EFFECTIVE MANAGEMENT INFORMATION

(EMI)

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SUMMARY

This paper provides a preliminary introduction to Effective Management Information (EMI) for general insurance companies. We first consider what is meant by EMI in the context of a general insurance company, and then give some examples of EMI that could be used by a direct insurance company. We have structured our thinking by considering the different *users* of EMI within such a company (Eg Board of Directors, underwriter, claims manager etc.) followed by the *functions* that these users perform, and finally by the *types* of EMI that might help with these functions. The examples are intended as a starting point for the design of an EMI system, and the tables will require tailoring for use in practical situations.

We believe that, although EMI is not strictly "actuarial", actuaries do have a contribution to make in this field. Through their involvement with some of the key financial aspects of a company (Eg reserving and pricing), they can identify the important driving forces, and hence design appropriate EMI systems. Furthermore, a genuinely effective management information system can enhance the actuary's performance, and in turn the company's.

EMI WORKING PARTY

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1. Introduction

There is a school of thought that believes that the most profitable companies have the best management information (MI) systems. This does not mean that having a good MI system will instantly lead to profits, although the opposite seems to be true, as most companies that have got into difficulties in recent years appear to have frequently had very poor management information systems.

Regardless of whether there is a genuine causative link between profitability and quality of MI system, we are convinced that an effective management information system can have a significant influence on the ability of a company to achieve its objectives. This applies to all areas of industry, not just insurance We are, however, concentrating on the general insurance market in this paper - but we think that many of the points made could be carried across to the life insurance market, as well as other industries.

Our motivation for writing this paper was twofold. First, the subject matter has not yet been widely discussed in actuarial circles, and secondly most general insurance companies' management information systems are generally of poor quality. Many of these systems are not really "systems", but rather a somewhat haphazard collection of often voluminous computer-generated documents, from which it is impossible to discern the proverbial wood from the trees.

As with most GISG working parties we have set our own terms of reference, which can be best summarised by setting out what we aim to do in the remainder of this paper:-

- discuss what we mean by EMI and assess whether actuaries have a role to play in designing EMI systems;
- discuss the types of EMI that are relevant for direct insurance;
- provide examples of EMI tables;
- consider briefly the types of EMI that reinsurers might use.

We have frequently used the example tables to explain various points. We hope to generate debate on the items that should be included in tables used for EMI, as well as on different ways of analysing certain issues. We do, however, appreciate that some of this information may be commercially sensitive.

We recognise that our treatment of some of the different types of EMI

that might be used by a company is superficial. This is partly because in practice, any individual piece of EMI will need to be tailored to the specific company and purpose for which it is designed. A separate paper could probably be written on each type of EMI that we address. We are concerned with the principles of EMI, and have provided some examples of EMI tables, which could serve as the starting point for design of tables for use in practice. Where possible, we have sought the views of the various users of EMI within our own companies.

Although the design and implementation of the computer systems that are used to produce EMI is an important topic in this area, we expect this to be the subject of another GISG working party in future, and hence we only refer to it briefly in this paper.

2. What is EMI ?

When considering this subject in isolation, it is tempting to begin by thinking of specific types of table etc., which will help with a particular problem (eg monitoring new business growth). However, before doing so, we must first ask ourselves what we mean by "effective management information". We have derived one possible definition that will serve as a useful starting point for the rest of the paper:-

"Knowledge or data, presented in a way that enables the recipients to understand their business more fully and hence assist them in making decisions."

Traditionally, most management information systems have concentrated on the financial performance of the company. However, it is also important to monitor the non-financial aspects of a company's operation such as customer satisfaction, so as to get a more complete picture of a company's current and likely future performance. This can be achieved by the "balanced scorecard" technique which is designed to give managers a balanced presentation of both the financial and operational measures.

It is informative to consider the possible criteria that we can use to judge whether a particular piece of management information is "effective". Possible examples of suitable criteria are:-

- presentation must aid interpretation;
- linked to the decision making process;
- can be interpreted in a short space of time;
- breadth then depth;
- regularly updated at appropriate times;
- sufficiently accurate for its purpose;
- cost effective.

The exact style and format of the EMI are often a matter of personal choice, and preferably will be designed to be consistent with other reports and documents produced within the company. The use of tables, graphs and charts are obvious choices, but a series of questions and answers can also be beneficial, particularly for EMI to be used by senior managers, who may find that such an approach enables them to get a quick overview of a wide range of issues within the company. Another approach is to use a filtering technique so that only those figures which are outside predefined limits are highlighted.

Where appropriate, the use of computerised on-line systems can provide more up to date and relevant information than a batch report-based approach.

In designing EMI tables for use in practice (be they on a computer screen in an on-line system or on paper for a batch system), it will be necessary to allow for the particular circumstances of each situation, but we believe that the example tables included in the paper will serve as a useful starting point for a discussion of the type and style of reports to be used.

As a subject on its own, management information is not particularly actuarial. However, an actuary's training teaches him/her to think in a way that is of use in designing EMI systems, where one of the key elements is assessing the genuine information needs of the company. Furthermore, as a user of EMI within a company, the actuary may have a contribution to make to those areas of the company that are not traditionally actuarial (Eg Claims department), but which could provide benefit in traditional actuarial areas (Eg pricing and reserving).

For general insurance purposes, many of the variables which are monitored are in fact estimates rather than known figures, and it is important that the relevant pieces of EMI make this clear. Where appropriate they should also give an indication of the uncertainty, which can be vital for informed decision making.

3. EMI for insurers

3.1 Introduction

This section discusses possible types of EMI that might be useful to a direct insurance company. This covers the spectrum from small UK based companies, writing perhaps one or two classes of business, to those that write all classes and operate in a number of territories with a number of different operating companies. We do not include any specific consideration of the EMI requirements of insurance units within banks and/or building societies, but many of the issues raised will also be relevant to this type of company.

We have attempted to structure our thinking by considering the various *users* of EMI within a company, followed by the various key *functions* that each user carries out, and finally to consider the *types of EMI* that might assist the user with each function he performs. The users within a company that we consider in this paper, with their key functions (for which EMI has a role to play) are summarised in the table overleaf.

Table 1

Summary of EMI users and their associated functions

User	Key Functions
Board and Senior Management	• Ensuring adequate return on capital; • Strategic analysis/decision making; • Allocation and raising (or returning) of capital.
Underwriting	• Pricing and Selection of risks; • Monitoring accumulations; • Monitoring growth/profitability; • Assessment of expenses; • Purchasing of outwards R/I.
Claims Manager	• Control overall cost of claims; • Satisfying needs of customers; • Apply appropriate claims management practices.
Reserving Manager	• Recommend "best" estimates of reserves; • Recommend published reserves(if different).

To focus on the users listed above, we have omitted certain other users within a company, such as Marketing / Sales and Investment. However, some of the different types of EMI that we discuss are likely to be of some benefit to these users (eg Marketing / Sales could use analysis of quotations accepted/declined).

Where the balanced scorecard approach is used, then consideration of the EMI required for each of these users can be useful in deciding upon which measures to bring forward to the scorecard.

3.2 EMI for Insurers - Board and Senior Management

This section provides only a very general discussion of the EMI requirements of the Board and senior management. This is due to their inevitably wide role within the company. In theory, any piece of EMI used within the company could be of use to them. However, a test of whether an EMI system is genuinely *effective* is whether it can provide information on the four or five key issues that are relevant to the company at any particular time. A system that can do this can be of real benefit to the board and senior management, by helping them to focus on these key issues.

The balanced scorecard technique can be of particular benefit to this category of EMI user, who need to get an overview of the company's operation. The technique looks at the company from four key perspectives:-

- Customer (ie how do the policyholder's view the company ?);
- Internal processes (ie how efficient is the company ?);
- Financial (ie what is the past performance like ?);
- Organisational (ie what is the ability of the company to innovate and learn ?).

This technique is useful in monitoring the impact of certain courses of action as viewed from these four perspectives. We do not discuss the balanced scorecard any further here, but further details can be found in the article "The Balanced Scorecard - Measures That Drive Performance" in the Harvard Business Review Jan-Feb 1992.

3.2.1 Functions of the Board and Senior Management

The main role of the Board of a UK proprietary insurer is to look after the shareholder interest. In carrying out this role they will be interested in the following:-

- ensuring they obtain adequate return on capital for the level of risk accepted;
- ensuring that the level of risk accepted is in line with shareholder's expectations;
- protecting the capital of the company;
- raising of additional capital;
- authorising and monitoring expenditure;
- production of accounts;

- recommending and payment of dividends;
- ensuring compliance with the relevant legislation and regulations;
- setting of guidelines for, and monitoring of, the executive.

Many of these functions will of course be delegated to the relevant departments within the company and much of the information gathered to enable the board and senior management to complete the various tasks will be retained within the departments, with only summarised versions being passed on.

In the remainder of this section we will look briefly at three specific functions of the board. The first of these concerns their responsibilities with regard to achieving an adequate return on capital for shareholders. Secondly, we consider a company in which the board has responsibility for monitoring a number of different territories, where we look at the information which could be used to monitor each territory. Finally, we consider the type of information that a board might use to assess a possible new venture.

