/Loss on outstanding claims".

Likewise a comparison and reconciliation between projected and actual results could be effected as a means of monitoring the reliability of projections and gaining an insight into the variances. Another instructive exercise would be to compare the figures for each revenue year as it develops with the original provisional results recorded for the year in question.

The frequency of production of the statements would depend upon individual circumstances; an annual basis might suffice initially but we would envisage that the eventual aim might be to achieve a quarterly issue.

- 12.8 The form of presentation discussed in this Section is intended primarily for management accounting purposes. It may be supposed that the main financial accounts would continue to be published in conventional revenue account format. We think it important that there should be a reconciliation between the two modes of presentation.

Thus for example the normal revenue account computation of incurred losses makes use of the formula -

Total claims payments) All years
plus Increase in total outstandings) of origin

The resulting incurred figure may be decomposed into -

Incurred losses for current year
plus Strain on prior years opening outstandings
(see Section 6.6).

This type of reconciliation should be performed for all relevant revenue items so that the relationship between the profits revealed by the management and financial accounts respectively is completely established; and the differences between them are fully accounted for.

Exhibit I

Revenue Results - Retrospectively un-audited to end-1975

	Revenue Year					
	1971	1972	1973	1974	1975	1976 (projected)
(1) Premiums debited	900	1250	1200	1500	1750	2000
(2) Pipeline premiums b/f	110	125	125	130	165	100
(3) Pipeline premiums c/f	125	125	130	165	200	230
(4) Premiums written (1)-(2)+(3)	915	1250	1205	1535	1785	2030
(5) Unearned premiums b/f	320	360	500	480	600	700
(6) Unearned premiums c/f	360	500	480	600	700	500
(7) Premiums earned (4)+(5)-(6)	875	1110	1225	1415	1685	1930
(8) Accumulated claims payments	585	651	613	630	577	
(9) Outstanding claims (incl. IBNR)	-	80	183	339	512	
(10) Incurred claims (8)+(9)	585	731	796	969	1089	1235
(11) Commission credited	87	125	120	154	178	203
(12) Pipeline commission b/f	10	12	12	12	16	19
(13) Pipeline commission c/f	12	12	12	16	19	22
(14) Commission due (11)-(12)+(13)	89	125	120	158	181	206
(15) Marginal management expenses	114	148	167	198	241	276
(16) Underwriting outgo (10)+(14)+(15)	788	1004	1083	1325	1511	1717
(17) Underwriting contribution (7)-(16)	87	106	142	90	174	213
(18) General expenses allocation	61	80	90	106	130	149
(19) Underwriting profit (17)-(18)	26	26	52	(16)	44	64
(20) Investment income	32	48	62	82	96	96
(21) Insurance profit (19)+(20)	58	74	114	66	140	160
(22) Solvency contribution	22	28	31	35	42	52
(23) Adjusted insurance profit (21)-(22)	36	46	83	31	98	108
(24) Transfer to/from contingency	0	5	6	(25)	33	30
(25) Distributable profit	36	41	77	56	65	98

Exhibit I
(continued)

Definitions and Notes

(1) Premiums debited	Premiums recorded to the accounting system during the revenue year.
(2) Pipeline premiums b/f	Premiums incepted in the previous year but recorded to the accounting system during the revenue year.
(3) Pipeline premiums c/f	Premiums incepted on the revenue year but not recorded to the accounting system until the following year.
(4) Premiums written	Premiums incepted during the revenue year.
(5), (6) Unearned premiums	See Sections 5.4. and 7.4 for alternative treatment and presentation.
(8) Accumulated claims payments	The total cumulative claims payments made to date (i.e. end-1975) under claims originating during the revenue year.
(9) Outstanding claims (incl. IENR)	Total estimated liabilities outstanding at end-1975 under claims originating during the revenue year. See Sections 9.4 and 10.4 for discussion of use of discounting in conjunction with cash estimates adjusted for future inflation.
(11) Commission credited	Commission recorded to the accounting system during the revenue year.
(12) Pipeline commission b/f	Commission due in respect of premiums incepted in the previous year but recorded to the accounting system during the revenue year.
(13) Pipeline commission c/f	Commission due in respect of premiums incepted in the revenue year but not recorded to the accounting system until the following year.
(14) Commission due	Commission due in respect of premiums incepted during the revenue year. The presentation adopted in Exhibit I treats (14) as 'written', with an implied 'front-end' component in earned premiums. See 7.4 for an alternative method of treatment involving concept of 'unearned commission'.
(15) Marginal management expenses	Operating expenses specifically identifiable to the class of business in question. It is assumed that these include claims-handling expenses; the alternative is to include them under items (8) and (9).

