

# **THE PREMIUM RATING OF COMMERCIAL RISKS**

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## OVERVIEW

Establishing premiums for commercial insurance risks is a blend of art and science in which the former has perhaps dominated, and an aura of mystique often surrounds the subject. The working party has been challenged by a lack of existing material. Many textbooks talk around and about the subject while our approach has been to establish a practical approach to pricing. Although the heterogeneity of commercial business requires judgements to be made within the pricing process, there are ways in which actuaries can add value. Three approaches have been developed to cope with business of different sizes although the boundaries between each category are fluid.

Pricing small businesses requires the application of techniques currently being used for personal lines insurance. Being unable to obtain real data, we simulated data and applied three techniques. From this exercise, generalised linear modelling should provide the firmest basis for pricing, even with a relatively small amount of data.

For the larger risks, pricing differentiation is primarily based on the historical claims. A key pricing issue is how to allow for “large” claims; while relatively rare, they make up a large proportion of the total claims value. A study commissioned by LIRMA into large motor personal injury claims (June 1997) demonstrated the need to understand the specific trends affecting larger claims and called for the collecting of industry data to carry out the analysis more effectively. However, even though any one insurer will be hampered by data paucity, we suggest that actuaries should show how the size of a claim to be included in the pricing depends on the overall number of claims.

In the middle ground, underwriters are faced with limited claims data and the knowledge that book rates are unlikely to reflect an individual risk. To understand underwriter behaviour, we asked 22 underwriters to price a motor fleet risk over successive renewals. We found that underwriters tended to give too much weight to the value of reported claims and took too little notice of claim frequency. Since the observed claims values do not adequately reflect the risk potential, the tendency is to under price each risk. Also, the pricing tended to be extremely volatile as it followed the claims. Using an approach set out by Julian Lowe in an unpublished paper, we were able to quantify the extent to which underwriters give credibility to this experience and the extent of the volatility they are prepared to pass on to their policyholders.

By following the principles established in this paper, an actuary can help to provide

- **a rigorous approach to risk assessment**
- **a firmer basis for underwriting decision making**
- **improved treatment of large claims and their allocation to the portfolio**

# **1 INTRODUCTION**

## **1.1 Terms of Reference and Scope**

The purpose of this paper is to provide accessible, comprehensive and action provoking material for general insurance actuaries. This should provide guidance on how to approach commercial insurance pricing and help to develop skills in this area.

It is the intention of the Working Party to avoid duplication with previous work whether carried out on a broad basis or specific to individual classes of business, in particular relating to personal insurance and London market business. Additionally, other work will be taken for granted including general management issues such as capital and expenses allocation in order that the paper can focus on the particular issues surrounding this area of the business.

The scope can be expressed in terms of the two dimensions of the size of the risks involved and the nature of the cover provided. Three broad groupings of policyholder size have been considered being small, medium and large which are closely correlated to the pricing approach adopted. The second dimension has been restricted to Liability, Property and Motor and the different issues which arise from these business areas have also been outlined in the appendices.

The contents of this paper represent the personal perspective of the working party members and should not be considered as representing our employers' views or policies.

## 1.2 An Overview of the UK Commercial Insurance Market

The last ten years' experience in the Commercial market include a classic illustration of the insurance cycle. The substantial losses in both the Personal and Commercial classes in the early 1990's resulted in substantial reductions in the industry's capacity and solvency levels. This was followed by dramatic increases in premium rates after 1991 to levels that were not sustainable. After considerable profits in 1994, delivered by high rates and relatively benign claims experience, increasing competition has resulted in rates falling across all the major classes. Though underwriting profits have fallen from their peak in 1994 to virtually break-even, high investment returns have ensured generally satisfactory insurance profits in 1995 and 1996. The consequence has been the continuation of the soft market.

In the tables below, the insurance profit figures includes estimated investment income on the underlying technical reserves at fixed interest rates. For some offices, additional income would be available through equity and other riskier assets. This information has been obtained directly from published financial statements.

### 1.2.1 Property

The following table shows the underwriting ratios and estimated insurance ratios over the decade to 1995 for the major composites.

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
U/W Ratio (%)	3	0	10	3	-22	-28	-14	2	13	12
Est. Insurance Ratio (%)	14	8	21	17	-7	-17	-6	7	20	18

This has been the best performing of the major commercial classes in recent years, helped by the absence of any major catastrophes since 1990. The gross written premium has grown by an average of 9.5% per annum over the ten years to 1995 to reach around £3.5bn. During 1990-1992, soft rates together with a blight of recession related claims and the 1990 storms, led to large losses. Apart from this period, the insurance returns have been good.

### **1.2.2 Motor**

The commercial motor market income is around £2bn per year and has seen little growth in the last ten years. There has been a strong desire for increased market share and profitability has been poor. The table below shows the underwriting ratios and estimated insurance ratios from 1986 to 1995.

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
U/W Ratio (%)	-12	-6	-7	-7	-25	-28	-16	-4	1	-4
Est. Insurance Ratio (%)	-2	4	4	8	-7	-12	0	4	10	9

In this ten year period, only 3 years have had an underwriting profit whereas 7 have had an insurance profit.

### **1.2.3 Liability**

The liability market at the end of 1995 amounted to premium income of around £3bn, having grown by about 6.5% per annum since 1986. At the underwriting result level, in no year in the last 10 has the ratio been better than -15%.

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
U/W Ratio (%)	-19	-15	-20	-33	-38	-46	-46	-27	-22	-18

The losses at the underwriting level have been very substantial, however given the long tail, it is a class for which investment income is very significant. The level of this additional income would vary considerably by office according to their investment policy, such as the proportion of equity and gilts backing the technical reserves, and it is difficult to assess whether insurance profits have been made.

Given the high ratio of technical reserves to premium income, results are particularly prone to adverse claims run-off, a common feature of this business. Indeed, underwriters will accept EL business only in conjunction with property where the EL risk is considered too volatile in isolation.

### ***1.2.4 Combined Experience***

Despite the very competitive nature of the market, profits have been made overall after allowing for investment income.

The following table shows the UK insurance industry's underwriting margin and estimated insurance profit over the 10 years to 1995 for Commercial & Personal combined.

<b>Year</b>	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
<b>U/W Margin (£bn)</b>	-0.5	-0.6	0.1	-0.2	-2.8	-4.5	-2.2	-0.0	1.3	0.3
<b>Est. Insurance Profit (£bn)</b>	0.3	0.3	1.2	1.1	-1.2	-3.0	-0.8	1.2	2.7	1.6

In the current economic climate, insurers are making additional returns on capital and so showing apparently high levels of profitability. It is unlikely therefore that the market will harden in the near future. Although figures are not available for the most recent period, the indications are that rates have continued to fall.

Nevertheless, in spite of the commercial insurance industry's acceptance of underwriting losses in the past, the market seems on the brink of a period of considerable change with several major developments.

### ***1.2.5 Mergers***

There has been the Royal and Sun Alliance merger with the prospect of considerable expense savings for the new entity. Guardian has taken over the commercial interests of the Legal and General and bought the RAC Insurance Services. Eagle Star has started a joint insurance venture with the AA. In the broking arena, Aon has purchased Alexander & Alexander, Bain Hogg and Minets while Marsh & McLennan has bought out the partners of Johnson and Higgins.

The greater concentration of resources will increase competition in the industry:

- ▶ the larger firms will have greater scope for expense savings in systems, back office functions and in the purchase of reinsurance and any other services such as partly outsourcing IT or claims handling
- ▶ the larger quantities of available data should enable precision in pricing

- ▶ a single large player may now have greater influence in moving the market through size or its importance in its targeted sector.
- ▶ larger brokers will have greater power in negotiating better deals for their clients and themselves at the expense of the insurer

### **1.2.6 *Electronic Data Interchange (EDI)***

In the drive to reduce expenses considerable efforts are being made to employ new technology through EDI.

ITT Quotel, a software house, has spearheaded the development of Gilt Edge, a comparative quotation system for the small commercial package business - combined Fire, BI & All Risks policies for small businesses - which also provides all point of sale documentation.

However, more sophisticated systems are envisaged under so called "full-cycle" EDI systems. As well as producing quotations, cover letter and policy, all data entry endorsements and amendments would also be effected through entries at the brokers' location, with electronic transmission updating records in the insurer's own system. These systems would also enable speedier altering of rating factors and rating quotation systems, such that there would be no standard template whose changing would need the agreement of the parties involved.

The EDI systems planned vary in scope from simple systems where data is passed electronically rather than through the post, eg e-mail messages with attachments of claims experience on large EL or fleet risks, to wholly automated quotations for commercial packaged business. The implementation of some major EDI systems for commercial business is scheduled to take place by middle of 1998.

It is expected that these developments will reduce error rates and duplication as well as increase speed. The hoped-for result is a considerable reduction in operational expenses, especially for packaged small business cases where expense ratios currently range between 30% - 50% of premium.

The further implications are that the market will become more liquid and competitive as brokers have access to a wider range of underwriters. In turn, they will need to become more expert in their respective lines of business. The development of such systems will put a far greater emphasis on accurate pricing, with the involvement of actuaries and statisticians in analysing data and in the development of premium formulae.



### ***1.2.7 The Potential for Increased Participation of Direct Writers***

To date, direct writers have had relatively little impact on the commercial insurance market, even in small package business which would seem most appropriate for this style of trading. Package business forms around 25% of the commercial property market and around 7% in premium terms of the commercial market as a whole. There appears to have been some protection for the traditional offices from the relatively complex nature of the risks (with greater heterogeneity than on personal lines) and high per unit marketing costs so the direct writers' approach offers less scope for efficiency savings.

In addition, the brokers' functions often include risk management, loss prevention and actual surveying of the risk. They may have an interest in minimising claims to benefit from profit share and other incentives from their major connections. Coding and analysing these "softer" elements would be difficult, and it is not felt that the direct writers have as great a potential as they demonstrated with personal lines.

However, it remains to be seen whether the development of EDI, which will have a commoditisation influence on some classes, will not also make it easier for the direct writers to gain client acceptability and penetrate the market.

### **1.3 Distinctive Features of Commercial Lines Business**

#### ***1.3.1 Pricing Philosophy***

One feature that generally distinguishes the pricing of commercial business from personal insurance business is the increased scope for judgement to be applied. The reasons for this vary, principally according to the nature and size of the risk. Thus, the price charged may vary from any theoretical basis based on individual features and also for “commercial” reasons.

A theme of this paper is that good underwriting practice requires that the four components of the price (risk premium, expenses, investment income and loadings for profit and contingencies) should each be assessed on a best estimate basis. “Best estimate” is meant both statistically and also in a practical sense: it should reflect the underwriter’s best honest endeavour to assess the risk and its associated costs. The profit loading or discount incorporated in the final price may vary according to market conditions but those conditions do not, per se, affect the risk’s cost profile.

In the working party’s experience, there is a tendency for underwriters to justify low prices prevalent in a soft market by considering the risks they write through rose tinted spectacles. Some of the components, especially any allowance for large claims within the risk premium, may even be ignored. Without any warning that this underlying risk assessment may itself be coloured by market conditions, Management pre-occupation with margins may leave the impression that all is relatively well.

The Bornheutter-Ferguson reserving method has been designed to take current profitability into account. However, it is highly dependent on realistic estimates being provided by the underwriters of the loss ratios to which they are writing. Where these are viewed more optimistically than is reasonable, even this method may be slow to pick up any adverse trend. If the real margins to which underwriters were operating in a soft market could be revealed at the time of inception and renewal rather than reserving, the market should also become more stable. Actuaries can, therefore, add value by encouraging Management to adopt life underwriting principles whereby costing and pricing are divorced

### *1.3.2 Setting Targets*

Given that the separation of costing and pricing is accepted to be sound practice, how can it be encouraged? Information systems influence behaviour so it is vital that they do so positively and actuaries can provide useful advice here. In industries where costs can be known with greater certainty than insurance, it is possible to link salespeople's bonuses to the level of discounts they concede. A similar approach can be adopted in commercial insurance whereby underwriters are targeted to achieve a specified relationship between these theoretical prices and the actual premiums achieved. The problem is that currently the same person compiles both and can readily put on the aforementioned spectacles to ensure apparently minimal discounts and maximum bonuses.

Some companies set targets for their underwriters to achieve a given loss ratio but such ratios take time to emerge, particularly in the case of casualty classes of business. This means that such an approach in isolation lacks the immediacy of feedback to underwriting decisions.

Insurance companies are currently highly focused on "efficiency" yet are perhaps ignoring the sound principles of separating front and back office. Where possible, underwriters should be accountable for risk selection and costing and for making risk improvement proposals as well as for establishing theoretical prices, where they might be supported by actuaries. They should be rewarded for the relationship between such theoretical prices and the actual costs whereby, over time, this relationship should be stable and generate an appropriate return on capital - with both insufficient and excessive returns being equally invalid.

The sales team would then be charged with achieving this return through the insurance cycle. While the return may be insufficient in soft markets, this should at least be compensated for by above average margins in harder markets so that the return required is met over the cycle. Against a firm and stable foundation of the theoretical prices, the company should be better able to manage its way through the cycle by monitoring the discounts and loads achieved.

However, in many cases, senior underwriters will still have to act both as underwriter and salesperson so employers need to understand the potential conflicts. To preserve balance sheets, the first step of an accurate and reliable risk assessment will always be required even if the premium achieved falls short of this theoretical level. The emergence of development underwriters, who spend their days in brokers' offices, needs particular care in terms of training, information systems and team building - reminding them of their primary loyalty to the risk carrier.

### ***1.3.3 Broker Relationships***

(The term broker will be used throughout this paper to include any intermediary, whether authorised to use the term “broker” or not).

Commercial risks are usually less well structured than is the case in Personal Lines: a proposal form is less likely to elicit all the vital information. A key ingredient in risk assessment is “housekeeping” - the care and attention to detail evidenced by management towards the buildings, employees, processes, public and products/services. This can only rarely come alive on a form and many insurers, therefore, rely on surveys either prior to quotation or shortly after going on risk.

While brokers increasingly service their smaller clients only by telephone, they usually have more knowledge of their client than the insurer. They have a clear duty to present their client in the best possible way but openly, honestly, with utmost good faith and should reveal all material facts. As professionals, they will understand how this duty relates to each risk they propose although some brokers take a reactive rather than proactive stance on information provision. The quality of each broker’s adherence to these principles is variable and can be found to be one of the most significant underwriting factors.

There is a relatively high concentration of commercial business as measured by premium income and with insurers courting the same relatively few brokers, incentives are being developed to cement these relationships. The remuneration of brokers tends to reflect not only pre-set commission rates on a per contract basis but may also be geared to volume and profitability, possibly reflecting each insurer’s preferred business categories. Such packages will be designed to encourage brokers to place large shares of their business with an individual insurer. They may incorporate “steps” such that their remuneration increases substantially as each “step” in premium income terms is reached. It has been known for business to change insurers in the period up to any accounting date which may be used for the assessment of this commission.

Therefore, these methods of remuneration can themselves be underwriting factors in that the pressures they create might reflect on the quality of the portfolio not only for the insurers offering such arrangements but also for those insurers doing business with such brokers but without offering second tier remuneration contracts.

## 2 GENERAL PRINCIPLES OF COMMERCIAL LINES PRICING

### 2.1 Pricing Framework for Incorporating Large Claims

The average commercial insurance risk is larger in terms of both sums insured and premiums than the average personal insurance risk. Such risks are also relatively diverse with a large variety of businesses by type and size compared with the comparatively homogenous personal lines risks. Among the consequences of these differences, is the lack of statistical claims information even at the portfolio level which could be used to price the business leaving underwriters to apply a considerable degree of judgement to the underwriting features of the risk. Given this large judgmental element within underwriting decision making, there is a tendency to consider the claims experience of the actual risk as a guide to its quality.

The pressure to do this is exacerbated by a market which increasingly evaluates insurance less on the value added to the client by the risk transfer and claims handling quality and more by the relationship between the premium paid and expected claims outgo. One result is that more weight is given to the claims experience in pricing than is statistically justified. This applies both to the relationship of the individual risk's claims frequency to that expected for that type of risk and also in terms of the funding for large claims.

For personal lines business, the challenge facing a pricing actuary is the allocation of claims from the ground up between all the various risk categories. In commercial insurance, at least some of the difference between risks in terms of claims experience can be expected to be derived from the actual claims generated by a particular risk. The objective of this section is to consider some approaches to the allocation of the large claim amount to all the relevant risks, whether developing rating manuals for smaller risks or pricing a single large insurance programme.

In considering how large a "large claim" for a particular risk or portfolio should be, underwriters should take account of the number of claims being reported and the nature of the underlying exposures. In contrast, commercial insurance underwriters tend to have a single figure in mind irrespective of the particular risk. A useful starting point for an actuary to support the underwriting decision may be to assess the claims distribution for each risk type and demonstrate to an underwriter how such a figure should vary from risk to risk.

It may, however, be the case that there would be a different claims distribution curve for each risk category depending on the propensity of that category to generate large claims. To take a simple example, in the case of commercial property business, the

profile of claims must vary by the sum insured of the underlying properties. It would simply not be possible for properties with sums insured between 0-£10m to suffer claims of £20m.