3.2.2 Return on Capital

In this section, we give a brief consideration to one particular aspect of investment that is of particular concern to an insurer - the use of return on capital as a measure of profitability. This will be one of the key pieces of high level EMI that many companies will use, and which the board and senior management are likely to focus on. First, let use define the shareholder's starting point:-

- We assume that they are portfolio investors, for whom the natural investment is a diversified portfolio of equities.
- Any decision to invest in an insurance company or inject marginal capital into an insurance company must enhance the return to the investor (taking proper account of tax, transaction costs etc.) compared to that from the diversified portfolio.
- Hence in considering return on capital as a measure, the "return" part, or numerator of the ratio is this additional return which the investor will want in excess of that obtained from the diversified portfolio.

So what does this additional return consist of ? We would suggest:-

- The additional insurance return in the year (in cash or otherwise is debatable) less

- Capital costs (including any tax disadvantages compared with the diversified portfolio) less
- Any reduction in return that could result from investment restrictions (such as, for policyholder protection, the requirement to hold some investments that may be sub-optimal in the long run).

Hence, some of the insurance return is required to meet these, essentially capital costs. The remainder gives us this additional return referred to above. In theory, the additional return should compensate for the risk that the capital is put to compared with the alternative, as well as the inflexibility of putting capital into an insurance company. It should therefore be "significant". The actual level that is deemed acceptable is a matter for some debate, which we believe is beyond the scope of our paper. In deciding on an appropriate return on capital, the EMI that will be required by managers would, however, include:-

- the capital used by each portfolio;
- the capital costs, in terms of the threshold return from insurance needed across the cycle, of keeping the capital in the insurer;
- the expected (or target) insurance return across the cycle, and hence,
- the required insurance return when the cycle permits insurance to be written.

3.2.3 Monitoring Territories

Information would be supplied to the board on a regular basis, in an agreed format. In some cases, this information would be transferred electronically to the group head office.

The information from each territory would then be summarised for use by the board and senior management. An example of two types of suitable EMI for monitoring a territory is given overleaf.

The first of these (Report 1 - "Managing Directors monthly report") provides a very quick overview of the key financial performance of the territory, together with a summary of the key operating statistics. The report is clearly very high level, and may easily conceal some important trends in the territory concerned. This makes the precis of the commentary provided by each territory an important part of the report. Guidelines may be required so as to ensure that the board are kept aware of important developments in each territory.

The second report goes into slightly more detail, and would not necessarily

be passed to the board, unless specific questions arose for that territory. As well as monitoring the underwriting position, this report gives a comparison of actual versus planned or forecast for a number of items, such as operating profit, reserve levels and key ratios. The report conveniently summarises each territory, which ideally should each use the same format for ease of comparison.

TERRITORY MONITORING : REPORT NO. 1 (Managing Director's monthly report)

TERRITORY _____ MONTH _____

[All figures are pre–tax]

KEY FINANCIAL DATA

During month					Full Year			
1994			Previous Year Actual	£m	1994			Previous Year Actual
Actual	Previous Forecast	Plan			New Forecast	Previous Forecast	Plan	
				Written Premiums				
				Earned Premiums				
				Expenses: Employment				
				Other				
				Investment : Income				
				realised gains				
				Unrealised gains				
				Claims Incurred				
				Operating profit				
				Operating cash flow				

KEY OPERATING STATISTICS

				Premium Growth				
				Lapse Ratio				
				Head Count				
				Investment return				
				Annualised Income				
				Embedded Value Growth				
				Return On Equity				

[A management narrative would be provided with this table which would be a summary of that supplied to Head Office from each territory. This would include explanation of the figures, including reasons for divergence from planned, or why new forecasts are required]

TERRITORY MONITORING : REPORT NO. 2 – Page 1

TERRITORY _____ MONTH _____

The following is an example of some of the information that would be supplied by each territory. [All figures are pre–tax].

Net Underwriting Position

	Written Premium	Earned Premium	Expenses	Commission	Claims Incurred	Underwriting Balance
Household						
Private Car						
Other Personal						
Commercial Property						
Commercial Liability						
Commercial Motor						
Commercial Other						
Marine						
Total Personal						
Total Commercial						
Total						

Claims incurred is defined as Claims Paid – Reserve Movements
The actual breakdown would depend on the types of business written in each territory
Separate figures could be provided for Deferred Acquisition Costs.
The year to date figures would also be sent in or derived at Group Head Office.

COMPARISON AGAINST PLAN \ FORECAST

The following comparison would be performed for each unit.

	MONTH IN ISOLATION				FULL YEAR			
UNIT: HOUSEHOLD	Actual	Previous Forecast	Plan	Prev' Yr Actual	New Forecast	Previous Forecast	Plan	Prev' Yr Actual
Written Premium								
Earned Premium								
Expenses								
Commission								
Claims Incurred								
Underwritting Balance								

TERRITORY MONITORING : REPORT NO. 2 – Page 2

TERRITORY _____ MONTH _____

OPERATING PROFIT

It would also be possible to to split investment income and gains between units and produce an operating profit for each unit.

	MONTH IN ISOLATION				FULL YEAR			
ALL UNITS	Actual	Previous Forecast	Plan	Prev' Yr Actual	New Forecast	Previous Forecast	Plan	Prev' Yr Actual
Underwriting Balance								
Investment Income								
Investment: realised G								
Investment: Unrealised G								
Profit Before Tax								

A schedule would also be provided giving a breakdown of the investments, investment income and gains.

The following comparisons would be performed for each unit.

RESERVES

		FULL YEAR			
Unit: Household	Actual	New Forecast	Previous Forecast	Plan	Prev' Yr Actual
Premium Reserve					
Claim Reserve					
Technical Reserves					

KEY RATIOS

			FULL YEAR			
Unit: Household						
Underwriting Ratios	Month	YTD	New Forecast	Previous Forecast	Plan	Prev' Yr Actual
Loss Ratio						
Commission Ratio						
Expense Ratio						
Operating Ratio						

		FULL YEAR			
Unit: Household					
Reserve Ratios	Actual	New Forecast	Previous Forecast	Plan	Prev' Yr Actual
Premium Reserve Ratio					
Claim Reserve Ratio					
Total Reserve Ratio					

3.2.4 Assessment of a proposed venture

In general terms, a board would make decisions regarding whether the company should proceed with a new venture or continue with an existing one, on the basis of either a presentation from the relevant senior manager, or on the basis of information contained within a report, or both. The type of information which would be contained in such a report is summarised below:-

- nature and background of the venture, including how this fits in with the existing strategy of the company;
- outlook for the market concerned, including competitor analysis, political, economic and legislative environment;
- for a takeover or merger, the quality of the company being considered, including management, image and details of financial commitments;
- cash flow analysis;
- expected rates of return, and sensitivity to key risk factors;
- cost and source / availability of capital;
- analysis of risks involved;
- an auditors assessment if it is an existing business;
- comments from solicitors on articles, contracts and other legal issues;
- actuarial reports on level of reserves, if it is an existing company;
- taxation and corporate structure;
- opinions of professionals working in the industry concerned;
- alternatives.

Clearly, each report would vary depending on the venture being considered, but the above list gives a summary of some of the key issues which are likely to be considered in such a report.

3.3 EMI for Insurers - Underwriters

In this section we consider the different types of EMI that an underwriter might find useful in respect of analysing the business that has already been written. We are not concerned with the detailed information that an underwriter might collect in respect of a particular risk or group of risks that he is considering whether to insure, other than that which can be gleaned from the past experience (and projections thereof).

The key requirement of EMI for use by the underwriters is that it should help them to identify features and trends in their portfolio, so that they can take whatever action is required as soon as possible. For example, having the EMI systems available which enable a company to make changes in, for example, their rating structure, before too much business is put on the books at potentially unprofitable rates, will help the underwriter maximise the profitability of his account.

3.3.1 Underwriting functions

It is clear that the precise functions of an underwriting department can vary between companies. Some companies may have statisticians and / or actuaries involved in the pricing of contracts, which would normally be seen as one of the key functions of the underwriters, whereas others may not. It is very difficult to generalise, but we have attempted to set out the main functions of the underwriting departments, for which analyses of past business might assist. These are listed below:-

- pricing of risks;
- selection of risks (including design of contracts and control of volumes);
- control of expenses;
- monitoring accumulations;
- purchase of outwards reinsurance.

To illustrate the types of EMI which could be used to assist with these functions, we now consider the first two functions.

3.3.2 EMI for pricing and selection of risks

Although there will be common requirements for different classes of business, the exact nature of the EMI will vary by class of business. As an example, we consider a Motor Account. Items which might be considered

useful are:-

1) Claim frequency.
2) Average claim amounts.
3) Business volumes (including lapse / renewal / new business information).
4) Paid, incurred and estimated ultimate loss ratios.
5) Claim notification and settlement patterns.
6) Analysis of rating factors.

Each of these could be broken down by

- Broad category of business (Private Car ; special/large schemes ; commercial vehicles)
- Comp/Non-comp
- Broker, if relevant
- Branch office, if relevant

Additionally, items 1), 2) and 5) could be broken down by:-

- Claim type (Fire ; Theft ; Windscreen ; AD ; TPPD ; TPBI)
- Claim size (Eg > 100k ; > 50k; > 0)
- Origin period (Year ; Quarter ; Month of Accident)
- Development period (Year ; Quarter ; Month of development)

Examples of some possible management reports (with fictional entries) are as follows:-

Report No.	Description
1	Claim frequency (Theft only)
2	Average Claim (Theft only)
3	Loss Ratio development
4	Renewal rates
5	New business rates
6	Quotation analysis
7	Rating Factor analysis

Example Reports 1. and 2. - Claim frequency and Average

The claim frequency tables allows an assessment to be made of:-

- The theft claim frequency by accident year.
- The trend in theft claim frequency across accident years.
- The difference between Comp and Non-Comp theft frequency.
- The delays in stabilisation of theft frequency for each year of accident.