Definitions and Notes (Continued)

(18) General expenses allocation	The balance of non-specific expenses chargeable to the class of business in question.
(20) Investment income	See Section 9.5.
(22) Solvency contribution	See Section 11.6.
(24) Transfer to/from contingency	See Sections 2.3 and 2.4 for discussion of the feasibility of operating this type of transfer process. Here we illustrate the concept as a rudimentary claims-equalisation device.

EXHIBIT II

Key Revenue Ratios - Retrospectively updated to and - 1975.

	Revenue Year					
	1971	1972	1973	1974	1975	1976 Projected
	%	%	%	%	%	%
(a) Incurred claims/Premiums earned	66.8	65.9	65.0	68.5	64.6	64.0
(b) Commission and Marginal Expenses/Premiums earned	23.2	24.6	23.4	25.2	25.0	25.0
(c) Operating ratio (a) + (b)	90.0	90.5	88.4	93.7	89.6	89.0
(d) Underwriting contribution/ Premiums earned	9.9	9.5	11.6	6.4	10.3	11.0
(e) Underwriting profit/ Premiums earned	3.0	2.3	4.2	(1.1)	2.6	3.3
(f) Investment income/ Premiums earned	3.7	4.3	5.1	5.8	5.7	5.0
(g) Insurance profit ratio (e) + (f)	6.7	6.6	9.3	4.7	8.3	8.3
(h) Distributable profit ratio	4.1	3.7	6.3	4.0	3.9	5.1

Section 13 - Policy-year / Series Accounting.

- 13.1 In Section 3.9. we briefly touch upon the concept of the revenue account as a mixture of contributions arising from a number of different years of origin. We have suggested that there is consequently considerable ambiguity in the interpretation of the resulting revenue profit.

The primary purpose of management accounting is to provide an objective test of past decision-making and a basis for future decisions. In the present context we may regard the decision-process as being concerned mainly with premium rating levels and underwriting standards.

The heterogeneity of the revenue account implies that it reflects the combined outcome of many decisions taken over a number of different periods; and it therefore fails to provide a criterion by which individual decisions may be appraised and judged. By the same token it is difficult to establish a rational approach to future decisions.

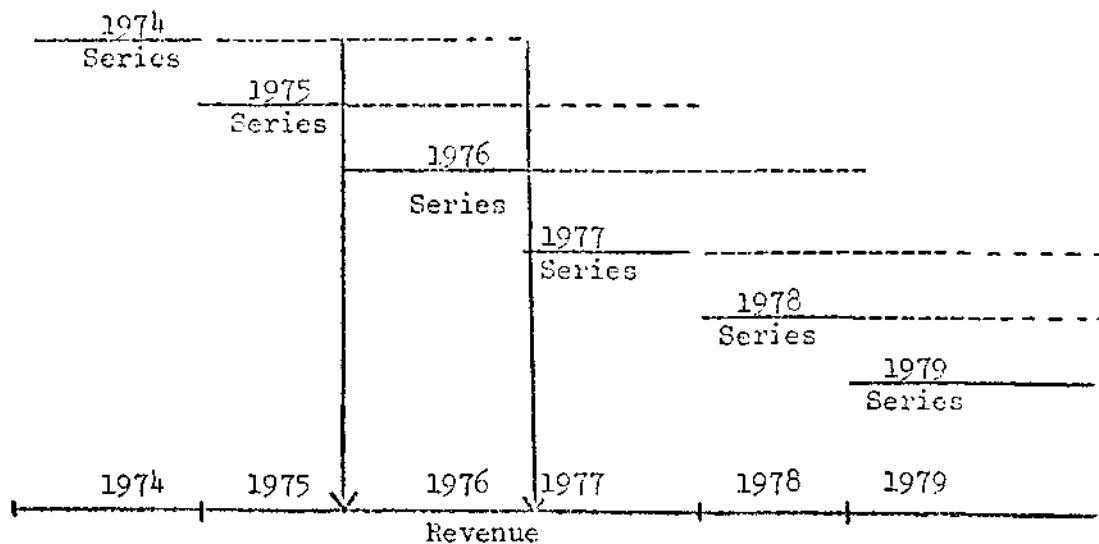
- 13.2 It will be apparent that we regard management accounting as being fundamentally concerned with management decisions. Such decisions exercised over some chosen period of time in terms of premium levels and underwriting standards will determine the quality of business taken on to the books during the period in question. In other words, in order to test those decisions we need to know the outcome of the business written during their currency.
- 13.3 We define a 'series' as the business written during an appropriate interval of time. A 'series account' is the financial outcome of a given series of business.