A simple analysis can show the proportion of claims above certain values in terms of both numbers and amounts. For example, a typical Employers' Liability account is likely to have around 2% of its claims by number exceeding £100,000 in 1996 values but these will account for between one quarter and one third of the total value of all Employers' Liability claims. This would suggest that a risk with, say, 30 claims per annum would include insufficient claims to explain the whole of the underlying exposure and that allowance would need to be made for claims that have not yet been seen in the experience. Equally, if 1,000 claims were split amongst 100 trade categories, the average of 10 claims per category would be insufficient to explain the whole of the claims experience although they may explain at least some of the differences between those groups.

Conventional credibility theory is based on claims from the ground up and assumes the existence of a theoretical claims value to be compared with an actual claims value. The weight applied to the actual claims experience depends on the number of claims observed. Problems with applying this approach to commercial insurance are two-fold. Firstly, given the heterogeneity of risks, there is a significant question mark as to whether reliable expected claims values can be derived for every type of risk. Secondly, the approach runs contrary to how commercial insurance underwriters approach risk pricing today. Given the weight that is currently given to the so-called attritional losses, it is suggested that actuaries should endeavour to add rigour to this approach and concentrate on ensuring that an adequate allowance is made for the claims experience not explained by the attritional losses themselves. Hence the risk premium formula:

$$P_R = A \cdot (1 + B_R) + C \times \text{Exposure}.$$

A = Attritional claims projected for risk period based on actual historical experience trended into the future.

$B_R$  = Big claims loading for risk type R. *The implicit and very important assumption is that propensity for "large" claims is proportional to the value of small claims.*

C = The rate for the cost of catastrophe claims as a percentage of the particular exposure basis used eg vehicle years, wageroll, turnover, sum insured, number of employees etc.

### ***2.1.1 The Small Claims (or Attritional Loss) Limit***

In determining the limit for attritional claims in a particular case, the first step is to derive the claims size distribution. The attritional loss limit will then vary according to the actual number of claims. In deriving a table along the lines of the one set out below, judgement as to an appropriate level of volatility within the relationship between expected and actual attritional loss claims would need to be made. For a given number of claims, the higher the attritional loss limit within which claims can be included, the greater the variability in pricing based on such claims would be from one year to the next. The lower the attritional loss limit, the greater the stability but the less reliance placed on the particular claims experience.

This balance between following a particular trade category or client's own experience and obtaining stability is one that will need to be made by each company and may be part of its underwriting and marketing philosophy. A useful discussion area is whether the attritional loss limit should vary solely by the number of claims or should also take into account the perceived propensity to generate such claims as expressed in the example table by low, medium and high exposure.

A second area of interest relates to the number of claims itself. In deriving the table, consideration would have been given to an **expected** number of claims. In practice, it is likely that the table would be applied to an **actual** number of claims. There seem to be theoretical problems with either stance.

For example, if a risk is poorly managed or trade category highly volatile and so generates a relatively large number of claims, a rating basis which looked only at the theoretical number of claims would reduce the weight given to the actual claims experience. It will also assume that the theoretical number of claims was a valid prediction. On the other hand, if the risk has been improving and the number of claims falling, less and less weight would be given to this falling claims experience if the basis were the actual number of claims (because the attritional loss limit would be lower and more of the premium calculation dependent on a less flexible large claims loading).

The statistical theory by which a table might be produced is similar to that covered in the section on “blending” and is relatively straightforward. It is expected that a table would be derived for each risk type (eg Fire, Personal Injury etc) as follows:

Number of Claims	Exposure Potential		
	Low	Medium	High
50	10,000	15,000	20,000
100	15,000	21,000	35,000
150	18,000	26,000	45,000
.	.	.	.
.	.	.	.
.	.	.	.

This approach can be used as a basis for discussing with the underwriter an implicit claim distribution for risks with different propensities to generate large claims. Ideally, data would be available so that values could be established with the aim of generating an acceptable level of stability in the claims value for claims up to those limits.

### *2.1.2 The Large (or Big) Claims Loading*

Firstly, there has to be some agreement about the **maximum** value of claims considered “large” ie non-catastrophe. Secondly, the assumption that a standardised approach to loading small claims should be tested: should the loading should reflect underlying risk directly or is this adequately covered by loading the small claims? Thirdly, it is assumed that the loading would vary by both the small claims limit and a measure of exposure. Lack of access to real data has prevented the working party from testing these assumptions; we leave that to the reader. Depending on the outcome of the analysis required to understand these relationships, the following might be constructed. “Run-Away” exposure is intended to signify the propensity of a risk category to generate extreme events. For example, an oil rig would be “High” while a corner shop would be “Low” in the likelihood of any one event costing more than, say, £10m.



Small Claim Limit	“Run-Away” Exposure		
	Low	Medium	High
10,000	100%	200%	500%
15,000	75%	140%	350%
20,000	60%	110%	250%
.	.	.	.
.	.	.	.
.	.	.	.

There should be sufficient data available to assess attritional losses within most insurance companies but there will almost certainly be a shortage of information to assess the larger claims. This may simply be down to data paucity because such claims are relatively rare. For lines of business involving personal injury claims in particular, there will be the additional issue of immaturity since the settlement tail on these large claims will be far longer than for the smaller claims.

There are also likely to be issues around blending company experience with reinsurance pricing. It is also a requirement that the pricing mechanism allows different prices to be derived for different covers. For example, underwriters of Public Liability currently operate with increased limit factors in order to differentiate their prices for a limit of indemnity of, say, £5m compared with £1m. This method should be able to achieve the same end albeit that the values may be somewhat different.

### 2.1.3 Adding Complexity to the Large Claims Assessment

A variation on this formula could come in a number of ways but the first example is where  $B_R$  is based partly on the table and partly on the actual experience. Hence

$$B_R = \Omega.B_A + (1 - \Omega).B_E$$

Where  $B_E$  = expected loading based on table of values

$B_A$  = actual “loading”

$\Omega$  = credibility based on the number of claims from the ground up

$B_A$  could be derived in a number of ways including:-

- ▶ The frequency of claims above the attritional loss limit multiplied by the average of such claims for the exposure category L, M or H. In one sense, this could be seen as a means to mix the risk credibility based on frequency with the portfolio credibility based on the overall average. A significant attraction to this approach is the reduced volatility in pricing dependent on a particular claim and probably its case estimate.
- ▶ A smoothed and trended big claims cost based on analysis of the risk. This is likely to be more volatile but may find favour with clients who expect the premium to reflect “actual” claims quite closely, however theoretically spurious such an approach might be.

$B_E$  is the value of the loading based on the claims distribution for the portfolio as a whole, potentially varying according to the expected exposure level.

#### ***2.1.4 The Catastrophe Risk***

The large claims loading is not intended to cover the entire distribution of claims but recognises that there is a common potential for claims of a more unusual nature related to the size of the exposure but much less likely to be correlated with the attritional losses. Examples of claim types to be allowed for within the catastrophe pricing will include industrial disease claims for Employers' Liability, long-term products liability claims under a general liability contract, or natural perils for property and motor risks. As these items are likely to involve significant judgement, the intention is to provide a relatively transparent framework which should provide a greater degree of pricing consistency.

Depending on how the large claim loading is derived, the catastrophe risk components may, therefore, include

- an element for the value of events above the large claims limit
- an estimate for the cost of multi-policy events, including natural perils
- an allowance for reinsurance costs
- an assessment of the prospective cost of latent claims

## 2.2 Commission and the Premium Formula

Unlike Personal Lines, commission may vary as a percentage of premium from one risk to another. It often forms part of the negotiation both between insurer and broker as well as between the broker and their client, especially for experience-rated or blended risks.

An underwriter may be aware of the expense margins required when applied to the average gross premium across a portfolio. However, the expense amount required does not alter only because the commission rate changes. This can happen if the premium calculation follows these traditional lines. The traditional premium formula is generalised and simplified as:

$$P = \frac{\text{Risk Premium}}{1 - \text{Expenses/Profit \%} - \text{Commission \%}}$$

Suppose that

$$\begin{aligned}\text{Risk Premium} &= 252 \\ \text{Expenses/Profit} &= 27\% \text{ of } P \\ \text{Commission} &= 10\% \text{ of } P\end{aligned}$$

$$P.10 = \frac{252}{1 - .27 - .10} = \frac{252}{.63} = 400.0$$

∴ The expenses recovered are 27% of 400 = 108.

If commission reduces to, say, 5%

$$P.10 = \frac{252}{1 - .27 - .05} = \frac{252}{.68} = 370.59$$

∴ The expenses recovered are 27% of 370.59 = 100.06

(To add to the confusion, the broker may have calculated

$$P.05 = \frac{90 \times 400}{95} = 378.95$$

and be disappointed at the additional loss of income).

Unless the underwriter intends to share some of this income reduction, the expense/profit load should relate to the Net Premium. In this example, it would be 30%.

Thus, the formula would be  $\frac{\text{Risk Premium}}{1 - \text{Expense/Profit Load \%}} \times \frac{1}{\text{Commission \%}}$

$$P.10 = \frac{252}{1 - .3} \times \frac{1}{1 - .10} = 400.00$$

$$P.05 = \frac{252}{1 - .3} \times \frac{1}{1 - .05} = 378.95$$

The expenses/profit margin is 108 in both cases and, what is more, the broker's approximation was shown to have been right all along! This approach preserves the insurer's income without distinguishing between the components.

Therefore, other than where book rates and standard commission levels apply, in order to support underwriters' pricing processes, the various components should be expressed in relation to the Net Premium. The underwriter should then focus on presentation of the net premium as calculated, recognising commission as the separate, additional cost of distribution.

## 2.3 Data Issues

There are certain types of information/data which are readily available to an insurer asked to quote for a commercial risk, although the extent and quality of this information varies markedly across the market. In recognition of this, in January 1996 the ABI produced a list of recommendations for companies responding to requests for information which included a set of template confirmed experience forms. However, although most insurers gave agreed to the recommendations in principle, they are not compulsory and the degree of variation in the scope and detail of the data given on the form between companies is still marked. To demonstrate this we obtained a selection of confirmed experience forms from a number of insurers and compared them to the ABI recommendations. The results of this exercise can be found in Appendix 2.

Some specific problems that can arise with the data provided to an insurer ( including that contained in the confirmed experience):

**i) Dates** There can be some confusion around the date as at which the experience is run and the date of the last claim included. Although the ABI has asked for these to be made clear, this is not always the case.

**ii) Adequacy of case estimates** The adequacy of case estimates varies from insurer to insurer. Some companies get around this by using holding insurer as a rating factor, and adjusting the experience provided in light of their knowledge of this insurers history of case estimate adequacy. Care needs to be taken here as a company's reserving philosophy may change over time, something that would not be immediately apparent to an outsider. A further complication arises where a risk has had more than one previous insurer covering the recent history and consequently the case estimate adequacy may vary for different policy years.

**iii) IBNR/TBNER** Some insurers are known to include an element of IBNR/TBNER in their case estimates for claims experiences. Again, this is something that varies from insurer to insurer and underwriters will sometimes adjust the data if they feel that an element of IBNR has been included.

**iv) Basis of cover** Claims experiences are usually provided for the basis of cover for which the quote is sought. However, where the basis is changing from the past some of the data adjustments may be rather ad-hoc in nature.

This is readily demonstrated by the application of excesses.

Usually, a confirmed experience will be constructed using the excess that applied for the policy period under consideration. This presents a problem to other insurers if the excess has changed in the past or if they are asked to quote with a new excess amount as a confirmed experience shows the claims cost to the insurer, not the ground up cost. The market agreed that, in order to get around this, they would provide "Excess Savings" figures which are the amounts that would be deducted from the claim cost in each policy period had the quote excess applied at that time.

These estimates are provided by the holding insurer and are calculated by simply calculating the difference between the quote excess and the original excess and multiplying this by the number of claims to which the excess applied. No adjustment is made for claims that might not have been reported had the higher excess applied, and no allowance is made for inflation. If the new excess is to be lower than previously then there is a lack of data as claims below the old excess, but above the new excess, are unlikely to have been reported to the holding insurer.

**v) Claims Development** For the majority of commercial risks, the data provided does not usually include complete claims triangles. Indeed, a typical claims experience will give only the current position for each of the last three to five years. The ABI have recommended that insurers additionally provide the position at the previous year, though few insurers do this fearing that this will reveal the strength of their reserving. It is possible for an insurer or broker to build up a claims triangle from successive claims experiences, although these can have distortions, as detailed below:

- where the policy period changes or has changed in the past (e.g. a change of renewal date at some time in the past)
- where the risk changes along a row (as each claims experience is usually based on the risk profile for the next policy year).
- changes in claims practice, eg, demise of the knock for knock agreements

**vi) Large Claims** In all rating analyses the underwriter's aim is to remove any distortion that may be present in the data and the most common cause of this is the presence of unusually large claims. Hence, the underwriter will look to remove claims which will distort the analysis (i.e. those claims that can be considered to have resulted from truly random events - claims where he considers that there is a reasonable chance of the circumstances that led to the claim recurring he will wish to include.)

However, in practice, it is this area in which the broker attempts to exert his influence. He will seek information concerning "large" claims that he considers should be removed from the experience, but his and the insured's definition of "large" will often differ from that of the insurer. The broker's and insured's aim is to convince the underwriter to remove as many claims as possible, either because the circumstances that led to the claim have been removed or because the claim was blamed on bad luck and could have happened to anyone.

Further, consistent with the other claims information provided normally, only the current estimate of individual large claims will be disclosed and not the full history of estimates. This, though, prohibits the removal of the claims from a claims development triangle.

**vii) Additional Data** A certain limited amount of information additional to the confirmed experience form, plus the other types of data usually provided (eg detailed surveys for large commercial property risks), is sometimes available. For example, for liability quotes, exposure information such as wage roll (sometimes provided split by clerical and manual) and turnover (split by product and places of export, if applicable) tend to be readily available from the current insurers.

However, more good quality and detailed data is often difficult to obtain as the brokers are usually reluctant to go back to the insured with further questions. Hence, beyond the usual confirmed experience, what is available is extremely fragmented and non-standard. For example, in some liability cases, the underwriter may be able to gain access to product brochures and business plans etc to assist in assessing the risk but, in others, these may not be available.

The cynical observer may infer that the underwriter invariably only has access to such additional/non standard information which will place the risk in a good light - any information which may intimate that there is something "out of the ordinary" about the risk is never likely to make it onto the underwriter's desk!

Underwriters will always talk about problems with the data provided to them including that on a claims experience, and with the current loose framework for the provision of information many of the issues cannot be easily resolved. More often than not it is only the underwriter's previous experiences of an insurer that allows him to "adjust" the data to make allowance for some of the problems that he faces. However, when making such adjustments, they are not basing their judgement on hard facts. This necessarily introduces an element of subjectivity into the validity of the data being used.

In an ideal world, it might be hoped that all insurers would provide data on a consistent basis. However, as with all forms of insurance, data is the key to accurate analysis and the holder of that information is reluctant to share the information with the rest of the market. Overall, it is difficult to see how the current situation will improve as long as companies can choose the extent to which they will adhere to the ABI Recommendations.



### 3 SMALL RISKS

This section looks at suggested methods of rating small risks and a hypothetical example is used to illustrate the methods described. By adopting a step-by-step structure, the section provides a practical guide to the application of the methods considered: two-way tables, generalised linear models, and credibility theory.

#### 3.1 The Hypothetical Portfolio

In order to illustrate the ideas in this paper we have taken a hypothetical portfolio of small commercial risks and generated some data based on the following information. The example is necessarily simple, but can be used to highlight the main points made. Business has been written for 20 years and we have five years of data.

Portfolio size - number of policies in 1995	Shop	Clothing manufacturer
Clerical	6,224	6,265
Manual	6,221	6,290

Claims experience	Frequency	Severity
Employers' Liability	1.0%	10,000
Water perils	2.5%	1,500

#### ► *Relativities of rating factors assumed*

Employers' Liability	Frequency		Severity	
	Shop	Clothing manufacturer	Shop	Clothing manufacturer
Clerical	1	1	1	1
Manual	5	10	5	5

Water Perils	Frequency		Severity	
	Shop	Clothing manufacturer	Shop	Clothing manufacturer
Low storm, high flood	1.0	1.0	1.00	2.0
Low storm, low flood	0.2	0.2	1.00	2.0
High storm, high flood	6.0	6.0	1.75	3.5
High storm, low flood	5.0	5.0	0.75	1.5

### ► *Data generation methodology*

New policies are generated randomly with a specified distribution of inception dates across years. After a year, the new policy is renewed randomly with the mean renewal probability given by a specified formula depending on the rating factors. Similarly, at the end of each renewal year, the method is repeated.

Claims are generated with accident dates randomly spaced so that the distribution of the number of claims in a year is Poisson with mean frequency given by another specified formula depending on the rating factors. The cost of each claim is randomly generated with a gamma distribution with mean given by a further specified formula depending on the rating factors.

This generation process was repeated as necessary to produce policies with the two risk types and claims with the two claim types.

### **3.2 Suggested premium formula**

This is the end product of any analysis. An overall premium rate is established and this is varied by rating factor. The formula is transparent which means that each element can be discussed with the underwriters. As the loadings for each type of cost are explicit, actual and expected values can be compared.

$$P = C \cdot (1+c_e) \cdot (1+c_i) + E + R + (e+c) \cdot P + \text{profit}$$

P = average premium charged for a risk. This could be per unit of exposure or per policy. The premium for individual risks will vary.