Report No. 2 uses the same format and allows the same assessments to be made of the Average cost per theft claim.

Similar tables would also be produced for the other types of claim.

Example Report 3 - Loss Ratio

This report uses the triangle style format for loss ratio development, with a monthly development for the first year, quarterly for the next two years and annually thereafter. This gives the underwriter information early in the development of the account so that he can take corrective action if necessary. Although the table uses accident year, a "rate set" cohort could also be used to test the effect of any rate changes. Clearly several other breakdowns could be used to analyse the account.

EMI FOR UNDERWRITERS : EXAMPLE REPORT NO. 1

Report type : Claim frequency (Cumulative)

Business category : Private Car

Position as at : 31-Dec-1993

Claim type : Theft

Units : Percentage

Comprehensive

Quarter	Year of accident				
	1989	1990	1991	1992	1993
1	0.55	0.67	0.77	.	.
2	0.66	0.69	.	.	.
3	0.87	0.71	.	.	.
4	1.43	.	.	.	.
5	.	.	.	.	
6	.	.	.	.	
7	.	.	.	.	
8	.	.	.		
9	.	.	.		
10	.	.	.		
11	.	.	.		
12	.	.			
13	.	.			
14	.	.			
15	.	.			
16	.	.			

Non-Comprehensive

Quarter	Year of accident				
	1989	1990	1991	1992	1993
1	0.56	0.78	0.56	.	.
2	0.78	0.91	.	.	.
3	0.91	0.94	.	.	.
4	1.12	.	.	.	.
5	1.34	.	.	.	
6	.	.	.	.	
7	.	.	.	.	
8	.	.	.		
9	.	.	.		
10	.	.	.		
11	.	.	.		
12	.	.			
13	.	.			
14	.	.			
15	.	.			
16	.	.			

EMI FOR UNDERWRITERS : EXAMPLE REPORT NO. 2

Report type : Average Claim (Cumulative)

Business category : Private Car

Position as at : 31–Dec 1993

Claim type : Theft

Units : Pounds Sterling

Comprehensive

Quarter	Year of accident				
	1989	1990	1991	1992	1993
1	400	345	452	.	.
2	412	367	.	.	.
3	456	387	.	.	.
4	567	.	.	.	.
5	588	.	.	.	
6	.	.	.	.	
7	.	.	.	.	
8	.	.	.		
9	.	.	.		
10	.	.	.		
11	.	.			
12	.	.			
13	.				
14	.				
15	.				
16	.				

Non–Comprehensive

Quarter	Year of accident				
	1989	1990	1991	1992	1993
1	213	178	235	.	.
2	224	188	.	.	.
3	256	190	.	.	.
4	298	.	.	.	.
5	301	.	.	.	
6	.	.	.	.	
7	.	.	.	.	
8	.	.	.		
9	.	.	.		
10	.	.	.		
11	.	.			
12	.	.			
13	.				
14	.				
15	.				
16	.				

EMI FOR UNDERWRITERS : EXAMPLE REPORT NO. 3

Report type : Loss Ratio **Report Date :** 31-Dec-1993

Business category : Private Car **Comp/Non-C:** Comp

Units: Cumulative Claims / Cumulative Premiums * 100

Data : Paid Claims Loss Ratio

Period	Underwriting year 1989	1990	1991	1992	1993
M1	1.00	0.40	2.00	.	.
M2	2.00	7.00	.	.	.
M3	5.00	19.00	.	.	.
M4	20.00	.	.	.	.
M5	30.00	.	.	.	.
M6	50.00	.	.	.	.
M7	.	.	.	.	.
M8	.	.	.	.	.
M9	.	.	.	.	.
M10	.	.	.	.	.
M11	.	.	.	.	.
M12	.	.	.	.	.
Q5	.	.	.	.	.
Q6	.	.	.	.	.
Q7	.	.	.	.	.
Q8	.	.	.	.	.
Q9	.	.	.	.	.
Q10	.	.	.	.	.
Q11	.	.	.	.	.
Q12	.	.	.	.	.
Y4	.	.	.	.	.
Y5	.	.	.	.	.
Y6	.	.	.	.	.

Data : Incurred Claims Loss Ratio

Period	Underwriting year 1989	1990	1991	1992	1993
M1	5.00	10.00	7.20	.	.
M2	10.00	20.00	.	.	.
M3	50.00	30.00	.	.	.
M4	55.00	.	.	.	.
M5	56.00	.	.	.	.
M6	57.00	.	.	.	.
M7	.	.	.	.	.
M8	.	.	.	.	.
M9	.	.	.	.	.
M10	.	.	.	.	.
M11	.	.	.	.	.
M12	.	.	.	.	.
Q5	.	.	.	.	.
Q6	.	.	.	.	.
Q7	.	.	.	.	.
Q8	.	.	.	.	.
Q9	.	.	.	.	.
Q10	.	.	.	.	.
Q11	.	.	.	.	.
Q12	.	.	.	.	.
Y4	.	.	.	.	.
Y5	.	.	.	.	.
Y6	.	.	.	.	.
Est'd Ult	.	.	.	.	.

Example Reports 4, 5 and 6 - Renewal, New Business and Quotation reports

There are a number of different types of reports that one could use for analysis of these issues. We have given just three examples which are useful in practice.

Report 4 allows the renewal rate to be monitored for each renewal month. The table includes some information on the delays to renewal acceptance being processed. This represents a summary of a more detailed table which would be used to estimate the ultimate number of renewals for each month (Eg via standard triangle-based methods). These estimates would need to take into account any changes in rates or other market features which would result in the past renewal pattern not being repeated. Such an analysis would of course be done for different sub-groups of business, so that, for example, the impact on retention rates of a rate review of young drivers could be assessed.

An analysis of renewals should also look at the rating factors of those that lapse compared to those that renew. This can provide valuable insight into the premium rates, relative to the market at the time at when the renewal was invited. An extension of this would involve collating information on the lapsed policyholders (possibly via survey) to establish their reason for lapse, which may not always be based purely upon cost.

Report 5 gives an example of how new business might be monitored. This table assumes that number of quotations provided cannot be easily obtained, such as for many broker-based companies. For Direct selling companies the situation is different this is dealt with in Report 6 - Analysis of quotations accepted/declined.

Assuming that the spread of policyholders by rating factor is similar for new business quotations compared with renewals (and that the rating structure is the same) then the number of renewals invited serves as a reasonable denominator to use for calculating the new business rate. Report 5 would be produced for different rating factor sub-groups to analyse the effect of any new marketing efforts or rate changes.

Analysis of renewals and new business using other obvious breakdowns such as broker or branch would also be useful.

Report 6 is for use in the case where the number of quotations can be analysed, such as a direct selling company that records information on all

quotes provided. The format is similar to Report 5, except that of course the denominator is the number of quotations given. Where there are delays between quotations given and quotations being processed as incepting, then this table could easily be amended to show the build up by delay. Use of a report of this form would allow analysis to be carried out, broken down by:-

- Telephone operator (for direct selling by 'phone to monitor operator performance)
- Day/week/month (to analyse trends)
- Source of caller's enquiry (for assessment of marketing efforts)
- Rating factors
- Rate set

Analysis by rate set (ie different rating structures or levels) can be taken one stage further by changing rates (by a reasonably small amount !) and assessing the impact on proportion of quotes accepted, so as to give an idea of the price / demand relationship. Analysis of this by rating sub-group can also be sued to assess how the price / demand relationship varies by sub-group.

Additionally, if information on quotes which the customer has received from other companies can be collected, then this could be analysed to make a limited assessment of rates relative to the market. However, we know of at least one computer system that is commercially available to the non-Direct selling companies which gives them information on competitor's rates and rating structure.

If possible, the analysis of renewals, lapses and new business should be made using a multiway analysis in a statistical package such as GLIM. Factors which could be used to explain variations in these rates would include rate set, month, major rating factors etc. This will help identify the important factors which influence the retention and new business rates.