For the purpose of the present discussion we assume purely for convenience that each series functions over a time-interval of a calendar year. Thus we can speak of the '1974 series' as meaning the business written in the year 1974. We emphasize that the concept of a series-year is a limitation which we have adopted for ease of presentation; in practice there would be common circumstances when an interval of greater/less than one year would be appropriate (for example, motor insurers have in recent times tended to revise their premium rates at shorter intervals than one year; each distinct rating table and its period of operation may be regarded as a separate series).

- 13.4 It is characteristic of a series account that its impact extends beyond the period in which the business was written. For example, the 1974 series (i.e. business written in 1974) will contribute a sequence of cash flows and reserves to the revenue in 1975 and beyond.

This establishes the link between the series account and the revenue account. Successive series may be visualised as parallel sequences of overlapping flows: and the revenue account may be regarded as being constructed by taking a cross-section through the relevant series and accumulating the corresponding contributions.

These ideas may be illustrated by the following simplified schematic representation (which assumes that the run-off of each series extends forwards two years beyond the written period).



The 1976 revenue account is here seen as being composed of components of the series accounts for 1974, 1975 and 1976.

- 13.5 The relationship between the series account and the revenue account may be illustrated more specifically by the following form of presentation. We may single out any revenue item (for example, claims payments) and analyse it into a 'matrix' of columns and rows representing revenue years and series years respectively.

Series Year	REVENUE YEAR						Series Result
	1974	1975	1976	1977	1978	1979	
1974	900	550	200				1650
1975		1010	580	210			1800
1976			850	500	170		1520
1977				1100	650	240	1990
Revenue Total			1630	1810			

The manner in which the revenue account is composed of a 'cross-section' taken through successive series is clearly demonstrated. This type of 'matrix' analysis may be performed for every other item entering into the revenue account.

- 13.6 Having discussed the relationship between the series account and revenue account we now consider in greater detail the construction of a series account.

The attached Exhibit III provides a specimen layout of the form and content of a series account.

We envisage that the account for each series would be constructed initially at the end of the year of origin (i.e. 1974 in the case of the example). At that stage the complete run-off of the series would be part fact and part projection. At the end of each subsequent year the series account would be appropriately up-dated; until such time as the total factual experience were established (i.e. at the end of 1976 in the assumed conditions of the example).

- 13.7 Given a set of series accounts it is of course possible to construct the revenue account for any required year by simply summing-through the relevant series for the revenue year in question.

There is thus a complete basis of reconciliation between series and revenue accounting.

- 13.8 Examination of the accounts of a given series as it develops progressively from one year to the next should provide a valuable insight into the accuracy of the figures initially estimated.

Likewise, since it is possible to construct a revenue account from the component series, the retrospective up-dating of past revenue results in the light of the emerging facts may provide an enlightening (and sobering) view of the validity of the originally-published results.

- 13.9 Viewed in the context of the aims of management accounting the series account has the following uses -

- (a) It provides a means of projecting the outcome of the business written during a particular year (or other appropriate period); and hence establishes the initial profitability target of the premium rating and underwriting decisions of the period.
- (b) The progressive development of the actual experience of the series provides a test of the validity of the original decision assumptions; and a record of the extent to which the performance departs from the target profitability.
- (c) A review of the outcome (actual / projected) of successive series provides a basis for compiling the projected target results of the new series associated with current rating/underwriting decisions.
- (d) The feature that any revenue account (actual or projected) may be synthesised from the appropriate contributing series is a valuable planning aid.

- 13.10 The items appearing in Exhibit III are defined in the same way as in Exhibit I of Section 12. The form of presentation would enable the various items to be picked out and used in the construction of the relevant revenue accounts (see Section 13.7).

Alternatively; regarding each Series as a self-contained entity, we might for example view the question of reserves in a rather different light. The UFR (or URP) and reserve for outstanding claims could be combined into a single "actuarial" reserve since the distinction is not strictly necessary within a Series context. (See Section 14.8).

The Series presentation also highlights the principle that the reserving basis does not affect the profit of the Series; it only determines the rate of release of surplus.