C = net of reinsurance expected average claims cost

$c_e$  = claims handling expenses

$c_i$  = claims inflation

E = per policy expenses

R = reinsurance cost

e = per premium expenses

c = commission percentage

Profit will include allowances for investment income in calculating the required return on capital and will be a percentage of premium or exposure. C could be split into:

attritional claims + big claims + cat claims + latent claims

$$= a + b + c + L$$

a and b would be split by type of claim, eg, for Employers' Liability it might be split into injury and disease claims. To assess how big is big, we need to look at a claim size distribution and the reinsurance programme. a will vary by rating factor but b may not unless there is evidence of large claims being affected by rating factors.

c will depend on the class of business, based on assessments of the expected cost of a catastrophe (flood or storm) and its estimated return period. This will provide the expected annual gross cost which can be blended with the reinsurance programme. c will vary by rating factor depending on the cover.

L will be a pragmatic view of the long term expectation of latent claims. This may not vary by rating factor, although it could be bigger for heavy industry. A view may be taken of the areas that might be more likely to give rise to latent claims.

Having assessed the full costs that will have to be met, the premium charged will then have to be adjusted to meet general business objectives, eg:

- To gain market share in a particular area
- To get in the top 5 of the Gilt Edge screen
- To gain publicity, by say being the cheapest, to generally increase overall volumes

Or perhaps, only to get a good lunch off the broker, or to keep the broker quiet when you are having a bad day...

### **3.3 Assessing the Claims Cost**

#### ***3.3.1 Assessing overall historical claims costs***

Assessing the historical claims cost can give an estimate of how profitable or unprofitable business has been. Past claims ratios can be compared with those calculated in the premium formula to show exactly how much has been made / lost. This gives an indication of the adequacy of the premium rates.

We need to assess the total historical claims cost and number of claims in order to calculate historical claims frequencies and average claims costs. This will be done by projecting triangulations of claims costs and claims numbers to ultimate. Each claim type will need to be projected separately if possible.

### ***3.3.2 Data needed***

For each type of cover, for each type of claim (for example, injury, disease, storm, flood), for 5-10 years (in order to assess trends) and for each claim:

- date of occurrence
- date of notification
- payments made with dates
- estimates with dates
- associated exposure
- changes in cover and deductibles so they can be taken into account

Generally, familiar data problems will appear: we need to group parts of the portfolio so as to ensure data are homogenous and credible (even when these targets cannot both be hit!). We should split the experience by cover and type of claim where these splits affect duration to settlement or seasonal or other variations in costs.

### ***3.3.3 Approach***

Of the possible time bases, only accident and underwriting periods are appropriate, obeying the principle of correspondence. Underwriting period makes more complete sense because one is grouping exposure and claims arising from underwriting done in a period, so changes in underwriting conditions can be taken into account. Accident period is however more popular generally. We will need accident month ultimates from some sort of projection on triangular data. Normal reserving issues are germane.

If triangles are not available, an ultimate needs to be established somehow, eg by projecting the latest values on industry trends. This projection might be routine for a short tailed class or might repay the investment of considerable effort for say Motor Third Party Injury. We should make some allowance for inflation. Even if we prefer not to deflate data for projections, we will need to measure past inflation and consider

the future effects for use in the pricing formula. We will need to decide whether to allow for a tail beyond the maturity of experience analysed, and to preserve homogeneity we might restrict the data. Large claims must be allowed for but the projection may be better if we model them separately.

We need to consider reinsurance ceded. The first approximation however should be a gross analysis, and the reinsurance analysis can then amount to an investigation of the relative cost of a session.

### ***3.3.4 Calculating average cost and frequency***

Average cost = ultimate cost of claims / ultimate number of claims

Frequency = ultimate number of claims / exposure

The exposure depends on what we plan to rate by. For EL we may use wageroll, for PL turnover and for fire sum insured year.

We would calculate average cost and frequency for several years to see what trends there are in the data. Data should be standardised to remove the effects of changes in mix which may give misleading results.

*Example:* Clothing manufacturer - manual workers, EL claims

Year	Exposure	Number of claims	Ultimate cost	Frequency	Ave cost
1995	25,000	4,346	61,721,473	17.38%	14,202
1996	41,666	7,157	103,213,350	17.18%	14,421
1997	27,778	4,722	71,275,143	17.00%	15,094
1998	18,518	3,184	50,886,881	17.19%	15,982

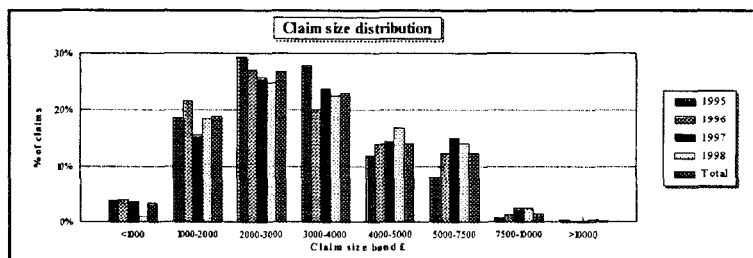
### ***3.3.5 Severity Distribution***

We need some sort of claim size distribution, again by claim type. This will look at the claims distribution by size for each accident year so that the effects of inflation and IBNR can be judged. Claims will be inflated to current day values before putting into size bands. Again, changes in deductibles and policy conditions will have an impact and should be adjusted for.

### Example of Claim Size

Year	<1000	1000-2000	2000-3000	3000-4000	4000-5000	5000-7500	7500-10000	>10000
1995	3.90%	18.69%	29.16%	27.72%	11.70%	8.01%	0.62%	0.21%
1996	4.07%	21.45%	27.00%	20.10%	13.69%	12.21%	1.36%	0.12%
1997	3.63%	15.43%	25.59%	23.59%	14.34%	14.88%	2.36%	0.18%
1998	1.09%	18.53%	24.80%	22.34%	16.62%	13.90%	2.45%	0.27%
Total	3.43%	18.86%	26.76%	23.01%	13.90%	12.23%	1.62%	0.18%

This can be shown graphically:



### 3.4 Approaches to analysing relativities between rating factors

Knowing the overall frequency and severity is important and feeds into the suggested premium formula. For rating we need to know these for each combination of rating factors. This brings a trade off between the amount of data in each cell and the number of cells we wish to look at. One solution may be to group rating factors that are similar and adjust the rates judgmentally at the end of the analysis.

We look at three methods of analysing the relativities:

- two way tables
- generalised linear models
- credibility theory

### 3.4.1 Two way tables

For example, looking at the water perils claims only we can assess the frequency and severity for each combination of rating factors:

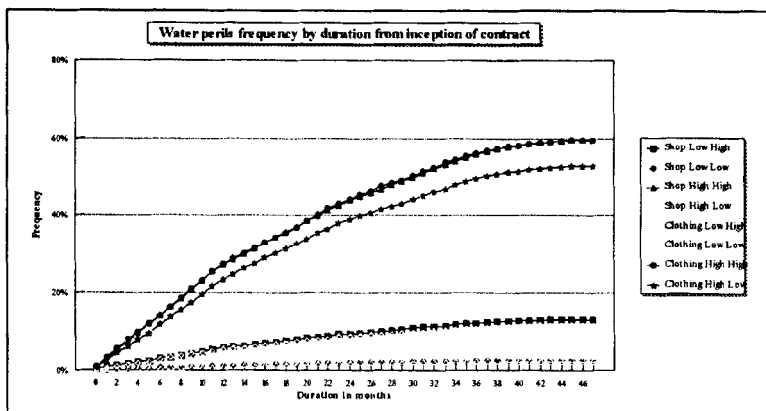
Risk	Storm	Flood	Frequency	Severity
Shop	Low	High	13%	2,666
Shop	Low	Low	3%	11,916
Shop	High	High	60%	2,635
Shop	High	Low	53%	13,233
Clothing	Low	High	12%	2,645
Clothing	Low	Low	3%	2,446
Clothing	High	High	60%	2,646
Clothing	High	Low	53%	2,635
<b>Total</b>			<b>35%</b>	<b>4,380</b>

This produces the following relativities:

Water Perils	Frequency		Severity	
	Shop	Clothing manufacturer	Shop	Clothing manufacturer
Low storm, high flood	1.00	0.90	1.00	0.99
Low storm, low flood	0.20	0.21	4.47	0.92
High storm, high flood	4.56	4.57	0.99	0.99
High storm, low flood	4.04	4.04	4.96	0.99

We can also analyse whether the development pattern varies between rating factors.

This can be shown graphically:



From the observed experience of Frequency and Severity, we can derive a risk premium of frequency by severity as follows:

Water Perils	Shop	Clothing manufacturer
Low storm, high flood	£346	£317
Low storm, low flood	£359	£73
High storm, high flood	£1,581	£1,588
High storm, low flood	£7,013	£1,370

Similarly, a table of premiums can also be derived for Employers' Liability:

Employers' Liability	Shop	Clothing manufacturer
Clerical	£298	£293
Manual	£6,722	£11,021

These premiums are per annum per package (remember we are dealing with small and uniform package business. If the package was to cover both water perils and EL, the two risk premiums would be added together.)



### 3.4.2 Generalised linear models

This approach involves using the well established technique of fitting generalised linear models ("GLiM's") to claims and policy data. What is perhaps not so well established is the idea of fitting these models to data that has been generated using a predetermined structure, so as to assess whether or not models can be fitted to certain types of data. We have used the data generation technique outlined above to generate the data, to which we then fit the GLiM. This is a convenient technique for testing model feasibility in the circumstances where "real" data is unavailable, as was the case here.

We used the data structure, and relativities for the rating factors as set out above, when generating the data. We produced a data set covering a period of four years, and for portfolios of three different sizes: 50,000 policies; 500 policies and 100 policies. The purpose of the exercise is to see whether we can fit a model to the data that has the same underlying relativities used to generate the data. We use a model that has the same structure (i.e. rating factors and levels) when fitting the data. This is an extremely simplified example, and the procedure differs from the practical situation where one needs to decide upon the model structure. However, it is still a useful guide as to whether the kind of rating factors and relativities one sees in practice in small commercial lines are likely to give rise to claims data to which GLiM's can be used.

We fitted the model using SAS/GENMOD. For claim frequency we used a Poisson error structure and for claim severity a Gamma error structure. As in the generated data, we considered the given interaction between business category (i.e. Shop or Clothing Manufacturer) and worker category (i.e. Clerical/Manual) for the EL claim type and between business type and Storm/Flood level for the Water Perils claim type.

The results are summarised in the following tables, which can be compared with the actual relativities shown above. Further details can be obtained from members of the working party.

#### *Example 1: 50,000 policies*

Employers' Liability	Frequency		Severity	
	Shop	Clothing manufacturer	Shop	Clothing manufacturer
Clerical	1.00	1.04	1.00	1.00
Manual	5.00	10.05	5.03	5.04

Water Perils	Frequency		Severity	
	Shop	Clothing manufacturer	Shop	Clothing manufacturer
Low storm, high flood	1.00	0.99	1.00	1.99
Low storm, low flood	0.19	0.19	0.99	1.90
High storm, high flood	5.90	5.98	1.73	3.49
High storm, low flood	4.93	4.89	0.74	1.48

*Example 2: 500 policies*

Employers' Liability	Frequency		Severity	
	Shop	Clothing manufacturer	Shop	Clothing manufacturer
Clerical	1.00	1.46	1.00	0.92
Manual	5.51	12.42	5.15	5.08

Water Perils	Frequency		Severity	
	Shop	Clothing manufacturer	Shop	Clothing manufacturer
Low storm, high flood	1.00	0.92	1.00	2.37
Low storm, low flood	0.15	0.10	0.92	1.99
High storm, high flood	4.36	4.97	1.79	3.73
High storm, low flood	3.49	3.89	0.79	1.61

*Example 3: 100 policies*

Employers' Liability	Frequency		Severity	
	Shop	Clothing manufacturer	Shop	Clothing manufacturer
Clerical	1.00	3.25	1.00	1.11
Manual	10.06	26.23	6.86	5.90

Water Perils	Frequency		Severity	
	Shop	Clothing manufacturer	Shop	Clothing manufacturer
Low storm, high flood	1.00	1.36	1.00	2.14
Low storm, low flood	.00	0.28	1.58	2.12
High storm, high flood	4.36	4.24	1.86	3.02
High storm, low flood	3.55	3.45	0.68	1.58

The results show the obvious feature that the more policies that one uses in the fitting process, then the better the model fits the data. It also shows that with too few policies (100 in this case) the fitted model is a poor fit to the known underlying structure of the data. However, even with only 500 policies the relativities in the fitted model are not too far away from the actual relativities. This should give some hope to those readers who have not attempted to use GLiM in pricing small commercial lines because they believed that the data would be too sparse. This may of course be true, but we encourage you to try it out on your own data - you might be surprised at the results (and so might your underwriting colleagues!).

### 3.4.3 Credibility theory

This section looks at the Employers' Liability experience only.

The theory used here is that one cell of data, which has most experience, can be used to deduce something about other cells with less experience. As the generated data assumes similar exposure in each cell, some data has been removed to make three cells smaller. The base cell used is the clothing manufacturer cell. All other combinations of rating factors are considered relative to this cell. The frequency for any one cell is then calculated as:

Frequency =  $Z \times$  calculated frequency in the cell +  $(1-Z) \times$  frequency in base cell

where  $Z = \min(M/m_0 \text{ and } 1)$

and  $M$  = observed number of claims in the cell

and  $m_0$  = the number of claims required for full credibility. Here 1,082 is used to give a probability that our estimate is within 5% of the true value 90% of the time, assuming a standard normal distribution of the total number of claims.

This produces the following frequencies:

Cell	Observed frequency	Number of claims M	Z	Frequency
Clothing, manual	40.53%	11,520	1.0	40.53%
Clothing, clerical	3.88%	272	0.5	22.16%
Shop, manual	20.12%	2,819	1.0	20.12%
Shop, clerical	3.79%	215	0.5	24.15%

and the following relativities:

Frequency	Shop	Clothing manufacturer
Clerical	1.0	0.9
Manual	0.8	1.7

This approach fails to estimate the correct relativities because the classes with few claims are given less credibility. The fact that the small number of claims is caused by a low underlying claims frequency is not recognised. Bearing in mind the results of the GLiM analysis above it would appear that reasonable results can be obtained using GLiM's with relatively small amounts of data and that a GLiM approach might be better than the credibility approach described above.

#### **3.4.4 Conclusion**

The analysis using GLiM's shows that these models may be more useful than perhaps might be thought for commercial business. Two way tables are quick and easy to produce, but rely on having a reasonable amount of data and not many rating factors. The credibility approach as described is fairly unhelpful and if used to set premiums could lead to a very incorrect rating structure and problems with selection.

The observed risk premium is a good starting point but may need the following adjustments to get to a "true" figure:

- i) Discounting to allow for delays in claims settlement

ii) Removing the effect of large claims from the observed experience. It would appear that large claims have arisen in the low storm/low flood and high storm/low flood categories.

iii) Adding in a margin for catastrophe. Eg for an '87 or '90 style storm. Or maybe to reduce the frequency if the experience observed contained a catastrophe.

iv) Add an estimate for latent claims. These would not be in the experience because we could not know of their occurrence.

v) Add or deduct for the underwriter's judgement. This may not be applicable for package business, it depends on how flexible the commercial insurer wishes to be. After the actuary has assessed a risk premium for groups of risks, the underwriter may assess that an individual risk differs significantly from its group. If this is the case the risk premium needs to be adjusted accordingly.

This is why it is important to separate risk premium from actual premium. By doing so you can make correct adjustments for the underwriters assessment.

### 3.5 Dealing with large claims

There are a number of ways that large claims can be dealt with in model fitting. One approach is to:

- Select a truncation point for the top-slicing
- Top-slice all claims at the truncation point
- Fit models to top-sliced data
- Add on a load to premiums to allow for excess cost over truncation point

The truncation point will be lower for assessing relativities than reserving as the data cells will be smaller, and the need for a stable results is greater. The objective is more to focus on claims allocation rather than evaluation.

It is sensible to investigate the dispersion of claim sizes about the average before choosing an error structure for the GLiM, and at this stage the truncation point can also be considered. One method is simply to produce normal plots, or perhaps logs, of claim sizes and consider whether the results would be more normal if a small number of large claims were removed. Other distributions can also be plotted. After fitting a model, the residuals should be examined for large outliers and the effect on fits of weighting these claims out should be investigated.

It should be remembered that a given statistical distribution is being used for modelling simply because it happens to fit the observations reasonably well and parsimoniously. If the parsimony and fit are both improved by eliminating a few claims, then to eliminate them would be an improvement. However, if the model becomes too dependent on the data then the model will not have predictive power. This can happen where, for example, the exact size of truncation influences the model unduly, and is itself determined by the particular data set used.

The truncation point would also depend on the size of the cells in the model. If categories are broad, relatively large claims will have less effect since they will be diluted by large numbers of more standard sized claims. However, the claims frequency for commercial package business is generally lighter than for, say, private cars so even broad categories will contain relatively few claims.

Other approaches include spreading the excess of claims above the truncation point proportionately among all the claims up to that level. A mixed model can also be considered in which large claims are treated as though each had an independent cause although there is then a risk of over fitting the model. Alternatively, large claims can be excluded entirely and a loading applied at the end of the process.