EMI FOR UNDERWRITERS : EXAMPLE REPORT NO. 4

Report type :	Renewal
Business category :	Private Car
Report Date :	10 April 1994

Year : 1993

Renewal Month	No. renewals invited	No. Renewals accepted by "R" 0	1	Ult	Renewal rate by "R" 0	1	Ult
J	13,000	1,300	6,000	6,500	10%	46%	50%
F	11,000	3,300	7,200	7,700	30%	65%	70%
M	16,000	1,600	7,700	8,000	10%	48%	50%
A	14,000	4,200	*8,950*	9,800	30%	64%	70%
M	15,000	.	.	.	.	.	.
J	14,000	.	.	.	.	.	.
J	17,000	.	.	.	.	.	.
A	15,000	.	.	.	.	.	.
S	14,000	.	.	.	.	.	.
O	17,000	.	.	.	.	.	.
N	17,000	.	.	.	.	.	.
D	14,000	.	.	.	.	.	.
All	177,000	.	.	.	.	.	.
TARGET	NA			123,900			70%

Year : 1994

Renewal Month	No. renewals invited	No. Renewals accepted by "R" 0	1	Ult	Renewal rate by "R" 0	1	Ult
J	14,000	1,540	6,900	*7,280*	11%	49%	*52%*
F	12,000	3,840	8,500	*9,000*	32%	71%	*75%*
M	17,000	2,381	*7,790*	*8,670*	14%	*46%*	*51%*
A	.	.	.		.	.	
M	.	.			.		
J							
J							
A							
S							
O							
N							
D							
All(to date)	43,000	7,761	*23,190*	*24,950*	18%	*54%*	*58%*
TARGET	NA			30,100			70%

Notes: "R" = Time (months) between renewal invited and renewal being processed as taken up.
"Ult" represents ultimate number of renewals taken up for each renewal month. When in italics, this is an estimate (Eg 8670 for March 1994)

EMI FOR UNDERWRITERS : EXAMPLE REPORT NO. 5

Report type :	New business
Business category :	Private Car
Report Date :	10 April 1994

Year: 1993

Renewal month	No. renewals invited	New business incepted by month "R"			New business rate (per renewal) by month "R"		
		0	1	Ult	0	1	Ult
J	13,000	440	560	700	3.4%	4.3%	5.4%
F	11,000	340	440	600	3.1%	4.0%	5.5%
M	16,000	658	734	900	4.1%	4.6%	5.6%
A	14,000	582	660	780	4.2%	4.7%	5.6%
M	15,000	.	.	.	.	.	.
J	14,000	.	.	.	.	.	.
J	17,000	.	.	.	.	.	.
A	15,000	.	.	.	.	.	.
S	14,000	.	.	.	.	.	.
O	17,000	.	.	.	.	.	.
N	17,000	.	.	.	.	.	.
D	14,000	.	.	.	.	.	.
All	177,000	.	.	.	.	.	.

Year: 1994

Renewal month	No. renewals invited	New business incepted by month "R"			New business rate (per renewal) by month "R"		
		0	1	Ult	0	1	Ult
J	14,000	534	621	*704*	3.8%	4.4%	*5.0%*
F	12,000	448	536	*621*	3.7%	4.5%	*5.2%*
M	17,000	678	*723*	*860*	4.0%	*4.3%*	*5.2%*
A	–						
M	–						
J	–						
J	–						
A	–						
S	–						
O	–						
N	–						
D	–						
All (to date)	43,000	1,660	*1,880*	*2,205*	3.9%	*4.4%*	*5.1%*

Notes : "R" = Time between new business inception date and new business being processed.
Figures in italics are estimates

EMI FOR UNDERWRITERS : EXAMPLE REPORT NO. 6

Report type :	Quotations analysis
Business category :	Private Car
Rate Set :	Jan 1994 (First)
Report Date :	10 July 1994

Rating subgroup : 001

Quotation Month	No. of quotes given	No. taken up	New business % (per quote)
J	13,450	500	4%
F	11,345	567	5%
M	16,789	789	5%
A	13,456	667	5%
M	.	.	.
J	.	.	.
J	–	–	–
A	–	–	–
S	–	–	–
O	–	–	–
N	–	–	–
D	–	–	–
All (to date)	55,040	2,523	4.58%
TARGET	60,000	3,000	5.00%

Rating subgroup : 002

Quotation Month	No. of quotes given	No. taken up	New business % (per quote)
J	13,000	567	4%
F	13,456	789	6%
M	16,783	1,134	7%
A	15,678	1,238	8%
M	.	.	.
J	.	.	.
J	–	–	–
A	–	–	–
S	–	–	–
O	–	–	–
N	–	–	–
D	–	–	–
All (to date)	58,917	3,728	6.33%
TARGET	50,000	2,500	5.00%

Example report 7 - Rating factor analysis

This report gives an example of a simple one-way rating factor table. The rating factor could be any relevant factor that is used. The report allows a number of key variables to be seen for each rating factor category. Office premium in the table is the risk premium (that is Claim frequency * Average incurred claim) loaded for expenses and adjusted for average NCD. Trends across accident years can easily be monitored by producing a series of tables for each accident year.

In practice this table would be expanded to give a breakdown by claim type. It may also be useful to remove any distortions caused by large claims. Furthermore, in order to remove distortions caused by differences in the mix of other rating factors between categories of the factor being analysed, the table should also include some form of standardised figures that have been adjusted for these differences. This could be achieved using a statistical model fitted to the data, so as to derive standard rating factor relativities.

If such a model has been fitted to the data, then tables that compare the modelled to the actual premium relativities will help the underwriter assess whether the premium rating structure needs amending.

EMI FOR UNDERWRITERS : EXAMPLE REPORT NO. 7

Report type :	Rating Factor analysis
Business category :	Private Car Comprehensive
Accident Year :	1993
Report Date :	10 July 1994
Rating Factor :	Any

Item	Rating factor category					
	1	2	3	4	5	All
Key inputs						
Vehicle Years	5,321	7,982	.	.	.	33,258
Earned Premium	1,561,814	2,186,539	.	.	.	9,370,883
Incurred claims	1,201,611	1,922,577	.	.	.	7,810,470
Number of Claims	1,652	2,478	.	.	.	10,325
Earned Commission	324,517	551,678	.	.	.	2,190,488
Avg NCD%	38.70%	42.60%	.	.	.	50.00%
Key variables						
Loss Ratio	76.94%	87.93%	.	.	.	83.35%
Avg Earned Premium	294	274	.	.	.	282
Commission rate	20.78%	25.23%	.	.	.	23.38%
Claim frequency	31.05%	31.04%	.	.	.	31.05%
Avg Incurred claim	727	776	.	.	.	756
Risk Premium	226	241	.	.	.	235
RP as % of overall RP	96.16%	102.56%	.	.	.	100.00%
Office Premium	677	723	.	.	.	748
OP as % overall OP	90.57%	96.60%	.	.	.	100.00%

3.4 EMI for Insurers - Claims Manager

In this section we cover the EMI which would be useful to a claims manager in running his department. Much of this information is of direct use in the global (ie not case specific) reserving process and hence is of particular relevance to whoever is responsible for the aggregate claims reserving. Some of the EMI is of direct benefit to other departments, and an actuary responsible for reserving should have access to this information.

3.4.1 Functions of the Claims Manager

As we see it the main functions are:-

a) Applying appropriate claims management practices.
b) Controlling the overall cost of claims. This consists of:-

(i) keeping the claim payments to a minimum, but acceptable level.
(ii) subject to (i), keeping the claim handling expenses to a minimum.
(iii) producing case estimates which are as accurate as possible, so that the insurer encounters the minimum of unexpected claim payments.

c) Satisfying the needs of customers who submit a claim.

Applying appropriate claims management practices would involve, for example:-

- monitoring trends of quantities such as cost of claim settlements, cost of incurred O/S claims, claim settlement patterns, claims expenses and case estimates over periods of time and over classes of business and types of claims;

- comparing these trends, if possible, with those of other insurance companies;

- being aware of the effect of claims cost on the profitability of the company;

- monitoring the claims cost and claims expense experience of competitors;

- keeping informed of market practices as regards claims handling policy (e.g. settling claims by a structure system, using approved repairers), so that the insurance company does not fall out of line with those practices.

It is rather difficult to develop EMI tables which would help directly with applying these practices. However, we have set out below seven examples of tables which will be of benefit in carrying out functions b) and c), which will also be of benefit in employing appropriate claims management practices.

Table 1 - Claim Payments

Table 1 is designed to assist the claims manager in keeping claim payments down to a minimum acceptable level (3.4.1b(i)). The table shows the extent to which the average claim payments have been kept under control in relation to previous years and the industry as a whole.

Average claim payments should be considered in relation to claim numbers as years / classes which experience small numbers of claims can easily give rise to large average claim payments.

The trend of average claim payments can differ for small and large claims, therefore if possible the information should be banded by size of claim. In this example the information is separated into two claim size bands, however, more than two bands could be used if appropriate.

Information on claim payment information will need to be given separately for each class of business or at least for each homogeneous group of classes. In practice, it may be difficult to obtain useful industry data, but if it can be obtained, then it is important to use common business classifications and definitions of average claim, so as to facilitate valid comparisons.

In this example the information is indexed by year of origin. However, year of notification or underwriting year could also be used, depending on the specific purpose of the analysis.

Examples of EMI for Claims Manager

1. Information on Claims payments: Change over period
comparison with rest of industry

DTI Auth Class X / Company's class X

			Year of Origin						
			1988	1989	1990	1991	1992	1993	1994
All claims	Number	company							
	mean payment per claim	company							
		industry							
	median payment per claim	company							
		industry							
Claims <= £K	Number	company							
	mean payment per claim	company							
		industry							
	median payment per claim	company							
		industry							
Claims > £K	Number	company							
	mean payment per claim	company							
		industry							
	median payment per claim	company							
		industry							

Notes:

1. The industry figures includes/excludes the company's own claim payments.
2. The number of claims refers to numbers incurred and settled at "date" / numbers notified / numbers incurred.
3. The mean payment per claim for the industry and the company are both calculated as follows:-

Table 2 - Loss Ratios

Table 2 is designed to indicate to the claims manager the degree of control required on future claim payments (i.r.o risks currently underwritten) in order to achieve target loss ratios and to achieve positive profitability. The use of such a table in this way would clearly represent a controversial claims payment strategy !

The table would though, in theory, help with the claims management practices identified in 3.4.1.a).

In order to assess the true level of profitability investment income would of course have to be allowed for, possibly via discounting.