EXHIBIT III

Series Account - 1974 Series

1. Date of Commencement of the series 2. Date of close of the series	1 January 1974 31 December 1974			Total run-off experience of the Series.
	Contribution of the series to the following revenue years :-			
	1974	1975	1976	
3. Premiums debited	2250	250	-	2500
4. Pipe-line premiums	250	-	-	
5. Premiums written	2500	-	-	2500
6. Unexpired premium reserve	1000	-	-	
7. Premiums earned	1500	1000	-	2500
8. Claims payments	900	550	200	1650
9. Reserve for outstanding claims	150	170	-	
10. Incurred claims	1050	570	30	1650
11. Commission paid	225	25	-	250
12. Pipeline commission	25	-	-	
13. Commission payable	250	-	-	250
14. Marginal management expenses	160	130	80	370
15. General expenses allocation	90	70	20	180
16. Investment income	45	50	5	100
17. Insurance profit = (7) - (10) - (13) - (14) + (15)	(5)	280	(125)	150

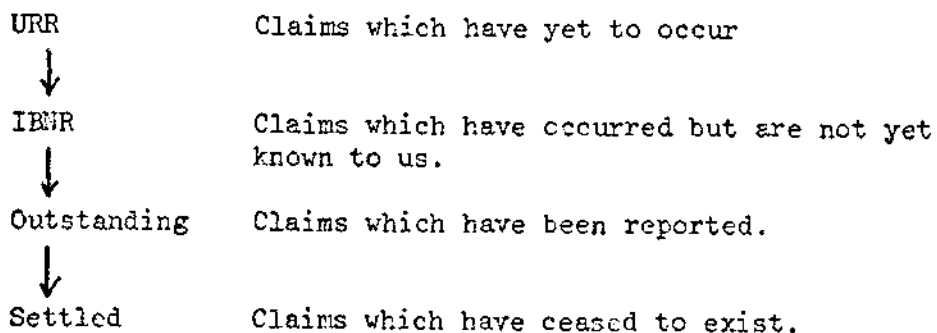
Management Accounting

Measurement of Profitability by Class of BusinessSection 14 - Concepts for Future Consideration.

- 14.1 S. Benjamin, in his paper presented to the Institute in March, initiated a debate as to whether the concepts developed by actuaries in life insurance are valid and useful in general insurance. Of particular interest for management accounts are the concepts of 'reserving bases' and 'new business strain', for it will be seen that many of the 'blurred edges' we have left can be clarified by the use of these concepts.
- 14.2 In our discussion of Unearned Premium Reserve we have hinted at the inconsistency of basing the reserve on the premiums written during the accounting period. Suppose that during the accounting period (assumed to be a calendar year) an office decides its premium rates are inadequate and increases them by 20 per cent from 1st July. It is suggested that the UPR at 31st December for business written in January to June needs to be grossed up to counteract the acknowledged inadequacy. Failure to do so merely imports the inadequacy into the reserves.
- 14.3 A recurrent problem has been the correct measurement at any point of time of amounts which cannot be precisely quantified e.g. Outstanding Claims. The actuary might well respond to these problems by setting up reserves on a basis which he was satisfied contained implicit margins, which would be released as surplus as the business progressed. It would be much more difficult to establish best estimates--this is a point of great importance. Thus, if we turn again to the format of the Revenue Account presented in section 3.5, the following changes could be made. Unearned Premium and Outstanding Claims are replaced respectively by a 'Reserve for Unexpired Risks' (calculated on a cautious basis whereas the Premiums will be on an optimistic basis) and a Reserve for Outstanding Claims which represents an upper quantile of the total amount; as a result 'profit' would better be described as 'surplus'.
- 14.4 The Reserve for Unexpired Risks is calculated so that it is estimated that no transfer of capital should be needed after inception to support business written; the difference on a risk between the Reserve at inception and the premiums less expenses is the 'new business strain' and this is the capital invested by the company to write the business. This new business strain is part of the contribution toward the overall solvency margin i.e. to the extent that the Unexpired Risk Reserve exceeds the UPR there is a notional allocation of the solvency margin between different year of account.