### ***3.5.1 Reinsurance - loading in the premium rates***

The claims cost to be loaded should be net of reinsurance, with a loading added for the cost of reinsurance.

The reinsurance programme will probably run from 1 January and a rating series will probably not. If the reinsurance programme is on a losses occurring during basis, it is necessary to estimate future years' reinsurance premiums as the rating series exposure will be covered by these future years' programmes.

It is probably best to assume that the current year's structure will continue although some companies may be able to incorporate the anticipated outcome of their reinsurance strategy.

### ***3.5.2 Catastrophe claims***

Using exposure round the country we can work out expected losses from particular hypothetical events (freeze, flood, storm) and the return periods for these events. The gross annual average cost is then the cost / return period for an event. The net cost is the gross cost less recoveries plus reinstatement premiums. Dividing this by the return period gives the annual net cost. The reinsurance premiums can be loaded in full if it is considered that reinsurance is a legitimate part of an insurance contract. If, on the

other hand, buying reinsurance is more to protect shareholders than less of the cost could be passed to policyholders. Note that the cat protections may also protect the household and motor accounts so some allocation is needed between accounts based on relative exposure to catastrophes.

The reinsurance costs will be loaded differently to different parts of the UK depending on how prone to catastrophes they are.

Any retained loadings may need to be put away to claims equalisation reserve if not used in a year.

Comparing the annual gross cost with the annual net cost plus reinsurance premiums will give an indication of how expensive reinsurance is.

***For Example:***

If we take the average shop sum insured as £15,000 and the average clothing manufacturers as £50,000 then we can estimate the exposed to risk as follows:

Storm	Flood	Number of Policies			Exposure (Millions)		
		Shop	Clothing	Total	Shop	Clothing	Total
Low	High	9,921	5,103	15,024	148.815	255.150	403.965
Low	Low	5,114	4,947	10,061	76.710	247.350	324.060
High	High	9,855	5,005	14,860	147.825	250.250	398.075
High	Low	4,968	5,087	10,055	74.520	254.350	328.870
<b>Total</b>		29,858	20,142	50,000	447.870	1,007.100	1,454.970
<b>Storm Total</b>		14,823	10,092	24,915	222.345	504.600	726.945
<b>Flood Total</b>		19,776	10,108	29,884	296.640	505.400	802.040

We can hypothesise different catastrophe losses and, either by looking at past events or by investigating expected damage, estimate the cost of an event. For example, if we can see that 25% of our flood exposure is in an area which might be flooded such as the East Coast and that 25% of shops in that area would suffer damage of 75% of the sum insured, the maximum probable loss for shops of a flood would be:

$$296,640,000 \times 25\% \times 25\% \times 75\% = \text{£}13.9\text{m}$$

If for clothing manufacturers we could see that 5% of our flood exposure was in the same area and that 50% of properties would suffer damage of 10% of the sum insured, the MPL would be:

$$505,400,000 \times 5\% \times 50\% \times 10\% = \text{£}1.3\text{m}$$

If we believe that such an event will occur on average once every 12 years, the gross annual cost is  $\text{£}15.2\text{m} / 12 = \text{£}1.3\text{m}$ .

If reinsurance cover of £10m excess of £10m is purchased, with 100% placed and no reinstatements, the annual cost can be broken down as follows:

Layer	Gross loss	Net loss	Annual cost
to £10m	£10.0m	£10.0m	£0.83m
£10m xs £10m	£5.2m	£0.0m	£0.43m

If the reinsurance premium is more than £0.43m, then, arguably, the reinsurance is expensive. The total annual cost is then £0.83m + reinsurance premium and this needs to be loaded into the premium rates. Shops will be allocated  $13.9/15.2 = 91\%$  of the cost which will be allocated to properties in the flood area. Clothing manufacturers will get 9% of the cost.

This method gives an estimate of the catastrophe cost. It has the drawback of being deterministic and trying to encapsulate a lot of information in one statistic. Modelling different catastrophes would be a better way of allocating these costs. However, this method is easily explainable to non-technical people and has clear assumptions which can be challenged and tested.



### **3.6 Judgement needed to produce a final product (Pricing vs Rating)**

This is particularly important in small commercial lines, as:

- There may not be large volumes of data on which “reliable” book rates can be determined.
- There may be a large number of possible rating levels for some rating factors, and this may have to be reduced to broader categories for the model fitting.
- The market is changing and becoming more competitive (e.g. more quote engines being used) and hence the past may not be a good guide to the future claims experience, and the risks of anti-selection may be increasing.
- There may be some “underwriting” factors that have not been captured in the book rating process (e.g. risk is in a particular area not picked up by area differentials).
- The old tariff rates could possibly be used as a reasonableness check, although they will be out of date.
- The key to assessing the extent to which judgement needs to be applied to the book rates is to use a control process that allows the actual experience, as it emerges, to update the book rates. Actual rates versus book rates need to be monitored to see how much judgement is being used in practice.

## 4 EXPERIENCE RATING or *"THEY'RE DUE A GOOD YEAR"*

### 4.1 Introduction

Every underwriter has an opinion about when it is appropriate to use pure experience rating and when it is not. In practice it is very rare for pure experience rating to be used to derive the total risk premium for a risk. Typically experience rating will be used to calculate the attritional part of the risk premium, and to this large claim loads will be added. These large claims loads are usually derived from consideration of the portfolio as a whole (or a sub-section of the portfolio). However, an underwriter would normally refer to a risk where the risk premium is made up in this way as being experience rated.

The debate about when it is appropriate to use experience rating centres around the issue of risk size. Underwriters are usually aware of the existence of a law of large numbers which is presumed to provide the general justification behind pricing risks on their own experience. Therefore, most underwriters agree that in theory experience rating should only be used where the expected number of claims is sufficiently large for the results to be statistically valid. In practice, of course, market forces come into play. Brokers and others put pressure on underwriters to base their premium calculations on the risk specific data, especially if they perceive the risk as being better than average. It is evident in the market that many underwriters have bowed to this pressure.

Market pressures surrounding the large risks are particularly acute. Being large, they attract relatively large premiums and commissions. Under pressure to meet targets and budgets, deficiencies can be made up by attracting such risks and the temptation to cut corners can be enormous. Prices will be discounted for a variety of reasons. For example, the expenses loading will often be cut on the basis that the underwriting costs involved for a £500,000 risk will be much the same as for a £50,000 one. In the event, of course, the £500,000 customer - even if they are only paying £350,000 - will expect gold-plated service, tailored exactly to meet their unique requirements. Dedicated claims staff, a hot line to the local manager and invitations to the corporate golf day will all be anticipated...

Having established that experience rating is to be used for a risk, differences in approach can arise depending on whether the risk is being renewed, or whether you are providing a quote for a piece of new business. In either case, experience rating will necessarily be based on the previous claims history of the risk. When quoting for new business the underwriter is totally reliant on the information provided to the market by the holding insurer, and the ABI have produced recommendations concerning the amount and format of information that should be made available (see Appendix 2).

However, when renewing a risk there will often be more information available than normally disclosed to the market and some companies have recognised this as giving them a potential competitive advantage.

A further factor affecting the manner in which experience rating is carried out is the current move towards higher excesses, high aggregate deductibles and self insurance (including captives - see Appendix 7) with catastrophe cover. Each of these requires more accurate pricing of each of the elements of the risk premium, as it will no longer be possible to rely on the surplus from one area to offset the deficiency in another (e.g. motor Accidental Damage subsidising the Third Party risk). When this is combined with the demand for more transparent pricing, it is hardly surprising that many underwriters are becoming increasingly uncomfortable with their traditional approach to experience rating. Underwriters are having to respond with more sophisticated techniques for pricing each of the elements within a risk, and they are looking to actuaries (among others) to provide them with a set of guidelines to assist them with this.

However, even with a large body of data in exactly the form required, pricing can never be merely an arithmetic exercise. The process should be primarily focused on measuring the value of the risk, using all the available data to assist in this process.

## **4.2 Risk Premium Calculation**

With the increasingly sophisticated approaches to analysis now possible when using a powerful PC, it is all too easy to lose sight of the objective. The analysis should provide an improved understanding of the historical loss experience. In other words, the cost base for the risk.

To an extent, the starting point is to treat the process as a reserving exercise and so it requires similar data such as triangulations and loss development patterns. Where these cannot be derived from the individual risk's own experience, proxy factors will have to be used. The DTI returns may appear good sources of general factors but it is likely that the data presented in claims experience will be inconsistent with them. There are three main reasons behind this.

Firstly, claims experiences may include case estimates calculated to allow for a measure of the IBNER/IBNR that is shown separately within the DTI returns. Secondly, DTI returns may cover a number of risk groupings which have markedly different development characteristics; comprehensive and third party fleet business is an obvious example.

Thirdly, there will be different claims cut off dates between an individual risk and the DTI's. Even if some allowance is made for this, the use of benchmark development factors assumes no seasonality. In other words, using DTI factors based on January-December data which include a partially developed winter is unlikely to be appropriate for July-June where a more mature set of winter claims is included.

The presentation of this costing exercise should highlight areas of greatest uncertainty so that they can be treated differently from those aspects where there is more confidence in the outcome. It should also be projected into the future taking care to allow for changes in exposure and cover as well as money values.

Underwriters have tended to focus on burning cost. This is the value of claims for a given number of years divided by the exposure measure. This approach tends to hide both any trends and the extent of variability. Pricing based on burning costs will provide a degree of smoothing in the way that moving average does. Surely actuaries have something to add to a moving average!

The simple discipline of following these steps will provide a much more useful costing base than most underwriters are used to

- ▶ for each of the previous years available, project the claims to ultimate
- ▶ adjust each year separately for the change in exposure from the original policy + year to the renewal period
- ▶ repeat this for changes in cover
- ▶ incorporate an inflation vector appropriate to the claims
- ▶ express each year's fully adjusted data as a percentage of the renewal period's exposure as well as in the renewal period's monetary value
- ▶ analyse these values for volatility and trends
- ▶ repeat the exercise after top slicing the large claims.
- ▶ add large claims load
- ▶ convert to gross premium

### 4.3 Large Claims Funding

Where information is available on individual large claims, it is common for underwriters to “top slice” these claims. As mentioned above, in theory the underwriter’s aim here should be to remove any distortion that may be caused to the analysis by the presence of unusually large claims. However in practice a monetary limit is set above which the claims are top-sliced.

Two questions that underwriters often find difficult to answer are:

- i) Where should the cut off point be for top-slicing?
- ii) What should the large claims fund contribution (or load) be?

Intellectually, top slicing appears better justified than removal. If the cut-off point is £50,000, why should a claim of £49,999 be kept in the record and one of £50,001 discarded? This is especially true if the values are estimated as the second claim may be settled within £50,000 and thereby return to the experience. Theoretically, it is possible to deal with both positions but top-slicing has more rigour.

In Section 2.1 of this paper, the general principles of selecting suitable cut off points are set out. These levels will vary according to the risk characteristics and the treatment of large claims. If they are top sliced, the implication is that the adjusted claims would retain a somewhat different variability compared to total removal. The allowance for large claims would also depend on this.

A further feature of large claims is that their very significance means that they will come under close scrutiny. Given their size, efforts will be made to seek subrogation or involve other defendants to the claim. While this will reduce the eventual outlay if successful, the result is that such claims will tend to be discounted by the broker.

Also, it is likely that the policyholder will review the process which generated the claim and seek to demonstrate that it could not be repeated. Hence, there will be pressure to remove the claim entirely on the basis that “this is what they bought insurance for” and “nothing like this can happen again so you do not need to price for it”. This style of risk management, sometimes referred to as “shutting the stable door after the horse has bolted”, still leaves the insurer exposed to future bolting horses. It illustrates the danger of pricing purely on the numbers without a good appreciation of the exposure.

However, the real world is one where underwriters have to make decisions based on the material presented to them. If they at least have some concept of the way claims are distributed by size, they will make more informed decisions about the treatment of large claims. If one risk needs to contribute less to the fund, another must contribute

more but how many underwriters even have a benchmark against which to make such judgements? For those that do, how reliable and up-to-date is it?

An improved understanding of claim profiles should also increase the level of confidence with which underwriters can price the risks. With an improved ability to produce a technical price, the underwriter is in a stronger negotiating position and can withdraw from a Dutch auction at a point where the loss would be unacceptable.

## **4.4 Other Issues**

### **4.4.1 Large Excesses**

With a large excess, there is often sparse information for claims above the deductible (because of low incidence). The volatility of these claims is high and is retained by the insurer (the stability in the larger number of smaller claims is passed to the insured). How should this increase in the volatility of the insurer's claims cost be priced?

The extra volatility suggests that proportionately more capital may be required, so increasing the profit margins required. However, modern portfolio theory suggests that, as long as the risk is still diversifiable, no further margin is warranted. The real issue is probably the greater level of uncertainty in valuing the retained exposure. This lack of confidence in the pricing should be reflected in larger safety margins. The policyholder needs to understand that the retained risks are relatively stable and predictable so that there is less need for a margin within their share of any notional ground-up price.

In pricing for a large excess, the underwriter will tend to refer to the reported claims experience. While the whole body of the estimates may provide a reasonable approximation to the ultimate value of the claims, the experience of many insurers is that the large cases are likely to run off in deficit. In such a situation, the underwriter could over estimate the value of the excess and so under-charge the cost of claims above it. In such a scenario, the client's belief that their conventional insurance premiums were excessive can only be reinforced as they find themselves with surplus funds for their retention.

The presence of a large deductible can have an influence on behaviour, making the policyholder more risk averse and so improving the risk. In such cases though, many insurers require the claims handling to be maintained under their control, particularly where the excess operates as an aggregate. Where a third party undertakes the role, the basis of remuneration of the handler is significant. If they are paid per claim, the pressure will be to achieve settlement quickly but the terms achieved may be

sub-optimal. Also, the risk carrier needs to have confidence in the consistency of case estimating and this is harder to achieve with a third party.

#### **4.4.2 Aggregate deductibles.**

For compulsory classes, the insurer provides certificates of insurance cover. Therefore, even where there is a deductible - single event or in the aggregate - the insurer retains the primary liability for any claims. The policyholder will reimburse payments but only in arrears in order to retain the cashflow benefit. Hence, the insurer carries a credit risk which will compound over subsequent renewals, particularly where personal injury and liability claims are involved. The underwriter should therefore ensure that this aspect is allowed for in the pricing even if he decides the price can be zero.

Assessing the value of aggregate deductibles could involve some fairly complex mathematics or modelling and certainly a good understanding of the data. Their interaction with an excess covering individual losses adds to this complexity. For example, suppose the underwriter has priced an aggregate deductible of £1m with a limit for any one claim of £100,000. What price should be charged if the excess is increased to £250,000? Or if the aggregate is reduced to £900,000? Actuaries can surely help underwriters understand these interactions and reduce the risk of anti-selection by improving the consistency of the quotations for each of the options.

These deductibles may be funded by a captive insurance company, 100% owned by the policyholder. Given that the captive will hold at least the net present value of its expected outgoings, this provides an additional level of security. However, captives **tend** to be lightly capitalised and cannot be relied on to perform under extreme conditions without parental support.

Further areas where analytical skills can aid the underwriter include the issues of indexation and the buying out of outstanding losses, including IBNR, after a specified period.

#### **4.4.3 Retrospective Rating**

This is a subject in itself and there is scope for significant actuarial involvement to improve current practices. There are many forms which this can take including: an agreed pricing formula based on actual claims and within minimum and maximum premium levels; profit sharing; low claims bonuses; risk management renewal bonuses. The purpose of this section is not to provide a definitive definition of each of these products; they are largely tailor made but share common ingredients.

The final price for any one period of insurance is based on the actual claims as reported for that period. The starting point is likely to be the premium for conventional, fixed price cover. In designing the parameters, underwriters and their advisers should be aware of the following additional issues that can arise:

- if the starting point is the market price, insurers can find themselves returning "peak-profits" while being left with "nadir-losses". In other words, if underwriters have assumed that they will service their capital on the average profit through the cycle, they could find that this average level is severely cut by a formula that is insensitive to the cycle.
- with our knowledge of the extent of the skewness of most claim size distributions, insurers may find they are returning the large claim fund contribution to those policyholders fortunate enough to avoid such an incident while being left underfunded for the less fortunate clients.
- for long-tail liability classes, the claims will be far too immature to base final premium adjustment and insurers run the risk of passing the fund back unless it is kept separate from the adjustment formula.
- the timing of any adjustment should be such as to allow for the development of case estimates to the point where they can be expected to reflect their ultimate value.

#### **4.4.4     *Investment Income***

Greater pressure for pricing transparency requires consideration of investment income when in the past it was often left to fall out as an extra profit margin. Allowance for investment income is generally made explicitly in the underwriting and pricing parameters.

For large risks the claims cost is sometimes calculated on a discounted basis. However this requires a payment pattern and these can be difficult to assess, in particular for new business as full paid claims triangles are extremely rare. Further the payment pattern of one insurer may not reflect the practices of another. Some insurers overcome this by using a discount pattern obtained from their account as a whole, or some other form of benchmark pattern.

Another common approach to allowing for investment income is to reduce the profit margin in the premium calculation. Here consideration needs to be given to the amount of premium that will be available to invest (e.g. gross premium less



commission less initial expenses less reinsurance cost) and to the length of time which it may be invested.