Examples of EMI for Claims Manager

2. Information on Loss Ratios (LR)

Class X Position as at "date"

		method of calculation	Year risk underwritten						
			1989 & prior	1990	1991	1992	1993	1994	All years
Written Premium (WP)	(1)		100						
Claim payments to date	(2)		65						
L.R. to date	(3)	(2)/(1)	65%						
Estimate O/S claims	(4)		15						
Estimate ultimate L.R.	(5)	{(2)+(4)}/(1)	80%						
Expenses as %age of WP	(6)		30%						
U/W Break-even LR	(7)	1-(6)/100	70%						
Target LR	(8)		85%						
U/W profit as %age of WP	(9)	(7)-(5)	-10%						
Amount by which estimated ultimate claim payments are below target as %age of WP	(10)	(8)-(5)	5%						
Amount available to pay claims before u/w break-even reached as %age of WP	(11)	(7)-(3)	5%						

Notes:

1. Expenses comprise underwriting, commission and claims expenses. Future claim expenses (i.r.o. incurred but non-settled claims) have been estimated. Future claim expenses (i.r.o incurred but non-settled claims) have / have not been discounted (at a rate of d% p.a.)
2. O/S claim payments have / have not been discounted in order to allow for / ignore the effect of investment income. (Rate of discount used was d% p.a.)
3. Loss ratio is defined as: - Claim Payments / Written Premium
4. U/W profit is: Written Premium (1) less claim payments (2+4) less Expenses (6*1)
5. (7) U/W break-even L.R. is the loss ratio required s.t. the u/w profit is zero.

Table 3 - Market Prices affecting Claim Costs

Tables 3 a) to d) are designed to keep claim payments down to an acceptable minimum (3.4.1.b(i)) and to keep control of claims handling expenses (3.4.1.b(ii)). The tables give market prices of certain goods and services which are commonly associated with claim payments e.g. vehicle repair, medical costs, legal fees and loss adjusters fees. This information would help to ensure that the company can obtain the lowest available price in the market for the required goods / services.

The information in this table is probably of more use to the junior claims staff, who are dealing with day to day claims, rather than to a senior claims manager.

Examples of EMI for Claims Manager

3. Information on Market Prices affecting Claim Costs

(a) Motor Vehicle Repair Prices (excl VAT)

			Region 1			Region 2		
			Vehicle repairer			Vehicle repairer		
			A1	B1	C1	A2	B2	C2
Vehicle part X	price of part	(1)						
	price of fitting	(2)						
	total price	(1)+(2)						
Vehicle part Y	price of part	(1)						
	price of fitting	(2)						
	total price	(1)+(2)						

(b) Property Repair Prices (excl VAT)

			Region 1			Region 2		
			Contractor/Building merchant			Contractor/Building merchant		
			A1	B1	A2	B2	C2	D2
Category of damage X	price of materials	(1)						
	labour charge	(2)						
	total price	(1)+(2)						
Category of damage Z	price of materials	(1)						
	labour charge	(2)						
	total price	(1)+(2)						

Examples of EMI for Claims Manager

3. Information on Market Prices affecting Claim Costs (contd..)

(c) Legal Fees charged to Insurers (excl VAT)

				Firm of Solicitor			
				A	B	C	D
Category of legal action X	Hourly rate		(1)				
	Number of hours required		(2)				
	total fee	(1)*(2)					
Category of legal action Y	Hourly rate		(1)				
	Number of hours required		(2)				
	total fee	(1)*(2)					

(d) Medical Charges

				Medical Provide			
				NHS	BUPA	PPP	Other
Medical condition X	#days in hospital (*)		(1)				
	Daily hospital accommodation charge		(2)				
	Hospital accommodation charge	(1)*(2)	(3)				
	Charge for treatment (*)		(4)				
	Total medical charges	(3)+(4)					
	#working days lost (*)						
Medical condition Y	{ information as above }						

Notes:

1. (*) - These quantities are estimated by medical practitioners
2. Daily hospital accommodation charge comprises of food, bed space, nursing care and doctors time
3. Charge for treatment comprises of drugs and medication provided

Table 4 - Accuracy of Case Estimates

Table 4 is designed to monitor the accuracy of case estimates (3.4.1.b(iii)). If case estimates have been accurate, the figure for incurred claims should remain reasonably constant over the claim payment development period. Changing incurred amounts as exhibited for the year 1991 in this table would prompt an investigation by the claims manager.

Usually a large movement in the incurred figure over development time indicates an inadequacy in the case estimation process. However, often case estimates will have to be increased due to unforeseeable circumstances, e.g. the involvement of a third party coming to light several years after the case estimate was first established. Therefore it may be useful to have an accompanying table showing claims where, due to unforeseeable circumstances, the incurred has changed since the first estimate was first made. This will enable the claims manager to distinguish between poor estimation and unforeseeable circumstances.

This information would need to be provided separately for class of business and, where appropriate, type of claim e.g. personal injury and non personal injury.

Examples of EMI for Claims Manager

4. Information on Accuracy of Case Estimates

Class X Type of Claim AA Position as at "date"

Year in which Case Estimate was first set up	# claims for which Case Estimates were established			Position at time T since 1st Jan of year of origin where T (measured in years) = 1	2	3	4	5
1990 and earlier years	95	Amount paid	(1)	1,787	10,299	16,765	18,889	19,539
		Estimated O/S based on case estimates	(2)	17,364	8,872	3,136	1,069	89
		Estimated incurred	(1)+(2)	19,151	19,171	19,901	19,958	19,628
1991	123	Amount paid	(1)	2,391	10,435	19,244	23,200	
		Estimated O/S based on case estimates	(2)	13,740	7,379	5,225	2,242	
		Estimated incurred	(1)+(2)	16,132	17,813	24,470	25,442	
1992	135	Amount paid	(1)	3,201	17,542	30,413		
		Estimated O/S based on case estimates	(2)	32,156	22,410	9,215		
		Estimated incurred	(1)+(2)	35,356	39,952	39,628		
1993	197	Amount paid	(1)	3,545	26,652			
		Estimated O/S based on case estimates	(2)	54,365	43,994			
		Estimated incurred	(1)+(2)	57,910	70,646			
1994	185	Amount paid	(1)	4,488				
		Estimated O/S based on case estimates	(2)	67,920				
		Estimated incurred	(1)+(2)	72,408				

Table 5 - Time Taken to Settle Claims

Table 5 is designed to assist with the functions of minimising claim handling expenses (3.4.1.b(ii)) and satisfying customer needs (3.4.1.c)). The quicker claims are settled the less the claim expenses and the greater the customer satisfaction (assuming of course that the claim is settled at a value which is acceptable to both sides). Monitoring time to settlement is also an example of applying appropriate claims management practices (3.4.1.a)

This information would need to be indexed by class of business and broad type of claim e.g. personal injury and non personal injury.

Examples of EMI for Claims Manager

5. Time taken to settle claims

Class X claim type AA Position as at "date"

			Number of claims notified in year settled in time...				Still O/S
			less than T1	Between T1 and T2	Between T2 and T3	Greater than T3	
Year of notificatio	Number of claim notified in year	Average incurred cost of claims notified in year					
1988							
1989							
1990							
1991							
1992							
1993							
1994							

Note:
1. If time to settlement falls exactly on one of the boundaries, it is allocated to the longer category
   E.g. if time to settlement is exactly T2, claim is allocated to the "Between T2 and T3" group

2. Definition of number of claims: Each party to a claim is counted as a separate claim for this table. This definition is used so that part settlements(i.e. where payment has been settled to one party in a claim) are regarded as settled claims

Tables 6 - Claim Handling Expenses

Tables 6 a) and b) are designed to assist the claims manager in monitoring claims handling expenses (3.4.1.b(ii)). They provide information on the internal costs of handling claims. These internal costs are mainly comprised of remuneration costs of staff employed in handling claims and the proportion of other overheads (e.g. accommodation, computer systems and personnel services) allocated to these staff members.

This information would need to be indexed by both class of business and, if appropriate, type of claim e.g. personal injury and non personal injury.

The information needs to be looked in conjunction with claim numbers and average claim amounts. Clearly claims involving large amounts will require greater resource than small claims.

Tables of this type will give the claims manager an indication of the changes in the efficiency with which claims are being handled, and of how this varies between types of claim.

Information on internal claim handling costs can be used at a global level, e.g. to quantify the cost of handling claims of a certain class and type as in table 6(a), or at an individual level, e.g. to quantify the proportion of claims for which the handling costs are deemed to exceed a specified level as in table 6(b). When using this information at an individual claim level, one can look at the full amount of claim handling expenses by bringing in the costs of professional fees (lawyers, assessors), travel, postage etc.

In order to obtain the type of detailed claim information outlined in these tables, the company would need to be operating a sophisticated Time Recording System (TRS). The need for TRS is especially prevalent for obtaining information at the individual claim level as in table 6(b). If a TRS is not in operation, the information at the global level, as in table 6(a), could be obtained by taking a sample of staff and monitoring how their time is being spent.

Due to the difficulties of obtaining the information, it may be appropriate to collect information on claims handling expense information is only produced for only settled claims, thereby avoiding the uncertainty of estimating the costs of settling outstanding claims.