- 14.5 The Revenue Accounts should now however include investment income, since although different departments handle underwriting and investment there is essentially one business being operated. The insurer offers contracts under which he receives premiums in return for promising to meet defined contingent liabilities, and can therefore obtain additional income by gearing his capital up by the premiums for the period between payment of a premium and payment of a claim. The investment income might logically be allocated among the accounts in proportion to the Reserves (i.e. the sum of the Unexpired Risk and Outstanding Claims reserves averaged over the year). However, in order to obtain the rate of discount to be applied it is also necessary to make a notional allocation of investments between accounts. This is perhaps in conflict with our earlier suggestion of crediting a short term deposit rate, but in general insurance most contracts are single premium the only investment problem is reinvestment and some sort of matching seems easier than in life assurance!
- 14.6 At this stage it must be stressed that in order to have explicit bases for Reserves it is not strictly necessary to resort to elaborate statistical formulae, particularly for the Unexpired Risk Reserve. The reserves could even be arbitrary if they were consistent over the portfolio and independent of the premium rates.
- 14.7 Accounts of this form would of course show surplus rather than profit. Profitability could be developed either by asset share techniques in which the Reserves were recognised as a cost and the account compared with experience or by a series account which brought in the change of Reserves as a cost. Either of these methods would help management to establish what return they were obtaining on the different constituents of their portfolio, a factor which at present is almost impossible to determine.
- 14.8 Do we need to distinguish between unexpired risk reserve, IBNR and reserve for outstanding claims? This question appears to be posed by the Series account concept (see Section 13.10).

Consider the following conceptual scheme:-



Each claim passes through each of the above states and it might be argued that actuarially speaking the reserving basis need not be affected by the above 'labels'. Fundamentally, the reserve basis (which may or may not be the same as the premium basis) is implicitly specified at the moment that each policy is issued; and from that point onwards we are concerned only with the balance of reserve, i.e. the initial reserve less accumulated claims payments.

In a Series account we therefore start off with the total initial reserves under all the written exposures and derive the balance of reserve at any particular point in time as simply the total initial reserve less the accumulated payments to date. Such an approach will of course result eventually in the revelation of a surplus or deficit in the reserve basis (i.e. whether it was strong or weak); but it will not affect the Series profit, only the rate at which such profit emerges.

The point is that this approach completely dispenses with the division of the reserve into different components which are, in an actuarial sense, artificial.

Appendix A

As a background to the matters discussed in the paper we endeavour to provide in this Appendix a general impression of the extent to which companies within the industry may already have moved away from the simple revenue account by introducing some of the enhancements discussed in this paper.

For obvious reasons we have not been in a position to conduct formal or extensive enquiries. Furthermore the methods of presenting management accounts within an individual company may vary. Hence in presenting the information in this Appendix we would stress that it lays no claim to being a comprehensive or authoritative survey. Nevertheless we hope it may provide a reasonably faithful picture of the current state of affairs among leading companies.

The difficulty of attempting to summarise many different forms of presentation of accounts led us to concentrate on certain key aspects which form the subject of much of the paper's discussions. These are listed in the attached schedule which shows the numbers of companies (out of a total of 10 of which enquiry was made) currently practising each aspect in question. Inevitably there are difficulties in trying to condense the many variants in the treatment of accounts into a simple schedule of this nature; and the practices of individual companies did not always slot easily into the form adopted. Our interpretation of our respondents' replies therefore implies some qualification of the results as presented in the schedule.

We take this opportunity of acknowledging the help we received from various people in compiling the information.

	Number of companies practising item of II
(1) Maximum extent of breakdown of management accounts:-	
(a) Main Fire/Accident/Motor division	2
(b) Some other main division	0
(c) Individual classes of business	8
(2) Exclusion from current year's incurred losses of movements on prior years' estimates	4
(3) Adjacent presentation of several years' results in sequence	8
(4) Of (3), prior years' results retrospectively up-dated to allow for movements in estimates	2
(5) Distinction between "debited" and "written" premiums	2
(6) Apportionment of general management expenses to individual classes of business	7
(7) Transfer to/from contingency reserve for individual classes of business	2
(8) Allocation of investment income to individual classes or main business divisions	5
(9) Cost of solvency margin support charged to individual classes or main business divisions	0
(10) Analysis of revenue account into contributory policy-year / series results	0

Appendix B.

References

- (1) Property and Liability Insurance Accounting.

Edited by R. W. Strain

Published by The Merritt Company for I A S A

- (2) Report of the Inflation Accounting Committee

(F.E.P. Sandilands)

H.M.S.O.

- (3) General Insurance - Inflation and the Unearned
Premium Reserve

Note by T. J. Matthews in GIRO 3.

(See also comments by G. B. Hey and W. R. Rowland in GIRO 4).