Even if the investment income allowance is not specifically tailored to the specific client and their policy, it should take into account the nature of the deal. For example, the investment income earnings on a premium paid in full on day one will be rather different from a policy whereby 10% was paid at the outset with the remainder based on claim payments over a period of 5 years with a final adjustment at the end of the fifth year.

Whatever method is used, making an allowance in the premium for future investment income removes one of the insurer's traditional safety margins, and for this reason insurers are generally cautious in selecting the investment return to use.

#### **4.4.5     *Reinsurance***

To what extent should reinsurance arrangements be taken into account when pricing?

Two approaches are common:

- i) Calculate the risk premium based on the claims below the net retention, and then add the cost of reinsurance above the retention.
- ii) Calculate the risk premium based on the gross claims.

Whichever is chosen, it is necessary to consider the cost of reinsurance versus the gross claims cost above the retention. It is extremely unlikely that the two would be equal as reinsurers will be adding their own profit margin, expenses and possibly investment income allowance into the equation. If method ii) is selected, therefore, it is probable that an additional amount to cover the excess of reinsurance cost over claims will be required.

There is still the issue of the extent to which the pricing of the reinsurance should be passed on to the insured. If the insurer is currently able to obtain their reinsurance "cheaply", should this discount be passed on to the insured? On the other hand, if reinsurance is currently dear, can the insurer afford not to pass this additional cost on to the insured? In practice market forces will come into play, and the extent to which any discounts are passed through to the insured will be heavily influenced by the state of the market.

A further significant issue surrounds risks with aggregate deductibles. The premium charged will represent an excess of loss risk whereas the reinsurance rates anticipate a

ground-up premium as the rating basis. In incorporating the reinsurance cost, the underwriter should apply the rates to an “as if” ground up premium. Further, it is this notional premium which should be declared to their reinsurers. (This aspect is a feature which reinsurance underwriters need to address more closely given the increasingly strong trend towards so-called non-conventional pricing).

## 5 BLENDING BOOK AND EXPERIENCE RATING

As described in sections 3 and 4, book rates are used to rate the smaller commercial risks, whereas the largest risks may be rated on experience alone. A great many risks fall into an intermediate category, however, where a blend of the two approaches is appropriate.

It is with these “blended” risks, more than the book or experience rated risks, that market practice seems most variable and at odds with the theoretical approach.

### 5.1 Practice

#### *5.1.1 Blending In Practice*

It seems that few actuarially-designed, theoretically sound rating systems are used in the market at present, although many fleet rating systems are based on theory to some extent. In general, for Liability and Property, the underwriter starts with the book rates (less any “discounts”) and moves them up or down according to past experience and their view of how the risk differs from the standard book risk. The process is highly subjective and the underwriter may also be influenced, consciously or unconsciously, by the market cycle. The quotation may also be influenced by other factors, for example client relationships or sales targets. The extent to which these have been factored into any given rate is rarely explicit.

#### *5.1.2 Fleet Rating Exercise*

In order to get a better understanding of underwriters’ approach to blending book rates and experience rates, we carried out a fleet rating exercise.

##### ► BASIS OF THE EXERCISE

The exercise involved the following steps.

1. Claim experience was simulated for a 150 vehicle fleet risk over a 10 year period. Claim numbers were based on a Poisson distribution. Claim amounts were based on a long-tail distribution derived from a large body of real claim data. Cover was Third Party only with a £100 excess, and moderate inflation was assumed over the 10 year period.
2. Book rates for years 4 to 11 were calculated using the same claim size distribution as the simulated experience, but a lower claim frequency.

3. A claim development pattern was imposed on the simulated experience so that, for each year, the partially developed experience of the preceding years was available.
4. The developed experience of the first three years, as at two months before the start of the fourth year, was transferred to a Market Experience Form - the format underwriters are used to seeing when they are asked to quote for a fleet risk. The form also showed the book rated premium for the forthcoming year.
5. Underwriters were invited to quote for the risk. They were specifically requested to quote only what they thought the risk was worth, with no regard for market rates. To assist in their decision, they were advised of the claim frequency and average cost per claim underlying the book rated premium.
6. The Market Experience Form was then updated to reflect the last year's development, the book rates were updated for inflation and the underwriters were invited to re-quote. A maximum of five years' experience was produced at each renewal. This step was repeated seven times, meaning that eight quotes were received in all.

The simulated experience, including the full development of incurred claims, is summarised below.

<b>Year</b>	<b>Number of claims</b>	<b>Development year 1 (£)</b>	<b>Development year 2 (£)</b>	<b>Development year 3 (£)</b>	<b>Largest claim (£)</b>
<b>-2</b>	30			23,555	3,966
<b>-1</b>	32		69,827	77,586	36,311
<b>0</b>	39	38,866	53,815	59,794	9,717
<b>1</b>	41	89,129	123,411	137,123	63,806
<b>2</b>	47	38,913	53,879	59,866	13,390
<b>3</b>	42	43,880	60,758	67,508	11,577
<b>4</b>	33	27,950	38,700	43,000	11,541
<b>5</b>	37	64,138	88,807	98,674	27,453
<b>6</b>	45	41,837	57,928		8,657
<b>7</b>	41	30,779			5,149

## ► RESULTS OF THE EXERCISE

A total of 22 full or partial returns were received from underwriters from eight different companies. Graph 1 shows the average premium quoted by the underwriters each year, as well as the range of responses, the book rated premium and the correct premium derived from the known claim number and claim size distributions. There are a number of interesting features:

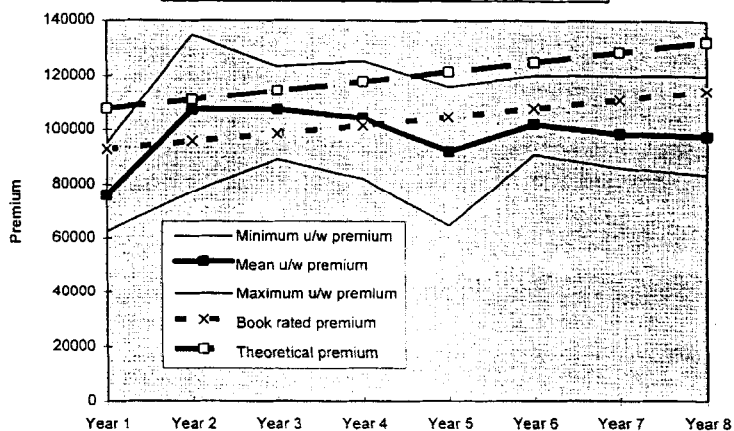
- The underwriters readily quoted well below (18% on average) the book rated premium in the first year, based on only three years of partially developed experience.
- A large claim in the Year 1 experience led underwriters to increase their rates dramatically for the following year. The average Year 2 premium was 41% higher than its Year 1 equivalent.
- Most of the underwriters seemed to be working to a three year time horizon in respect of past experience. Hence, there was a 12% fall in the average premium between Year 4 and Year 5, when the large Year 1 claim fell from their consideration.
- The underwriters tended to focus on average claims per vehicle, rather than on claim frequency. Apart from in Years 1 and 5, the risk had fortuitously low average claim costs over the 10 year period and the average premium quoted never rose above the theoretical level. A focus on claim frequency would, however, have indicated that the risk was probably worse than the standard book rated risk.
- There is little indication that the underwriters were allowing for claim inflation in their calculations.
- The wide range of quotes given, and the willingness of at least one underwriter in each year to quote more than 10% below the average level, indicates why it is so difficult to make a profit in this market.

## 5.2 Theory

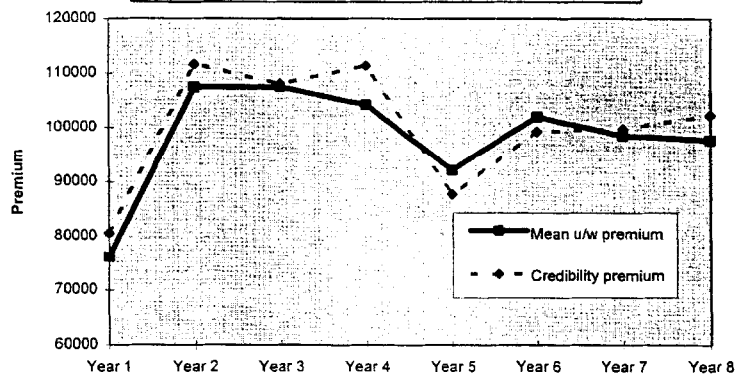
### 5.2.1 *Blending In Theory*

Theoretical approaches to blending book and experience rates tend to rely on using statistical methods to calculate a credibility weight ( $Z$ , such that  $0 < Z \leq 1$ ) to apply

**Graph 1: Fleet Rating Exercise Results**



**Graph 2: Underwriter Premium vs Credibility Premium**



to past claims experience. The residual weight  $(1 - Z)$  is then applied to the book rated premium. The results of each calculation are added to give the theoretical premium.

Assumptions on the claim number and claim cost distributions inevitably underlie the statistical methods used.

#### ► LIMITS

Limits to the claim number range over which blending techniques are used can be defined. Typically, a definition is chosen for full credibility and, if the number of claims is above the resultant threshold, pure experience rating is used. Having defined full credibility, statistical methods can be used to derive credibility factors for risks where actual claim numbers are below the full credibility threshold. It is possible to select an additional threshold, say at the  $Z = 0.1$  level, below which no credibility is given to experience and book rates are applied.

#### ► SUBDIVISION BY TYPE OF COVER/TYPE OF CLAIM

Limits will vary for different types of cover and different types of claim, eg

Property:	Fire/theft/flood
Liability:	Accident/disease
Fleet:	Comprehensive/Non-Comprehensive
	Property damage/bodily injury

Failure to subdivide experience appropriately may lead to too much weight being given to the experience. Conversely, excessive subdivision may mean there is insufficient experience in each of the subgroups to produce a significant credibility factor. It is important to get the right balance.

For some types of cover or claim, eg Property fire cover or Liability disease claims, very low expected claim frequencies may mean that credibility techniques are not appropriate.

### ***5.2.2 A Theoretical Approach***

One theoretical approach, taken from Julian Lowe's unpublished paper "Pricing Insurance Contracts", is outlined below.

## ► BASIS

Define the book rate for a risk as  $P_0$ . Premiums in subsequent years,  $P_t$  are defined as follows:

$$P_t = Z \cdot X_{t-1} + (1 - Z) \cdot P_{t-1} \quad \text{for years } t = 1, 2, \dots$$

where  $X_t$  is the amount of claims experienced in year  $t$  and  $Z$  is the credibility weighting discussed above.

For limited fluctuation credibility,  $Z$  is chosen so that the premium is only expected to change by  $p\%$  in  $c\%$  of cases. For example, with  $p = 0.1$  and  $c = 0.05$ , the premium should move from one year to the next by 10% or more in only 5% of cases.

Assuming that the claim frequency follows a Poisson process with expected value  $n$ , and the individual claim amounts are from a distribution  $X$  then, under various assumptions, an approximation for  $Z$  is:

$$Z = \frac{p \cdot \sqrt{n}}{x_\epsilon \cdot \sqrt{\phi}}$$

where  $\phi = E[X^2] / E[X]^2$ ,  $n$  is the number of expected claims, and  $x_\epsilon$  is calculated as:

$$x_\epsilon = y_\epsilon + 1 \cdot \frac{\gamma_x \cdot (y_\epsilon^2 - 1)}{6}$$

$\gamma_x$  is the skewness of the aggregate distribution and  $y_\epsilon$  is the number such that  
 $1 - \epsilon = N(y_\epsilon)$

$N$  being the Normal distribution function.

## ► RESULTS

The credibility factor given to actual claims experience under the above model depends heavily on the variability criteria,  $p$  and  $c$ , selected.

Assume a claim number distribution that is Poisson(100) and a claim size distribution that is Lognormal(7, 1.5). The table below shows the credibility weighting for various combinations of  $p$  and  $c$ , such that the premium is only expected to change by  $p\%$  in  $c\%$  of cases.



p %	c %				
	10	20	30	40	50
5	7%	10%	15%	23%	40%
10	13%	20%	30%	46%	79%
15	20%	31%	45%	70%	100%
20	26%	41%	61%	93%	100%
25	33%	51%	76%	100%	100%

For example, under the variability criterion that the premium should vary by more than 15% in up to 20% of cases, the experience would be given a credibility weighting of 31% in the above example. Credibility weightings for any given variability criteria will increase as the expected number of claims increases. They decrease as the claim size variance increases.

#### ► COMPARISON AGAINST THE FLEET RATING EXERCISE RESULTS

The fleet rating exercise described above was based on a Poisson(40) distribution for claim numbers. The distribution used to generate the claim amounts can be adequately approximated using a Lognormal(6.3, 1.4) distribution. Using these parameters in the model as outlined, along with a variability criterion that premiums should change from year to year by more than 10% in 50% of cases, produces a credibility weighting  $Z$  of 0.59.

Let us redefine the credibility weighted premium described earlier as follows:

$$P_t = Z \cdot X_{t-1} + (1 - Z) \cdot B_t \quad \text{for years } t = 1, 2, \dots$$

where  $X_{t-1}$  is the average premium based on the ultimate claim experience from years  $t-1$ ,  $t-2$ , and  $t-3$ ;  $B_t$  is the book rated premium for year  $t$ ; and  $Z$  is 0.59, as determined above.

Graph 2 compares the credibility weighted premium produced by the above formula with the average premium quoted by the underwriters each year. The two are remarkably similar, indicating that the underwriters tend to:

- rate using a three year time horizon
- accept very frequent, fairly substantial year-on-year variation in premium.

## 5.3 Conclusions

### 5.3.1 *How The Market Stands At Present*

The fleet rating exercise, combined with the credibility techniques, can give an (admittedly simplistic) view of the market as it stands today for these blended risks. Two factors stand out.

Firstly, it seems that underwriters tend to focus on aggregate claim amounts per unit of exposure, rather than claim frequency and average cost per claim separately. Thus, they lose the significant advantage of analysing claim frequency in isolation.

Claim number distributions will almost invariably be less skew than claim amount distributions and have a relatively low variance. They are, therefore, easier to model satisfactorily and more likely to show a statistically significant deviation from the base rate norm than an equivalent history of claim amounts. Additionally, they have a faster, more stable development pattern than claim amounts, so it is easier to forecast ultimate numbers and more reliance can be placed on the recent years which are the most relevant to future experience.

Unfortunately, the approach taken by many underwriters means that any information on claim frequency levels and trends in the data is obscured by “noise” from the volatile claim amount distribution.

Secondly, the underwriters tend to work to a very short time horizon. Admittedly, there will be a point at which historical data can no longer be considered valid but the common use of claims reserving triangles going back a decade or more suggests that actuaries, at least, believe that historical data can be useful for many years. There can be little doubt that many, if not most, underwriters are ignoring data that would be valuable to the blending process.

The combination of these two factors means there is a very strong tendency to over-react to good or bad recent experience. As the fleet rating exercise demonstrated, it seems that if a risk is fortunate enough to experience, say, three lucky years in terms of total claim amounts, the large claim from four years ago can be conveniently forgotten.

The inevitable volatility arising from this is exacerbated by market expectations. If it is true that the underwriters can be statistically naive in their approach to rating, then it is still truer of the brokers. Enormous pressure will often be exerted for a reduction in rates on the back of a few years of good experience. Conversely, big increases will be accepted following a large claim even where this was a truly random event.

### *5.3.2 How Actuaries May Change The Market*

Increasing involvement of actuaries in pricing will lead to more extensive use of statistically robust rating models. It will also drive an improvement in data quality and quantity, as the actuaries strive to increase the sophistication and accuracy of their models.

For risks in the rate blending category, actuarial models are likely to have much lower variability criteria than those underwriters are comfortable with. That is, they are likely to give less credibility to experience than an underwriter would. The effect of this is that where the premium has had a few lucky years, the actuarial premium will be above those quoted in the market. However, where the risk has had random large claims, the actuarial premium is likely to be very competitive.

The current level of premium volatility seen in underwriters' quotations persists only because it is the norm. The lack of a rigorous framework to the rating process and the consequent reliance on subjective judgements will also often lead to market forces being factored into quotations, either consciously or subconsciously. This can only contribute to the cyclical effects caused by fluctuations in capacity.

The introduction of actuarial pricing techniques presents an opportunity for selection by focusing on "unlucky" risks. As more groups start to take advantage of this, the current situation will become unsustainable. In the long-term, those who continue using current methods will lose out to those who cherry-pick the risks over-priced by the rest of the market. The variability in the markets' view of the "correct" price for a risk will reduce considerably. The cycle, which is capacity-driven, will persist but may be dampened by greater rating objectivity.

This is not to suggest that actuaries will come to dominate the market. The underwriter is king and his reign is likely to continue.

An actuarial pricing model is no more than a **model**, and the only certain thing is that it is wrong. Model errors and parameter errors are unavoidable. A numerically adept underwriter, who understands the strengths and limitations of the model, will be able to add considerable value to the rating process.

Additionally, while it is vital to have an idea of the correct rate for a given risk, quoting that rate in all cases is not a recipe for success. Over the long-term, you may get your target return on the risks you write, but you will get very little business in times of surplus capacity and miss the opportunity of charging a higher premium in times where capacity is short. Underwriters will add value by adjusting the "correct" rate to reflect market conditions and, thus, optimising the trade-off between volume and profitability.