Examples of EMI for Claims Manager

6. Claims Handling Expenses

(a) Time spent processing claims and time cost of processing claims

Class X Claim type AA Position as at "date"

		Calendar Year 1993				Calendar Year 1994			
		Year of notification				Year of Notification			
		1991 & prior	1992	1993	all years	1992 & prior	1993	1994	all years
Number of claims handled in calendar year									
Average incurred cost of claims settled in calendar year									
Staff Grade X	# staff involved in handling claims during year (A)								
	Total time spent handling claims during year (measured in years) (B)								
	Time cost = [Salary factor for staff at Grade X + Fixed Cost factor] * (B)								
Staff Grade Y	{ information as for X }								
All Staff	# staff involved in handling claims during year (= sum of all As)								
	Total time spent handling claims during year (measured in years) (= sum of all B's)								
	Total Time cost = Sum of individual grades time cost								

Notes:

1. Columns can be summed to obtain time cost by notification year.
2. All cost amounts are in terms of present monetary values as at 31.12.94 (say)

Examples of EMI for Claims Manager

6. Claims Handling Expenses
(b) Claims Cost Ratios

Claim cost ratio is defined as: $\frac{\text{Claim handling cost of claim}}{\text{Final claim settlement amount}}$

Claim handling cost = Time Cost (as defined in table 5(a) but applying to an individual claim)
+ Professional fees + other claims related outgo (e.g. Travel, postage,, stationary, phone calls)

Class X Claim type AA Position as at "date"

		Number of claims settled in year for which claims cost ratio is:-						
		0 - 0.25	0.25 - 0.5	0.5 - 0.75	0.75 - 1.0	1.0 - 1.5	1.5-2.0	>= 2.0
Year of settlement	Average incurred cost of claims settled in year							
1988								
1989								
1990								
1991								
1992								
1993								
1994								

Notes: All costs and settlement amounts are accounted for on monetary values applicable at date of settlement (Date of settlement is defined to be the date on which the claim file is closed, if a claim has been reopened then settlement date is taken as the date the claim was most recently closed)

Table 7 - Satisfying needs of customers (claimants)

Table 7 is designed to assist the claims manager to assess the degree of customer satisfaction with the claims handling process (3.4.1.a). The absolute number of complaints will be of limited use, but the trend in the number of complaints (scaled by business volumes) should give some indication as to whether the situation is improving or deteriorating.

To obtain a fuller indication of customer satisfaction, this table would have to be used in conjunction with observing the views of the company's customer service formed by the market, brokers and press.

Information on customer satisfaction would be studied separately by class and, if appropriate, type of claim - although policy renewals can only be looked at by class.

When considering customer satisfaction for a particular class of business / group of claimants, one has to consider at the same time the frequency of claims and average claim size. Claims settled for large amounts will usually give rise to a higher complaint rate than for smaller claims.

An alternative way of assessing claimant's satisfaction is to conduct occasional surveys of claimants to assess their satisfaction with the claims service. Some market information is also available from time to time, such the *Which ?* survey published recently. This looked at 60,000 Consumer's Association members and considered the customers satisfaction with regard to the time taken to settle a claim and the overall satisfaction with the claim awarded by the company. A survey such as this is of little use to the individual companies, apart from perhaps prompting the apparent poor performers to conduct their own more detailed survey to assess whether their is a genuine problem. Analysis of any trends in the average time to settlement could also help with this.

Examples of EMI for Claims Manager

7. Satisfying needs of customers (claimants)

Class X

		Year				
		1990	1991	1992	1993	1994
Number of claims handled in year						
Average incurred cost of claims settled in year						
Number of complaints made to company i.r.o claims notified in year	Concerning amount of settlement					
	Concerning time to settlement					
Number of policies due for renewal in year						
Lapse rate of renewable policies	Policies for which claim made in 12 months prior to renewal date or claim outstanding					
	Policies for which no claim made in 12 months prior to renewal date and no claims outstanding					

All Classes

		Year				
		1990	1991	1992	1993	1994
Number of complaints made to company i.r.o claims notified in year	Concerning amount of settlement					
	Concerning time to settlement					

3.5 EMI for Insurers - Reserving Manager

For the purposes of this paper, "Reserving Manager" refers to the manager who is responsible for carrying out the calculations in order to estimate the overall level of reserves that the company should hold. This estimate would then be provided to senior management who would decide on the actual level of reserves to hold.

Rather than focus on the information that a reserving manager would need to make such an estimate (which has already been covered extensively elsewhere), we will look at the *outputs* which the reserving manager would produce in order to communicate the results to the board and senior management, so as to assist them in deciding on appropriate reserve levels. In considering these outputs we therefore only review the high level outputs which might be used, rather than the detailed output tables such as loss ratio summaries / fund statements / graphs etc which would be used at a lower level.

GN12 covers the general points which should be taken into account when making a formal report on the reserves of a general insurance undertaking and these points will not be repeated here. Instead, we will concentrate on the major factors, and give specific examples of EMI for use in communicating reserve estimates.

3.5.1 Functions of reserving manager

- To recommend best estimate reserves.
- To recommend published reserves, if different.

Best estimate reserves are defined here as the expected value of future claims payments. Published reserves, however, such as those in the DTI returns, may incorporate some margin for caution.

Clearly, a reserving manager may have other functions apart from recommending reserves, but we shall limit ourselves to this aspect of his/her work.

3.5.2 EMI for communicating recommended reserve reserves

The EMI used for this purpose will obviously depend upon the nature of the business being considered, and on the data and methods which are used to produce the reserve estimates. As an example, we will consider the EMI which could be used for a UK Motor account. The items should

include:-

1. the size of reserves on best estimate and published bases;
2. some idea of the uncertainty surrounding the estimates;
3. the accuracy of previous estimates and explanation of any significant differences between actual and expected;

and they should be shown separately for each element of the reserve. For this example, we assume that the reserve estimate is broken down into a reserve for:-

a) claims reported but outstanding (including any additional amounts which the reserving manager may have added to the claims manager's estimates);
b) claims incurred but not reported;
c) reopened claims [assumed to be included in a) and b)] ;
d) expenses of settling claims [again assumed to be included in a) and b)] ;
e) unearned premiums;
f) additional amount for unexpired risks.

In addition, each of these could be broken down into territory, broad category of business and product, and may be shown net of reinsurance or gross, with a separate offset for reinsurance.

We now set out some examples of suitable tables, which could form the basis of a report for use in recommending reserve levels. The data contained in the tables is entirely fictitious and whilst the presentation is intended to be appropriate, the data is not necessarily representative of actual UK Motor business.

The tables will need tailoring to individual circumstances, and in particular will need amending in situations where the reserve cannot be broken down as shown above.

Table 1

This table shows the size of the reserves for claims reported (that is case estimates) on a best estimate and published basis. It also indicates the uncertainty surrounding the estimates and the likely adequacy of the recommended published figures.

Column (3) is the best estimate reserve, which unless the reserving manager adds a margin, will be the case estimates made by the claims department.

Columns (2) and (4) are confidence limits around the best estimate (the required degree of confidence being chosen by senior management). In a stochastic reserving context the optimistic and pessimistic reserves could be defined as those reserves which have a V% and a W% chance of proving large enough, although these would be difficult to calculate without making distributional assumptions.

Column (5) is the reserve on a published basis - this may be defined as the reserve with an X% chance of proving large enough, or as the reserve Y% or £Z larger than the best estimate, or some other definition chosen by senior management.

Columns (6) and (7) show the margin for caution in the published reserve.

1 RESERVES FOR CLAIMS REPORTED
Valued as at 30.9.1994
Motor

class of business	optimistic basis	best estimate basis	pessimistic basis	Published basis		
				reserve	margin over best estimate	margin over best estimate as % of best est
	£000	£000	£000	£000	£000	%
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Private car comp	3,026	3,362	3,765	3,559	197	6%
Private car non-comp	1,031	1,121	1,233	1,174	53	5%
Commercial vehicles	2,039	2,241	2,488	2,358	117	5%
Motor cycles	470	516	573	544	28	5%
Total motor	6,566	7,240	8,059	7,635	395	5%
					(5)-(3)	(6)/(3)

Table 2

This table shows how accurate previous best estimates of reserves for claims reported have been. This may help to indicate the level of confidence which can be placed on the reserving managers best estimates (which may of course just be the claims managers best estimates). For each year of notification, the cohort of claims which were notified in that year, but which were outstanding at the end of that year (that is, at a particular valuation date) are monitored through time. The focus of attention is upon movements in these estimates from the valuation date.

The most useful elements of the table are firstly the final two columns which show how much movement there has been from the original estimates, and secondly, the final row which shows the movement through time of these estimates. [The sum of column (8) is of course the same as the sum of the final row]

The detail of the entries in each row is as follows:-

Column (2) row 1 shows the reserve calculated as at 31 December 1990 for claims reported in 1990 and prior years which were outstanding as at 31 December 1990.

Column (3) row 1 shows the reserve calculated as at 31 December 1991 for claims reported in 1990 and prior years which were outstanding at 31 December 1991.

Row 2 shows the amount paid between 31 December 1990 and 31 December 1991 on claims reported in 1990 and prior years which were outstanding at 31 December 1990.

Row 3 is the total of rows 1 and 2 and represents an updated best estimate of what the reserve should have been at 31 December 1990.

Other years of notification follow a similar pattern.

Columns (9) and (10) show the difference in the latest restated reserve and the original reserve and indicates the accuracy of the original estimate.

The 1993 & prior reported but O/S at valuation date row is the total of rows 1, 4, 7 and 10.

The 1994 reported but O/S at valuation date row is the reserve calculated at the date indicated for outstanding claims reported in 1994.