Additionally, it is important to establish good relationships with brokers. This may require writing some risks at a bad rate in order to ensure you are offered risks which you can write at a good rate. Underwriters will add value by adjusting the “correct” rate to reflect market conditions and, thus, optimising the trade-off between volume and profitability as well as by adjusting quotations to maximise the benefits from their broker relationships.

## 6 HOW TO WIN THE HEARTS OF UNDERWRITERS

A key theme to emerge from this paper is that, for all sizes of commercial risks, an actuarial approach can be beneficial. In addition, the paper notes that the underwriter is king and is likely to remain so. It is important, if actuaries are to be invited to contribute their techniques to this market, that they can demonstrate to the underwriter that they can be useful without appearing to "know better". The suggestions below have been tried and field tested with success by members of the working party.

### ➤ *Personal Attributes*

- ♦ go to the pub with underwriters and get to know them
- ♦ show underwriters that you respect their skills and knowledge
- ♦ reassure underwriters that you value them and believe you may be able to help them improve their performance and support their important role in the company/agency
- ♦ stress the difference between the roles: actuaries assess COSTS on historical information, underwriters PRICE risks by applying experience and judgement to the whole exposure picture, including historical costs
- ♦ look to learn from underwriters and develop active listening skills
- ♦ seek to develop a symbiotic relationship rather than bamboozle them with science
- ♦ start the dialogue at a common set of understanding
- ♦ avoid second guessing underwriters - work with them to improve current techniques rather than starting from scratch on your text-book approach
- ♦ find out how underwriters make their decisions and incorporate judgement, especially when looking at individual risks
- ♦ attend internal underwriting courses
- ♦ be visible - move your office to the underwriting floor and walk about!

➤ *Prepare Simple Analysis that Illuminates*

- ♦ two-way tables that reveal things of interest that may not be obvious
- ♦ pool disparate information to show the bigger picture and any trends - eg using paper-based survey reports
- ♦ provide feedback to underwriters on how they are performing against budget
- ♦ start with reserving, especially below the whole account level, to provide underwriters with a feel for the profitability of their own account
- ♦ from subsets, show underwriters areas they might be able to exploit and those to avoid
- ♦ demonstrate those areas of the account vulnerable to competitors and which need defending
- ♦ where the account is running badly, offer help to turn things round
- ♦ provide support for the difficult sums now being asked of underwriters, eg investment income, catastrophe spreading and cross-subsidy assessments
- ♦ what if's for profitability given varying assumptions - different excesses, covers etc
- ♦ ensure any reports on underwriting are at least copied to the underwriters concerned and give them the opportunity to comment on draft versions
- ♦ allow the work to get noticed by senior management to increase demand

➤ *Obtaining data in the format required*

- ♦ watch what the administrators do with information - how it is stored and what is thrown away
- ♦ understand how data items are defined
- ♦ make sure that the numbers used are the same as those used by the underwriters
  - find out where they get their data from

### ACKNOWLEDGEMENTS

The working party would like to thank EQECAT for their help in describing some of the data they use in their own systems for analysing commercial claims experience.

Keith Chandler and Grant Mitchell kindly contributed to the data generation and analysis used in the small risks section.

Without the willingness of 22 motor fleet underwriters being prepared to price our "Blending" example, that section of the paper would have remained purely theoretical and so we are extremely grateful to them.

### RECOMMENDED READING

The working party found little material on which to base the pricing aspects of this paper. However, we are grateful to Julian Lowe for providing a copy of his unpublished paper, "Pricing Insurance Contracts". It was presented at a joint Institute of Actuaries and Institute of Risk Management under the title "The Future Role of Insurance in Risk Management". This prompted some of the developments outlined in our paper.

For a good overview of the underlying theory, we suggest "Statistical and Financial Models of Insurance Pricing and the Insurance Firm". It is written by David Cummins and published in *The Journal of Risk and Insurance* (Vol 58, No 2, June 1991).

Previous GISG papers cover certain commercial classes in more detail. For example, *Fire in 1986* and *Employers' Liability in 1990*. The CII textbooks provide a great deal of detail about the features of the various lines of business but are relatively sparse on pricing.

Also of interest is a GISG paper presented in 1983: "The treatment of large claims when deciding on a premium structure and on the relationships between the premiums for different groups" by Martyn Bennett and Peter Johnson. The paper introduces the concept and application of top-slicing.

## ABI RECOMMENDATIONS ON PRODUCTION OF CLAIMS EXPERIENCES

An ABI circular titled "Broker Reporting Mandates" dated 23 February 1996 reported, "Owing to increasing inconsistency in market practice as regards the type and scope of information being provided to reporting brokers or other intermediaries, a Working Group had been set up to look at the issue of Broker Reporting Mandates generally and, in particular, to revise the ABI Recommended Procedure. The final report of this group recommended that "a common format for presentation of claims experience should be established for use by all member companies." "

The ABI Recommendations are, however, no more than that, recommendations. Although most insurers have agreed in principle to following the recommendations, the extent to which they comply varies considerably from company to company.

### ABI Recommended Procedures for Dealing with Broker Reporting Mandates (1996)

*Issued 2 February 1996.*

*It has been agreed that with effect from 1 January 1996:*

- i. *insurers will only provide claims experiences and details of Long Term Undertakings in response to Reporting Mandates presented by brokers or other insurance intermediaries;*
- ii. *insurers will provide details to brokers and other intermediaries, even where there is no Agency agreement in force.*

*The following recommended procedures should, however, continue to be observed by ABI members when approached for information by a reporting broker or other intermediary (hereinafter termed "Broker(s)") in respect of the following classes of insurance:-*

*Accident, Liability, Motor (Commercial), Material Damage and Business Interruption Industrial and Commercial Property, Engineering, Contract works, Theft, Money and related risks and Legal Expenses.*

*NB: The procedures do not apply in the case of certain classes of business such as Professional Indemnity, Bonding/Surety or the generality of contingency risks.*



1. *No action will be taken by the insurer until presented with a current letter of authority prepared on the insured's own headed paper, signed and dated by an authorised official whose position must be stated. The letter must make clear the classes of business to be reported on.*
2. *On receipt of an acceptable letter of authority, the insurer will notify the holding broker that the business is being reported upon and of the intention to supply information after 5 working days have elapsed.*
3. *Unless the holding broker produces a cancelling or modifying mandate from the insured within the 5 working days of the insurer's notification to the hold broker, the insurer will immediately provide claims experience (using the recommended ABI Form) and details of Long Term Undertakings to the reporting broker:*
  - a. *with the exception of Motor (Commercial) - see b. below - authenticated claims experience, using where applicable the recommended ABI form, for up to 5 years or for the period during which the business has been held if less than 5 years. If the business has been held for less than 5 years the identity and location of the previous insurer should be stated if known.*
  - b. *For Commercial Motor -*
    - i. *authenticated claims experience for up to 3 years or for a period during which the business has been held if less than 3 years. If the business has been held for less than 3 years, the identity and location of the previous insurers should be stated if known. Such experience to be provided on the standard company form for fleets.*
    - ii. *if rated on no claims discounts - details of the individual no claims discounts earned.*
4. *No additional information will be supplied.*

ABI recommended claims experience forms exist for:

- Material Damage (Fire and Special Perils) Claims Experience (for risks with annual premium £5,000 and above).
- Business Interruption (Fire and Special Perils) Claims Experience (for risks with annual premium £5,000 and above).
- Engineering Claims Experience (Other than Contract Works)
- Contract Works (for risks with a Turnover above £2 million).
- Public Liability
- Employers' Liability Claims Experience
- Motor Fleet

We obtained specimen forms from a number of insurers and compared these both with the ABI recommendations and with each other. Forms were obtained for Motor Fleet, Liability (Employers' & Other) and Property (Material Damage & Business Interruption).

## **Motor Fleet Experience Forms**

This form was revised and notification sent to insurers in October 1992. A copy of the ABI recommended form can be found at the back of this section.

Degree of compliance with ABI recommendations:

Only one insurer showed Fire & Theft as a separate category, all of the others included this within Accidental Damage. None of the insurers showed the position last year. (It is believed that insurers feel that this will allow an assessment to be made of their reserving strength). Half of the insurers provided three years of claims information, the other half provided five years.

Exposure: one insurer showed only vehicle years, and one insurer showed number of vehicles at start of period of insurance. The majority, however, had provision for both of these to be shown.

All of the insurers provided the date of compilation of experience, and the renewal date. Only two provided the date of the last claim reported for the most recent period of insurance.

It is interesting to compare the areas of partial compliance with those specifically referred to in the letter which accompanied the distribution of the new form in October 1992. The letter stated, "The original fleet claims experience form was adopted by the motor fleet market many years ago. The view has been expressed in the market that there is a need for the form to be brought up to date; in particular, it should take account of the following features:

- the increase in the incidence of theft claims;
- the need for a clearer statement of the "cut-off" date;
- the need for a clearer statement of where payments on outstanding claims are shown
- the need for a statement of the position at the previous renewal, given the dramatic increase in claims frequency and cost over the last few years."

It would seem evident from the sample of insurers that we looked at that little attention has been paid to this letter.

### **Liability (Employers' & Other) Experience Forms**

Most of the insurers that we looked at do not have different forms for Employers' Liability and other liability classes.

#### **Employers' Liability:**

Some insurers exactly replicated the ABI recommended form. Many insurers, however, do not use a form providing so much detail. In particular they do not separate out the specified disease information. Other insurers had a very basic form covering all classes of liability business which simply showed: period of insurance; claims settled, number and amount; claims outstanding, number and amount; claims total, number and amount; and basis (cover details and exposure information). Some insurers do not separate the paid and outstanding claims information.

#### **Other Liability:**

All of the insurers used very simple forms showing: period of insurance; claims settled, number and amount; claims outstanding, number and amount; claims total, number and amount; and basis (cover details and exposure information). Some insurers do not separate the paid and outstanding claims information.

### **Property (Material Damage & Business Interruption) Experience Forms**

All of the forms provided were very simple showing: period of insurance; claims settled, number and amount; claims outstanding, number and amount; claims total, number and amount; and basis (cover details and exposure information). Some insurers do not separate the paid and outstanding claims information. In addition to the total claims information, details of individual losses above a fixed monetary amount (typically £100,000) were also provided.

# MOTOR FLEET EXPERIENCE FORM

Renewal Date

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1000

Policy Number

[illegible]

Period	Cover in Period (including excesses, amount and type, if applicable)

\* Calculated to

61

Event Date of Last Claim included

611

**NOTE:** The experience shown is that of..... only with whom contact may be made if clarification is necessary.  
If during any part of the past three years the business has not been held by....., the name of the insurer (if known) has been shown.

Date:

14

## DATASETS USEFUL FOR COMMERCIAL BUSINESS

**Uses of information**

By linking datasets with information on claim predictors and comparing to real claim data, rating can be improved, particularly in areas of sparse data. Linking to exposure data can show areas where there are high accumulations of risk. Hypothetical and past events can be simulated to calibrate the model and also assess reinsurance needs.

Many companies are researching commercial data having established systems for personal lines business. A lot of effort is being spent on researching data sources and assessing their usefulness.

Ideally data should be available electronically but this is not always possible. Data has often been collected for some other reason and so may not be in an ideal form for use by actuaries. There is scope for liaison with the people collecting data to show them other uses for the data if they collect it in a slightly different form or add some extra fields.

**Data available which may be of use in commercial business****➤ Inland Revenue commercial property database**

This has 1.7m records from properties in England and Wales. The data held for each property is:

- postcode
- address
- description of use
- description code (some properties appear in more than one code. It is unclear how useful this could be and there is some scope for improving communication between insurers and bodies compiling data). There are 36 description codes which appear to be split into 7 categories including commercial, leisure, education, municipal, industrial.
- rateable value (from 1 to 999,500)
- region
- town
- authority
- valuation office

The description codes are allocated by Inland Revenue valuation officers and are as follows:

CODING	DESCRIPTION
CA	Advertising right / Bus shelter / Display board / Sales office / Showcase
CC	Adventure centre / Barn / Caravan park / Camping ground / Holiday centre / Cottage / Flat / Home
CG	Ambulance station / Bus depot / Garage / Car auction / Sales site / Showroom / Petrol station / Road haulage / Vehicle depot
CH	Apartment house / Boarding house / Guest house / Holiday unit / Student Accommodation / Youth hostel
CL	Public house / Wine bar / Night club
CM	Indoor or Outdoor market / Antiques market / Cattle market
CO	Conference centre / Consulting room / Offices / Surgery / Taxi office
CP	Car park & Premises
CR	Café / Restaurant
CS	Bank / Garden centre / Hairdressing salon / Kiosk / Post office / Retail warehouse / Shop
CW	Store / Land used for storage & Premises / Warehouse / Petrol & oil storage depot
CX	Studio / Chapel of rest / Site for TV relay station / Animal clinic / Relaxation centre / Amusement arcade / Casino / Day centre / Nursery
EL	School & Premises
EM	Library / Museum
EP	School / Training centre
EU	College / Conference centre / Lecture room / University
EX	Adult education centre / Art gallery / Castle / Children's nursery / Classroom / Community education centre / Conference centre / Dance studio / Day centre / Youth centre
FD	Dock
FE	Electricity generating centre
IF	Factory / Workshop / Abattoir / Bakery / Brewery / Mill
IM	Tipping site / Oil well / Mine / Plants & Premises / Quarry
IX	Oil rigs / Bakery / Pipeline & appurtenance / Printing works / Reservoir / Sawmill / Slaughterhouse / Studio / Yard / Grain silos

LC	Clubhouse / Boat house / Community centre / Changing room / Church hall / Club / Community centre / Day centre / Youth centre / Hall
LI	Bowling alley / Greyhound stadium / Gymnasium / Sports centre
LS	Football ground / Boathouse / Bowling club / Tennis centre / Sporting right / Swimming pool
LT	Bingo hall / Theatre / Cinema
LX	Activity centre / Adventure Playground / Airfield / Amusement centre / Archery / Bathing hut / Beach chalet / Fishing lake / Gymnasium / Stables / Zoo
MC	Burial ground / Cemetery / Crematorium
MH	Clinic / Consulting room / Dental surgery / Health centre / Hospital / Surgery
ML	Civic centre / Guildhall / Government office / Town hall
MP	Court room / Fire station / Law court / Police station
MR	Home / Holiday accommodation / Hostel / Nursing home / Outdoor pursuits centre / Youth hostel
MX	Advice centre / Ambulance station / Kennels / Chapel of rest / Fire station / Communication station / Crown contribution office / Public convenience / Transmitting station
NT	Boathouse / Bus station / Mooring / Pier / Wharf
NW	Sewage disposal works / Sewage treatment works
NX	Bus garage / Communication station / Dock / Fire station / Harbour / Public conveniences / Sewage works / Sorting office / Telephone exchange

- **National on-line manpower information system:** This has the number of employees by industry and by the postcode sector where they work.
- **Yellow point (Yellow pages):** This is the exact grid reference of every business in the yellow pages directories.
- **Government accident and crime statistics:** Details of thefts provided by public sector bodies.
- **GOAD (owned by Experian):** GIS for shopping centres with architects' drawings. This covers high streets and malls. Predominantly used for retail planning and site location for new stores.

- **DVLA commercial vehicle data:** This is vehicle data at postcode district level. The postcode is the location of the registered business, not necessarily where the vehicle is kept.
- **Association of Geographic Information:** The AGI source-book gives details of datasets publicly available.
- **TDS (a marketing company):** Information from the yellow pages, Companies House and the electoral roll.
- **Fire Brigade:** Electronic fire data can be sourced from fire stations.
- **Government data:** There is unreleased government data on business square footage, construction type, size of business.
- **Fire statistics for the United Kingdom :** The latest volume is 1993 with 1995 hopefully being published late in 1997 by the Home Office. There is a summary version - Summary Fire statistics. The latest version as of July 1997 is 1995.
- **NHS / Healthcare / Fire statistics :** This has details of fire related injuries and is published by HMSO.
- **Criminal statistics:** This has details of all criminal statistics and is published by HMSO.
- **Notifiable offences in England and Wales 1996:** This is a summary document on crimes by Police Authority and is published by the Home Office.
- **Accident statistics:** This has details of car accidents split by make and model and is published by the Department of Transport. It is available from HMSO.
- **Company Accounts:** This can be used by looking at individual company's accounts to see if anything looks odd, for example, if directors have county court judgements against them or if the company has not filed accounts for a while.

In addition, credit companies use a credit score to assess the financial stability of companies. If the credit score is low, indicating a lack of financial stability, this may be a predictor of fraudulent claims.



- **Other data:** deprivation measures; distance to nearest fire station; distance to motorways (although this is not considered a major rating factor); County court judgements profile; details on company directors (finances, CCJ's, credit history); internet data.

### **Data Protection Act**

Using any publicly available information will involve linking datasets from various sources to find out as much as possible about different risks. This potentially has implications in respect of the Data Protection Act. The Data Protection Act requires that data users must register their use of personal data with the Office of the Data Protection Registrar.

Section 1 of the Act contains the definitions of “data user” and “personal data”. The “data user” is the legal person who processes personal data, by controlling the content and use of that data. Thus for the purposes of the Act any individual or a legal entity can be a data user. “Personal data” means any data consisting of information which relates to a living individual who can be identified from that information (or from that and any other information in the possession of the data user).

Thus the individual need not be identified by name; unique identifiers such as address and date of birth, or even account numbers will be personal data because the data user will usually possess other information which will enable that data to be related to the individual. The data user must process the personal data by reference to the data subject. The Data Protection Tribunal has stated that that will happen when the data are processed in a way linked to the data subject, ie, when the purpose of the processing was to learn something about an individual (*Equifax Europe Limited v The Data Protection Registrar* (June 1991) Para 49).

Once registered, the data user must comply with the Eight Data Protection Principles. The First requires that information to be contained in personal data shall be obtained and processed fairly and lawfully. This means that if information is obtained in a surreptitious manner, it is likely to be deemed unfair, because the individual did not have the opportunity to consent or agree to the obtaining. Similarly, if information is obtained in a way that breaches the criminal or civil codes such as through trespass or in breach of the individual's property rights, then this may not only be unlawful, but it may also breach the First Data Protection Principle.

Note that as soon as data is put into a database the Act applies. For example, there is an exemption to the Act for the electoral register, but if the electoral register is put into a database the Act applies from that point.

## COMMERCIAL MOTOR INSURANCE

### Definition

For the purposes of this paper, “motor” cover is confined to commercial motor fleet risks. These are considered to be any multi-vehicle policies where the primary use is for business. The characteristics of Motor Trade business have not been considered as a separate entity.

### Cover available:

There is a minimum legal requirement for motor insurance as defined by the Road Traffic Act. This is provided by **Third Party only (TPO)** insurance and covers:

- Unlimited liability for bodily injury or death to any other person (including passengers)
- Liability for Third Party property damage, (£250K is the minimum legal cover)
- Emergency doctors treatment to any injured person (including the insured)

Other more extensive covers are:

**Third Party Fire and Theft (TPFT)**, which additionally covers losses or damage to the insured’s vehicle from fire and theft.

**Comprehensive**, which, in addition to the cover provided under TPFT, covers accidental damage to the insured’s own car. Other benefits such as the repair of broken windscreens may also be included.

Cover in the market is fairly standard, so policy wordings may be less of an issue than for some other classes of business. Also, one fleet can have a mixture of covers.

Fleets tend to have large per vehicle excesses which can vary depending on the type of vehicle. Indeed, there has been a trend in recent years to greater self insurance for all fleet sizes. Small fleets are moving to TPFT cover and taking higher excesses; larger fleets operating under captives or moving to very high excesses (eg £25,000 accidental damage excesses), possibly with an aggregate deductible or stop loss.

Exclusions also tend to be fairly standard, covering, for example, depreciation and wear & tear, losses arising as a result of earthquakes, war, riot or civil commotion etc.

Add-ons are similar to those available in the private car market, eg uninsured loss recovery, courtesy cars, breakdown cover etc. This is a particular feature of small fleets, with very large fleets tending to have their own arrangements in force.

### **Measure of Exposure**

A well defined standard unit of exposure is the number of vehicles, the vehicle-year which is even incorporated in UK statutory returns. However, since different types and uses of vehicles are covered in a commercial fleet, a vehicle-year is a much less homogeneous concept than for private car.

Also, it is almost certainly not the best measure of the exposure to risk. The mileage for each is a better measure of the extent to which each vehicle is used and hence “exposed to risk”.

### **Risk Factors**

The main risk factor is the number of vehicles, which is covered by the measure of exposure.

Others are:

- Type of vehicles (very important given the variety of different vehicles which can be insured in a single fleet)
- Mileage
- Driver characteristics, eg quality
- Overnight parking location

### **Rating Factors/Information**

Information on several factors is commonly obtained. These are:

- Type of vehicles: categories will probably be fairly broad, such as cars, light commercial, heavy commercial etc
- Cover for each vehicle
- Voluntary excesses
- Nature of vehicle use (eg for own use or for hire/reward etc)
- Type of goods carried

Also, some form of “soft information”, such as the standard of management supervision and vehicle maintenance, is sometimes allowed for as part of the “underwriter’s judgement”.

Other factors which are commonly associated with private cars and single commercial vehicles are also significant, such as accident record, ages of drivers, mileage, radius of operation, vehicle weight, vehicle age, restrictions as to who may drive. However, such information is not often available, especially for the medium to large fleets with more than, say, 10 vehicles.

As the traditional private car measures of risk are not practical, insurers make extensive use of the fleet's own claims experience. Depending on the size and location of the fleet one needs also to consider potential accumulation of risk, especially if all vehicles are kept in the same location overnight.

## **Claims**

### **Reporting delays**

Most claims are reported very quickly, as the event is usually known about more or less immediately. However, some bodily injury claims may not be reported for months or even years, as it may take some time for the injury or its extent to become apparent. This is especially true for injuries to minors where reporting delays can be very long.

### **Settlement Delays**

Generally, claims for property damage are settled very quickly, in months rather than years, with any delays being caused by the time taken to establish liability. Thus, such claims are, in general, short tail.

However, claims for bodily injury can take many years to settle with delays being caused both by time taken to establish liability and then to determine the extent of the injuries and assess the speed of recovery etc. Thus, these claims are generally longer tailed, enabling some investment income to be earned on the reserves.

### **Claims Frequency**

Claims frequency per unit of exposure for fleets is often very high relative to other classes of business, including private car. Indeed, frequencies of 50% or more per vehicle year are not uncommon, this being caused by high "exposure to risk" with some vehicles being driven many tens of thousands of miles per year by a variety of drivers, some of whom may be unfamiliar with the type of vehicle.

## **Claim Severity**

The claim size distribution for property damage for a typical fleet is not particularly interesting. Few claims exceed the cost of replacing the vehicle, although the cost of that vehicle can vary significantly - up to £150K not being unusual. Of course, there is always that airside fleet risk that manages to extensively damage a Boeing 747!

However, the claim size distribution for bodily injuries is very skew, with many small claims but the occasional very large one. Indeed, there is no real upper limit on claim size, cover for TP injury being unlimited, and some settlements for very serious injuries have been extremely large. *The largest settlement in respect of injuries to a single person that we have heard of to date is £3.5m.*

## **Selling**

Most of the business is sold through brokers, although, some of the larger fleet business is written direct. Indeed, for the medium to large risks, the market is dominated by the larger intermediaries. As there is a market agreement to supply claims and exposure data to attacking brokers, broker retention is relatively poor.

Commission rates are around 7½% - 15%, although a lot of the larger fleets are now broked for a fee.

## **Premium Rating Issues**

Retrospective adjustment to the premium is common, as exposure is often (considerably) different to that anticipated at policy inception. For the larger risks, some form of profit share is quite common.

The low retention rates that this class suffers impacts adversely on costs.

Given the long settlement tail for certain claims, investment income can be fairly significant for this class and, hence, underwriting losses can be tolerated.

## **Trends and Cycles**

There is currently significant over capacity in the market which is putting enormous pressure on prices. Further, this is an extremely price sensitive class. Risks are easily transferable; hence loyalty is low with lapse rates being higher than for many other classes of business. Indeed, this class is highly cyclical and is reputedly one of the lines that leads the insurance cycle.

## **Government and Legislative Impact**

With the long settlement delays that can occur with bodily injury claims, this class of business is susceptible to retrospective legislation. This is demonstrated by the recent changes to the rules regarding the Compensation Recovery Unit (CRU), although the overall impact of these changes for this class is not major.

Similarly, the discussions about changes to the Ogden tables also highlight the potential impact of such retrospective changes. However, any retrospective impact for motor fleet risks caused by Ogden is unlikely to be major. Companies may change their reserving practice in anticipation of Ogden, inflating new claims and aiming to increase premium rates.

## **Current Social/Economic Factors and Other Issues**

To cut costs many companies are moving to a longer replacement cycle for vehicles; the average age of fleet vehicles is increasing.

The commercial fleet market is exposed to changes in the tax system. The taxation trend in the last 10 - 15 years has been to make company cars a less attractive option, hence reducing demand.

With the new Government and their proposed "Integrated Transport System", the situation is likely to be the subject of considerable attention over the next year or so. As communication methods improve and become more affordable, (eg use of the Internet and video-conferencing), demand for company cars may reduce.

For the medium to larger fleets there has been increased emphasis placed on general risk management over the past few years with the aim of improving the experience and reducing premiums. For example, improving the standard of vehicle maintenance, introducing advanced driver training etc. Larger fleets also often have a fleet manager.

## COMMERCIAL PROPERTY INSURANCE

### Definition

For the purposes of this paper, “property” covers risks to buildings, contents and business interruption.

### Cover available:

No form of property insurance is a legal requirement. The most basic level of cover is indemnity against losses to commercial premises caused by fire.

However, insurance can be extended to cover the following perils:

Lightening, explosion, aircraft, riot/civil unrest, terrorism, malicious damage, earthquake, storm, flood, burst pipe, impact, subsidence and theft.

There are common standard exclusions which apply to each of the above perils, as well as the exclusions which apply to all cover types, (eg radiation, war risks, etc). For property insurance, an ABI standard wording exists: “Recommended practices, wordings and procedures relating to material damage and business interruption commercial and industrial insurance”.

There is a wealth of different types of cover available both in terms of the perils and the policy construction. Policies may be on a “full value subject to average basis, but others will not be subject to average” and some will even be on a first loss basis. The existence of a standard wording and a good knowledge of the different bases reduces the risk of gaps or unidentified exposures occurring in policies.

### Measure of Exposure

The generally accepted and, hence, usual measure of exposure for buildings and contents is the sum insured per year. Other measures, such as building year, are too heterogeneous as some of the main determinants of the underlying risk are the type, construction, size, age etc of the building.

In addition to the fact that one property is not necessarily equivalent to one unit of risk, there is the problem that most insurers do not record details of each individual premises covered as the cost of doing so is considered prohibitive. However, it should be noted that, while a property “risk unit” has never been regarded as a practical concept here in the UK, it is accepted as normal in some parts of the continent. The

measures of exposure usually used for business interruption cover are annual profit or turnover, if available.

### **Risk Factors**

There are many risk factors for this class because of the large range of perils covered. For example, purely for the fire risk, the main factors affecting the risk are the probability of fire occurring, the inflammability of the building and stock, and the risk management processes in place aimed at preventing or controlling fire.

There are also the problems associated with accumulation of risk, especially when considering natural perils.

### **Rating Factors**

In order to assess the risk, information on a large number of factors is collected, namely the following:

- Level of Exposure (ie maximum sum insured and expected maximum loss)
- Perils covered
- Occupation/trade carried out (may be more than 1)
- Use of hazardous products or processes
- Other equipment/machines used (including electrical)
- Number of tenants and trades of tenants
- Level of excess/self insurance
- Building construction
- Size in terms of the floor area
- Number of floors
- Internal partitioning etc
- Age of the building
- Locality (may affect risk of arson, flooding etc.)
- Types of space heating used
- The risk management processes that are in place to control the risk.

Risk Management would cover things such as:

- The level/extent of any training
- Presence or not of a sprinkler system (and its type)
- Type of fire fighting equipment available
- Distance of nearest fire station



Extent of the exposure of the insurer relative to its capacity by:

- Geographical area for perils
- Trade/occupation in terms of, eg, risk of arson
- EML

In addition, for the larger cases, underwriters will also consider the following:

- Qualitative impressions of how well the company is run etc
- Previous claims experience.

Overall, there is far greater use of “soft” information as obtained from surveys etc for this class of business than for, say, Motor Fleet business.

### **Data Issues**

Until 1985, the Fire Offices Committee collected data/statistics from all member offices and regulated rating, policy wordings and commission levels. Following its demise, anticipating impending anti-cartel government legislation, and the high levels of competition undermining the importance of collected experience, the property insurance market was very unstable for a period. However, the market statistics scheme was continued by the ABI to facilitate the exchange of data.

The collective data available from this source was invaluable in providing “market” burning costs for various industry classes, hence, providing some form of “peer group” premium. This scheme has recently folded as only 10 companies were contributing to it. The large companies, such as Royal and Sun Alliance, GA, CU etc, all considered that they have sufficient data of their own without the need for overall market data.

Despite the demise of the ABI market statistics scheme, this class has far greater publicly available data/information than any other class as demonstrated in appendix 3. These include:

### **Claims**

#### **Reporting Delays**

Claims are usually reported very quickly. In fact large losses would be notified extremely quickly, within 1 - 2 days of the event, with the Loss Adjuster’s report being obtained within approximately 1 - 2 weeks. The maximum reporting delay is usually a few months, such as where claims are notified via quarterly bordereaux.

## **Settlement Delays**

While most material damage claims are settled quite quickly, delays can occur with some 10% or more of the ultimate claim cost still being unsettled after 3 years. Such delays are invariably caused by disputes over the amount of the claim or the liability; for example, in cases of suspected fraud or belief that the policyholders have failed to meet any obligations set out in the policy.

For business interruption cover delays of 2 to 3 years are not uncommon.

## **Claim Frequency**

The claim frequency varies by peril and so is affected by the underlying mix of perils in an insurer's portfolio. For the larger risks, the overall non-zero frequency will be quite low because of the large excesses that such risks will probably have.

## **Claim Severity**

The underlying claim distribution is highly skew as the majority of claims are fairly small, but there is an occasional extremely large claim resulting from a total loss. However, for this class of business, the underlying claim distribution for a single risk is dependent on the indemnity limit contained in the policy.

The gross of reinsurance claim distribution for an insurer as a whole will depend on any accumulations of risk that exist. For example, an insurer may insure a large proportion of commercial properties in a flood plain, or very close together so a number catch light in a major fire.

## **Selling**

Most risks are sold through brokers but some small risks are sold via affinity groups such as trade associations or via banks. Some brokers now obtain quotes for small risks via the Gilt Edge system, which is supported by a panel of Insurers including GAN, NIG, Iron Trades, ITT London and Edinburgh, UAP, AGF, CU and Cornhill.

Broker remuneration is usually on a commission basis although there has been a trend for the larger risks to be broked for a fixed fee as opposed to a percentage. Indeed, we have heard of a commission rate as high as 73%.

The type of product, however, does vary according to the risk's size:

**Small:** Sold as a ready made packaged product, covering other forms of insurance, such as Employers' Liability as well as the material damage aspect.

**Medium:** Sold as a “tailor made” product but again, would also cover other forms of insurance such as Employers’ Liability.

**Large:** Different policies (and indeed possibly even different companies), may be used to cover the separate elements of buildings, contents and business interruption. Indeed, for the very large risks, it is common for the buildings risk etc to be co-insured.

### **Premium Rating Issues**

As the value of stock held will vary throughout the year and will not be known in advance, it will be necessary to retrospectively adjust the premium paid to reflect the actual amount held. There is no standard way in the market to allow for inflation in policies. Escalator clauses and index-linked policies do exist, but so do other methods and, indeed, a great variety of methods may exist in a single company. Hence, offices need to determine the extent to which they want to be able to identify these within their computer systems. For index-linked buildings policies, some form of building cost inflation index would be used and, as the premium is often expressed as a percentage of the sum insured, this is inflation-linked in a similar way.

Difficulties arise in assessing the level of discount which should be given for various levels of excess. These problems are especially true for large cases and may be compounded if the excess required is to vary by peril for a risk, (eg £25K excess on flood, but £100K on fire), especially as, for example, a £25K excess on impact cover would wipe out the majority of the losses in most cases.

Additionally, there are problems in ascertaining the discount to be given depending on the type of excess applying - either “each and every loss” or “per event”. Further, the excess definition may vary year on year, complicating the premium rating process even more.

Many medium sized risks and the vast majority of large risks are multi-site, which poses problems when rating weather perils which are geographically dependent. This problem is compounded when considering global risks.

When rating individual risks which are large relative to the insurer’s capacity, underwriters need to consider accumulation of exposure by geographical location, by trade or occupation, and EML. It may mean that acceptance of the risk will necessitate the purchase of reinsurance cover and, hence, the availability of this on either a treaty or a facultative basis needs to be considered, together with the cost.

As stated above, there is a higher dependency on “soft” information obtained from surveys etc, for this class of business than for others. Obtaining this information costs

money and so the administration costs and, the acquisition costs in particular, tend to be proportionately higher for property insurance than for other classes of business.

There is also now the increased administration involved in dealing with terrorism cover: setting up the returns, collecting the premium, passing it on etc. This not only involves a lot of time (especially the auditing processes required), but also incurs extra acquisition costs.

### **Trends and Cycles**

Similarly to Motor above, there is currently significant over-capacity in the market which is causing downward pressure on prices. One would normally expect rates to start to rise in 1997, but recent mergers may keep rates depressed for a little longer as they reduce operating costs and, hence, cut rates.

### **Government & Legislative Impact**

The relatively short reporting and settlement delays associated with this class of business mean that the impact of retrospective legislation is minimal.

### **Current Social/Economic & Other Issues**

During a recession, property claims tend to be higher if there is a reduction in risk management expenditure, with less money being spent on security and maintenance, and an increased incidence of fraud. However, as claims are individually investigated, potential fraud is more easily identified than for personal lines.

There has been an increase in the number of large fires, which is currently causing concern. and causation is one of the issues being address by the Loss Prevention Council. Computer losses have been on the increase in recent years, with the £100K loss becoming more common. Over the past 2-3 years the average claim cost has risen quite dramatically, although it is settling down now, as computer chips are no longer in great shortage of supply and the market is now generally more security conscious.

Aggregation of weather peril losses is becoming a growing concern in the market, with more companies using geodemographic systems to identify potential problem areas where they have accumulations of risk.