The total reported but O/S at valuation date row is the sum of the previous 2 rows, that is, the total reserve calculated at the date indicated for all claims reported but outstanding. It shows how the total reserves have developed over time.

The 1993 & prior movement in restated year end reserve row shows by how much the previously valued total reserve was restated by at each valuation date. For example, in column (8): (5,021-5,021) + (3,800-3,700) + (3,140-3,212) + (3,091-3,102) = 17. The significant reasons for the most recent movement are then explained in the notes to the table.

2 DEVELOPMENT OF RESERVES FOR CLAIMS REPORTED
Best estimate basis
Motor total

year of notification (1)		valued as at 31.12 1990 £000 (2)	valued as at 31.12 1991 £000 (3)	valued as at 31.12 1992 £000 (4)	valued as at 31.12 1993 £000 (5)	valued as at 31.3 1994 £000 (6)	valued as at 30.6 1994 £000 (7)	valued as at 30.9 1994 £000 (8)	total movt from original estimate £000 (9)	% (10)
1990 & prior	reported but O/S at valuation date	4,931	1,789	994	547	498	370	300		
	paid after year of notification		3,223	3,998	4,463	4,514	4,651	4,721		
	restated year end reserve		5,012	4,992	5,010	5,012	5,021	5,021	90	2%
1991	reported but O/S at valuation date		3,635	1,987	1,099	1,021	878	978		
	paid after year of notification			1,711	2,576	2,670	2,822	2,822		
	restated year end reserve			3,698	3,675	3,691	3,700	3,800	165	5%
1992	reported but O/S at valuation date			2,985	1,659	1,503	1,317	1,245		
	paid after year of notification				1,554	1,695	1,895	1,895		
	restated year end reserve				3,213	3,198	3,212	3,140	155	5%
1993	reported but O/S at valuation date				3,258	2,994	2,513	2,022		
	paid after year of notification					223	589	1,069		
	restated year end reserve					3,217	3,102	3,091	(167)	-5%
1993 & prior	reported but O/S at valuation date	4,931	5,424	5,966	6,563	6,016	5,078	4,545		
1994	reported but O/S at valuation date	-	-	-	-	765	1,738	2,695		
total	reported but O/S at valuation date	4,931	5,424	5,966	6,563	6,781	6,816	7,240		
1993 & prior	movt in restated year end reserve		81	43	223	(38)	(83)	17		

Notes 1991 notified claim thought to have been settled reopened with estimated further payments of £100,000.
1992 notified claim previously estimated at £72,000 settled at no cost

Table 3

This table also shows how accurate previous best estimates of reserves for claims reported have been. In contrast to table 2, however, instead of considering the accuracy of reserves at a given valuation date, we consider the accuracy of reserves at a given delay from the original estimate. This would obviously be of benefit to the claims manger (assuming the estimates are based largely on his / her judgement).

Column (2) row 1 shows the reserve calculated as at 31 December 1990 for claims reported in 1990 and prior years which were outstanding at 31 December 1990, ie column (2) row 1 in table 2.

Row 3 shows the reserve calculated as at 31 December 1991 for claims reported in 1991 which were outstanding at 31 December 1991, ie column (3) row 4 in table 2.

Column (3) row 1 shows the best estimate 3 months later of what the reserve for claims reported in 1990 and prior years should have been at 31 December 1990.

Row 3 shows the best estimate 3 months later of what the reserve for claims reported in 1991 should have been at 31 December 1991.
Etc.

The index and average index rows indicate the percentage movement in the best estimate reserves and highlights any potential consistent under / over reserving at certain delays from the original estimate.

Table 4

This table shows the size of the reserves for claims incurred but not reported on a best estimate and published basis. It also indicates the uncertainty surrounding the estimates and the likely adequacy of the recommended published figures.

Column definitions are the same as those for table 1.

3 DEVELOPMENT OF INDICES OF RESERVES FOR CLAIMS REPORTED
Best estimate basis
Motor total

year of notification		period of development (from original estimate)									
		original estimate	3 months	6 months	9 months	12 months	15 months	18 months	21 months	33 months	45 months
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1990 & prior	restated year end reserve, £000	4,931	4,957	4,979	4,969	5,012	5,005	5,010	4,997	5,009	5,021
	index	100	101	101	101	102	102	102	101	102	102
1991	restated year end reserve, £000	3,635	3,650	3,671	3,692	3,698	3,689	3,695	3,690	3,800	
	index	100	100	101	102	102	101	102	102	105	
1992	restated year end reserve, £000	2,985	3,102	3,192	3,221	3,213	3,198	3,212	3,140		
	index	100	104	107	108	108	107	108	105		
1993	restated year end reserve, £000	3,258	3,217	3,102	3,091						
	index	100	99	95	95						
average	index	100	101	101	101	104	103	104	103	103	102

4 RESERVES FOR CLAIMS INCURRED BUT NOT REPORTED
Valued as at 30.9.1994
Motor

class of business	optimistic basis	best estimate basis	pessimistic basis	Published basis		
				reserve	margin over best estimate	margin over best estimate as % of best est
	£000	£000	£000	£000	£000	%
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Private car comp	322	403	500	449	46	11%
Private car non-comp	113	135	162	148	13	10%
Commercial vehicles	221	269	328	297	28	10%
Motor cycles	51	62	76	69	7	11%
Total motor	707	869	1,066	963	94	11%
				(5)-(3)		(6)/(3)

Table 5

This table shows how accurate previous best estimates of reserves for claims incurred but not reported have been. The format is similar to table 2, except that it is by year of occurrence rather than notification and there is an additional row , the outstanding claims. As with table 2, the most useful entries are the final two columns and the final row. The detail of the rows and columns is as follows:-

Column (2) row 1 shows the reserve calculated as at 31 December 1990 for claims incurred in 1990 and prior years which were not reported by 31 December 1990.

Column (3) row 1 shows the reserve calculated as at 31 December 1991 for claims incurred in 1990 and prior years which were not reported by 31 December 1991.

Row 2 shows the reserves for claims outstanding at 31 December 1991 calculated as at 31 December 1991 for claims incurred in 1990 and prior years which were reported between 31 December 1990 and 31 December 1991.

Row 3 shows the amount paid up to 31 December 1991 on claims incurred in 1990 and prior years which were not reported by 31 December 1990.

Row 4 is the total of rows 1, 2 and 3 and represents an updated best estimate of what the reserve should have been at 31 December 1990.

Subsequent years of occurrence follow a similar pattern.

Columns (9) and (10) show the difference in the latest restated reserve and the original reserve and indicates the accuracy of the original estimate.

The 1993 & prior IBNR by valuation date row is the total of rows 1, 5, 9 and 13. The 1994 IBNR by valuation date row is the reserve calculated at the date indicated for claims incurred but not reported in 1994.

The total IBNR by valuation date row is the sum of the previous 2 rows, that is, the total reserve calculated at the date indicated for all claims incurred but not reported. It shows how the total reserves have developed over time.

The 1993 & prior movement in restated year end IBNR reserve row shows by how much the previously valued total reserve was restated by at each

valuation date. Eg, in column (8): (624-625) + (680-669) + (712-732) + (741-771) = -40. The reasons for the most recent movement are then explained in the notes to the table.

5 DEVELOPMENT OF RESERVES FOR CLAIMS INCURRED BUT NOT REPORTED
Best estimate basis
Motor total

year of occurrence		valued *as at* 31.12 1990	valued *as at* 31.12 1991	valued *as at* 31.12 1992	valued *as at* 31.12 1993	valued *as at* 31.3 1994	valued *as at* 30.6 1994	valued *as at* 30.9 1994	total movt *from* original estimate	
		£000	£000	£000	£000	£000	£000	£000	£000	%
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1990 & prior	IBNR by valuation date	592	30	2	0	0	0	0		
	reported but O/S at valuation date		291	159	88	82	71	59		
	paid		296	454	532	541	554	565		
	restated year end IBNR reserve		617	615	620	623	625	624	32	5%
1991	IBNR by valuation date		632	32	2	1	0	0		
	reported but O/S at valuation date			316	175	163	140	105		
	paid			323	490	507	529	575		
	restated year end IBNR reserve			671	667	671	669	680	48	8%
1992	IBNR by valuation date			683	35	21	7	3		
	reported but O/S at valuation date				364	330	289	238		
	paid				341	378	436	471		
	restated year end IBNR reserve				740	729	732	712	29	4%
1993	IBNR by valuation date				751	601	376	150		
	reported but O/S at valuation date					49	212	329		
	paid					90	183	262		
	restated year end IBNR reserve					740	771	741	(10)	-1%
1993 & prior	IBNR by valuation date	592	662	717	788	623	383	153		
1994	IBNR by valuation date	-	-	-	-	192	459	716		
total	IBNR by valuation date	592	662	717	788	815	842	869		
1993 & prior	movt in restated year end IBNR reserv		25	37	58	(15)	34	(40)		

Notes The number of claims incurred in 1993 and reported in 1994 Q3 was lower than expected so the 30.9.1994 IBNR has been reduced slightly.

Table 6

This table also shows how accurate previous best estimates of reserves for claims incurred but not reported have been, using the delay from the original estimate as the time axis.

Column (2) row 1 shows the reserve calculated as at 31 December 1990 for claims incurred in 1990 and prior years which were not reported by 31 December 1990, ie column (2) row 1 in table 5.
Row 3 shows the reserve calculated as at 31 December 1991 for claims incurred in 1991 which were not reported by 31 December 1991, ie column (3) row 5 in table 5.
Etc.