## LIABILITY INSURANCE

### Definition

For the purposes of this paper, “liability” covers Employers’ Liability (EL) and Public Liability, including Products Liability (PL).

### Cover available:-

There is a legal requirement for every employer to purchase a specified minimum level of EL insurance, providing indemnity against claims from employees who suffer injury, illness or death as a result of their employer’s negligence. The current minimum level of cover is £2 million and this is the subject of a Government review.

Group companies purchase the same minimum cover as non-group companies. In 1994, reinsurers stopped providing unlimited reinsurance cover. Therefore, insurers started to limit cover and agreed to offer a maximum of £10m per occurrence for on-shore risks as standard.

There is no such legal requirement for public liability or products liability insurance and, hence, for these covers the policy wording and cover tends to be less standard than for EL. This can pose a significant risk for the insurer, in respect of exposures unidentified at the time of writing the policy, or the insured, in respect of “gaps” in the cover of which they are unaware.

The limits of indemnity tend to be fairly standard for the smaller risks, regardless of the underlying exposure.

While there may be common exclusions for both types of cover, EL can carry very few exclusions under the EL Act. Underwriters tend to rely on precise business descriptions in order to restrict cover to that intended. However, exclusions may be modified depending on the proposer and, hence, is potentially another area where gaps or unidentified exposures in the cover may arise.

The recent, albeit slight, trend to move from a “claims incurred” basis to a “claims made” basis for certain types of liability insurance also poses a number of difficulties such as gaps in insurance cover. For EL in the UK, opinion is divided as to whether such cover fulfils the employer’s legal insurance requirements,

Specific policies are available to cover individual identifiable exposures such as pollution cover.

## **Measure of Exposure**

It is generally accepted that no single measure of exposure fully reflects the real underlying exposure to risk for any liability insurance.

### ***Employers' Liability***

The almost universally accepted measure of exposure for this class is the total wage roll (sometimes provided split between clerical and manual). This has the advantages that it is readily available and verifiable, and also part of the damages paid for injury is related to employees' wages. However, arguably, at least part of the risk is the time for which employees are exposed to risk as measured by, for example, the number of hours worked. This could be used instead of, or in addition to, the traditional measure of wage roll although likely to prove difficult to obtain and verify.

### ***Public Liability***

For this class, there is no universal measure of exposure, with both wage roll and turn-over being used, neither of which are ideal. A premium based on turn over would be retrospectively adjusted and so, during a recession with reducing income, premiums would fall. However, in this scenario, it is likely that reducing turn-over would result in a small budget for general maintenance and security etc. (ie, poorer risk management) and, hence, potentially increasing claims costs.

### ***Products Liability***

Similar comments apply as under Public Liability above, with no ideal measure of exposure existing. The most commonly used measure is turnover although others are used. For example, turnover is not an ideal measure as a product which is quite cheap may give rise to a proportionately higher risk than an expensive product (eg a cheap, less well tested drug compared to a new radical, more expensive but very well researched and tested drug).

## **Risk Factors**

The risk factors differ between the different types of liability insurance, although there are significant overlaps in the data and information required. This enables the easy rating of small risks, often contained in a package policy covering Public, Products and Employers' Liability.

## **Rating Factors**

As indicated above, information on a wide variety of rating factors would be collected, examples of which are as follows:-

- Employer's trade or occupation (EL & PL)
- Location of employer's premises (EL & PL)
- Material & substances handled (EL & PL)

### *EL Only*

- Equipment and production
- Safety devices installed
- Availability of first aid and medical facilities

### *Products Only*

- Nature of the product (split by each?)
- Where the product is sold (in particular, North America or not)
- Material contents or ingredients of the product (any dangerous components?)
- How prone the product is to deterioration before and while in use

There are many others!

For all types of liability insurance, however, a certain amount of "soft" information is used, especially for the larger risks. This will be obtained from surveys of the premises and, hence, a general inspection of the working conditions and processes involved etc. Less tangible factors such as the Management's attitude to safety and risk management and the level of supervision and training of staff etc sometimes play an important part in determining the risk and, hence, the premium to be charged.

## **Claims**

Overall, liability insurance tends to be long-tailed.

### **Reporting Delays**

For EL insurance, claims can be divided into 2 broad categories - injuries and disease. Accident claims are invariably reported very quickly. However, claims relating to industrial disease are usually reported much more slowly as it may take many years for the disease to become apparent.

A similar phenomenon occurs for Products Liability insurance. Some incidents will be reported quickly, such as, for example, fire caused by faulty wiring, but others will take

years to be notified since it takes time before the condition is attributed to the correct cause, such as, for example, unwanted and serious side effects caused by drugs in certain circumstances.

### **Settlement Delays**

Settlement delays for all classes of liability insurance can be extremely extended - delays of over 10 years between notification and the final payment are not unknown. This is especially true for Product Liability claims relating to drug treatments where the settlement may even take decades. The causes for these delays are as follows:

- Time taken to establish liability
- Time taken after the claim is notified for the condition to stabilise
- Time taken, after the condition has stabilised, for an appropriate settlement value to be agreed, (during which time “payments on account” may be made).

Overall, liability classes of insurance suffer from the impact of **latent claims**. There was a certain amount of disagreement among the members of the working party as to exactly what a “latent claim” was - whether, for example, it included or excluded claims from illnesses now known about but for which all sources of the cause had not necessarily been identified such as industrial deafness. For example, the definition given in the actuarial education literature: *latent claims are deemed to be claims resulting from perils or causes of which the insurer is unaware at the time of writing a policy.*

### **Claim Frequency**

Claim frequency depends on the type of liability insurance.

For EL insurance, claim frequency will depend on the trade or occupation and the employer’s treatment of claims, for example, the employer may or may not report minor incidents to the insurer. Overall, the claim frequency per employee is very low, but, given the number of employees in the UK, the overall number of claims each year is still fairly high.

For Products Liability, claim frequency is usually very low but it is heavily exposed to high concentrations of risk, in that the occurrence of one claim may well be followed by hundreds of others.



## **Claim Severity**

For liability insurance, the claim distribution is very skew as most claims are likely to be for fairly small amounts, but there will also be the occasional extremely large claim. There are also a lot of nil claims.

For EL, many of the more common injuries and illnesses will be subject to a standard settlement agreed between the employer and the trade union. However, a claim for disabling injuries suffered by a young employee with good career prospects who will require constant long term care will be extremely high.

Products and Public Liability are also subject to extremely large claims, particularly, on the Products Liability side for pharmaceuticals.

It should be noted that the underlying claims distribution for a single liability risk is independent of the limit of indemnity in the policy, with claims potentially being settled for amounts far higher than this limit.

## **Selling**

Currently, practically all liability insurance is sold through brokers, with perhaps some of the larger risks going direct.

The small risks are often sold as a package and there are now many schemes on the market for such smaller risks where the broker has a certain amount of delegated underwriting authority. These arrangements are usually restricted in terms of allowable trades and occupations with standard terms and rates applying.

Over time, electronic trading will probably also have an impact on the small/medium liability insurance market and, hence, the more standard risks will involve little or no face to face negotiation.

## **Premium Rating**

As stated above, there are currently no major differences in the type of policy sold or cover offered by UK insurers for Employers' Liability. There are certain differences such as the territorial limits (eg England, Scotland and Wales only or the whole of the UK including Northern Ireland), but even then these are fairly standard.

However, this is not the case for either Public Liability or Products Liability, with the variation in cover and policy type being quite extensive. For example, Products

Liability policies may, on occasions, be extended to provide cover for contractual liability for products as well as the more general liability cover.

Another significant variation in cover which often occurs in practice is in terms of the limit of indemnity - such limits for Public Liability or Products Liability policies can be a **“per event”** basis or, alternatively, a **“per policy year”** basis.

Further, the policy may specify the territorial limits within which it applies. The implicit or, indeed, explicit inclusion of certain regions/countries in the cover such as, for example, North America is a significant variation in the level of cover compared to a policy which covers the UK alone.

For Public Liability policies, there is the additional problem of “working away” in that for certain trades/occupations, such as the construction industry, cover may need to be extended to indemnify the Policyholder against Public Liability claims for work carried out off the main business premises.

The risk and, hence, the experience under each of the above variations in cover is very different. Hence, extreme care must be taken to ensure that when pricing such a contract, heed is paid to the breadth of the policy wording and, hence, the true extent of the underlying exposure.

In order to rate liability policies, some reliance is placed on “soft information” obtained from surveys, business plans etc. Obtaining and digesting such reports takes time and, in some cases, money, which pushes up acquisition costs.

Underwriting losses are acceptable for liability classes of business as, given the long settlement delays associated with a lot of liability claims, investment income is significant.

However, it should be noted that, not only has there been a history of underwriting losses for EL but also of trading losses, predominantly because of the underestimation of the claims tail caused by latent claims.

Accumulation of risk also poses a problem when rating liability insurance. There is a large concentration of risk for many EL insurance risks as there will often be many employees in the same location. A major incident caused by the employer’s negligence may therefore result in hundreds of claims, (eg Piper Alpha). This can be even more true for Products Liability cover, where a single claim for a faulty product is likely to lead to hundreds and possibly even thousands of claims (eg Thalidomide).

Hence, for liability classes, there is a need to consider purchasing additional reinsurance cover especially for the larger risks where potential accumulation may be

high. This is also true where an insurer covers several employers in the same industry and, hence, will be highly exposed to a single latent cause, such as asbestosis, deafness etc.

Any extra costs for reinsurance need to be factored into the premium charged.

There is a current trend in the market for insureds to want higher limits of indemnity. However, at the same time, there is a move to greater self insurance of the more predictable small claims by higher excesses being taken. Indeed, for larger risks, there is a definite move towards the insured taking the risk for the attritional claims (ie so not pound-swapping), with only the large, unpredictable claims being insured.

### **Trends and Cycles**

As stated above, EL premium rates are depressed, even at the top of the insurance cycle caused by the long tail nature of the business.

Historically, the other classes of liability insurance (ie Public and Products Liability), have usually made good profits over the cycle. However, it is expected that competition will increase in these lines in the future, suppressing premium rates as for EL.

### **Government & Legislative Impact**

Since there are long settlement delays with liability claims in general, this class of business is particularly susceptible to retrospective legislation, to a much greater extent than Motor mentioned above. The expected overall impact of the recent changes to the rules regarding the Compensation Recovery Unit (CRU) and the potential impact of the possible changes to the Ogden tables on EL costs highlight this problem.

### **Current Social, Economic and Other Issues**

Liability claims generally show an increasing average claims cost. This is fuelled by more claim awareness and new latent diseases - as well as the effects of things such as the Ogden tables.

#### **Ogden**

The use of these tables, which were recommended by the Law Commission, would increase the claims costs on severe bodily injury cases by up to 20%-30%, mainly down to the assumption of index linked gilt returns of 2%-3%, rather than the

traditional equity/gilt assumption of around 4.5%. The Court of Appeal however reversed three settlements where these were used and judged that the pre-Ogden discount rates should apply. The cases are now being taken to the House of Lords. An acceptance of the lower discount rates would require sizeable reserve strengthening for the EL class in particular although it will also have an effect on motor reserves and reinsurance prices.

### **Compensation Recovery Unit**

The recent changes in DSS clawback regulations will result in the removal of the £2,500 de minimis limit and also restrict the extent of recovery of DSS from the claimants. The changes, which will come in force in October 1997, will have a significant effect on bodily injury costs and particularly impact EL claims. The additional annual cost to insurers have been estimated by Price Waterhouse at between £40m and £60m. As with Ogden, reserve strengthening would also be required.

### **NHS Costs**

In the July 1997 Budget, the new Labour Government clarified its intentions to tighten up the current rules and increase recoveries from insurers. The Law Commission proposes that the NHS costs from accidents be recouped from insurers but implementation costs have not been quantified, and could well prove substantial.

### **Environment Act 1995**

The most significant aspects are contained in Part II of the Act relating to contaminated land. Essentially, the Act provides for remediation notices to be issued, by the relevant authority, which will require the "appropriate persons" - the party causing the pollution, or the owner if guilty party cannot be found - to clean up the land. The concern from insurers' point of view will be whether coverage under past PL policies, before the recent changes in exclusion wordings, will expose them to huge liabilities. The hope will be that the English Courts will continue to interpret the "plain meanings" of the policy wordings and restrictions in cover, unlike in the US, which has resulted in some notable recent victories.

There is the general impression that the British public is becoming more likely to sue when hurt in any way, seeking to find somebody to blame for their misfortune. Taken to extremes, this attitude can result in extreme risk aversion among professionals who are becoming increasingly unwilling to provide any advice beyond what has been thoroughly tested. There needs to be a balance between "safety first" and progress; as the costs of such claims are passed back to consumers in increased prices, perhaps we will come to realise that there really, really is no free lunch.

## CAPTIVES

These are companies set up primarily to insure some or all of the risks of the industrial or commercial parent companies. Originally they were only set up for the larger firms, but the development of the captive market and "Rent-a-Captives" has enabled relatively small companies with only a few hundred thousand pounds of premium to use them.

Although they do not form part of the Company insurance market, in aggregate they carry a very significant amount of commercial risk and often interact with the company market.

There are various types, but the most common form is the Reinsurance captive. The premiums are normally paid by the client to a fronting insurance company, which then passes on to the captive the bulk of the premium, and with which it also reinsures a significant part of the risk. There is great variety in the details of how cover is provided, but usually there are limits to the overall and individual claim amounts, with the excesses being retained by the fronting insurer.

Another form of captive is the Direct captive where the underwriting and claims handling take place in house, thus further reducing the margin of the third party insurer and broker. This type has a particular advantage as under EU legislation it can underwrite any "large risk" across borders within the EU without establishing subsidiaries or funds in the operating states and this would be convenient to companies doing business in several member states.

In "Rent-a-Captives", one insurer underwrites the risk of several unrelated companies. This route avoids expensive start up costs and enables quick entry for relatively low management fees. It is normal for the risks and funds to be kept separate.

Most captives have been set up in offshore locations such as Bermuda and the Cayman Islands and, more recently, in Guernsey and the Isle of Man.

### Advantages of Captives

Their main triggers for establishing captives are to save paying the expenses and profit margins of insurers and the perception that insurance premiums involve paying for the losses of other, less well managed risks. Among the other advantages are:

- ▶ by benefiting directly from good risk management large organisations have an incentive better to understand and improve their risk management processes
- ▶ coverage can be developed through fund accumulation for risks which are difficult to purchase in the company market, such as gradual pollution, or which are regarded by the market as trade risks
- ▶ most captives are set up offshore where there are often tax benefits and reduced regulatory problems which can enhance income
- ▶ multi-national companies can co-ordinate coverage consistently between different locations

### Disadvantages of Captives

The disadvantages, compared to more traditional forms of insurance, will depend to some extent on the form of captive chosen and size of operation involved and include:

- ▶ for the smaller operations the administration costs together with volatility in claims may eventually result in ultimate costs being greater than through the conventional route
- ▶ the management time expended in operating the captive may not justify the savings involved and may distract risk managers from risk improvement which is what will generate the really significant savings
- ▶ the insurance market is often extremely competitive and the establishment of a captive may result in a loss of the opportunity to exploit the market cycle as there may be a tendency to channel funds to the captive
- ▶ for certain compulsory classes such as Employers' Liability there may be a conflict of interest as long term cover for employees could be dependent upon the continuation of existence of the captive where it operates on a direct basis
- ▶ at a group level, no risk transfer has taken place, only the establishment of a distinct fund

## History of Captives

The earliest UK captives were established as insurance companies in the 1920's and 1930's and operated on a co-insurance basis, mostly for property risks. Among these early captives were Blackfriars set up by Unilever & ICI. The point of real growth was in the US in the early 1950's when improving risk financing techniques led to parent companies setting up captives offshore to avoid complex domestic insurance legislation and high taxation.

Of the captives in existence today, which number over 3,000, around 60% have US parentage, with the UK the next largest with some 15%. The number of UK parented captives has grown dramatically in the last 10 years and the impact has been very significant. At the upper end of the market, around 90% of the top 100 UK companies now have captive involvement. It is estimated that through captives and other forms of self insurance, around 20% of the total commercial market premium has effectively been removed from the insurance industry.

## Supervisory Issues

In general, as corporate rather than individual policyholders have been involved, the focus of the parent companies Government's concern has been regarding the movement of funds overseas and the avoidance of tax on premiums or profits. A Budget change in 1995 required that "Controlled Foreign Companies" (captives) pay at least 90% of their profits as dividends rather than 50% previously. The profits are to be calculated using the rules of UK tax law rather than the more flexible arrangements which may prevail in the captive's location.

As regards solvency, it is common with reinsurance captives that in the event of failure the fronting insurer bears the ultimate costs. For the non liability classes the issues will be similar to those generally encountered in reinsurance security.

However, where the liabilities ultimately relate to cover to provide benefits to individuals, such as on third party motor and Employers' Liability (compulsory classes), it is particularly important for the insurer to be confident that the arrangements and funds in place will still prove adequate when the claims come to be paid. This is particularly relevant in the case of industrial disease where some of the claims may take 50 years to mature while the aggregate protection provided to the captive will generally be un-indexed. The complex nature of the contracts and essentially unregulated market make it especially difficult for the supervisor to determine whether sufficient net funds are held.