Column (3) row 1 shows the best estimate 3 months later of what the reserve for claims incurred but not reported in 1990 and prior years should have been at 31 December 1990.
Row 3 shows the best estimate 3 months later of what the reserve for claims incurred but not reported in 1991 should have been at 31 December 1991.
Etc

The index and average index rows indicate the percentage movement in the best estimate reserves and highlights any potential consistent under/over reserving at certain delays from the original estimate.

6 DEVELOPMENT OF INDICES OF RESERVES FOR CLAIMS INCURRED BUT NOT REPORTED
Best estimate basis
Motor total

year of occurrence		period of development (from original estimate)									
		original estimate	3 months	6 months	9 months	12 months	15 months	18 months	21 months	33 months	45 months
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1990 & prior	restated year end reserve, £000	592	598	612	620	617	618	617	616	618	624
	index	100	101	103	105	104	104	104	104	104	105
1991	restated year end reserve, £000	632	651	669	675	671	672	665	668	680	
	index	100	103	106	107	106	106	105	106	108	
1992	restated year end reserve, £000	683	697	712	731	740	729	732	712		
	index	100	102	104	107	108	107	107	104		
1993	restated year end reserve, £000	751	740	771	741						
	index	100	99	103	99						
average	index	100	101	104	104	106	106	106	105	106	105

Table 7

This table shows the size of the UPR and the size of the URR on a best estimate and published basis. It also indicates the uncertainty surrounding the estimates and the likely adequacy of the recommended published figures.

Column (3) is the best estimate of the cost of future claims on the balance of unexpired risks. It is not the URR on a best estimate basis which is the larger of the figure shown in column (3) and the UPR.

Columns (2) and (4) are confidence limits around the best estimate.

Column (5) is the expected cost of future claims on the balance of unexpired risks if a severe freeze were to happen in the next quarter. A severe freeze could be defined as, for example, having the same impact on the business as the January 1990 freeze. Additional / alternative scenarios could be used to indicate the potential impact of adverse deviations.

Column (6) is the unearned premium reserve which can be calculated fairly accurately and so does not require separate best estimate and published bases.

Column (7) is the URR on a published basis, that is, the larger of the expected cost of future claims on the balance of unexpired risks on a published basis and the UPR. The former may be defined as the reserve with a X% chance of proving large enough, or as the reserve Y% or £Z larger than the best estimate, or some other definition chosen by senior management.

Columns (8) and (9) show the margin over the best estimate in the published reserves.

Column (10) shows the maximum loss ratio which can be experienced on the unexpired risks for which the published URR remains adequate.

7 RESERVES FOR UNEXPIRED RISKS
Valued as at 30.9.1994
Motor

class of business	optimistic basis	best estimate basis	pessimistic basis	reserve required if severe freeze in next quarter	unearned premium reserve	Published basis: unexpired risk reserve	Published basis: margin over best estimate	Published basis: margin over best estimate as % of best est	Published basis: max LR for which URR will prove large enough
(1)	£000 (2)	£000 (3)	£000 (4)	£000 (5)	£000 (6)	£000 (7)	£000 (8)	% (9)	% (10)
Private car comp	1,883	2,690	3,658	3,497	4,138	4,138	1,448	54%	100%
Private car non-comp	682	897	1,166	1,166	1,196	1,196	299	33%	100%
Commercial vehicles	1,309	1,793	2,385	2,331	2,561	2,561	768	43%	100%
Motor cycles	301	413	549	537	393	478	65	16%	122%
Total motor	4,175	5,793	7,758	7,531	8,288	8,373	2,580	45%	101%
						(7)-(3)	(8)/(3)		(7)/(6)

Table 8

This table shows how accurate previous best estimates of the cost of future claims on the balance of unexpired risks have been.

Column (2) row 1 shows the reserve calculated as at 31 December 1990 for claims incurred after 31 December 1990 in respect of policies written in 1990. (It is assumed that all policies cover a period no longer than 1 year so there will be no policies written before 1990 which can give rise to claims incurred after 31 December 1990.)

Row 2 shows the loss ratio implied by the reserve on unexpired risks and is simply row 1 divided by the UPR at 31 December 1990.

Column (3) row 1 shows the best estimate at 31 December 1991 of what the reserve should have been at 31 December 1990. This could be broken down between IBNR, reported but outstanding, and paid to give a feel for the degree of estimation still in the restated reserve but this would complicate the table somewhat and may not be a practicable or worthwhile exercise.

Row 2 shows the updated implied loss ratio.

Row 3 shows the reserve calculated as at 31 December 1991 for claims incurred after 31 December 1991 in respect of policies written in 1991. Etc.

Columns (9) and (10) show the difference in the latest restated reserve and the original reserve and indicates the accuracy of the original estimate.

8 DEVELOPMENT OF THE EXPECTED CLAIM COSTS OF UNEXPIRED RISKS
Best estimate basis
Motor total

year of underwriting		valued as at 31.12 1990	valued as at 31.12 1991	valued as at 31.12 1992	valued as at 31.12 1993	valued as at 31.3 1994	valued as at 30.6 1994	valued as at 30.9 1994	total movt from original estimate	
									£000	%
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1990	restated year end reserve, £000	3,630	3,891	3,978	3,949	3,952	3,955	3,957	327	9%
	implied loss ratio, %	72%	77%	79%	78%	78%	78%	78%		
1991	restated year end reserve, £000		3,428	3,921	4,278	4,321	4,371	4,353	925	27%
	implied loss ratio, %		75%	86%	94%	95%	96%	95%		
1992	restated year end reserve, £000			4,163	4,621	4,519	4,671	4,788	625	15%
	implied loss ratio, %			77%	85%	84%	86%	89%		
1993	restated year end reserve, £000				5,518	5,318	5,198	5,267	(251)	-5%
	implied loss ratio, %				73%	70%	69%	70%		

Table 9

This table also shows how accurate previous best estimates of the cost of future claims on the balance of unexpired risks have been, using delay from the original estimate as the time axis.

Column (2) row 1 shows the reserve calculated as at 31 December 1990 for claims incurred after 31 December 1990 in respect of policies written in 1990, ie column (2) row 1 of table 8.

Row 3 shows the reserve calculated as at 31 December 1991 for claims incurred after 31 December 1991 in respect of policies written in 1991, ie column (3) row 3 of table 8.

Column (3) row 1 shows the best estimate 3 months later of what the reserve for claims incurred after 31 December 1990 in respect of policies written in 1990 should have been.

Row 3 shows the best estimate 3 months later of what the reserve for claims incurred after 31 December 1991 in respect of policies written in 1991 should have been.

The index and average index rows indicate the percentage movement in the best estimate reserves and highlights any potential consistent under / over reserving at certain delays from the original estimate.

Alternatively the development of implied loss ratios could be traced. This would obviously still give the same index values.

9 DEVELOPMENT OF INDICES OF THE EXPECTED CLAIM COSTS OF UNEXPIRED RISKS
Best estimate basis
Motor total

year of underwriting		period of development (from original estimate)									
		original estimate	3 months	6 months	9 months	12 months	15 months	18 months	21 months	33 months	45 months
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1990	restated year end reserve, £000	3,630	3,721	3,771	3,827	3,891	3,941	3,962	3,975	3,961	3,957
	index	100	103	104	105	107	109	109	110	109	109
1991	restated year end reserve, £000	3,428	3,577	3,732	3,879	3,921	4,012	4,207	4,261	4,353	
	index	100	104	109	113	114	117	123	124	127	
1992	restated year end reserve, £000	4,163	4,324	4,421	4,573	4,621	4,519	4,671	4,788		
	index	100	104	106	110	111	109	112	115		
1993	restated year end reserve, £000	5,518	5,318	5,198	5,267						
	index	100	96	94	95						
average	index	100	102	103	106	111	111	115	116	118	109

4. EMI for reinsurers

Many of the types of EMI considered for direct insurers will apply equally well, with some minor amendments, to a reinsurer. Thus, a reinsurer will obviously want to have EMI for:-

- the Board and senior management;
- underwriting;
- claims manager;
- reserving manager;
- investment manager.

However, there will also be a need for concise EMI to cover:-

- retrocession programmes;
- large loss monitoring;
- aggregate exposure monitoring;
- cedant monitoring (Eg league tables by income/profitability);
- latent claim exposures.

Different breakdowns would obviously apply, the most important of which would be:-

- analysis of direct versus broker business;
- main business class (Marine ; Non-Marine etc);
- business type (Fac ; Treaty; Prop/Non-prop ; Cat/per-risk etc);
- exposure by peril/territory;
- underwriting team/unit;
- discontinued versus continuing business.

With the increasing trend towards one year accounting, special consideration needs to be given to the complex effects which such a change has on the financial structure of the company, and on its own internal EMI reports, which in many cases will have to be redesigned.

The fact that reinsurance exposes the writer to an international portfolio of risks, written by a diverse group of cedants, using a wide range of contracts makes the need for a thorough and well designed EMI system all the more important. Because of these features, probably the single most important piece of EMI for a reinsurer, would be that which enables monitoring of underwriting against pre-defined plans. Such plans would allow the underwriter to write within certain income and exposure limits and would require him/her to work towards a target return on the capital which would be allocated to each underwriting unit.

We do not go into any further detail here, as many of the examples given earlier for a direct insurer, could be adapted for use in a reinsurance environment.